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LEVEL

TEMPERATURE

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Worldwide

Mercoid came into existence when a young independent inventor with an innovative switch design needed a manufacturer for his idea. He found an interested instrumentation manufacturer, The Federal Gauge Company of Chicago, Illinois, that had extensive Bourdon tube experience dating back to 1917. Mercoid's first control was a Bourdon tube pressure switch that was released in 1921. The switch with its ingenious design became an instant success and has lasted over eighty years through its evolution into the present D Series Pressure Control. The D Series is still the premier adjustable pressure switch on the market today.

The company was at the forefront of controls technology during the foundation of the heating and refrigeration industries, which drove expansions into temperature and level controls. Mercoid experienced continued success and was eventually acquired by Dwyer Instruments, of Michigan City, Indiana, in 1984. Dwyer created a new plant for Mercoid and moved the manufacturing from Chicago to Wolcott, Indiana.

Mercoid innovated mercury switches, which is where the namesake arrived. Today Mercoid is much more than mercury switches with almost all products being available with snap switches. Mercoid has continued the innovative spirit as it has expanded into many new products including level transmitters and digital pump controllers.

This catalog details all of the products manufactured by the Dwyer Instrument's family that are used by industrial and process industries for pressure, flow, level and temperature monitoring and control.

In addition to making and selling quality precision instruments, Dwyer is committed to a standard of customer service—including competitive prices and knowledgeable, courteous technical support—that generates and sustains long-term relationships.

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-continued on next page

Mercoid® Catalog Index

Index by Model

How Pressure Switches & Temperature Switches Work

Using This Guide

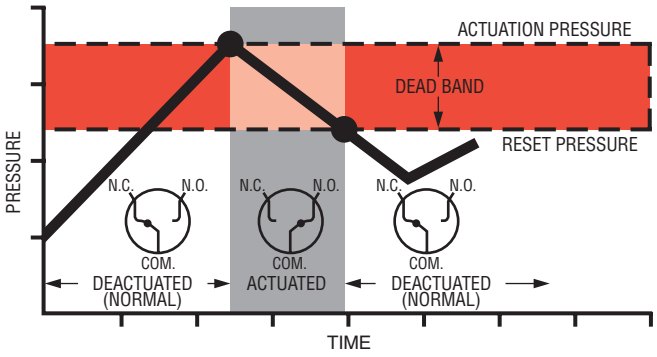
This introduction to Mercoid® pressure, and temperature switches contains information to assist the specifying engineer in selecting the proper switch for the application. A careful reading of this section will help specify a control that is not only best for the application, but also one that does not have unnecessary features or capability, (which reduces cost) and one that probably is available from stock, which speeds delivery. Mercoid® maintains a generous stock of the more widely used models suitable for most applications, specifying one of these "standard" models will benefit the customer. Even if ordering a replacement special control, a review of this guide is encouraged to see if a "standard" model is now appropriate. If necessary, Mercoid® offers a wide selection of special options to suit almost any application. Technical assistance is readily available from our headquarters or the nearest sales office.

What are they?

A pressure switch is a device which utilizes air, gas or liquid pressures which are higher than, or positive to, atmospheric pressure to actuate an electric switch at a preset actuation point. A vacuum switch performs the same function for pressures which are lower than, or negative to, atmospheric pressure. A differential pressure switch is a device which utilizes differential pressure to actuate an electric switch at a pre-set actuation point. This may be the difference between two positive or two negative pressure, one of each, or a positive and atmospheric or a negative and atmospheric pressure. A temperature switch merely substitutes "temperature" for "pressure" in the above descriptions. In all cases the electric switch thus actuated may be used to start or stop motors, fans or pumps, open or close valves, dampers or louvers, sound an alarm, light a warning signal, provide a computer input signal, etc.

The setpoint is that pressure or temperature (positive, negative, or differential) at which the electric switch operates and, in most Mercoid® controls, it is field adjustable by means of a visible calibrated scale. It is usual to consider that the control "actuates" at the pre-set level on increasing pressure or temperature and "deactuates" on decreasing pressure or temperature. ("Deadband" is the difference between the actuation and deactuation pressures or temperatures for a given setpoint.)

When a change in pressure or temperature occurs, causing the sensing element to move and actuate the switch, some of that pressure or temperature must be removed before the switch will reset for another cycle.



The deadband is the pressure or temperature that must be removed before the switch resets for another cycle after the setpoint has been reached and the switch actuated.

A deadband is inherent in a snap switch. It results from two things. The spring rate of the range spring at the chosen setpoint and the deactuation travel of the switch lever. Thus the deadband is different at each setpoint. When the setpoint is at the lowest end of the pressure switch range, (or the highest end of the filled system temperature switch range), the deadband is minimum. Conversely, when the setpoint is at the highest end of the pressure or lowest end of the temperature switch range, deadband is maximum.

For example: A pressure switch is set to actuate when an increasing pressure reaches 100 psi (6.9 bar). The pressure then begins to drop. The switch remains actuated, however, until the pressure drops to approximately 95 psi (6.6 bar). This difference of 5 psi (.35 bar) is the "deadband." It is the overlap or pressure difference between the setpoint at which the switch actuates and the point at which the switch resets when pressure drops.

In many applications it is desirable to be able to adjust the deadband to a value considerably greater than the minimum. Some pressure and temperature switches (such as Mercoid's model DA) allow this adjustment.

Most Mercoid® controls reset the electric switch automatically upon deactuation. However, some models are available with a manual reset feature which requires that an operator reset the switch by means of a push-button before it is again ready to actuate. This feature is usually specified for alarm applications where a problem must be corrected before the system is allowed to restart.

Note that all Mercoid® controls have a discrete range of setpoints that a particular model will cover. It is recommended that the control selected have an intended

actuation setpoint as close as possible to the middle of the total adjustment range. Also, the specifier should be sure the maximum operating or surge temperature or pressure does not exceed those ratings of the control selected.

Many Mercoid® controls are available with either snap-action or tilt-type mercury electric switches. In general, snap-action switches offer lower cost and are well-suited to most medium load, frequent cycle applications or for operating environments where mercury is not allowed, i.e., food processing. Mercury switches are highly reliable in harsh environments and in very low cycle or "dry circuit" applications where infrequent alarm testing is the usual reason for operation or the switch is providing a "no-current" computer input contact closure and the load cannot "self-clean" the contacts. Mercury switches usually provide for narrower deadbands. A magnetically-operated mercury switch is also available which provides an even narrower deadband but has a limited electrical load rating. It should be noted that mercury switch controls are sensitive to mounting position and shock or vibration applications.

Both snap-action and mercury switches are available with a variety of circuit configurations, i.e., SPST, SPDT, DPDT, DPST, two-stage, etc. However, specifiers should consider a SPDT circuit (one common, one normally open and one normally closed terminal) as standard. The SPDT circuit is supplied on most stocked Mercoid controls and allows the control to be used in either actuate or deactuate on increasing or decreasing pressure or temperature applications as well as accommodating changes from one to the other in the field.

How do they work?

When a change in pressure or temperature occurs, the sensing element in the control moves and transmits the resulting force to the electric switch. Sensing elements used in Mercoid® pressure controls include bourdon tubes, metal bellows and elastomer diaphragms. Bourdon tube or bellows motion is coupled to the control "movement," which transmits the motion to the electric switch only when the tube position corresponds to a pre-set actuation point. Actuation points are adjusted by moving pointers linked to the movement.

Diaphragm motion is resisted by a calibrated spring. This spring determines the range of pressure within which the diaphragm motion will actuate the electric switch. The actuation point is set by adjusting the compression or tension of the spring.

Temperature control sensing elements include filled systems and bi-metals. The filled system switches use a bulb filled with inert gas and connected by capillary tubing to a bourdon tube pressure switch. Changes in bulb temperature cause the gas inside the bulb to expand or contract. The resulting change in internal pressure is sensed by the pressure switch. Bi-metal systems use bi-metal sensors to directly actuate an electric switch. The bi-metals are usually formed into a spiral to increase the mechanical motion for small temperature changes.

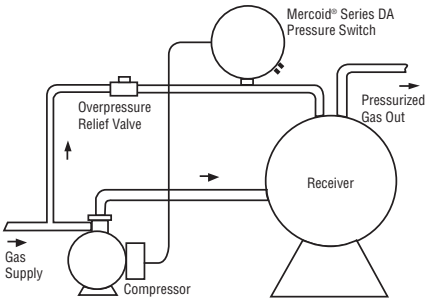
Bourdon tube controls provide good sensitivity over a broad range of pressures except at the very low end. Rated operating pressures and, therefore, maximum pressure ranges are limited by the strength of the bourdon tube. However, bourdon tubes can be fabricated from various metals to offer excellent media compatibility and, in the case of stainless steel, can be welded directly to the pressure connection to reduce the possibility of a leak in case of fire.

Diaphragm controls offer both very low and very high pressure ranges as well as lower cost but are limited in operating temperature. Care must be taken to insure the diaphragm elastomer material is compatible with the media involved. Since diaphragm area can be made large, very low pressures can be sensed and different pressures introduced on each side of the diaphragm to control differential pressure. However, a large diaphragm control is sensitive to mounting position and vibration. On very high pressure range controls, the diaphragm is essentially used as a seal and is backed up by a metal piston which operates the switch mechanism. Thus, with built-in motion stops, considerable over-pressures can be tolerated. These controls are also insensitive to mounting position and vibration.

Metal bellows provide good sensitivity, resistance to vibration and moderate cost, particularly in a differential pressure control. The metal bellows may also be compatible with media which cannot be used with elastomer diaphragms.

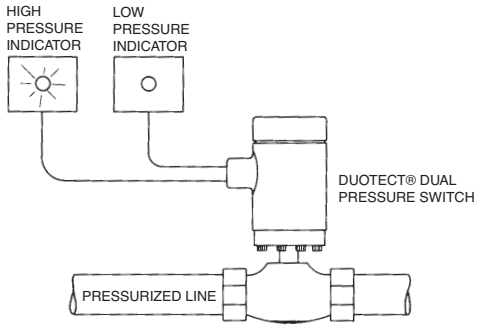
In temperature controls, selection is very similar to pressure controls. Filled systems are available with either bourdon tube or bellows sensing elements. Bi-metal controls are usually less expensive but may not be as sensitive. Material of the sensing element and other wetted parts must be compatible with the media to be controlled. If a sensing element is to be inserted in a pipe with high velocity liquid flow, a heavy duty protective well should be used to protect the element.

APPLICATIONS – How to use Mercoid Pressure controls!



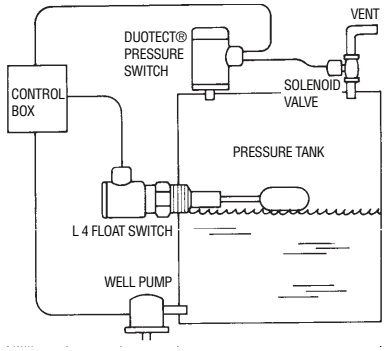
Mercoid® Series DA pressure switch maintains desired gas pressure in tank.

Demand for compressed gas varies in this gas line. So a Mercoid® Series DA adjustable deadband pressure switch is included to turn the compressor on at low pressure and off when the maximum pressure is reached.



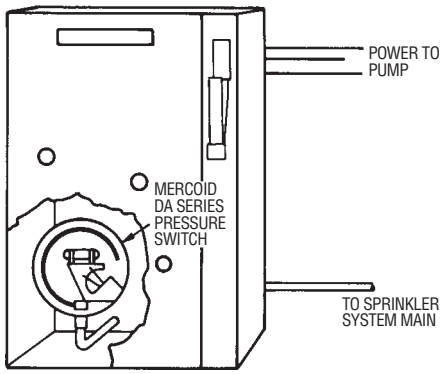
One diaphragm actuates two independent explosion-proof switches in Duotect® pressure switch to monitor pressure.

High pressure lines or systems for air, gases, or liquids can be monitored for proper pressure between desired limits with a Duotect® dual pressure switch. Independent low and high alarm or control points can be set from 5 to 1500 psig. With two individual switches operating from a common diaphragm, one Duotect® switch does the job. The high and low pressure indicators or alarms are activated only when the limits are exceeded; both are deactivated when the pressure is within the limits. The Duotect switch is explosion-proof and can be used with hazardous media or in explosive atmospheres.



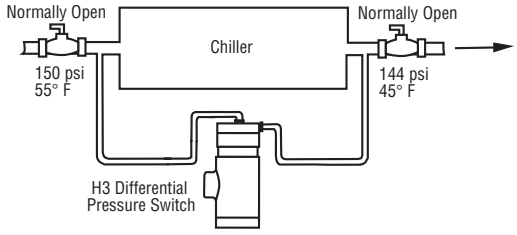
Switches control water level and tank pressure.

A hydro-pneumatic tank with a deep well pump maintains desired pressure in a water system. The pump, however, delivers entrained air along with makeup water, requiring periodic tank venting to prevent excess pressure buildup. As both water level and tank pressure must be maintained, one side of the W.E. Anderson® Duotect® pressure switch is interlocked with the Anderson L4 float switch via the control box. When tank pressure falls below the preset system pressure due to water drawdown, the Duotect® switch starts the pump and transfers control to the float switch. When the preset water level is reached, the float switch turns the pump off. If entrained air has increased the pressure beyond the limit set in the other side of the Duotect® pressure switch, after a time delay covering several normal cycles, the switch will open the solenoid valve and vent the tank down to proper pressures.



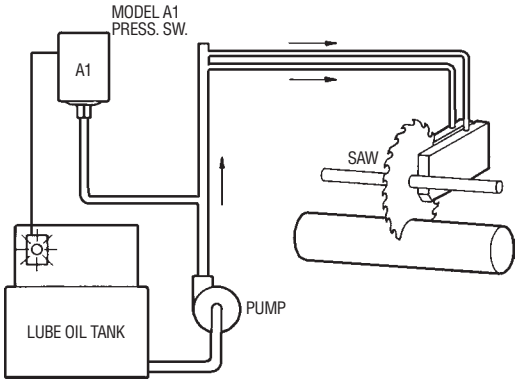
The Mercoid® DA Series is the industry standard pressure switch for fire pump controls.

Fire pump controls operate pumps which supply water to building fire sprinkler systems, turning on the main pumps when system pressure falls due to sprinkler heads being activated and turning on smaller make-up pumps to maintain system pressure which may fluctuate due to small leaks. These controls almost always employ the Mercoid® DA Series pressure switch due to its rugged design which provides high reliability over long periods of infrequent operation. The DA Series switch provides independent high and low setpoints over the entire pressure range of the switch to meet varying requirements from system to system. The low setpoint maintains minimum pressure required for proper system operation while the high setpoint prevents damage due to over-pressurization of the system.



W.E. Anderson® H3 explosion-proof differential pressure switch protects water chiller.

If ice builds up inside water chiller, or if tubes become restricted, differential pressure across chiller increases. Differential pressure switch Series H3 senses the increase and actuates an alarm. Switch is typically set between 10 and 20 psid.



Mercoid® model A1 pressure switch senses loss of lubricating oil to saw blade in saw mill and actuates an alarm.

Since only a small amount of oil is used, the sawdust can be recovered and used as a fuel. The pressure switch (A1) sounds an alarm if the oil pressure is lost, preventing severe damage to the saw blade.

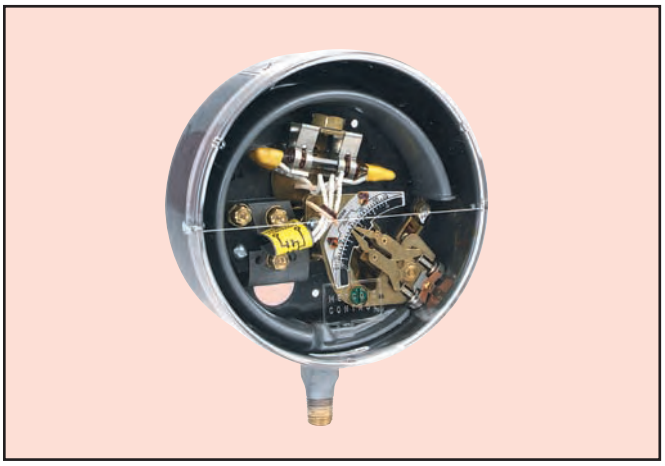
Mercoid®

Series D

Bourdon Tube Pressure Switches

Pressure Ranges to 8000 psi (551.6 bar)

CE UL SA FM APPROVED



Customers tell us that this is the best pressure switch made. The Mercoid® D Series is one of the world's broadest lines of pressure switches. Whatever your application might be, it is most probable it can be fully satisfied with a D Series pressure switch.

The D Series has extremely high sensitivity and great repeatability. The DA Models are equipped with two external adjustments, one for setting high pressure operating point, the other for setting low pressure operating point. Deadband, the difference between high and low setpoints, is adjustable over the full scale. The DS Models are equipped with a single external adjustment for setting operating point only. The deadband is fixed at a factory setting and cannot be altered in the field. For switches choose between the snap action switch, hermetically sealed snap action switch and hermetically sealed mercury switch.

FEATURES

- Visible calibrated dial
- On/off indication (except hermetically sealed snap switch models)
- Adjustable or fixed deadband
- SPDT snap-action, hermetically sealed snap action or hermetically sealed mercury switch
- External switch setpoint adjustments
- Minimum deadband is obtainable at any point in the range
- Pressure Ranges of full vacuum to 8000 psig.
- UL listed, CSA approved. Many models FM approved.
- General purpose, weatherproof or explosion-proof enclosures

SPECIFICATIONS

Wetted Materials: Brass, 403 SS, or 316 SS.
Temperature Limit: 180°F (82°C).
Pressure Limit: Maximum pressure of the operating range.
Enclosure Rating: General purpose, weatherproof or explosion-proof.
Repeatability: ±1% of full operating range, ±1.5% on DS-7300 models.
Switch Type: SPST mercury switch, SPDT mercury switch, SPDT snap switch, or SPDT hermetically sealed snap switch. Other circuit types available.
Electrical Rating: See model charts.
Electrical Connections: Screw terminal.
Conduit Connection: General purpose: 1/2″ hole for conduit hub. Weatherproof: 1/2″ conduit hub. Explosion-proof: 3/4″ female NPT.
Process Connection: General purpose and weatherproof: 1/4″ male NPT, 1/2″ male NPT on ranges 15S and 16S. Explosion-proof: 1/2″ male NPT and 1/4″ female NPT.
Mounting Orientation: Vertical.
Set Point Adjustment: Thumbscrew.
Weight: General purpose: 4 lb (1.8 kg), weatherproof: 6 lb (2.7 kg), explosion-proof: 8 lb (3.5 kg).
Deadband: See model chart.
Agency Approvals: CE, UL, CSA, FM (depending on model).

How to Order Mercoid® Series D Pressure Switches

Operating Requirements

D is the generic designation for the pressure switch series. The next letter following the D designates the function of the switch with regard to the type of deadband and operation. DA, for example, means a D series pressure switch that has an adjustable deadband with double adjustments and is fully automatic. See page 10 for more information.

Enclosures

A general purpose NEMA 1 enclosure is furnished as standard on all Series D pressure switches. Weatherproof and explosion-proof housings are optionally available and designated by adding a third character to the model number. DAW, for example, indicates a DA pressure switch with a weatherproof enclosure. See page 13 for more information.

Wetted Material

The D Series is available with Bourdon tubes constructed of brass, Type 403 stainless steel, and Type 316 stainless steel. Material is designated as part of the series type number with 3 corresponding to brass, 2 to 403 stainless steel, and 4 to 316 stainless steel. For example, DA-31, DA-7031, DS-7231, and DA-531 all have brass bourdon tubes. Shown in the left hand column of the sample model number charts on pages 11 and 12.

Switch Type and Action

Mercoid® Series D pressure switches are available with mercury or snap-action contacts. Snap-action switch models always start with the series type number of 7. For example, DA-7031 and DS-7231 are both snap switch models. Snap switches are availale in SPDT and DPDT while the mercury switches are available in SPST, SPDT, DPDT, and DPST. The switch code designates the type of contact and follows the series type number in the overall model number. For example, DA-7031-153 is a SPDT snap switch while DA-31-153 is a SPDT mercury switch. Contact rating should also be considered when choosing the contact type. Shown across the top of the columns of the sample model number charts on pages 11 and 12.

Operating Range

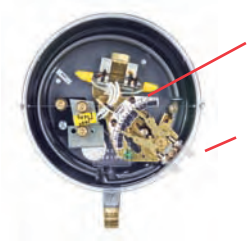
The last part of the Series D model number is the operating range number. Operation of the switch is adjustable within the limits of the shown operating range. The upper limit of the adjustable operating range is also the maximum pressure for the switch and should not be exceeded. For example, DAW-33-3-2 has range number 2, which is 0 to 30″ Hg vacuum. Shown in the second column of the sample model number charts on pages 11 and 12.

A complete model number chart is included on pages 16 and 17.

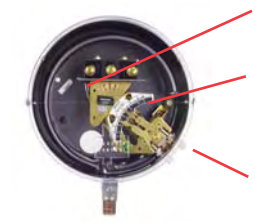
Mercoid® Series D Bourdon Tube Pressure Switches

Type DA

Adjustable Deadband, Fully Automatic, Double Adjustments



Mercury Switch

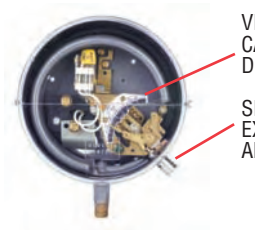


Snap-Action Switch Contact

Equipped with two external adjustments, one for setting *high* pressure operating point, the other for setting *low* pressure operating point. Deadband, or the difference between high and low setpoints, is adjustable over full scale. Mercoid's most popular operating mode, available on most Series D pressure and temperature controls.

Type DS

Fixed Deadband, Fully Automatic, Single Adjustment



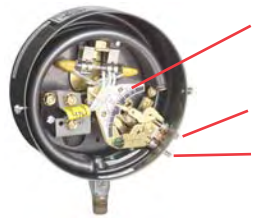
Mercury Switch

Snap-Action Switch Contact

Equipped with single adjustment for setting operating point only. A single pointer on scale sets pressure point at which switch action occurs. Fixed deadband is factory set and cannot be altered in the field. Available on series D-200, D-7200 and D-9200 only.

Type DR

Semi-Automatic, Manual Reset, Single Adjustment



Manual Reset

Equipped with a single adjustment for setting operating point to operate the circuit automatically upon a pressure increase or decrease. Pushbutton reset must be operated manually to restore the circuit to original position after automatic operation. Suffix "L," i.e. DR-31-153L denotes control will operate automatically on *increase*; suffix "U" denotes control will operate automatically on *decrease*.

Type DL

Semi-Automatic, Manual Lock Reset, Single Adjustment

Manual Lock Reset

Equipped with a single adjustment for setting operating point. Control will operate at setpoint only upon a *decrease* in pressure. Manual lock feature permits circuit to be reset and locked in position. Lock remains in effect until pressure rises above control setting. Lock then releases and circuit is held in reset position until further automatic operation upon pressure decrease.

Type D-400, DA-7400

Two-Stage, Fully Automatic, 2 Set Pts.

Provides two stage control by actuating one circuit upon a rise or fall in pressure and a second circuit on a further rise or fall. Each setpoint has a fixed deadband.

MODELS

D Series Pressure Switch with Mercury Switch and General Purpose Enclosure

Bourdon Tube Material	Adjustable Operating Range (psig)	Minimum Deadband (psig)	SPDT 4A @ 120 V 2A @ 240 V AC/DC	SPST Open on Increase 10A @ 120 V 5A @ 240 V AC/DC	SPST Close on Increase 10A @ 120 V 5A @ 240 V AC/DC	Minimum Deadband (psig)	SPST 5A @ 120 VAC 2A @ 240 VAC 2.5A @ 120 VDC 1A @ 240 VDC (Open on Increase)	SPST 5A @ 120 VAC 2A @ 240 VAC 2.5A @ 120 VDC 1A @ 240 VDC (Close on Increase)
	0-30˝ Hg Vac	2" Hg	**DA-31-153-2**	**DA-31-2-2**	**DA-31-3-2**	1˝ Hg	**DA-531-2-2**	**DA-531-3-2**
	10˝ Hg Vac - 12	1	**DA-31-153-3**	**DA-31-2-3**	**DA-31-3-3**	0.5	**DA-531-2-3**	**DA-531-3-3**
	25˝ Hg Vac - 50	3.5	**DA-31-153-27**	**DA-31-2-27**	**DA-31-3-27**	2	**DA-531-2-27**	**DA-531-3-27**
	1/8 – 15	1	**DA-31-153-1**	**DA-31-2-1**	**DA-31-3-1**	0.5	**DA-531-2-1**	**DA-531-3-1**
	1/8 – 20	1	**DA-31-153-3A**	**DA-31-2-3A**	**DA-31-3-3A**	0.5	**DA-531-2-3A**	**DA-531-3-3A**
Brass	1 – 35	1.75	**DA-31-153-4**	**DA-31-2-4**	**DA-31-3-4**	0.75	**DA-531-2-4**	**DA-531-3-4**
	2 – 60	3	**DA-31-153-5**	**DA-31-2-5**	**DA-31-3-5**	1	**DA-531-2-5**	**DA-531-3-5**
	5 – 100	3.75	**DA-31-153-6**	**DA-31-2-6**	**DA-31-3-6**	2	**DA-531-2-6**	**DA-531-3-6**
	5 – 150	6	**DA-31-153-7**	**DA-31-2-7**	**DA-31-3-7**	3	**DA-531-2-7**	**DA-531-3-7**
	10 – 200	8	**DA-31-153-8**	**DA-31-2-8**	**DA-31-3-8**	3.5	**DA-531-2-8**	**DA-531-3-8**
	10 – 300	12	**DA-31-153-9**	**DA-31-2-9**	**DA-31-3-9**	6	**DA-531-2-9**	**DA-531-3-9**
	30˝ Hg Vac – 60	6	**DA-21-153-25S**	**DA-21-2-25S**	**DA-21-3-25S**	3	**DA-521-2-25S**	**DA-521-3-25S**
	30˝ Hg Vac – 75	8	**DA-21-153-26S**	**DA-21-2-26S**	**DA-21-3-26S**	4	**DA-521-2-26S**	**DA-521-3-26S**
	2 – 60	4	**DA-21-153-5S**	**DA-21-2-5S**	**DA-21-3-5S**	2.5	**DA-521-2-5S**	**DA-521-3-5S**
	5 – 100	6	**DA-21-153-6S**	**DA-21-2-6S**	**DA-21-3-6S**	3	**DA-521-2-6S**	**DA-521-3-6S**
	10 – 200	8	**DA-21-153-8S**	**DA-21-2-8S**	**DA-21-3-8S**	4	**DA-521-2-8S**	**DA-521-3-8S**
403	10 – 300	14	**DA-21-153-9S**	**DA-21-2-9S**	**DA-21-3-9S**	7	**DA-521-2-9S**	**DA-521-3-9S**
Stainless	40 – 350	14	**DA-21-153-9AS**	**DA-21-2-9AS**	**DA-21-3-9AS**	7	**DA-521-2-9AS**	**DA-521-3-9AS**
Steel	25 – 600	25	**DA-21-153-10S**	**DA-21-2-10S**	**DA-21-3-10S**	15	**DA-521-2-10S**	**DA-521-3-10S**
	50 – 1000	60	**DA-21-153-11S**	**DA-21-2-11S**	**DA-21-3-11S**	40	**DA-521-2-11S**	**DA-521-3-11S**
	100 – 1500	90	**DA-21-153-12S**	**DA-21-2-12S**	**DA-21-3-12S**	50	**DA-521-2-12S**	**DA-521-3-12S**
	300 – 2500	150	**DA-21-153-13S**	**DA-21-2-13S**	**DA-21-3-13S**	100	**DA-521-2-13S**	**DA-521-3-13S**
	500 – 5000	450	**DA-21-153-15S**	**DA-21-2-15S**	**DA-21-3-15S**	200	**DA-521-2-15S**	**DA-521-3-15S**
	800 – 8000	750	**DA-21-153-16S**	**DA-21-2-16S**	**DA-21-3-16S**	400	**DA-521-2-16S**	**DA-521-3-16S**
	30˝ Hg Vac – 75	7	**DA-41-153-26E**	**DA-41-2-26E**	**DA-41-3-26E**	3.5	**DA-541-2-26E**	**DA-541-3-26E**
	5 – 75	3	**DA-41-153-23E**	**DA-41-2-23E**	**DA-41-3-23E**	2	**DA-541-2-23E**	**DA-541-3-23E**
	10 –100	7	**DA-41-153-6E**	**DA-41-2-6E**	**DA-41-3-6E**	3.5	**DA-541-2-6E**	**DA-541-3-6E**
316	10 – 150	6	**DA-41-153-24E**	**DA-41-2-24E**	**DA-41-3-24E**	3	**DA-541-2-24E**	**DA-541-3-24E**
Stainless	10 – 300	18	**DA-41-153-9E**	**DA-41-2-9E**	**DA-41-3-9E**	5	**DA-541-2-9E**	**DA-541-3-9E**
Steel	30 – 400	30	**DA-41-153-21E**	**DA-41-2-21E**	**DA-41-3-21E**	15	**DA-541-2-21E**	**DA-541-3-21E**
	75 – 800	75	**DA-41-153-22E**	**DA-41-2-22E**	**DA-41-3-22E**	35	**DA-541-2-22E**	**DA-541-3-22E**
	100 – 1000	100	**DA-41-153-11E**	**DA-41-2-11E**	**DA-41-3-11E**	45	**DA-541-2-11E**	**DA-541-3-11E**
	200 - 2500	210	**DA-41-153-13E**	**DA-41-2-13E**	**DA-41-3-13E**	110	**DA-541-2-13E**	**DA-541-3-13E**

D Series Pressure Switch with Snap Action Switch and General Purpose Enclosure

		Adjustable Deadband SPDT: 15A @ 120/240 VAC		Fixed Deadband SPDT: 15A @ 120/240 AC		Hermetically Sealed, Fixed Deadband SPDT: 5A @ 120/240 VAC, 5A res. @ 30 VDC	
Bourdon Tuberial Material	Adjustable Operating Range (psig)	Minimum Deadband (psig)	Model Number	Fixed Deadband (psig)	Model Number	Fixed Deadband (psig)	Model Number
	0-30˝ Hg Vac	9˝ Hg	**DA-7031-153-2**	3˝ Hg	**DS-7231-153-2**	5˝ Hg	**DS-7331-153-2**
	10˝ Hg Vac - 12	4	**DA-7031-153-3**	1.5	**DS-7231-153-3**	3	**DS-7331-153-3**
	25˝ Hg Vac - 50	8	**DA-7031-153-27**	2.5	**DS-7231-153-27**	3.75	**DS-7331-153-27**
	1/8 – 15	4	**DA-7031-153-1**	1.5	**DS-7231-153-1**	3	**DS-7331-153-1**
	1/8 – 20	4	**DA-7031-153-3A**	1.5	**DS-7231-153-3A**	3	**DS-7331-153-3A**
Brass	1 – 35	5	**DA-7031-153-4**	1.5	**DS-7231-153-4**	3	**DS-7331-153-4**
	2 – 60	6	**DA-7031-153-5**	2	**DS-7231-153-5**	3	**DS-7331-153-5**
	5 – 100	9	**DA-7031-153-6**	2.5	**DS-7231-153-6**	3.75	**DS-7331-153-6**
	5 – 150	16	**DA-7031-153-7**	3	**DS-7231-153-7**	5.25	**DS-7331-153-7**
	10 – 200	16	**DA-7031-153-8**	4	**DS-7231-153-8**	6.75	**DS-7331-153-8**
	10 – 300	25	**DA-7031-153-9**	5	**DS-7231-153-9**	9	**DS-7331-153-9**
	30˝ Hg Vac – 60	12	**DA-7021-153-25S**	3.5	**DS-7221-153-25S**	5.25	**DS-7321-153-25S**
	30˝ Hg Vac – 75	15	**DA-7021-153-26S**	3.5	**DS-7221-153-26S**	5.25	**DS-7321-153-26S**
	2 – 60	9	**DA-7021-153-5S**	3	**DS-7221-153-5S**	4.5	**DS-7321-153-5S**
	5 – 100	13	**DA-7021-153-6S**	3.5	**DS-7221-153-6S**	5.25	**DS-7321-153-6S**
403	10 – 200	15	**DA-7021-153-8S**	4	**DS-7221-153-8S**	7.125	**DS-7321-153-8S**
Stainless	10 – 300	19	**DA-7021-153-9S**	6	**DS-7221-153-9S**	10.5	**DS-7321-153-9S**
Steel	40 – 350	20	**DA-7021-153-9AS**	6	**DS-7221-153-9AS**	10.5	**DS-7321-153-9AS**
	25 – 600	45	**DA-7021-153-10S**	10	**DS-7221-153-10S**	18	**DS-7321-153-10S**
	50 – 1000	95	**DA-7021-153-11S**	20	**DS-7221-153-11S**	33	**DS-7321-153-11S**
	100 – 1500	130	**DA-7021-153-12S**	30	**DS-7221-153-12S**	52.5	**DS-7321-153-12S**
	300 – 2500	260	**DA-7021-153-13S**	60	**DS-7221-153-13S**	90	**DS-7321-153-13S**
	500 – 5000	900	**DA-7021-153-15S**	200	**DS-7221-153-15S**	300	**DS-7321-153-15S**
	800 – 8000	1500	**DA-7021-153-16S**	500	**DS-7221-153-16S**		
	30˝ Hg Vac – 75	10	**DA-7041-153-26E**	3.5	**DS-7241-153-26E**	5.25	**DS-7341-153-26E**
	5 – 75	8	**DA-7041-153-23E**	4	**DS-7241-153-23E**	6	**DS-7341-153-23E**
316	10 –100	10	**DA-7041-153-6E**	3.5	**DS-7241-153-6E**	5.25	**DS-7341-153-6E**
Stainless	10 – 150	11	**DA-7041-153-24E**	4	**DS-7241-153-24E**	6.75	**DS-7341-153-24E**
Steel	10 – 300	28	**DA-7041-153-9E**	8	**DS-7241-153-9E**	12	**DS-7341-153-9E**
	30 – 400	52	**DA-7041-153-21E**	10	**DS-7241-153-21E**	18	**DS-7341-153-21E**
	75 – 800	120	**DA-7041-153-22E**	25	**DS-7241-153-22E**	37.5	**DS-7341-153-22E**
	100 – 1000	190	**DA-7041-153-11E**	35	**DS-7241-153-11E**	52.5	**DS-7341-153-11E**
	200 - 2500	400	**DA-7041-153-13E**	75	**DS-7241-153-13E**	112.5	**DS-7341-153-13E**

MODELS

D Series Pressure Switch with Mercury Switch and Weatherproof Enclosure

Bourdon Tube Material	Adjustable Operating Range (psig)	Adjustable Deadband: Minimum Deadband (psig)	Adjustable Deadband: SPDT 4A @ 120 V 2A @ 240 V AC/DC	Adjustable Deadband: SPST Open on Increase 10A @ 120 V 5A @ 240 V AC/DC	Adjustable Deadband: SPST Close on Increase 10A @ 120 V 5A @ 240 V AC/DC	Minimum Deadband (psig)	SPST Open on Increase 5A @ 120 VAC 2A @ 240 VAC 2.5A @ 120 VDC 1A @ 240 VDC	SPST Close on Increase 5A @ 120 VAC 2A @ 240 VAC 2.5A @ 120 VDC 1A @ 240 VDC
Brass	0-30˝ Hg Vac	2˝ Hg	**DAW-33-153-2**	**DAW-33-2-2**	**DAW-33-3-2**	1˝ Hg	**DAW-533-2-2**	**DAW-533-3-2**
	10˝ Hg Vac - 12	1	**DAW-33-153-3**	**DAW-33-2-3**	**DAW-33-3-3**	0.5	**DAW-533-2-3**	**DAW-533-3-3**
	25˝ Hg Vac - 50	3.5	**DAW-33-153-27**	**DAW-33-2-27**	**DAW-33-3-27**	2	**DAW-533-2-27**	**DAW-533-3-27**
	1/8 – 15	1	**DAW-33-153-1**	**DAW-33-2-1**	**DAW-33-3-1**	0.5	**DAW-533-2-1**	**DAW-533-3-1**
	1/8 – 20	1	**DAW-33-153-3A**	**DAW-33-2-3A**	**DAW-33-3-3A**	0.5	**DAW-533-2-3A**	**DAW-533-3-3A**
	1 – 35	1.75	**DAW-33-153-4**	**DAW-33-2-4**	**DAW-33-3-4**	0.75	**DAW-533-2-4**	**DAW-533-3-4**
	2 – 60	3	**DAW-33-153-5**	**DAW-33-2-5**	**DAW-33-3-5**	1	**DAW-533-2-5**	**DAW-533-3-5**
	5 – 100	3.75	**DAW-33-153-6**	**DAW-33-2-6**	**DAW-33-3-6**	2	**DAW-533-2-6**	**DAW-533-3-6**
	5 – 150	6	**DAW-33-153-7**	**DAW-33-2-7**	**DAW-33-3-7**	3	**DAW-533-2-7**	**DAW-533-3-7**
	10 – 200	8	**DAW-33-153-8**	**DAW-33-2-8**	**DAW-33-3-8**	3.5	**DAW-533-2-8**	**DAW-533-3-8**
	10 – 300	12	**DAW-33-153-9**	**DAW-33-2-9**	**DAW-33-3-9**	6	**DAW-533-2-9**	**DAW-533-3-9**
403 Stainless Steel	30˝ Hg Vac – 60	6	**DAW-23-153-25S**	**DAW-23-2-25S**	**DAW-23-3-25S**	3	**DAW-523-2-25S**	**DAW-523-3-25S**
	30˝ Hg Vac – 75	8	**DAW-23-153-26S**	**DAW-23-2-26S**	**DAW-23-3-26S**	4	**DAW-523-2-26S**	**DAW-523-3-26S**
	2 – 60	4	**DAW-23-153-5S**	**DAW-23-2-5S**	**DAW-23-3-5S**	2.5	**DAW-523-2-5S**	**DAW-523-3-5S**
	5 – 100	6	**DAW-23-153-6S**	**DAW-23-2-6S**	**DAW-23-3-6S**	3	**DAW-523-2-6S**	**DAW-523-3-6S**
	10 – 200	8	**DAW-23-153-8S**	**DAW-23-2-8S**	**DAW-23-3-8S**	4	**DAW-523-2-8S**	**DAW-523-3-8S**
	10 – 300	14	**DAW-23-153-9S**	**DAW-23-2-9S**	**DAW-23-3-9S**	7	**DAW-523-2-9S**	**DAW-523-3-9S**
	40 – 350	14	**DAW-23-153-9AS**	**DAW-23-2-9AS**	**DAW-23-3-9AS**	7	**DAW-523-2-9AS**	**DAW-523-3-9AS**
	25 – 600	25	**DAW-23-153-10S**	**DAW-23-2-10S**	**DAW-23-3-10S**	15	**DAW-523-2-10S**	**DAW-523-3-10S**
	50 – 1000	60	**DAW-23-153-11S**	**DAW-23-2-11S**	**DAW-23-3-11S**	40	**DAW-523-2-11S**	**DAW-523-3-11S**
	100 – 1500	90	**DAW-23-153-12S**	**DAW-23-2-12S**	**DAW-23-3-12S**	50	**DAW-523-2-12S**	**DAW-523-3-12S**
	300 – 2500	150	**DAW-23-153-13S**	**DAW-23-2-13S**	**DAW-23-3-13S**	100	**DAW-523-2-13S**	**DAW-523-3-13S**
	500 – 5000	450	**DAW-23-153-15S**	**DAW-23-2-15S**	**DAW-23-3-15S**	200	**DAW-523-2-15S**	**DAW-523-3-15S**
	800 – 8000	750	**DAW-23-153-16S**	**DAW-23-2-16S**	**DAW-23-3-16S**	400	**DAW-523-2-16S**	**DAW-523-3-16S**
316 Stainless Steel	30˝ Hg Vac – 75	7	**DAW-43-153-26E**	**DAW-43-2-26E**	**DAW-43-3-26E**	3.5	**DAW-543-2-26E**	**DAW-543-3-26E**
	5 – 75	3	**DAW-43-153-23E**	**DAW-43-2-23E**	**DAW-43-3-23E**	2	**DAW-543-2-23E**	**DAW-543-3-23E**
	10 –100	7	**DAW-43-153-6E**	**DAW-43-2-6E**	**DAW-43-3-6E**	3.5	**DAW-543-2-6E**	**DAW-543-3-6E**
	10 – 150	6	**DAW-43-153-24E**	**DAW-43-2-24E**	**DAW-43-3-24E**	3	**DAW-543-2-24E**	**DAW-543-3-24E**
	10 – 300	18	**DAW-43-153-9E**	**DAW-43-2-9E**	**DAW-43-3-9E**	5	**DAW-543-2-9E**	**DAW-543-3-9E**
	30 – 400	30	**DAW-43-153-21E**	**DAW-43-2-21E**	**DAW-43-3-21E**	15	**DAW-543-2-21E**	**DAW-543-3-21E**
	75 – 800	75	**DAW-43-153-22E**	**DAW-43-2-22E**	**DAW-43-3-22E**	35	**DAW-543-2-22E**	**DAW-543-3-22E**
	100 – 1000	100	**DAW-43-153-11E**	**DAW-43-2-11E**	**DAW-43-3-11E**	45	**DAW-543-2-11E**	**DAW-543-3-11E**
	200 - 2500	210	**DAW-43-153-13E**	**DAW-43-2-13E**	**DAW-43-3-13E**	110	**DAW-543-2-13E**	**DAW-543-3-13E**

D Series Pressure Switch with Snap Action Switch and Weatherproof Enclosure

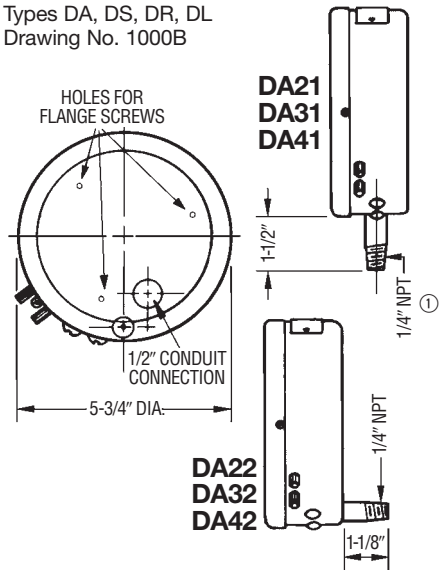
Bourdon Tube Material	Adjustable Operating Range (psig)	Adjustable Deadband SPDT: 15A @ 120/240 VAC: Minimum Deadband (psig)	Adjustable Deadband SPDT: 15A @ 120/240 VAC: Model Number	Fixed Deadband SPDT: 15A @ 120/240 VAC: Fixed Deadband (psig)	Fixed Deadband SPDT: 15A @ 120/240 VAC: Model Number	Hermetically Sealed, Fixed Deadband SPDT: 5A @ 120/240 VAC, 5A res.@30 VDC: Fixed Deadband (psig)	Hermetically Sealed, Fixed Deadband SPDT: 5A @ 120/240 VAC, 5A res.@30 VDC: Model Number
Brass	0-30˝ Hg Vac	9˝ Hg	**DAW-7033-153-2**	3˝ Hg	**DSW-7233-153-2**	5˝ Hg	**DSW-7333-153-2**
	10˝ Hg Vac - 12	4	**DAW-7033-153-3**	1.5	**DSW-7233-153-3**	3	**DSW-7333-153-3**
	25˝ Hg Vac - 50	8	**DAW-7033-153-27**	2.5	**DSW-7233-153-27**	3.75	**DSW-7333-153-27**
	1/8 – 15	4	**DAW-7033-153-1**	1.5	**DSW-7233-153-1**	3	**DSW-7333-153-1**
	1/8 – 20	4	**DAW-7033-153-3A**	1.5	**DSW-7233-153-3A**	3	**DSW-7333-153-3A**
	1 – 35	5	**DAW-7033-153-4**	1.5	**DSW-7233-153-4**	3	**DSW-7333-153-4**
	2 – 60	6	**DAW-7033-153-5**	2	**DSW-7233-153-5**	3	**DSW-7333-153-5**
	5 – 100	9	**DAW-7033-153-6**	2.5	**DSW-7233-153-6**	3.75	**DSW-7333-153-6**
	5 – 150	16	**DAW-7033-153-7**	3	**DSW-7233-153-7**	5.25	**DSW-7333-153-7**
	10 – 200	16	**DAW-7033-153-8**	4	**DSW-7233-153-8**	6.75	**DSW-7333-153-8**
	10 – 300	25	**DAW-7033-153-9**	5	**DSW-7233-153-9**	9	**DSW-7333-153-9**
403 Stainless Steel	30˝ Hg Vac – 60	12	**DAW-7023-153-25S**	3.5	**DSW-7223-153-25S**	5.25	**DSW-7323-153-25S**
	30˝ Hg Vac – 75	15	**DAW-7023-153-26S**	3.5	**DSW-7223-153-26S**	5.25	**DSW-7323-153-26S**
	2 – 60	9	**DAW-7023-153-5S**	3	**DSW-7223-153-5S**	4.5	**DSW-7323-153-5S**
	5 – 100	13	**DAW-7023-153-6S**	3.5	**DSW-7223-153-6S**	5.25	**DSW-7323-153-6S**
	10 – 200	15	**DAW-7023-153-8S**	4	**DSW-7223-153-8S**	7.125	**DSW-7323-153-8S**
	10 – 300	19	**DAW-7023-153-9S**	6	**DSW-7223-153-9S**	10.5	**DSW-7323-153-9S**
	40 – 350	20	**DAW-7023-153-9AS**	6	**DSW-7223-153-9AS**	10.5	**DSW-7323-153-9AS**
	25 – 600	45	**DAW-7023-153-10S**	10	**DSW-7223-153-10S**	18	**DSW-7323-153-10S**
	50 – 1000	95	**DAW-7023-153-11S**	20	**DSW-7223-153-11S**	33	**DSW-7323-153-11S**
	100 – 1500	130	**DAW-7023-153-12S**	30	**DSW-7223-153-12S**	52.5	**DSW-7323-153-12S**
	300 – 2500	260	**DAW-7023-153-13S**	60	**DSW-7223-153-13S**	90	**DSW-7323-153-13S**
	500 – 5000	900	**DAW-7023-153-15S**	200	**DSW-7223-153-15S**	300	**DSW-7323-153-15S**
	800 – 8000	1500	**DAW-7023-153-16S**	500	**DSW-7223-153-16S**		
316 Stainless Steel	30˝ Hg Vac – 75	10	**DAW-7043-153-26E**	3.5	**DSW-7243-153-26E**	5.25	**DSW-7343-153-26E**
	5 – 75	8	**DAW-7043-153-23E**	4	**DSW-7243-153-23E**	6	**DSW-7343-153-23E**
	10 –100	10	**DAW-7043-153-6E**	3.5	**DSW-7243-153-6E**	5.25	**DSW-7343-153-6E**
	10 – 150	11	**DAW-7043-153-24E**	4	**DSW-7243-153-24E**	6.75	**DSW-7343-153-24E**
	10 – 300	28	**DAW-7043-153-9E**	8	**DSW-7243-153-9E**	12	**DSW-7343-153-9E**
	30 – 400	52	**DAW-7043-153-21E**	10	**DSW-7243-153-21E**	18	**DSW-7343-153-21E**
	75 – 800	120	**DAW-7043-153-22E**	25	**DSW-7243-153-22E**	37.5	**DSW-7343-153-22E**
	100 – 1000	190	**DAW-7043-153-11E**	35	**DSW-7243-153-11E**	52.5	**DSW-7343-153-11E**
	200 - 2500	400	**DAW-7043-153-13E**	75	**DSW-7243-153-13E**	112.5	**DSW-7343-153-13E**

Mercoid® Series D

Bourdon Tube Pressure Switches — Control Dimensions & Enclosures

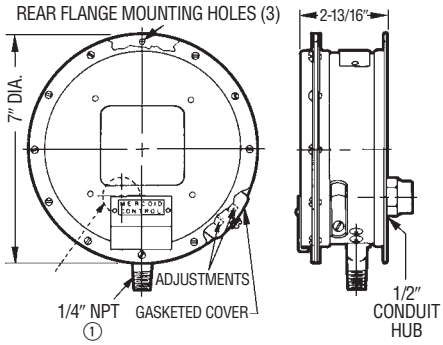
General Purpose

Types DA, DS, DR, DL
Drawing No. 1000B



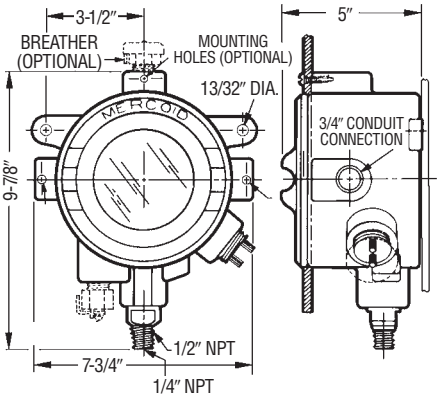
Weatherproof

Types DAW, DSW, DRW
Drawing No. 1062



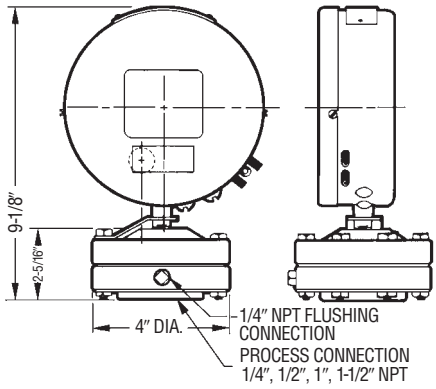
Explosion-Proof

Types DAH, DRH, DSH
Drawing No. 1350



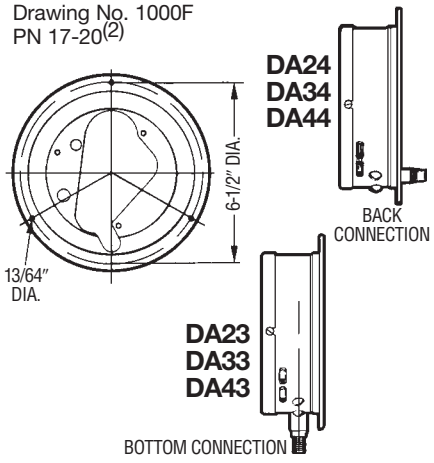
Diaphragm Seal

Types MSAG
Drawing No. 2305



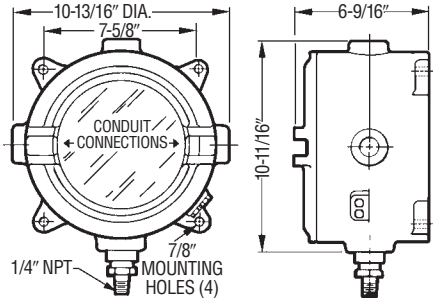
Flange for Surface Mounting

Drawing No. 1000F
PN 17-20(2)



Explosion-Proof

Types DAE, DRE, DSE
Drawing No. 98D



(1.) 1/2″ NPT Connection for ranges 15S, 16S

(2.) Use PN 17-31 for ranges 15S, 16S

General Purpose

NEMA 1 Enclosure

For indoor use and other general purpose applications under normal atmospheric conditions. Provides protection against dust and light splashing. Heavy gauge plain steel case. Flanged case available. Transparent cover for visible on-off operation. Locking device prevents tampering. Pressure connection, 1/4″ NPT. Electrical connection back of case for 1/2″ conduit or BX. Shipping wt. 4 lb (1.8 kg). See above for dimensions. *Furnished as standard unless otherwise specified.*

Watertight, Dust-tight/ Type W

NEMA 3S, 4, & 4X Enclosure

For outdoor or indoor applications. Complies with hose test and requirements for watertight, dust-tight, drip-tight weatherproof, weather-resistant, splash-proof, sleet-proof, and moisture-resistant. Flanged, heavy gauge steel case with transparent cover for visible on-off operation. External adjustments protected by cover. Bottom pressure connection. 1/4″ NPT. Electrical connection back of case for 1/2″ conduit, removable 1/2″ hub. Shipping wt. 6 lb (2.7 kg). See above for dimensions. *Optional, add "W" to prefix, i.e. DAW, DRW, DSW, when ordering.*

Explosion-Proof Type H

Hazardous Area Enclosure suitable for Class I, Groups C & D, Class II, Groups E, F & G; NEMA 7 & 9 applications. Control mechanism is an integral part of enclosure and cannot be replaced in the field. For surface, panel or pipe mounting. Aluminum case with glass window in cover for visible on-off operation. Bottom pressure connection, 1/2″ male NPT × 1/4″ female NPT. External adjustments. Available with breather and drain. Shipping wt. 8 lbs. (3.6 kg.). See above for dimensions. Optional housing, to order add "H" to prefix. Example: DAH, DRH, or DSH. Not available on D80 Series.

NOTE: Standard general purpose NEMA 1 and NEMA 4 enclosures are suitable for Class I, Division 2 applications with addition of conduit hub (mercury switch models only).

Mercoid® Series D Options and Accessories

Mounting Flange For Surface Mounting (Field Installation)

For DA, DAF, DS, DSF, DR, DRF and DL controls only. May be ordered separately for field installation.

Part No. 17-26
(except on 15S, 16S)
Part No. 17-31
(for range 15S, 16S only)

Mounting Bracket

For use with standard NEMA 1 enclosure general purpose controls only: Series DA, DAF, DS, DSF, DR, DRF, DL. Note: *not* adaptable for Range 15S and 16S.
Part No. 33-25

Conduit Hub

For 1/2″ rigid conduit. Mercury switch type controls with standard general purpose NEMA-1 or optional weather-resistant NEMA-3 or NEMA-4 enclosures are suitable for Class 1, Div. 2 applications when ordered with this hub. Available for DA Series.
Part No. 42-413

Remote Connections

Part No. 49-62HP – 6 ft. copper remote connection, 2500 psig max.

Part No. 49-210 – 12 ft. 316 s.s. connection with 303 s.s. fittings, 3000 psig max.

Breathers & Drains

For Class I, Groups C, D and Class II, Groups E, F, G (water only). Mercoid S.S. drains are flame-tight, but not watertight which permits water to escape continuously.

Mercoid S.S. breathers include a water shedding cap and provide effective case ventilation.

For Series DAH, DAHF, DRH, DRHF, DSH, DSHF.
Part No. 42-274 – Standard drain.

Part No. 42-276 – Standard breather.

For Series DAE, DRE.
Part No. 42-275 – Drain with 1/4″ connection.
***Part No. 42-276** – Standard breather with 1/2″ connection.
***Part No. 42-279** – Reducer (3/4″ to 1/2″) for breather.

*Breather and reducer must be ordered together.

Pigtail Siphon

Recommended for steam applications 35 psig or higher. For Series D-30, D-530, D-230, D-7030, D-7230 pressure controls. Please specify.

Part No. 42-58 2000 psig max.

Miscellaneous

Oxygen & Acetylene Service
Spec. 23444

Fungus Proof
Spec. 23720

FM Approval –
DAF, DRF, DSF

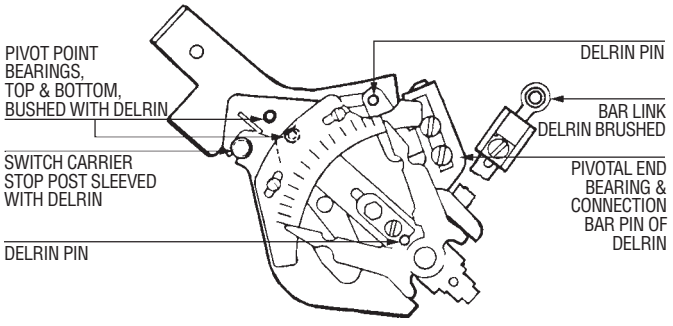
Factory Mutual Approved Series D Pressure Switches

FM APPROVED

Cover Over External Adjustments

Acetal Bushed Movement "B"

*Registered Trademark of E.I. DuPont de Nemours & Co.



Provides longer service life for Series D pressure and temperature controls. Vibration and pulsation are the prime causes of control wear. Almost all types of vibration will have some effect on the life and continued accuracy of controls.

To offset the wearing of metal surfaces found in bearings and pivot points, the control mechanism is designed to incorporate Acetal bushed movements at each possible wear point. Also for environments where corrosion may be a factor.

Add Letter B After Type and Suffix Nos. Example: DS-221-2B, DA-31-3B, DAH-41-3B.

Series D-900

Bourdon Tube Pressure Switches — Over-Pressure Diaphragm Controls

OPERATING RANGES

Brass Bourdon Tube, with Mercury Switch

RANGE NO. Adjustable Operating Range (psig)		MIN. DEADBAND (psig)		FIXED DEADBAND
		DA-931	DA-9531	DS-9231
3	10″ Hg. Vac. 12 PSIG*	1.5	0.75	3 oz.
1	1-14	1.5	0.75	3 oz.
4	1-35	3.5	1.5	7 oz.

*Operation not recommended for processes that do not go below 0 PSIG.

Steel Bourdon Tube, with Mercury Switch

RANGE NO. Adjustable Operating Range (psig)		MIN. DEADBAND (psig)		FIXED DEADBAND
		DA-921	DA-9521	DS-9221
5S	2-60	4	2	7 oz.
6S	5-100	6	3	12 oz.
8S	10-200	8	4	12 oz.
9S	20-300	14	7	1 psig
10S	50-600	50	25	2.5 psig
11S	75-1000	75	40	10 psig
12S	100-1500	100	50	12 psig
13S	300-2500	150	100	45 psig

NOTES: Above controls must have seal attached
DA-9 = Indicates slugged bourdon tube

FEATURES

Protects to 2,500 psig • Available to 5,000 psig • External adjustment • Adjustable or fixed deadband • Integral over-pressure seal • 316 Stainless Steel diaphragm • Operates in ambient temperatures -10 to +140°F. • Available with mercury or snap switch.

APPLICATION

For low pressure setpoints in a system where normal pressures may rise to 5,000 psig. An over-pressure seal protects the control beyond a predetermined pressure. When that pressure is exceeded, the diaphragm seats and no further motion is transmitted.

Series D

Bourdon Tube Pressure Switches — Pipe-Mounted Diaphragm Seals

Type MSAG/MSAH

SEAL WITH TYPE DA PRESSURE CONTROL

Type MSAG (PLAIN)

Type MSAH (CLEAN-OUT)

TYPE	MATERIAL EXPOSED SURFACES
MSAG	Steel or 316 SS
MSAH	Steel or 316 SS
XTBX	FEP and PVC

FEATURES

Maximum seal design pressure is 2500 psig for MSAG and MSAH, 100 psig XTBX. Seals can be filled after installation via Bleed Screw (7) in diagram at right. Thin, flexible diaphragm (2) is actuated by system pressure. Diaphragm transmits system pressure to seal's liquid fill (3) to operate the Bourdon tube of the protected control which attaches at (1). Chemical corrosion or other damage to seal from system's pressure medium can be prevented by proper selection of materials for the diaphragm, (2) bottom bowl (8) and other surfaces which the pressure medium will contact.

APPLICATION

Mercoid® diaphragm seals prevent corrosive, viscous or other damaging pressure media (gas, liquid, etc.) from entering the pressure power element (Bourdon tube) in pressure or differential pressure controls. Plain seals cannot be field-disassembled for cleaning or other purposes.

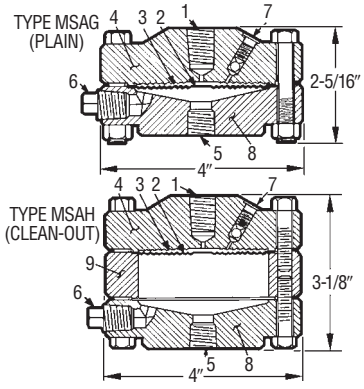
Mercoid® clean-out type diaphgram seals *can* be field-disassembled for cleaning or other purposes. Top bowl (Key #4 in diagram at right) with both clean-out ring (9) and control attached can be removed while bottom bowl (8) is still connected to system. However, system must be shut down beforehand.

Seals cannot be used below 10″ Hg vacuum.

To Order Seals – Plain or Clean-Out Types

When ordering, specify all of the following:

- Type and pressure range of control which seal is to protect.
- Diaphragm seal type desired.
- Diaphragm material – 316 stainless steel, FEP-coated 316 stainless steel, or Tantalum.
- Pressure medium-to-seal contact surfaces material-rust-resistant finish or 316 stainless steel.
- Size of seal-to-system connection 1/4″, 1/2″, 1″, or 1½″ NPT.
- Temperature range of pressure medium.
- Ambient temperatures.



1 Pressure Control Connection
2 Diaphragm: 316SS, FEP-Coated 316SS or Tantalum
3 Liquid Fill
4 Top Bowl, rust-resistant finish
5 Seal-to-System Connection
6 Flushing Connection (1/4″ NPT) and Removable Plug
7 Bleed Screw
8 Bottom Bowl, rust-resistant finish steel or 316SS
9 Clean-Out Ring

Mercoid® diaphragm seals are not available for Range 15S & 16S Mercoid Pressure Controls

NOTE: Controls and gauges with diaphragm seals can be affected by ambient and system temperature changes, particularly at low pressures. For these conditions, Mercoid® Controls can be furnished with ambient temperature compensation (available only when control is mounted on seal). Write for details.

Most seals can be furnished with a remote copper or S.S. tubing connection between seal and control. A mounting bracket (No. 33-25) may be used for remote mounted controls. *Specify if remote connection is desired.*

Mercoid®

Series DA

Pressure/Temperature Controls — Nomenclature Guide

GENERAL

EXAMPLE	__DA__	__31	_153__	_4	Standard DA Bourdon Tube Control. Dual setpoint, automatic reset, SPDT mercury switch, 1-35 PSIG.
RESET OPTIONS	R		U		Manual reset, single adjustment – operates on decrease automatically.
	R		L		Manual reset, single adjustment – operates on increase automatically.
	③ S				Automatic reset, single adjustment. DS only.
	① ③ L				Manual lock reset, single adjustment. Available as special order only.
HOUSING & APPROVAL OPTIONS	**W**				Weather proof enclosure Nema 3S, 4 and 4X. Flanged back standard.
	N3 W				Weather resistance, includes drain. Flanged back standard. Available as special order only.
	H				Explosion-proof enclosure – control integral. Available only on DA, DR, DS.
	E				Explosion-proof enclosure – control removable. Available only on DA, DR, DS.
	⑦ F				Factory Mutual Approval. DAW is FM approved as standard.
CIRCUIT SWITCHING OPTIONS		__	___2		SPST opens on pressure increase. Elect Code A, mercury switch.
		__	___3		SPST closes on pressure increase. Elect Code A, mercury switch.
		__	**_153**		SPDT Elect Code B, mercury switch
		__	_156		2 each SPST, one opens as the other one closes. Elect Code A, mercury switch.
		__	_804		2 each SPDT, Elect Code B, mercury switch, 18″ leads; Elect Code G, snap switch, screw terminals
		__	_( )		Other circuits available, consult factory.
		_2	___2_		SPST opens on increase, electrical code I, DS only, mercury switch.
		_2	___3_		SPST closes on increase, electrical code I, DS only, mercury switch.
	② ⑧	_4	4122_		Two stage, includes 2 each SPST, mercury switch.
	② ⑧	_4	4129_		Two stage, includes 2 each SPST, mercury switch.
	② ⑧	_4	4132_		Two stage, includes 2 each SPST, mercury switch.
	② ⑧	_4	4123_		Two stage, includes 2 each SPST, mercury switch.
		_5	___**2**		SPST mercury switch, electrical code H, opens on increase.
		_5	___3		SPST mercury switch, electrical code H, closes on increase.
		70	**153**		Snap switch SPDT, elect code D, 15A @120 VAC.
	⑫	70	804		2 each SPDT, elect code F, for ranges above 35 psi only, add 30% to minimum deadbands, 702,703,704 only.
		72	153_		DS only, snap siwtch, SPDT, elect code E.
		72	804_		2 each SPDT, snap switches, elect code G, DS only.
		74	____		Two stage, includes 2 each, SPDT snap switches, elect code G.
			B		Acetal Bushed Movement. For all controls.
OVERPRESSURE OPTIONS		_9	___2	XX	2500 psi overpressure, 316SS diaph. seal, SPST open on increase, elect code A. Specify range per Pg. 15.
		_9	___3	XX	2500 psi overpressure, 316SS diaph. seal, SPST close on increase, elect code A. Specify range per Pg. 15.
		_9	_153	XX	2500 psi overpressure, 316SS diaph. seal, SPDT elect code B. Specify range per Pg. 15.
		92	2_	XX	2500 psi overpressure, 316SS diaph. seal, SPST open on increase, elect code I, DS only.
		92	3_	XX	2500 psi overpressure, 316SS diaph. seal, SPST close on increase, elect code I, DS only.
		95	2_	XX	2500 psi overpressure, 316SS diaph. seal, SPST open on increase, elect code H.
		95	3__	XX	2500 psi overpressure, 316SS diaph. seal, SPST close on increase, elect code H.

PRESSURE RANGES &

2		25 S	30″ Hg. Vac. – 60 psig range.	Type 403SS Bourdon tube.
2		26 S	30″ Hg. Vac. -75 psig range.	Type 103SS Bourdon tube.
2		5 S	2-60 psig range.	Type 403SS Bourdon tube.
2		6 S	5-100 psig range.	Type 403SS Bourdon tube.
2		8 S	10-200 psig range.	Type 403SS Bourdon tube.
2		9 S	10-300 psig range	Type 403SS Bourdon tube.
2		9A S	40-350 psig range.	Type 403SS Bourdon tube.
2		10 S	25-600 psig range.	Type 403SS Bourdon tube.
2		11 S	50-1000 psig range.	Type 403SS Bourdon tube.
2		12 S	100-1500 psig range.	Type 403SS Bourdon tube.
2		13 S	300-2500 psig range.	Type 403SS Bourdon tube.
2		**15 S**	500-5000 psig range.	Type 403SS Bourdon tube. Not avail. with housing E or back conn.
2		**16 S**	800-8000 psig range.	Type 403SS Bourdon tube. Not avail. with housing E or back conn.
3		**2**	0-30″ Hg. Vac.	Brass Bourdon tube.

ELECTRICAL RATING CODES

For Mercury Switch Contacts

CODE	CIRCUIT SUFFIX NO.	AC CAPACITY 120V	240V	440V	DC RESISTIVE 120V	240V	HORSEPOWER AC	DC
A	-2, -3	10A	5A	3A	10A	5A	3/4	1/3
B	-153, -804	4A	2A	①	4A	2A	1/8	NA
C	-2, -3	⑥	⑥	⑥	10A	5A	3/4	1/3
H	-2, -3	5A	2A	NA	2 1/2A	1A	1/8	1/10
I⑫	-2, -3	0.3A	0.15A	NA	0.15A	0.07A	NA	NA

BOURDON TUBE MATERIALS

3	3	10" Hg. Vac. – psig range.	Brass Bourdon tube.
3	1	1/8 – 15 psig range.	Brass Bourdon tube.
3	**3 A**	1/8 – 20 psig range.	Brass Bourdon tube.
3	4	1-35 psig range.	Brass Bourdon tube.
3	2 7	25" Hg. Vac. – 50 psig range.	Brass Bourdon tube.
3	**5**	2-60 psig range.	Brass Bourdon tube.
3	6	5-100 psig range.	Brass Bourdon tube.
3	**7**	5-150 psig range.	Brass Bourdon tube.
3	**8**	10-200 psig range.	Brass Bourdon tube.
3	**9**	10-300 psig range.	Brass Bourdon tube.
4	**2 6 E**	30" Hg. Vac. – 75 psig range.	Type 316SS Bourdon tube.
4	2 3 E	5-75 psig range.	Type 316SS Bourdon tube.
4	6 E	10-100 psig range.	Type 316SS Bourdon tube.
4	**2 4 E**	10-150 psig range.	Type 316SS Bourdon tube.
4	**9 E**	10-300 psig range.	Type 316SS Bourdon tube.
4	**2 1 E**	30-400 psig range.	Type 316SS Bourdon tube.
4	**2 2 E**	75-800 psig range.	Type 316SS Bourdon tube.
4	**1 1 E**	100-1000 psig range.	Type 316SS Bourdon tube.
4	**1 3 E**	200-2500 psig range.	Type 316SS Bourdon tube.
⑥ 8	2 3 K	5-75 psig range.	Type 316SS Bourdon tube, Carbon Steel Bottom, F housing standard.
⑥ 8	2 4 K	10-150 psig range.	Type 316SS Bourdon tube, Carbon Steel Bottom, F housing standard.
⑥ 8	9 K	10-300 psig range.	Type 316SS Bourdon tube, Carbon Steel Bottom, F housing standard.

For Snap-Action Contacts

CODE	CIRCUIT SUFFIX NO.	AC CAPACITY 120V	AC CAPACITY 240V	AC CAPACITY 440V	DC RESISTIVE 120V	DC RESISTIVE 240V	HORSEPOWER AC	HORSEPOWER DC
D	-153	15A	15A	15@ 480V	1/2A	1/4A	1/8	NA
E	-153	15A	15A	NA	④	④	③	NA
F	-804	12A	10A	5A	1/2A	1/4A	③	NA
G	-804	5A	5A	NA	⑤	⑤	NA	NA

① -153 circuit available 1A 440V AC on special order
② Also rated 0.9 Amps at 24V AC
③ 1/4 HP at 120V AC, 1/2 HP at 240V AC
④ DC rated controls (up to 10 Amps) Consult factory
⑤ 5A, 30 V DC resistive
⑥ 17A non-inductive at 120/240/440V AC

CONNECTION & MOUNTING OPTIONS

1	Standard Housing.
2	Back Connection. Not available on D-900 series. Not available for range 15S, 16S.
3	Flanged back – (standard on "W" models).
4	Back Connection and flanged back. Not available for range 15S or 16S or on D-900, 9200, 9500 series.

RANGES

3 5	1 N	–60°F to +30°F range	150°F max.	304 S.S. bulb and copper capillary std.; S.S. special order.
3 5	3 N	0-100°F range	240°F max.	304 S.S. bulb and copper capillary std.; S.S. special order.
3 5	4 N	50-150°F range	250°F max.	304 S.S. bulb and copper capillary std.; S.S. special order.
3 5	5 N	100-200°F range	300°F max	304 S.S. bulb and copper capillary std.; S.S. special order.
3 5	7 N	140-300°F range	500°F max	304 S.S. bulb and copper capillary std.; S.S. special order.
④ **3 5**	8 N	250-415°F range	550°F max	304 S.S. bulb and capillary std.
⑤ **3 5**	9 N	350-550°F range	600°F max	304 S.S. bulb and capillary std.
3 5	1 0 N	100-300°F range	500°F max	304 S.S. bulb and copper capillary std.; S.S. special order.
3 5	1 1 N	100-500°F range	600°F max	304 S.S. bulb and capillary std.
⑩ **3 6**	5 NS	100-200°F range	300°F max	304 S.S. bulb std.
⑩ **3 6**	6 NS	140-250°F range	380°F max	304 S.S. bulb std.

CONNECTION & MOUNTING OPTIONS

⑪ 3 7	Same as 36 except back connection. 304 S.S. bulb std.
3 8	Same as 35 except has flanged back.
⑨ 3 9	Same as 35 except has flanged back and back connection.

NOTES:

1. Not available on D_ _ -_ 5, 74 or 95
2. Available on DA only
3. Not available on D_ _ _- 70_ _
4. & 5. Not available with 9, 92, 95 Diaph. Seals
6. Available also as _ _ 28, 58, 708 and 728. Not available with E or H housing or 70-804 circuit.
7. F available only as DAF, DSF, DRF, DAHF, DRHF, DSHF; not all ranges or circuits.
8. Switch rating for D-400: AC, 120V @ .3A, 240V @ .15A, 24V @ .8A, DC, 120V @ .15A, 240A @ .07A. Not available for 440V service.
9. Available only as _ _ 39, 539, 239, 7039, 7239, 439 and 7439.
10. Available only as _ _ 36, 7036, and 7236
11. Available only as _ _ 37, 7037, 7237
12. Available only on 702, 703 and 704

HOW TO ORDER BY MODEL NUMBER

DSH-7231-153-4
① ② ③ ④ ⑤

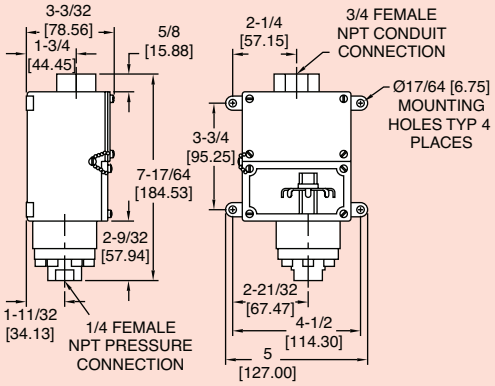
1. Select auto or manual reset, fixed or adjustable deadband
2. Select housing
3. Select bourdon tube, mercury or snap switch including electrical rating, mounting/connections
4. Select switch action
5. Select range

Mercoid®

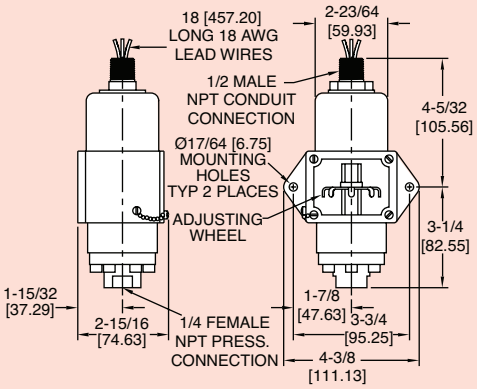
Series 1000

Diaphragm Operated Pressure Switches

Visible Setpoint, Fixed Deadband, Pressure Ranges to 1400 psi, Over Pressure Protection to 3000 psi



Weatherproof



Explosion-proof

Extremely rugged construction provides excellent reliability in chemical, petroleum and industrial plants. Bellville spring movement permits mounting of control in any position and helps prevent contact chatter. New design also provides high overpressure protection. Available with standard weather-proof housing to meet NEMA-1 through 4X and NEMA-13, JIC. This control is also offered with an explosion-proof housing suitable for NEMA-7, class I groups A, B, C and D; and NEMA-9 class II groups E, F and G. Diaphragm elements are provided in a choice of polyimide, 316 stainless steel or teflon to meet most liquid or gas applications. Bottom pressure ports are aluminum or 316 stainless steel. Switching arrangements are single pole double throw (SPDT) rated up to 15 amps 125/250 VAC or double pole double throw (DPDT) rated up to 5 amps 125/250 VAC, 30 VDC resistive. Setpoint adjustments are easily made by use of a large internal thumb wheel isolated from the electrical chamber for added safety.

APPLICATIONS

Chemical, petroleum, food and drug processing industries. Used indoor, outdoor or in explosion-proof areas. Machine tools, high vibration locations.

SPECIFICATIONS

Wetted Materials: See pressure chamber and diaphragm material in model chart.
Temperature Limits: –30 to 170°F (–35 to 77°C).
Pressure Limit: 3000 psig (206.8 bar).
Enclosure Rating: See model chart.
Switch Type: SPDT or DPDT snap switch.
Electrical Rating: See model chart.
Electrical Connection: Weatherproof (W):Screw type, explosion-proof (E, EH): 18 AWG, 18˝ (460 mm) long.
Conduit Connection: Weatherproof (W): 3/4˝ female NPT, explosion-proof (E, EH): 1/2˝ male NPT .
Process Connection: 1/4˝ female NPT.
Mounting Orientation: Any position.
Set Point Adjustment: Internal thumbwheel.
Weight: 3 lb (1.4 kg).
Deadband: See range chart.
Agency Approvals: CE, UL.

Suggested Specification

Pressure switches shall be diaphragm operated with fully adjustable setpoint. Switch shall have visible setpoint indicator protected by clear polycarbonate window. Control shall be suitable for mounting in any position. Electrical terminals shall be isolated from setpoint adjustment. Units shall be Mercoid® Diaphragm Operated Pressure Switch Model 100(__)(__)-(__)-(__) .

MODEL CHART – SERIES 1000

EXAMPLE	1003	W	A	1	D	1003W-A1-D Pressure Control, weatherproof NEMA-4X, fixed deadband, automatic reset, SPDT snap acting switch, adjustable range 5-40 psig [0.48-2.8 bar], maximum pressure 3000 psig [206.8 bar].	
CONSTRUCTION	100	W				Weatherproof construction, NEMA-4X.	UL
		E				Explosion-proof construction, NEMA-7, 9, Class I Group A, B, C & D; Class II Group E, F & G	UL
		EH				Explosion-proof construction and hermetically sealed switch(es), NEMA-7, 9 – Class I Group A, B, C & D; Class II Group E, F & G	UL
PRESSURE CHAMBER MATERIAL(WETTED)			A			Aluminum pressure port.	UL
			B			316 stainless steel pressure port.	UL
DIAPHRAGM MATERIAL (WETTED)				1		Polyimide diaphragm and BUNA-N O-ring.	UL
				2		316 stainless steel diaphragm and Fluoroelastomer O-ring*	UL
				3		FEP diaphragm and Fluoroelastomer O-ring	UL
CIRCUIT (SWITCHING) OPTIONS					D	SPDT snap acting switch, rated 15A at 125/250 VAC resistive, 1/8 hp at 125 VAC, 1/4 hp at 250 VAC (1000W only)	UL
					J	SPDT snap acting switch, rated 15A at 125/250/480 VAC resistive, 0.5A at 125 VDC, 0.25A at 250 VDC, 1/8 hp at 125 VAC, 1/4 hp at 250 VAC	UL
					F	DPDT: 2 each SPDT snap acting switches, rated 5A at 125/250 VAC, 5A at 30 VDC resistive*	UL
ADJUSTABLE PRESSURE RANGES & MAXIMUM OPERATING PRESSURE	3					Adjustable range 5-40 psig [0.48-2.8 bar]	UL
	4					Adjustable range 10-70 psig [0.69-4.8 bar]	UL
	5					Adjustable range 25-200 psig [1.7-13.8 bar]	UL
	6					Adjustable range 50-350 psig [3.5-24.1 bar]	UL
	7					Adjustable range 75-550 psig [5.2-37.9 bar]	UL
	8					Adjustable range 100-900 psig [6.9-62.1 bar]	UL
	9					Adjustable range 200-1400 psig [13.8-96.5 bar]	UL

*Deadband approximately 10% higher when using 316SS diaphragm or code F Switch

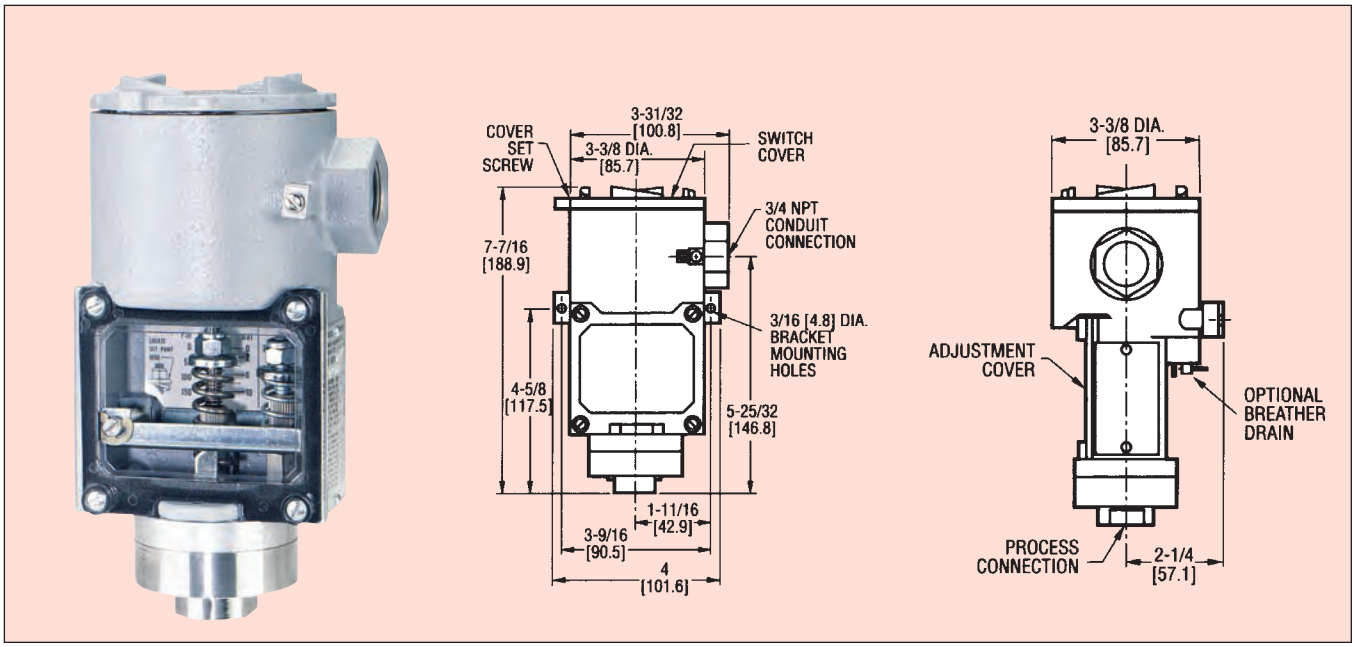
RANGE ORDERING NUMBER	ADJUSTABLE OPERATING RANGE		MAX. SYSTEM PRESSURE WITHOUT BURSTING		APPROXIMATE FIXED DEADBAND – MID RANGE			
					E TYPE		W TYPE	
	psig	bar	psig	bar	psi	bar	psig	bar
3	5-40	.48-2.8	3000	206.8	2.5	.17	2	.14
4	10-70	.69-4.8	3000	206.8	5	.34	4	.28
5	25-200	1.7-13.8	3000	206.8	10	.69	8	.55
6	50-350	3.5-24.1	3000	206.8	18	1.20	15	1.00
7	75-550	5.2-37.9	3000	206.8	36	2.50	30	2.10
8	100-900	6.9-62.1	3000	206.8	60	4.10	50	3.50
9	200-1400	13.8-96.5	3000	206.8	90	6.20	75	5.20

Mercoid®

Series SA1100

Diaphragm Operated Pressure Switches

Visible Setpoint, Adjustable Deadband, Hermetically Sealed Snap Switch, Weatherproof and Explosion-proof



Weatherproof and Explosion-Proof in One Economical Enclosure

Extremely rugged construction assures excellent reliability in chemical, petroleum and industrial plants. New design also provides burst pressure protection to 3000 psi (206 bar). The rolling diaphragm design maintains a constant effective area to minimize friction. This results in a minimum deadband as low as 5% of full scale. Since many applications require higher deadbands, the SA1100 includes a separate adjustment of this when necessary. A pump being used to control liquid level in a tank would be a typical situation where this feature would be important. Both setpoint and deadband adjustments are protected, yet clearly visible behind a clear polycarbonate window and are fully isolated from the electrical components for additional safety. A 7/16" open-end wrench is the only tool required to change settings. Terminal blocks are provided for switch wiring connections and both internal and external ground screws are included. Standard housing is weatherproof to NEMA standards 1 through 4X and 13; explosion-proof to NEMA 7, Class I, Groups B, C & D; NEMA 9, Class II, Groups E, F & G. Optional construction adds drain to meet IP54.

APPLICATIONS

Chemical, petroleum, food and drug processing industries. Used indoor, outdoor or in explosion-proof area.

SPECIFICATIONS

Wetted Materials: See pressure chamber and diaphragm material in model chart.
Temperature Limits: -30 to 180°F (-35 to 82°C).
Pressure Limit: 1200 psig (82.6 bar).
Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups B, C and D; Class II Groups E, F, and G. UL-NEMA 4X, CSA-NEMA 4. ATEX Compliant CE 0344 Ex II 2 G EEx d IIC T6 Process Temperature ≤75°C.
Switch Type: SPDT or DPDT snap switch.
Electrical Rating: See model chart.
Electrical Connections: Screw terminal.
Conduit Connection: 3/4″ female NPT.
Process Connection: 1/4″ or 1/2″ female NPT.
Mounting Orientation: Within 20° of vertical.
Set Point Adjustment: Internal 7/16″ hex nuts.
Weight: 3.5 lb (1.6 kg).
Deadband: See deadband chart.
Agency Approvals: UL, CSA, CE and ATEX.

Suggested Specification

Pressure switches shall be (UL/CSA) (ATEX) listed and be diaphragm operated with fully adjustable setpoint. Switch shall have visible setpoint indicator and adjustable deadband protected by clear polycarbonate window. Electrical terminals shall be isolated from setpoint adjustment. Housing shall be weatherproof and explosion-proof, Cl I, Groups B, C & D; Cl II, Groups E, F & G, ATEX Compliant CE 0344 Ex II 2 G EEx d IIC T6 Process Temperature ≤75°C. Switches shall be Mercoid® Diaphragm Operated Pressure Switches Model SA11(_ _)E-(_ _)-(_ _)-(_ _).

MODEL CHART - Series SA1100

Example	SA11	13	E	A	4	K	1		SA1113E-A4-K1 Pressure Control; weatherproof, NEMA 4X,explosion-proof NEMA 7&9; aluminum pressure chamber, Buna-N diaphragm and O-ring; 1/4 inch female NPT process connection; adjustable deadband, automatic reset; SPDT snap acting switch; adjustable range 30-500 psig
Construction	SA11								Series Designator, weatherproof NEMA 4X, explosion-proof NEMA 7, 9
Adjustable Pressure Ranges		11 12 13							Adjustable range 10-150 psig (0.7-10 bar) Adjustable range 20-250 psig (1.4-17.2 bar) Adjustable range 30-500 psig (2.0-34.0 bar) Maximum pressure for all ranges: Operating: 1200 psig (82.6 bar) Burst pressure: 3000 psig (206 bar)
Circuit (Switch) Options			E HS HG						Snap action switch rated 15A @ 125/250/480 VAC, 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 1/2 A @ 125 VDC resistive, 1/4 A @ 250 VDC resistive Hermetically sealed snap action switch rated 5A @ 125/250 VAC, 5A resistive @ 30 VDC* Hermetically sealed snap action switch with gold contacts rated 1A @ 125 VAC, 1A resistive @ 30 VDC*
Pressure Chamber Material (Wetted)				A B S					Aluminum Brass 316 SS
Diaphragm Material (Wetted)					4 5				Buna-N diaphragm and O-ring Fluorocarbon diaphragm and O-ring
Circuit (Switch) Type						K L			SPDT DPDT (not available with HS or HG switch options)
Process Connection							1 2		1/4 inch female NPT 1/2 inch female NPT
Options								AT DRAIN	ATEX certified construction Housing with drain - allows condensate to be drained from inside enclosure (meets NEMA 3R instead of 4X)

*Options that do not have ATEX.

SWITCH DEADBAND CHART

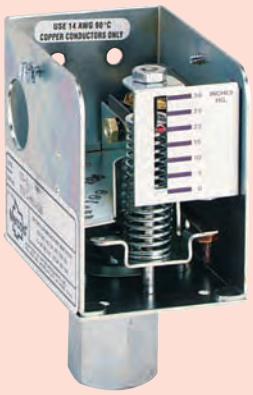
Range Number	Adjustable Operating Range		Approximate Minimum Deadband				Approximate Maximum Deadband	
			Low		High			
	psig	bar	psig	bar	psig	bar	psig	bar
11	10-150	0.7-10	4.0	0.28	7.5	0.52	75	5.2
12	20-250	1.4-17.2	5.0	0.35	12.5	0.86	150	10
13	30-500	2.0-34	12	0.83	45	3.1	300	21

Mercoid®

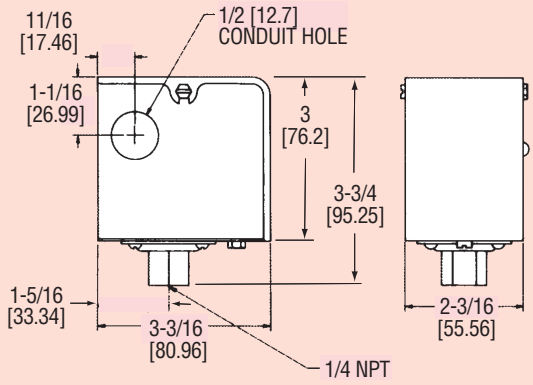
Series CS & CD

Low Cost Diaphgram Operated Pressure Switches

Adjustable Setpoints, Fixed or Adjustable Deadband, Snap Action Switch



General purpose



Low cost CS and CD series pressure switches combine advanced design, precision construction and small size. These controls are ideal for instrument panels, small compressors and general industrial applications.

Adjustable setpoint and easy-to-wire SPDT snap switch reduce installation time, saving money. Operates in any position and is vibration resistant. Enclosure is of NEMA-1 construction. Wetted parts are suitable for any media compatible with BUNA-N and zinc plated steel.

SPECIFICATIONS

Wetted Materials: Nylon reinforced Buna-N and steel.
Temperature Limits: -30 to 150°F (-35 to 66°C).
Pressure Limit: 30 psig (2.1 bar) for ranges 1, 3, and 10. 50 psig (3.5 bar) for range 30. 175 psig (12.1 bar) for range 150.
Enclosure Rating: General purpose.
Switch Type: SPDT snap switch.
Electrical Rating: 15A @ 120 VAC, 8A @ 240 VAC.
Electrical Connections: Screw terminal.
Conduit Connection: 1/2˝ hole for conduit hub.
Process Connection: 1/4˝ female NPT.
Mounting Orientation: Any position.
Set Point Adjustment: Internal screw.
Weight: .5 lb (0.23 kg).
Deadband: See model chart.
Agency Approvals: CE, UL.

MODEL CHART SERIES CS, CD

EXAMPLE	CS	10	CS-10 Pressure Control, fixed deadband, automatic reset, SPDT snap switch rated 15A@120 VAC, range 1-10 psig [.07-.70 bar].	
CONSTRUCTION	CS CD		Fixed Deadband, General Purpose Enclosure, NEMA 1 Adjustable Deadband, General Purpose Enclosure, NEMA 1	
ADJUSTABLE PRESSURE RANGES			**Adjustable Operating Range** / **Maximum Momentary Surge Pressure psig [bar]**	
		1	1-30˝ Hg Vac [25-750 mm Hg] / 30 [2.1]	
		3	10-100˝ wc [2.5-25 kPa] / 30 [2.1]	
		10	1-10 psig [.07-.70 bar] / 30 [2.1]	UL
		30	1-30 psig [.07-2.1 bar] / 50 [3.5]	UL
		150	10-150 psig [.7-10.3 bar] / 175 [12.1]	UL

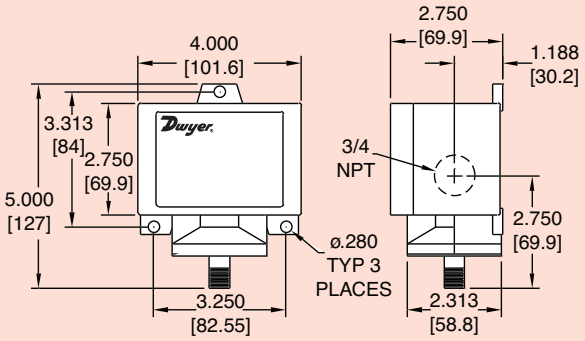
DEADBAND CHART (Approximate)

Range	Series CS - Fixed Deadband		Series CD - Adjustable Deadband			
			Minimum		Maximum	
	At Minimum Setting	At Maximum Setting	At Minimum Setting	At Maximum Setting	At Minimum Setting	At Maximum Setting
1	1˝ Hg [25 mm Hg]	1.5˝ Hg [38 mm Hg]	Not Available			
3	5˝ wc [127 mm wc]	7˝ wc [178 mm wc]				
10	.25 psig [.02 bar]	.4 psig [.03 bar]	.5 psig [.03 bar]	1.5 psig [.1 bar]	10.5 psig [.72 bar]	11.5 psig [.79 bar]
30	.5 psig [.03 bar]	1.0 psig [.07 bar]	1.5 psig [.1 bar]	2.0 psig [.14 bar]	11.5 psig [.79 bar]	12 psig [.83 bar]
150	1.5 psig [.1 bar]	5 psig [.35 bar]	6 psig [.41 bar]	14 psig [.97 bar]	16 psig [1.1 bar]	24 psig [1.66 bar]

Series ES

Electronic Pressure Switch

Adjustable Set Point, Local Indication, NEMA-4 Enclosure



Series ES Electronic Pressure Switch is proven reliable, even in the toughest industrial applications. The switch uses a thin film pressure sensor that is rated for 10,000,000 cycles at the rated load, allowing the ES to outlast mechanical switches in high cycle applications. The switch is designed with narrow, adjustable deadbands that can be adjusted to less than 0.5% of range with multi-turn potentiometers. Features include status light for indication of process pressure, setpoint, reset and relay output status. Optional 3-1/2″ digit LED provides local indication of process pressure. The electronics are housed in a watertight, epoxy coated aluminum enclosure for additional corrosion resistance. The Series ES is ideal for pressure alarms, shutdown and control on high cycle applications such as metal stamping, presses, injection molding machines and other process equipment.

SPECIFICATIONS

Service: Compatible liquids or gases.
Power Suppy: 110 VAC; 50/60 Hz.
Repeatability: ±0.5% of nominal range.
Temperature Limits: -20 to 160°F (-28.9 to 71.1°C).
Process Connection: 1/4″ male NPT.
Electrical Connections: 3/4″ male NPT.
Switch Type: SPDT relay.
Electrical Ratings: 10 amps (resistive) @ 250 VAC; 10 amp (resistive) @ 30 VDC.
Setpoint: Adjustable via internal multi-turn potentiometers.
Deadband Adjustment: Between 0.1% and 95% of nominal range.
Cycle: Ten million @ rated load.
Sensor Element: Thin film pressure sensor.
Display: (on ES1 models only) 3-1/2 digit LED.
Resolution: ±1%.
Wetted Parts: Diaphragm: 17-4 PH stainless steel; Pressure connection: AISI/316 stainless steel.
Housing: NEMA 4 (IP66) watertight epoxy coated aluminum enclosure.
Weight: 1lb 9 oz (709 g).
Agency Approvals: CE, UL, CSA.

MODELS

Model Number	Setpoint Range psi (bar)	Max. Pressure psi (bar)	LED
ES04021	3-60 (.21-4.1)	120 (8.3)	No
ES04022	5-100 (.34-6.9)	200 (13.8)	No
ES04024	15-300 (1.0-20.7)	600 (41.4)	No
ES04029	150-3000 (10.3-206)	4500 (310)	No
ES14021	3-60 (.21-4.1)	120 (8.3)	Yes
ES14022	5-100 (.34-6.9)	200 (13.8)	Yes
ES14024	15-300 (1.0-20.7)	600 (41.4)	Yes
ES14029	150-3000 (10.3-206)	4500 (310)	Yes

APPLICATIONS

Use the Series ES for sludge and slurry applications in waste water, pulp and paper mills. Electric switches will outlast mechanical switches in high cycle applications such as plastic injection molding and other machine tools. Adjustable deadband makes the Series ES ideal for hydralic systems, pumps, pipelines, and elevated tank applications.

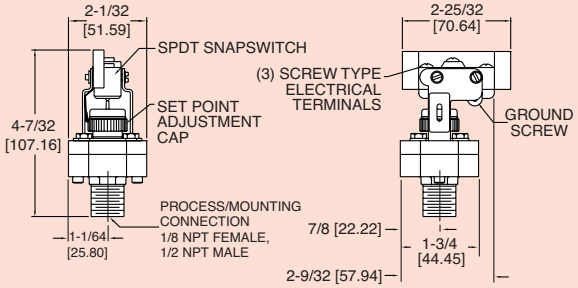
Mercoid®

Series A1S & A1B

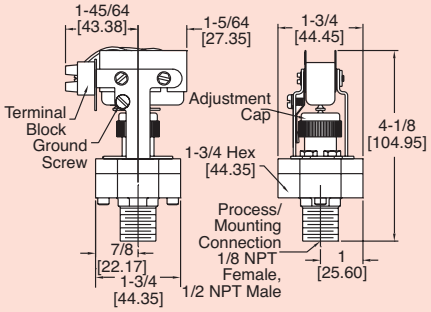
Low Cost OEM Pressure Switch

316 SS or Buna-N Diaphragm, Optional Weatherproof Enclosure, Ranges from 3-20 to 50-500 psig

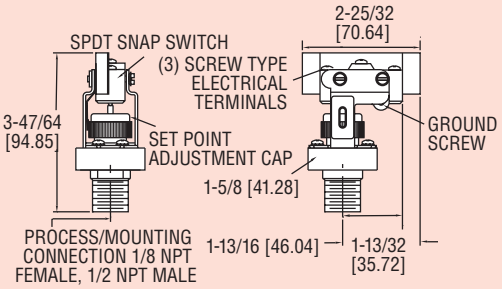
Standard Snap Action Switch

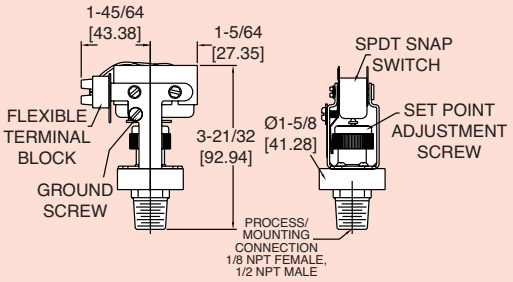


Hermetic Snap Action Switch



Series A1S





Series A1B

Low Cost and Precision Made. The A1 Pressure Control provides the flexibility required for industrial applications. The A1 pressure switch is ideal for panel mounting wherever a high quality economical open case control is required. Optional weatherproof housing meets NEMA 4X standards. Superior 15A contact allows direct control of a motor or pump without the use of external relays - a true time and money savings. Unique features include broad temperature limits for increased application possibilities and convenient indicating scale for quick and easy field adjustment. The rugged A1S construction incorporates the features most often requested by customers; a 316 SS diaphragm pressure element for exceptional compatibility and long service life. The A1B construction offers a lower cost Buna-N diaphragm for those applications not requiring 316 SS. Pressure chambers available are: aluminum with PTFE impregnated hard coating perfect for oil based hydralic fluids and noncorrosive air and gases, brass for water and water based fluids, and 316 SS for harsher applications. Optional hermetically sealed snap switches are available for harsh environments.

OP enclosure and mounting configuration offers a unit that can be directly mounted through the panel wall keeping the process outside of the panel. Unit has a flush bottom and includes a gasket and mounting nut to insure a tight weatherproof seal against the panel.

Features

- 316 SS or Buna-N diaphragm
- Aluminum, Brass, or 316 SS pressure chamber
- High current SPDT snap switch
- Weatherproof enclosure available in Polycarbonate of 316 SS
- Hermetically sealed snap switch option

SPECIFICATIONS

Wetted Materials:

Pressure Chamber: Aluminum with PTFE impregnated anodized coating, brass, or 316 SS.
Diaphragm: 316 SS on A1S, Buna-N on A1B.
O-ring: Fluoroelastomer on A1S, Buna-N on A1B.

Temperature Limit: -40 to 180°F (-40 to 82°C).
Pressure Limits: 750 psig (51 bar).
Enclosure Rating: O, and OP enclosure none. PC, PN, SC, and SN enclosures meet NEMA 4X standards.
Switch Type: Type 1: SPDT snap switch. Type 1HS: SPDT hermetically sealed snap switch.
Electrical Rating: Switch Type 1: 15A @ 120/240/480 VAC, 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC. Switch Type 1HS: 5A @ 120/240 VAC.
Electrical Connection: Screw terminals on Type 1 switch, terminal block on Type 1HS switch.
Process Connection: 1/8″ female NPT and 1/2″ male NPT. OP style has 1/8″ female NPT and 1/2″ male straight thread.
Mounting Orientation: Within 20° of vertical.
Set Point Adjustment: Knurled screw cap with indicating scale.
Weight: A1S: 9 oz (.25 kg), A1B: 6 oz (.17 kg).
Deadband: Fixed, See deadband chart.

Mercoid®

Series A1S & A1B

Low Cost OEM Pressure Switch

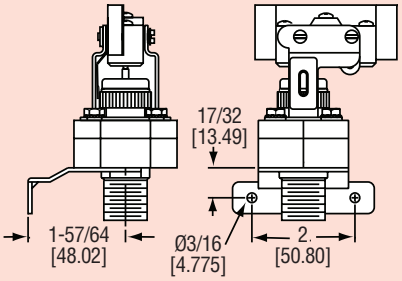
316 SS or Buna-N Diaphragm, Optional Weatherproof Enclosure, Ranges from 3-20 to 50-500 psig

Example	A1	S	PC	SS	1	2	A1S-PC-SS-1-2 Pressure Control; 316 SS diaphragm and Fluoroelastomer O-ring; weatherproof enclosure, NEMA-4X, polycarbonate with conduit entry; 316 SS pressure chamber; fixed deadband, automatic reset; SPDT snap acting switch; adjustable range 15-150 psig
Construction	A1						Series Designator
Diaphragm Material		S B					316 SS diaphragm and Fluoroelastomer O-ring Buna-N diaphragm and Buna-N O-ring
Enclosure & Mounting			O OP PC SC				Open case Open case - panel mount, has 1/2˝ straight thread and flush bottom, includes gasket and mounting nut (only available on A1B with brass chamber) Weatherproof enclosure, NEMA 4X, polycarbonate with conduit entry Weatherproof enclosure, NEMA 4X, 316 SS with conduit entry
Pressure Chamber Material				AL BR SS			Aluminum with PTFE impregnated anodized coating Brass 316 SS
Circuit (Switch) Type					1 1HS		SPDT snap action switch, rated 15A @ 120/240/480 VAC, 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC SPDT Hermetically sealed snap switch rated 5A @ 120/240 VAC
Adjustable Pressure Range						1 2 3 4	3-20 psig (.21-1.4 bar) 15-150 psig (1.0-10.3 bar) 25-250 psig (1.7-17.2 bar) 50-500 psig (3.4-34.5 bar)

Optional Enclosures & Mounting:

Weatherproof

Open Case-Panel Mount



Series A1S and A1B Deadband Chart - psig (bar)

Model	Range	Deadband at Minimum Range	Deadband at Maximum Range
A1S or A1B with Type 1 Switch	3-20 (.21-1.4)	1 (.07)	3 (.21)
	15-150 (1.0-10.3)	5 (.34)	15 (1.0)
	25-250 (1.7-17.2)	8 (.55)	25 (1.7)
	50-500 (3.4-34.5)	15 (1.0)	50 (3.5)
A1S with Type 1HS Switch	3-20 (.21-1.4)	1.5 (.10)	4 (.28)
	15-150 (1.0-10.3)	10.5 (.72)	40 (2.8)
	25-250 (1.7-17.2)	9 (.62)	50 (3.5)
	50-500 (3.4-34.5)	14.5 (.99)	42 (2.9)
A1B with Type 1HS Switch	3-20 (.21-1.4)	2 (.14)	6 (.41)
	15-150 (1.0-10.3)	6 (.41)	25 (1.7)
	25-250 (1.7-17.2)	17 (1.17)	50 (3.5)
	50-500 (3.4-34.5)	12.5 (.86)	44 (3.0)

Accessories:

A-613 Mounting Bracket

Optional accessory is formed from 14 ga. steel, zinc plated for corrosion resistance. Provides rugged permanent mounting and speeds installation. Two 1/4" 6-32 mounting screws are included to attach switch to bracket.

Mercoid®

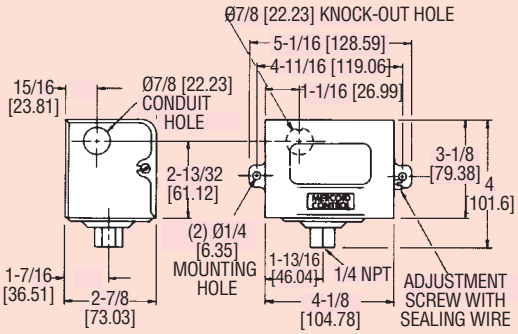
Series AP

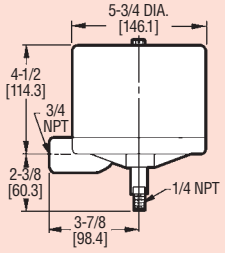
Diaphragm Operated Pressure Switches

Visible Setpoint Adjustment, Compact, Low Cost, Snap Action Switch, Optional Weatherproof or Explosion-proof Housings

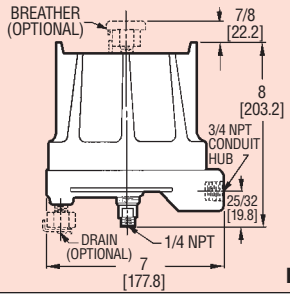
FM APPROVED

General purpose





Weatherproof



Explosion-proof

Reliable and convenient, series AP pressure switch is a compact low cost switch for instrument air or other low pressure applications. Visible setpoint and external adjustment add convenience to the general purpose model. Used on air, noncorrosive gas or liquid service compatible with wetted parts. Available with optional weather-proof and explosion-proof housings.

SPECIFICATIONS

Wetted Materials: Nylon reinforced Buna-N and steel or PTFE and 316 SS.
Temperature Limits: -30 to 150°F (-35 to 66°C).
Pressure Limit: See operating range charts.
Enclosure Rating: General purpose, Weatherproof or explosion-proof.
Switch Type: See model chart.
Electrical Rating: See model chart.
Electrical Connections: Screw terminal.
Conduit Connection: 7/8″ (22.23 mm) hole for 1/2″ (12.7 mm) conduit hub.
Process Connection: 1/4″ female NPT.
Mounting Orientation: Vertical for mercury switch models, any position for snap switch models.
Set Point Adjustment: External screw.
Weight: General purpose: 2 lb (0.9 kg), weatherproof; 4 lb (1.8 kg), explosion proof: 7 lb (3 kg).
Deadband: See operating range charts.
Agency Approvals: FM, UL, CSA.

Suggested Specification

Pressure switches shall be Mercoid® Pressure Switch Model AP-(__) operated by Buna-N diaphragm. Setpoint shall be visible, and shall be externally adjustable without shutting down process. Deadband shall be fixed. Switch shall incorporate (hermetically sealed mercury switch) (SPDT snap switch).

OPERATING RANGES – TYPE AP & AP-41

With Mercury Switch (mm w.c.), [bar]

RANGE NO.	CIRCUIT SUFFIX NO.	SWITCH ACTION ON PRESS. INCREASE	APPROX. SWITCH DEADBAND	
			LOW	HIGH
33	-2 -3 -88 -89 -153	SPST OPENS SPST CLOSES SPST CLOSES SPST OPENS SPDT	8″ w.c. (205) 8″ w.c. (205) 3″ w.c. (80) 4″ w.c. (102) 5″ w.c. (127)	10″ w.c. (250) 10″ w.c. (250) 3″ w.c. (80) 4″ w.c. (102) 6″ w.c. (152)
36	-2 -3 -26 -36 -88 -89 -153	SPST OPENS SPST CLOSES SPST CLOSES SPST OPENS SPST CLOSES SPST OPENS SPDT	1.0 psig [0.07] 1.0 psig [0.07] 1.5 psig [0.10] 1.5 psig [0.10] 4″ w.c. (102) 6″ w.c. (152) 0.3 psig [0.02]	2.0 psig [0.14] 2.0 psig [0.14] 2.5 psig [0.17] 2.5 psig [0.17] 8″ w.c. (205) 12″ w.c. (305) 0.5 psig [0.03]
37	-2 -3 -26 -36 -88 -89 -153	SPST OPENS SPST CLOSES SPST CLOSES SPST OPENS SPST CLOSES SPST OPENS SPDT	2.0 psig [0.14] 2.0 psig [0.14] 2.5 psig [0.17] 2.5 psig [0.17] 6″ w.c. (152) 8″ w.c. (205) 0.8 psig [0.06]	3.0 psig [0.21] 3.0 psig [0.21] 3.5 psig [0.24] 3.5 psig [0.24] 12″ w.c. (305) 16″ w.c. (406) 1.5 psig [0.11]
39	-2 -3 -26 -36 -88 -89 -153	SPST OPENS SPST CLOSES SPST CLOSES SPST OPENS SPST CLOSES SPST OPENS SPDT	6 psig [0.41] 8 psig [0.55] 8 psig [0.55] 8 psig [0.55] 1.5 psig [0.10] 1.5 psig [0.10] 4 psig [0.28]	16 psig [1.10] 17 psig [1.17] 20 psig [1.38] 20 psig [1.38] 3.0 psig [0.21] 3.0 psig [0.21] 10 psig [0.69]

OPERATING RANGES – TYPE AP

With Snap Switch (mm w.c.), [bar]

RANGE NO.	ADJUSTABLE RANGE	MAX. PRESS. psig	SINGLE SPDT		(2) SPDT SNAP SWITCHES	
			APPROX. SWITCH DEADBAND			
			LOW	HIGH	LOW	HIGH
33	10″ vac-50″ wc (250 vac-1250)	15 [1.0]	8″ wc (205)	10″ wc (250)	4.5″ wc (127)	5″ wc (127)
36	1-20 psig [0.07-1.4]	60 [4.1]	0.5 psig [0.04]	1.5 psig [0.11]	0.75 psig [0.05]	1.5 psig [0.11]
37	1-30 psig [0.07-2.1]	60 [4.1]	0.75 psig [0.05]	1.5 psig [0.11]	0.75 psig [0.05]	1.5 psig [0.11]
39	10-125 psig [0.7-8.6]	160 [11]	3 psig [0.2]	7 psig [.49]	1.25 psig [0.09]	4 psig [0.3]

MODEL CHART – SERIES AP

EXAMPLE	AP	_	_	153	_	36	AP-153-36 Pressure Control, fixed deadband, automatic reset, SPDT mercury switch, adjustable range 1-20 psig (0.07-1.4 bar), maximum pressure 60 psig (4.1 bar)			
CONSTRUCTION	AP						General Purpose enclosure, NEMA-1.	UL		CSA
	AS						Low pressure steam switch, NEMA-1, range 34 only. Circuits, 2, 3, 26, 36, 153 only. PTFE covered diaphragm, plated steel pressure port.	UL		
		F					Factory Mutual approved, NEMA-1, circuit 153 only. Range 37 only. APF-153-37 or APF-7021-153-37 only.	UL	FM	CSA
RESET OPTIONS		R			U		Manual reset – operates on decrease automatically. NEMA-1 only. Not available with circuit 88, 89 or snap switch type.	UL		CSA
		R			L		Manual reset – operates on increase automatically. NEMA-1 only. Not available with circuit 88, 89 or snap switch type.	UL		CSA
HOUSING OPTIONS		S					Less enclosure	UL		CSA
		WT					Weatherproof enclosure, NEMA-4.			
		W					Weatherproof enclosure with condensate drain, NEMA-2, 3R.	UL		CSA
		H					Explosion-proof enclosure, NEMA-7, 9, Class I Group, C & D; Class II Group E, F & G.	UL		
CIRCUIT (SWITCHING) OPTIONS			_	2			SPST mercury switch, Electrical Code P* – opens on pressure increase.	UL		CSA
			_	3			SPST mercury switch, Electrical Code P*– closes on pressure increase.	UL		CSA
			_	26			SPST mercury switch, Electircal Code R* – closes on pressure increase. Not available with range 33.	UL		CSA
			_	36			SPST mercury switch, Electrical Code R* – opens on pressure increase. Not available with range 33.	UL		CSA
			_	88			SPST magnetic mercury switch, Electrical Code T* – closes on pressure increase.	UL		CSA
			_	89			SPST magnetic mercury switch, Electrical Code T* – opens on pressure increase.			
			_	153			SPDT mercury switch, Electrical Code S*.	UL		CSA
			_	( )			Other circuits available, consult factory.			
			70_ _	153			SPDT snap acting switch, rated 15A at 120 VAC, 8A at 240 VAC, 0.5A at 120 VDC, 0.25A at 240 VDC, 3/4 hp at 120 VAC, 1 hp at 240 VAC.	UL		CSA
			70_ _	804			DPDT: 2 each SPDT snap acting switches, rated 5A at 120/240 VAC, 5A at 30 VDC resistive	UL		CSA
			80_ _	153			SPDT snap acting switch, rated 15A at 120 VAC, 8A at 240 VAC, 4A at 480 VAC, 6A at 24 VDC resistive, 0.5A at 120 VDC, 0.25A at 240 VAC, 3/4 hp at 120 VAC, 1.5 hp at 240 VAC.	UL		CSA
WETTED MATERIALS			_ _				Mercury switch type. Plated steel pressure port, Buna-N diaphragm.	UL		CSA
			41				Mercury switch type. 316 stainless steel pressure port, PTFE diaphragm.			
			7021				Snap switch type. Plated steel pressure port, Buna-N diaphragm.	UL		CSA
			8021				Snap switch type. Plated steel pressure port, Buna-N diaphragm.	UL		CSA
			7041				Snap switch type, 316 stainless steel pressure port, PTFE diaphragm.			
			8041				Snap switch type, 316 stainless steel pressure port, PTFE diaphragm.			
ADJUSTABLE PRESSURE RANGES & MAXIMUM OPERATING PRESSURES						33	Adjustable range 10˝ wc VAC –50˝ wc (250 mm VAC to 1250 mm wc), maximum pressure 15 psig (1.03 bar).	UL		CSA
						34	Adjustable range 1-15 psig (0.07 to 1.03 bar), AS only, maximum pressure 30 psig (2.1 bar), maximum temperature 275°F (135°C) psig.	UL		CSA
						36	Adjustable range 1-20 psig (0.07-1.4 bar), maximum pressure 60 psig (4.1 bar).	UL		CSA
						37	Adjustable range 1-30 psig (0.07-2.1 bar), maximum pressure 60 psig (4.1 bar).	UL		CSA
						39	Adjustable range 10-125 psig (0.7-8.6 bar), maximum pressure. 160 psig (11 bar)	UL		CSA

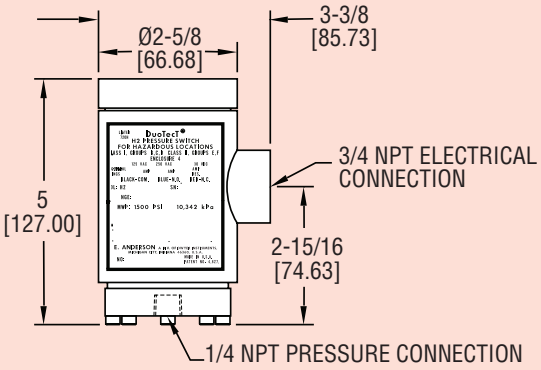
* See Chart below.

ELECTRICAL RATING MERCURY SWITCH

CODE	CIRCUIT SUFFIX NO.	AC CAPACITY			DC CAPACITY		HORSEPOWER	
		120V	240V	440V	120V	240V	AC	DC
P	-2, -3	10A	5A	3A	10A	5A	3/4	1/3
R	-26, -36	17A AT 120/240/277 VAC, Resistive balance same as above.						
S	-153	4A	2A	NA	4A	2A	1/8	NA
T	-88, -89	0.5A	0.25A	NA	0.25A	0.125A		

Series H2 Dual-Action Explosion-Proof Pressure Switches

Explosion-proof and Weatherproof Housing



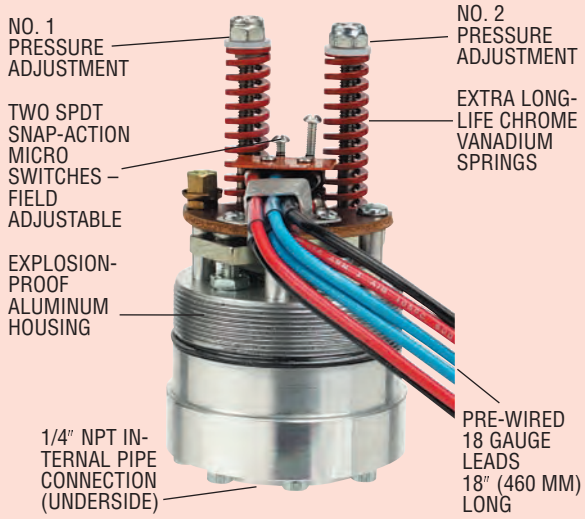
The unique Model H2 Duotect® pressure switch features two switches actuated by double concentric pistons from a single tough Polyester Film or Polyester Film-backed diaphragm.

Patented design provides overlapping of low and high setpoint ranges for maximum coverage in any application.

Explosion-proof threaded top is removable for easy maintenance or to adjust switch without disturbing wiring.

Accurate, dependable long-lived operation results from the built-in quality of Duotect® pressure switches. They are designed for sequencing work where two different actions are to be triggered, as pressure of a liquid or gas increases or decreases. This permits control and protection of many types of equipment and systems subject to pressure variations. The patented design consists of two pistons in a concentric arrangement, operated by a single diaphragm with one pressure chamber. Each piston actuates a separate switch independent of the other. The switches may be adjusted to operate together, or at opposite ends of the range, or at any two intermediate setpoints. They can be easily field adjusted. For quick maintenance, the threaded top is removed to adjust or service switches without disturbing electrical or pressure connections. The controls are UL and CSA Listed as Explosion Proof, Class I, Groups B, C, D. Class II groups E, F & G, and weatherproof NEMA-4.

Expanded Listings. Consult factory for models that are UL Listed (not CSA) Explosion-proof Class I, Groups A, B, C, & D; Class II, Groups E, F, & G; Weatherproof, NEMA-4X. Contacts rated 10 amp @ 125/250 VAC, 5 amps @ 30 VDC.



*U.S. Patent No. 3,657,501

APPLICATIONS

Widely used for OEM and plant installation for control and alarm systems on equipment subject to pressure variations of liquids, air and gases. Suitable for protection of motors, pumps, compressors, generators, engines, mills, presses, automatic production fixtures, processing and treatment plants, etc.

SPECIFICATIONS

Wetted Materials: Aluminum chamber with Polyester Film diaphragm and Buna-N O-ring standard. Brass chamber or 316 SS chamber optional. FEB diaphragm optional. Fluoroelastomer or EPDM O-ring optional.
Temperature Limit: 275°F (135°C). CSA Approved: -20 to 90°C (-4 to 184°F).
Pressure Limit: 1500 psig (103 bar).
Enclosure Rating: UL listed explosion proof, Class I, Groups B, C, and D. Class II Groups E, F, and G. Weatherproof, NEMA 4. CSA optional. Class I, Groups B, C & D. Class II, Groups E, F & G -20°C ≤ Tamb ≤ 75°C T6 [optional -20°C ≤ Tamb ≤40°C T5] Type 4.
Switch Type: Two SPDT snap switches.
Electrical Rating: 5A @ 125/250 VAC. 5A res., 3 A ind. @ 30 VDC. Gold Contacts or 10A switch optional.
Electrical Connections: 18 AWG, 18″ (460 mm) long.
Conduit Connection: 3/4″ female NPT.
Process Connection: 1/4″ female NPT.
Mounting Orientation: Any position.
Set Point Adjustment: Internal nut.
Weight: 2 lb (.9 kg).
Deadband: Approximately 10% of range.
Agency Approvals: CE, UL, CSA.

MODELS

MODEL NUMBER/WETTED MATERIAL			PRESSURE –psi (bar)	
ALUM/ POLYESTER FILM BUNA-N	BRASS/ POLYESTER FILM BUNA-N	316 SS/ FEB BUNA-N	LOW SWITCH	HIGH SWITCH
H2A-1	H2B-1	H2S-1	3-40 (.21-2.76)	5-75 (0.35-5.17)
H2A-2	H2B-2	H2S-2	25-250 (1.72-17.2)	30-400 (2.07-27.6)
H2A-3	H2B-3	H2S-3	100-1000 (6.89-68.9)	150-1500 (10.3-103)
Switch deadband approximately 10% of range				

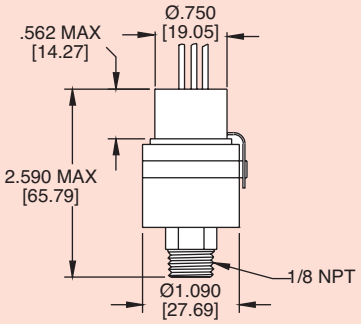
OPTIONS (Add as a suffix to model number)

-CSA CSA approved construction
-MV Gold contacts on snap switch for dry circuits rated 1A @ 125 VAC, 1A res. or .5A ind. @ 30 VDC
-VIT Fluoroelastomer O-rings
-EPDM EPDM O-rings
-TF FEB diaphragm where not standard
For single set point, add suffix S to range number, i.e. H2A-1S

Series APS/ AVS

Adjustable Pressure Switch

Vacuum and Pressure Ranges, 5A Switch, Compact Size



Miniature Series APS/AVS Adjustable Switches offer reliable switching for pressure/vacuum alarm, shutdown or control. The units are readily adjustable throughout their range using the locking adjusting ring and indicating pointer. The body is constructed of stainless steel for durability in harsh environments. Switches include 12˝ (30 cm) wire leads sealed with epoxy for additional protection.

SPECIFICATIONS

Service: Compatible liquids or gases.
Wetted Materials: Capsule: 17-7 PH; Fitting: 303 stainless steel.
Temperature Limits: -65 to 225°F (-54 to 107°C), a set point change of up to 2% when used below -10°F (-23°C) or above 125°F (52°C).
Pressure/Vacuum Limits: 150% of range.
Switch Type: SPDT snap action.
Electrical Ratings: 5A @ 250 VAC, 3A @ 28 VDC.
Electrical Connections: 3-wire, 20 AWG insulated with PVC, 12˝ (30 cm) length.
Process Connection: 1/8˝ male NPT.
Setpoint: Field adjustable.
Cycling: Not to exceed 20 CPM.
Sensor Element: Capsule.
Weight: 3 oz (85 g).

MODELS

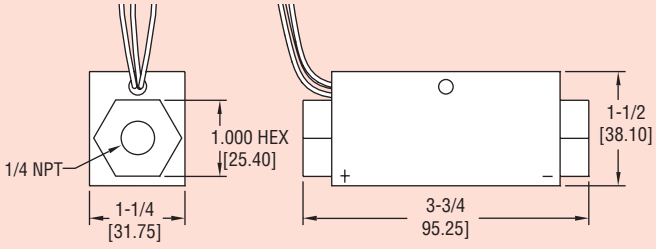
Model Number	Set Point Range psi (bar)		Repeatability psi (bar)	Deadband psi (bar)	Model Number	Set Point Range ˝Hg (cm Hg) Vac		Repeatability ˝Hg (cm Hg)	Deadband ˝Hg (cm Hg)
	Increasing	Decreasing				Increasing	Decreasing		
APS-150	0.8-28.5(.06-2.0)	1.6-30.0(.11-2.1)	±0.6(.04)	0.8-1.3(.06-.09)	AVS-150	1.6-27.1 (4.1-68.6)	2.7-28.2 (6.9-71.6)	±1.2 (3.1)	1.3-2.7 (3.3-6.9)
APS-250	2.0-48.0(.14-3.3)	3.0-50.0(.21-3.5)	±1.0(0.7)	1-1.7(.07-.12)	AVS-250	4.0-24.8 (10.2-63.0)	5.1-28.2 (13.0-71.6)	±2.0 (5.1)	1.5-3.2 (3.8-8.1)
APS-350	3.0-96.5(.21-6.7)	4.5-100(.31-6.9)	±2.0(.14)	1.6-4(.11-.28)	AVS-350	6.0-21.5 (15.2-54.6)	8.4-28.2 (21.3-71.6)	±4.0 (10.2)	2.6-7.3 (6.6-18.5)
APS-450	7.5-242(.52-16.7)	9.7-250(.67-17.2)	±5.0(.35)	2.5-9(.17-.62)					
APS-550	15.0-485(1.0-33.4)	20.0-500(1.4-34.5)	±10.0(.69)	5-22(.35-1.5)					

Series A4

Differential Pressure Switch

Adjustable Set Point, High Overpressure

CE



Rugged Series A4 Differential Pressure Switch offers field adjustments and can handle system pressures up to 6000 psig. Piston design allows mounting in any orientation. The switch is capable of carrying moderate shock and vibratory loads.

MODELS

Model Number	Repeatability psi (bar)	Set Point psid (bar)	
		Increasing	Decreasing
A4-1	±2 (.14)	7-13 (.48-.89)	2-7 (.14-.48)
A4-2	±4 (.28)	13-25 (.89-1.7)	5-16 (.34-1.1)
A4-3	±8 (.55)	25-45 (1.7-3.1)	10-21 (.68-1.5)
A4-4	±16 (1.1)	35-160 (2.4-11.0)	20-80 (1.4-5.5)
A4-5	±32 (2.2)	120-250 (8.3-17.2)	35-120 (2.4-8.3)

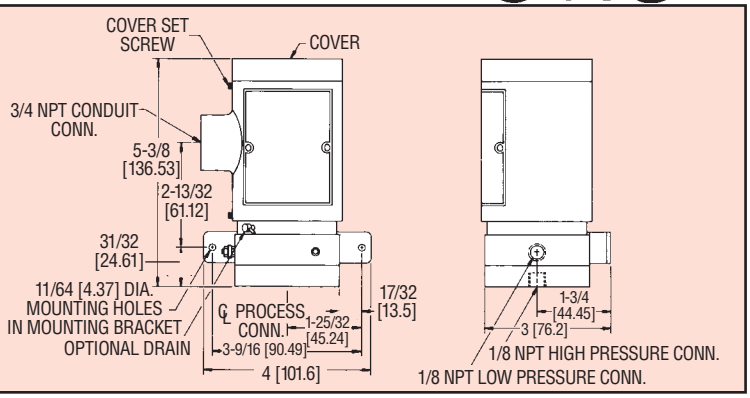
SPECIFICATIONS

Service: Compatible gases.
Wetted Materials: Body, piston, and fittings: anodized aluminum;. spring: steel.
Temperature Limits: -65 to 225°F (-54 to 107°C).
Pressure Limits: 2000 psid (138 bar), 6000 psig (413 bar).
Repeatability: See table.
Switch Type: SPDT.
Electrical Rating: AC: 3 VA, 0.25A @ 120 VAC; DC: 5 VA, 0.25A @ 175 VDC.
Electrical Connection: 24 AWG X 12˝ (30.5 cm) wire leads.
Process Connection: 1/4˝ female NPT.
Mounting Orientation: Any.
Set Point Adjustment: See table.
Weight: 8.5 oz (241 g).
Agency Approvals: CE.

Series H3 Explosion-Proof Differential Pressure Switches

Setpoints from 10" w.c. to 200 psid — Rated 1500 psig, Weatherproof

Patent No. 4,827,095



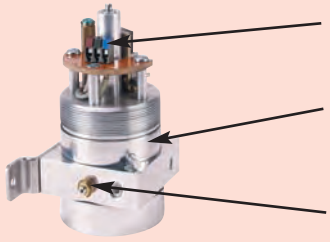
Explosion-proof, heavy duty, industrial unit has patented and unique new design which provides sensitivity to differential pressures as low as 10 inches of water (254 mm w.c.), yet handles total pressure of 1500 psi (103 bar). Unlike common differential pressure switches that use a piston-type motion transfer, the Series H3 utilizes a rotary motion transfer shaft that prevents a change in total pressure from causing a setpoint shift. Unit yields deadbands approximately 5% of range, with zero setpoint shift due to variation in working pressures. Friction is minimized and repeatability increased by allowing range spring to act directly on diaphragm plate. Rolling diaphragm design maintains constant effective area to further reduce friction. Diaphragm is allowed to "seat", allowing application of full rated pressure, up to 1500 psi (103 bar), on either high or low pressure port, without damage. Special overtravel feature prevents overtightening of range adjust screw. Choose optional brass chamber for water and water-based fluids or 316 stainless steel for harsher applications.

SPECIFICATIONS

Wetted Materials: See pressure chamber and diaphragm material in model chart.
Temperature Limit: -4 to 220°F (-20 to 104°C), ATEX: -20 to 90°C (-4 to 194°F).
Pressure Limit: 1500 psig (103 bar).
Enclosure Rating: See ratings chart.
Switch Type: SPDT or DPDT snap switch.
Electrical Rating: 5A @ 125/250 VAC, 30 VDC.
Electrical Connections: See model chart.
Conduit Connection: 3/4" female NPT.
Process Connection: 1/8" female NPT.
Mounting Orientation: Vertical.
Set Point Adjustment: Internal screw.
Weight: 4 lb, 2 oz (2 kg).
Deadband: Approximately 5% of range.
Agency Approvals: UL, CSA, CE, and ATEX see ratings chart.

HAZARDOUS LOCATION/WEATHERPROOF RATINGS

MODEL	UL	CSA	Directive 94/9/EC ATEX Compliant
H3_–__C	—	—	CE 0344 Ex II 2 G EEx d IIB -20°C≤ T amb ≤ 75°C T6 EC-Type Certificate No. KEMA 03ATEX 2584
H3_–__L H3_–__T	Cl. I, Gr.B, C & D Cl. II, Gr.E, F & G NEMA 4X	Cl. I, Gr.B, C & D Cl. II, Gr.E, F & G NEMA 4	—
H3_–__C-DR	—	—	CE 0344 Ex II 2 G EEx d IIB -20°C≤ T amb ≤ 75°C T6 EC-Type Certificate No. KEMA 03ATEX 2584
H3_–__L-DR	Cl. I, Gr.B, C & D Cl. II, Gr.E, F & G NEMA 3	—	—



Internal terminal blocks for conductors up to 18 gauge are optional.

Optional NEMA 3 (IP 54) housing includes explosion-proof drain. Standard NEMA 4X (IP 56) version is without drain.

External Ground Connection Standard — Internal ground connection also standard — use either one.

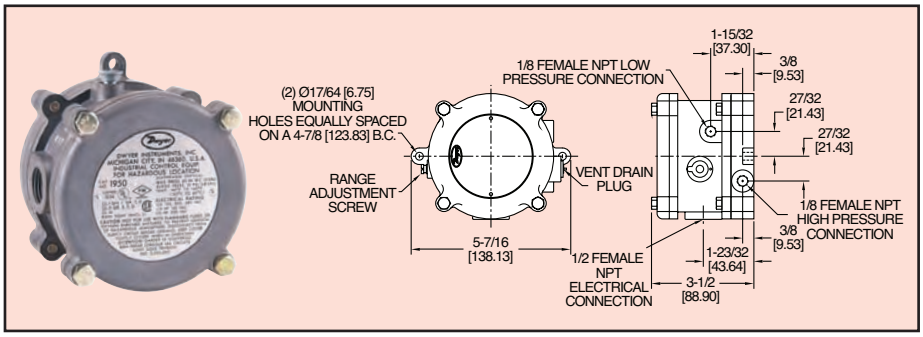
Note: Shown without housing and cover.

Model Chart - Series H3

Example	H3	S	2	S	C	MV	H3S-2SC-MV Differential Pressure Control; 316 SS pressure chamber and Fluoroelastomer diaphragm; weatherproof and ATEX; SPDT snap action switch with gold contacts; fixed deadband, automatic reset; adjustable range 0.5-15 psid
Construction	H3						Series designator, weatherproof and explosion-proof
Pressure Chamber & Diaphragm Material (Wetted)		A S					Aluminum chamber with Nitrile diaphragm 316 SS chamber with Fluoroelastomer diaphragm
Adjustable Operating Range			1 2 3 4				Adjustable range 10-180 in. w.c. (2.48-44.78 kPa) Adjustable range 0.5-15 psid (0.03-1 bar) Adjustable range 5-70 psid (.34-4.8 bar) Adjustable range 10-200 psid (.7-13.8 bar)
Circuit (Switch) Options				S D			SPDT snap action switch rated 5A @ 125/250 VAC, 30 VDC DPDT snap action switch rated 5A @ 125/250 VAC, 30 VDC
Electrical Connection					L T C		18 AWG x 18 inch lead wires UL, CSA approved internal terminal block ATEX approved internal terminal block
Options						DRAIN MV VIT	Housing with drain - allows condensate to be drained from inside enclosure (meets NEMA 3 instead of 4X) Gold contacts on snap switch for dry circuits rated 1A @ 125 VAC, 1A resistive or 0.5 A inductive @ 30 VDC Fluoroelastomer diaphragm option where not standard

Series 1950 Explosion-Proof Differential Pressure Switches

Compact, Low Cost, Explosion-proof and Weatherproof



Model 1950 Explosion-Proof Differential Pressure Switch combines the best features of the popular Dwyer® series 1900 Pressure Switch with an integral explosion-proof and weather-proof housing, making it an exceptional value for either application. It is CE, UL and CSA Listed, FM approved for use in Class I, Div. 1, Groups C and D, Class II Groups E, F, and G and Class III hazardous atmospheres (NEMA 7 & 9), Raintight (NEMA 3). Weatherproof features include a drain plug and O-ring seal in cover. Electrical connections are easily made by removing front cover. For convenience the set point adjustment screw is located on the outside of the housing. Twelve models offer set points from .03 to 20″ w.c. (7.5 kPa to 5 kPa) and from .5 to 50 psi (0.035 to 3.5 bar). The unit is very light and compact – about half the weight and bulk of other explosion-proof or weather-proof switches with separate enclosures.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult Factory.
Temperature Limits: -40 to 140°F (-40 to 60°C); 0 to 140°F (-17.8 to 60°C) for 1950P-8, 15, 25, and 50. -30 to 130°F (-34.4 to 54.4°C) for 1950-02.
Pressure Limits:
Continuous: 1950's - 45″ w.c. (0.11 bar); 1950P's - 35 psi (2.41 bar); 1950P-50 only - 70 psi (4.83 bar).
Surge: 1950's - 10 psi (0.69 bar), 1950P's - 50 psi (3.45 bar), 1950P-50 only - 90 psi (6.21 bar).
Enclosure Rating: IP64, NEMA 3, 7 and 9.
Switch Type: Single-pole double-throw (SPDT).
Electrical Rating: 15 A @, 125, 250, 480 VAC, 60 Hz. Resistive 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 60 Hz.
Electrical Connections: 3 screw type, common, normally open and normally closed.
Process Connections: 1/8″ female NPT.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Set Point Adjustment: Screw type on top of housing.
Weight: 3.25 lb (1.5 kg); 1950-02 model, 4.4 lb (2 kg).
Agency Approvals: CE, UL, CSA, FM.

SERIES 1950 SWITCHES - MODELS, OPERATING RANGES AND DEAD BANDS

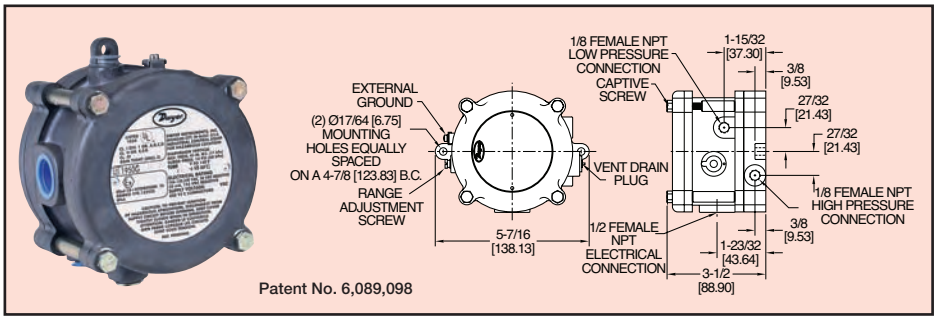
Model Number	Range, Inches W.C.	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950-02-2S	.03 to .10	.025	.05
1950-00-2F	.07 to .15	.04	.05
1950-0-2F	.15 to .50	.10	.15
1950-1-2F	.4 to 1.6	.15	.20
1950-5-2F	1.4 to 5.5	.30	.40
1950-10-2F	3 to 11	.40	.50
1950-20-2F	4 to 20	.40	.60

Model* Number	Range, PSID	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950P-2-2F	0.5 to 2	.3	.3
1950P-8-2F	1.5 to 8	1.0	1.0
1950P-15-2F	3 to 15	.9	.9
1950P-25-2F	4 to 25	.7	.7
1950P-50-2F	15 to 50	1.0	1.5

CAUTION: For use only with air or compatible gases. Applications with hazardous atmospheres and a single positive pressure may require special venting.
*P=PSID range models

Model 1950G Explosion-Proof Differential Pressure Switch

Explosion-Proof, Weatherproof, Compatible with Natural Gases



The Model 1950G Explosion-Proof Switch combines the best features of the popular Dwyer® Series 1950 Pressure Switch with the benefit of natural gas compatibility. Units are rain-tight for outdoor installations, and are UL listed for use in Class I, Groups A, B, C, & D; Class II, Groups E, F, & G and Class III atmospheres, Directive 94/9/EC (ATEX) Compliant for CE Ex 11 2 G EExd IIB & Hydrogen T6 and CSA & FM approved for Class I, Div 1, Groups B, C, D; Class II, Div 1, Groups E, F, G and Class III atmospheres. The 1950G is very compact, about half the weight and bulk of equivalent conventional explosion-proof switches.
Easy access to the SPDT relay and power supply terminals is provided by removing the top plate of the aluminum housing. A supply voltage of 24 VDC, 120 or 240 VAC is required. A captive screw allows the cover to swing aside while remaining attached to the unit. Adjustment to the set point of the switch can be made without disassembly of the housing.

SPECIFICATIONS

Service: Air and compatible combustible gases.
Wetted Materials: Contact Factory.
Temperature Limits: 0 to 140°F (18 to 60°C). Note: Set point drift may occur with ambient temperature changes.
Pressure Limits: 45″ w.c. (11.2 kPa) continuous; 10 psig (68.95 kPa) surge.
Enclosure Rating: IP64, NEMA 3, 7 and 9.
Switch Type: 1 Form C relay (SPDT).
Electrical Rating: 10A, 120/240 VAC, 28 VDC. Resistive 50 mA, 125 VDC.
Power Requirements: 24 VDC ±10%. 120 or 240 VAC ±10% optional.
Electrical Connections: Internal Terminal Block.
Process Connections: 1/8″ female NPT.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Set Point Adjustment: Screw type on top of housing.
Weight: 2 lb 15.7 oz. (1.35 kg).
Agency Approvals: CE, UL, CSA, FM, ATEX.

MODELS

Model Number[1]	Range, Inches W.C.	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950G-00-B-24	.07 to .15	.04	.06
1950G-0-B-24	.15 to .50	.06	.11
1950G-1-B-24	.4 to 1.6	.11	.29
1950G-5-B-24	1.4 to 5.5	.4	.9
1950G-10-B-24	3 to 11	.9	1.8
1950G-20-B-24	4 to 20	1.2	3.0

[1]Note: For alternate supply voltages change 24 to 120 or 240. Example: 1950G-00-B-120

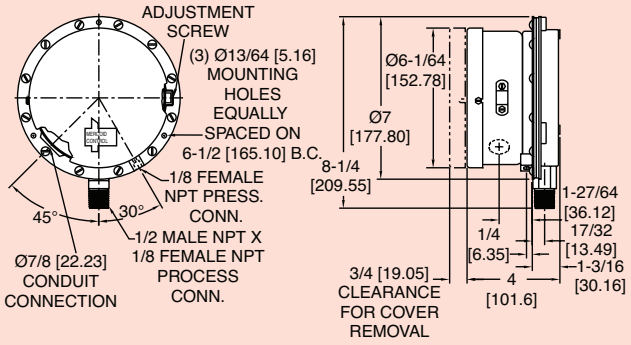
Mercoid®

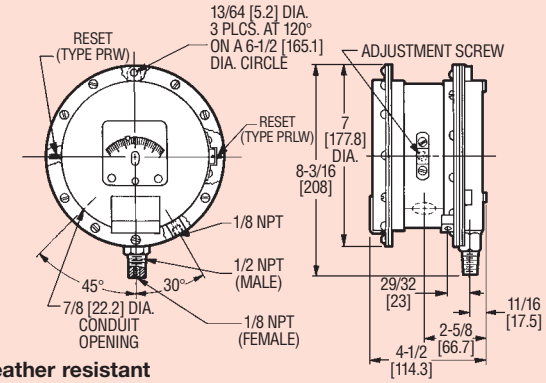
Series PG

Gas Pressure/Differential Pressure Switches

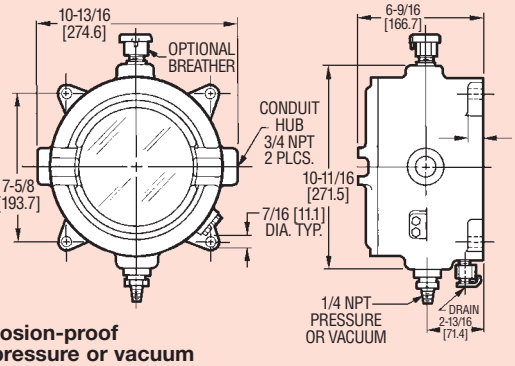
External Adjustment, Visible Dial, Hermetically Sealed Snap Switch

General purpose

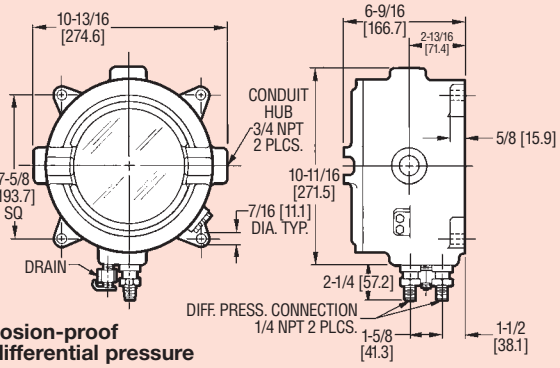




Weather resistant



Explosion-proof for pressure or vacuum



Explosion-proof for differential pressure

Large sensitive diaphragm and reliable, time proven mechanical design are combined in Series PG pressure/differential pressure switches. For use with air and other compatible gases, they feature excellent ±1% of full scale repeatability, clear easy-to-read scale and convenient external setpoint adjustment.

Application flexibility is assured by a large variety of switching options including SPST, SPDT, DPST and DPDT; opening or closing on increasing pressure, vacuum or differential. PR and PRL models add manual reset operation on increasing or decreasing pressure. Mercury switches or hermetically sealed snap switches are available where high humidity would be a problem. If vibration or other factors preclude the use of mercury, snap switches can be provided. Standard housing is NEMA-1. Optional enclosures can be supplied for weather resistant and explosion-proof requirements.

SPECIFICATIONS

Wetted Materials: Fairprene, brass, steel, and aluminum.
Temperature Limits: -10 to 180°F (-23 to 82°C).
Pressure Limit:
Single Pressure Use on High Side:
Sustained Pressure: 15 psig (1.0 bar).
Surge Limit: 20 psig (1.4 bar).
Differential Pressure Use:
Sustained Pressure, Range P1: 2 psig (.14 bar).
Sustained Pressure, Range P2: 10 psig (0.7 bar).
Enclosure Rating: General purpose. Weatherproof and explosion-proof optional.
Repeatability: ±1% of full range.
Switch Type: See model chart.
Electrical Rating: See model chart.
Electrical Connections: Screw type.
Conduit Connection: 7/8″ (22.23 mm) hole for 1/2″ (12.7 mm) conduit hub.
Process Connection: 1/2″ male NPT and 1/8″ female NPT used for single positive pressure or high differential pressure, 1/8″ female NPT used for single vacuum or low differential pressure.
Mounting Orientation: Vertical.
Set Point Adjustment: External screw.
Weight: 4.5 lb (2 kg).
Deadband: See model chart.
Agency Approvals: UL, CSA, FM for mercury switch models. UL only on snap switch models.

MODEL CHART – SERIES PG

EXAMPLE	PG	–	–	153	P1	PG-153-P1 (Vacuum) (Pressure) (Differential Pressure) Control, fixed deadband, automatic reset,SPDT mercury switch, adjustable range. 1.0-30″ w.c. (25-760).	UL	FM	CSA
CONSTRUCTION	PG					General purpose enclosure, NEMA-1 (standard).	UL	FM	CSA
RESET OPERATIONS	PR					Manual reset–operates on pressure increase automatically, resets on decrease[1].	UL	FM	CSA
	PRL					Manual reset–operates on pressure decrease automatically, resets on increase[1].	UL	FM	CSA
HOUSING OPTIONS		W				Weather-resistant enclosure, NEMA-2, 3R		FM	CSA
		E				Explosion-proof enclosure, NEMA-7, 9 – Class I Group C&D; Class II Group E, F, & G. Includes drain. Specify if for pressure, vacuum or differential pressure.			
CIRCUIT (SWITCHING) OPTIONS (For Electrical Codes see Chart Below)				2		SPST mercury switch, Elect Code K† – opens on vacuum, pressure or differential pressure increase.	UL	FM	CSA
				2P		SPST mercury switch, Elect Code L† – opens on vacuum, pressure or differential pressure increase	UL	FM	CSA
				3		SPST mercury switch, Elect Code K† – closes on vacuum, pressure or differential pressure increase	UL	FM	CSA
				3P		SPST mercury switch, Elect Code L† – closes on vacuum, pressure or differential pressure increase	UL	FM	CSA
				153		SPDT mercury switch, Elect Code M†	UL	FM	CSA
				103		DPST: Two SPST mercury switches, Elect Code L† – both close on increase FM approved PG, PGW only	UL	FM	CSA
				105		DPST: Two SPST mercury switches, One Elect Code L†, One Elect Code N – Both open on decrease.	UL	FM	CSA
				127		DPST: Two SPST mercury switches, Elect Code L† – both open on increase	UL	FM	CSA
				129		DPST: Two SPST mercury switches, One Elect Code L†, One Elect Code N – Both open on increase.	UL	FM	CSA
				158		SPDT: Two SPST mercury switches, One Elect Code L† – opens on increase, One Elect Code N – closes on increase	UL	FM	CSA
				161		SPDT: Two SPST mercury switches, One Elect Code L† – opens on decrease, One Elect Code N – closes on decrease	UL	FM	CSA
				156		SPDT: Two SPST mercury switches, Elect Code L† – One opens on increase, One closes on increase	UL	FM	CSA
				804		DPDT: Two SPDT mercury switches, Elect Code M†			
				(__)		Other Circuits Available, consult factory.			
			7000	153		SPDT: Snap acting switch, Rated 15A at 120 VAC, 8A at 240 VAC, 0.5A at 120 VDC, .25A at 240 VDC (1)			
				153HS		SPDT Hermetically Sealed Snap Switch, Rated 5A@125/250 VAC 5A resistive @ 30 VDC.	UL		
				153HG		SPDT Hermetically Sealed Gold Contact Snap Switch, Rated 1A @ 125 VAC, 1A resistive @ 30 VDC.	UL		
			7200	804		DPDT: Two SPDT snap acting switches, Rated 5A at 120/240 VAC, 30 VDC resistive (1)			
ADJUSTABLE DIFFERENTIAL PRESSURE RANGES WITH MAXIMUM SUSTAINED PRESSURES					P1	Adjustable range 1.0-30″ w.c. (25-760), maximum sustained pressure 2 psig* [0.14]	UL	FM	CSA
					P2	Adjustable range 0.5-5 psig [.03-.35], maximum sustained pressure 10 psig* [.69]	UL	FM	CSA

(mm w.c.) [bar]

Notes: * Maximum sustained pressure 15 psig [1.0], maximum surge limit 20 psig [1.4], both ranges when used as single pressure switch with low pressure port vented to atmosphere.

[1] 7000-153 and 7200-804 not available with PR or PRL manual reset.

† See Electrical Rating Chart Below.

Electrical Ratings - Mercury Switch

CODE	RATING AC OR DC
K	6A at 120 V, 3A at 240V
L	10A at 120 V, 5A at 240V
M	4A at 120 V, 2A at 240V
N	1A at 120 V, 0.5A at 240V

Deadbands (mm w.c.) [bar] (Approx.)

	RANGE P1, 1-30 IN. W.C.			RANGE P2, .5-5.0 psid		
SINGLE MERCURY SWITCH	**MINIMUM In. wc**	**MIDDLE In. wc**	**MAXIMUM In. wc**	**MINIMUM psi**	**MIDDLE psi**	**MAXIMUM psi**
2 or -3	.7 (18)	1 (25)	1.3 (33)	.11 [.008]	.16 [.011]	.25 [.018]
2P or -3P	2 (50)	2.75 (70)	4 (102)	.31 [.022]	.44 [.031]	1.13 [.079]
152, -153, -4 or -54	1 (25)	1.5 (38)	1.9 (48)	.13 [.009]	.25 [.018]	.38 [.027]
DOUBLE MERCURY SWITCH						
103, -127 or -156	2.5 (65)	3.5 (90)	4.5 (114)	.38 [.027]	.56 [.039]	1.25 [.088]
105, -129, -158, -161 or -804	1.5 (33)	2 (50)	2.5 (64)	.22 [.015]	.31 [.022]	.75 [.053]
119, -131, -190	1.0 (25)	1.5 (38)	1.9 (48)	.13 [.009]	.25 [.018]	.38 [.027]
SINGLE SNAP SWITCH						
153	2.5 (65)	3 (80)	4 (102)	.38 [.027]	.44 [.031]	.5 [.035]
DOUBLE SNAP SWITCH						
804	.5 (12)	.6 (15)	.7 (18)	.13 [.009]	.16 [.011]	.19 [.013]

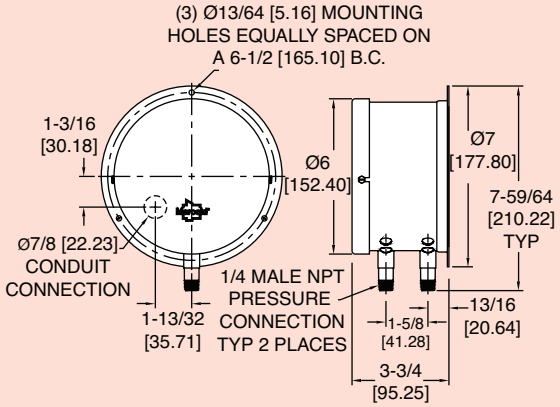
Mercoid®

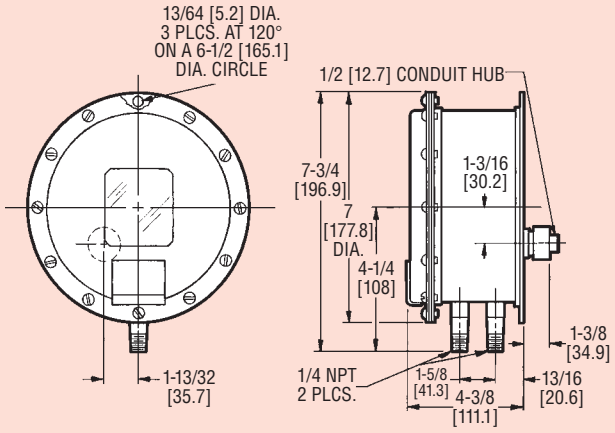
Series BB

Bourdon Tube Differential Pressure Switches

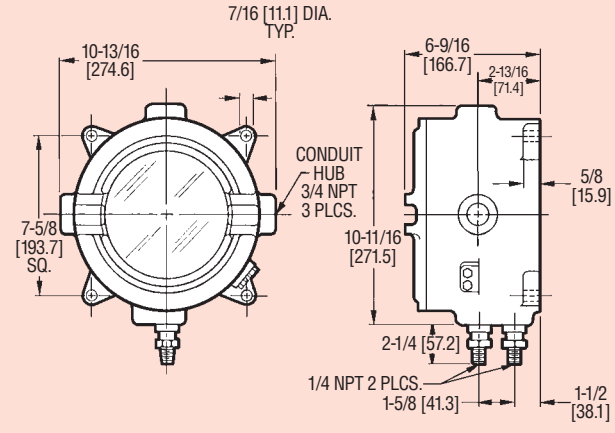
Stainless Steel Bourdon Tubes, Adjustable Deadband, Pressure Ranges to 8000 psig, Optional Explosion-proof Enclosure

General purpose





Weatherproof



Explosion-proof

Welded stainless steel Bourdon tubes reduce chance of leakage, (even in the event of fire), in model BB differential pressure switches. Units are ideal for checking differential pressure (head) across high pressure pumps and filters. Hermetically sealed mercury wetted contacts help ensure reliable operation. Extra sensitive (fixed deadband) units are available on special order as are weatherproof and explosion-proof enclosures.

SPECIFICATIONS

Wetted Materials: 403 SS Bourdon tube. 316 SS optional.
Temperature Limits: -10 to 180°F (-23 to 82°C).
Pressure Limit: Maximum pressure of the operating range.
Enclosure Rating: General purpose. Weatherproof and explosion-proof optional.
Switch Type: SPST mercury switch. See model chart.
Electrical Rating: 5A @ 120 VAC, 2.5A @ 240 VAC, 2.5A @ 120 VDC, 1A @ 240 VDC.
Electrical Connections: See model chart.
Conduit Connection: 7/8″ (22.23 mm) hole for 1/2″ (12.7 mm) conduit hub.
Process Connection: 1/4″ male NPT. 1/2″ male NPT on ranges 15S and 16S.
Mounting Orientation: Vertical. Vibration free.
Set Point Adjustment: Thumbwheel screw.
Weight: 4 lb (1.8 kg).
Deadband: See model chart.
Agency Approvals: CSA.

Suggested Specification

Differential pressure switches shall be operated by welded type (316) (403) stainless steel Bourdon tubes. No elastomeric or plastic O-rings, diaphragms or packing shall be used in pressure containment. Contacts shall be hermetically sealed and mercury wetted.

MODEL CHART – SERIES BB

EXAMPLE	BB		523	2	6S	BB-523-2-6S Differential Pressure Control, 403SS Bourdon Tubes, adjustable deadband, automatic reset, SPST magnetic mercury switch, adjustable range 0-40 psid, operating range 5-100 psig flanged back	
CONSTRUCTION	BB					General purpose enclosure, NEMA-1 (standard)	CSA
HOUSING OPTIONS		W				Weatherproof enclosure, NEMA-3S, 4, 4X	CSA
		E				Explosion-proof enclosure, NEMA-7, 9 – Class I Group C & D, Class II Group E, F & G.	CSA
CIRCUIT (SWITCHING) OPTIONS			2_ _	2		SPST magnetic mercury switch – opens on differential pressure increase. Fixed deadband. Rated at 0.3A at 120 VAC, 0.15A at 240 VAC	CSA
			2_ _	3		SPST magnetic mercury switch – closes on differential pressure increase. Fixed deadband. Rated at 0.3A at 120 VAC, 0.15A at 240 VAC	CSA
			4_ _	4122		2 stage: 2 each SPST magnetic mercury switches – 1 each opens on differential pressure increase, 1 each opens on further increase. Rated 0.3A at 120 VAC, 0.15A at 240 VAC	CSA
			4_ _	4129		2 stage: 2 each SPST magnetic mercury switches – 1 each closes on differential pressure increase, 1 each closes on further increase. Rated 0.3A at 120 VAC, 0.15A at 240 VAC	CSA
			4_ _	4132		2 stage: 2 each SPST magnetic mercury switches – 1 each closes on differential pressure increase, 1 each closes on differential pressure decrease. Both open mid range. Rated 0.3A at 120 VAC, 0.15A at 240 VAC	CSA
			4_ _	4123		2 stage: 2 each SPST magnetic mercury switches – 1 each opens on differential pressure increase, 1 each opens on differential pressure decrease. Both closed mid range. Rated 0.3A at 120 VAC, 0.15A at 240 VAC	CSA
			5_ _	2		SPST magnetic mercury switch, opens on differential pressure increase. Adjustable deadband, Rated 5A at 120 VAC, 2.5A at 240 VAC, 2½A at 120 VDC, 1A at 240 VDC	CSA
			5_ _	3		SPST magnetic mercury switch, closes on differential pressure increase. Adjustable deadband. Rated 5A at 120 VAC, 2.5A at 240 VAC, 2½A at 120 VDC, 1A at 240 VDC	CSA
BOURDON TUBE MATERIALS			2_			Type 403 stainless steel Bourdon Tubes.	CSA
			4_			Type 316 stainless steel Bourdon Tubes.	CSA
MOUNTING			3			Flanged back	CSA
ADJUSTABLE DIFFERENTIAL PRESSURE RANGES OPERATING PRESSURE RANGES Maximum pressure not to exceed maximum adjustable operating pressure range.					25S	Adjustable range 0-40 psid, operating range 30″ Hg. VAC – 60 psig, 403SS Bourdon Tube	CSA
					6S	Adjustable range 0-40 psid, operating range 5-100 psig, 403SS Bourdon Tube	CSA
					8S	Adjustable range 0-120 psid, operating range 10-200 psig, 403SS Bourdon Tube	CSA
					9S	Adjustable range 0-180 psid, operating range 10-300 psig, 403SS Bourdon Tube	CSA
					10S	Adjustable range 0-360 psid, operating range 25-600 psig, 403SS Bourdon Tube	CSA
					11S	Adjustable range 0-600 psid, operating range 50-1000 psig, 403SS Bourdon Tube	CSA
					12S	Adjustable range 0-900 psid, operating range 100-1500 psig, 403SS Bourdon Tube	CSA
					13S	Adjustable range 0-1500 psid, operating range 300-2500 psig, 403SS Bourdon Tube	CSA
					15S	Adjustable range 0-3000 psid, operating range 500-5000 psig, 403SS Bourdon Tube	CSA
					16S	Adjustable range 0-5000 psid, operating range 1000-8000 psig, 403SS Bourdon Tube	CSA
					23E	Adjustable range 0-38 psid, operating range 5-75 psig, 316SS Bourdon Tube	
					6E	Adjustable range 0-36 psid, operating range 10-100 psig, 316SS Bourdon Tube	
					24E	Adjustable range 0-55 psid, operating range 10-150 psig, 316SS Bourdon Tube	
					9E	Adjustable range 0-200 psid, operating range 10-300 psig, 316SS Bourdon Tube	
					21E	Adjustable range 0-275 psid, operating range 30-400 psig, 316SS Bourdon Tube	
					22E	Adjustable range 0-450 psid, operating range 75-800 psig, 316SS Bourdon Tube	
					11E	Adjustable range 0-500 psid, operating range 100-1000 psig, 316SS Bourdon Tube	
					13E	Adjustable range 0-925 psid, operating range 200-2500 psig, 316SS Bourdon Tube	

SWITCH DEADBAND

RANGE TABLE psi (kg/cm²)			SINGLE STAGE			TWO STAGE 4XX		
RANGE NO.	ADJ. RANGE psid (kg/cm²)	MAX. RANGE psid (kg/cm²)	APPROX. FIXED DEADBAND 2XX-2 2XX-3 psid (kg/cm²)	ADJUST. DEADBAND 5XX-2 5XX-3 psid (kg/cm²) MIN.	MAX.	APPROX. FIXED DEADBAND EACH SWITCH psid (kg/cm²)	SPREAD BTWN SWITCH OPERATIONS psi (kg/cm²) MIN.	MAX.
25S	0-40 (0-2.8)	60 (4.2)	.4 (0.028)	3 (0.21)	40 (2.8)	.5 (0.035)	2 (0.14)	12 (0.84)
6S	0-40 (0-2.8)	100 (7)	.4 (0.028)	3 (0.21)	40 (2.8)	.5 (0.035)	2 (0.14)	12 (0.84)
8S	0-120 (0-8.4)	200 (14)	.75 (0.053)	4 (0.28)	120 (8.4)	2 (0.14)	3 (0.21)	40 (2.8)
9S	0-180 (0-12.6)	300 (21)	1.25 (0.088)	6 (0.42)	180 (12.6)	4 (0.28)	5 (0.35)	60 (4.2)
10S	0-360 (0-25.2)	600 (42)	5 (0.35)	15 (1.05)	360 (25.2)	7 (0.49)	12 (0.84)	80 (5.6)
11S	0-600 (0-42)	1000 (70)	10 (0.7)	20 (1.4)	600 (42)	-	-	-
12S	0-900 (0-63)	1500 (105)	10-15 (0.7-1.05)	40 (2.8)	900 (63)	12 (0.84)	32 (2.24)	200 (14)
13S	0-1500 (0-105)	2500 (175)	30 (2.1)	50 (3.5)	1500 (105)	20 (1.4)	62 (4.34)	300 (21)
15S	0-3000 (0-210)	5000 (350)	50 (3.5)	125 (8.75)	3000 (210)	40 (2.8)	100 (7)	1500 (105)
16S	0-5000 (0-350)	8000 (562)	150 (10.5)	500 (35)	5000 (350)	125 (8.8)	300 (21)	2000 (140)
23E	0-38 (0-2.65)	75 (5)	1.25 (0.09)	3.5 (0.25)	38 (2.65)	2 (0.14)	2.25 (0.16)	5.5 (0.40)
6E	0-36 (0-2.50)	100 (7)	1.8 (0.12)	4 (0.28)	36 (2.50)	2.5 (0.18)	3 (0.21)	9 (0.63)
4E	0-55 (0-3.85)	150 (10)	2 (0.14)	5 (0.35)	55 (3.85)	3.25 (0.23)	4 (0.28)	11 (0.77)
9E	0-200 (0-14)	300 (21)	3.75 (0.26)	14 (1.0)	200 (14)	6 (0.43)	7 (0.49)	27 (1.90)
21E	0-275 (0-19)	400 (28)	6.5 (0.46)	18 (1.27)	275 (19)	9 (0.64)	12 (0.84)	60 (4.22)
22E	0-450 (0-31)	800 (56)	13 (0.90)	20 (1.40)	450 (31)	20 (1.40)	26 (1.83)	75 (5.27)
11E	0-500 (0-35)	1000 (70)	25 (1.75)	25 (1.75)	500 (35)	35 (2.50)	45 (3.10)	125 (8.80)
13E	0-925 (0-65)	2500 (175)	50 (3.50)	65 (4.60)	925 (65)	50 (3.50)	90 (6.23)	175 (12.30)

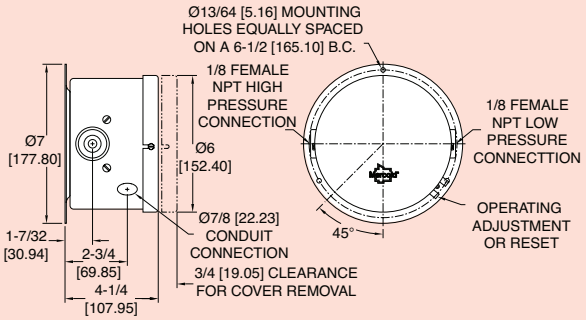
Mercoid®

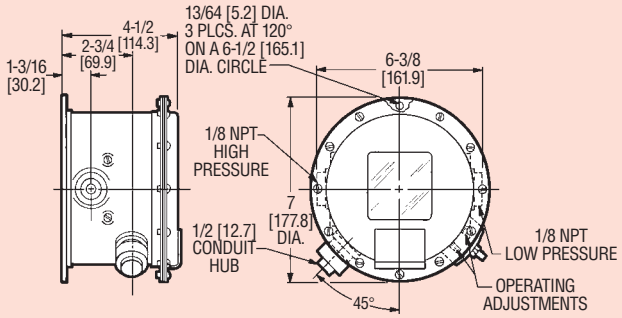
Series DP

Double Bellows Differential Pressure Switches

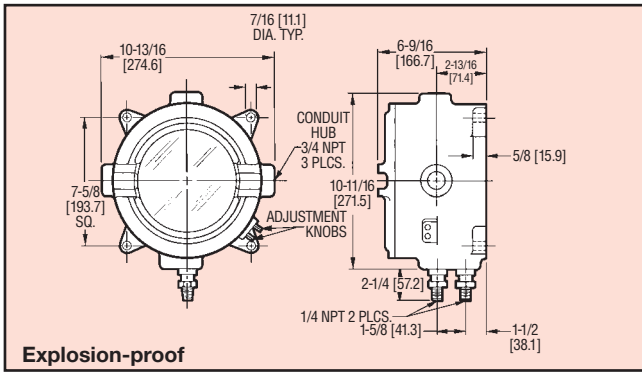
Visible Setpoints, Adjustable or Fixed Deadband, High Pressure Ranges

General purpose





Weatherproof



Explosion-proof

Two opposing bellows in the Model DP differential pressure switch result in maximum sensitivity, quick response to changes and good vibration resistance. Choice of brass or 316 stainless steel assures broad media compatibility. Setpoint adjustment is easy thanks to external knobs and large, clear scale reading directly in psid.

A wide variety of switches and circuit styles enables exactly the specific type of control function needed for any system. Mercury® switches are a good choice for humid areas while snap switches are better able to resist vibration. Various operations possible include single adjustment – fixed deadband, double adjustment – adjustable deadband, manual reset (increasing or decreasing pressure) and two stage with each SPST or SPDT switch independently adjustable. Standard enclosure is NEMA-1 style. Optional weatherproof construction is for outdoor use and explosion-proof enclosure meets requirements for Class I, Groups C & D; Class II, Groups E, F & G.

SPECIFICATIONS

Wetted Materials: Brass on ranges 61, 62, 63 or 316 SS on ranges 62E, 64E, 65E.
Temperature Limits: –10 to 180°F (–23 to 82°C).
Pressure Limit: Maximum pressure of the operating range.
Enclosure Rating: General purpose, weatherproof or explosion-proof.
Switch Type: Mercury or snap switch, see model chart.
Electrical Rating: See model chart.
Electrical Connection: Screw terminal.
Conduit Connection: General purpose: 1/2″ hole for conduit hub. Weatherproof: 1/2″ conduit hub. Explosion-proof: 3/4″female NPT.
Process Connection: General purpose and weatherproof: 1/8″female NPT, explosion-proof: 1/4″male NPT.
Mounting Orientation: Vertical.
Set Point Adjustment: Thumbscrew.
Weight: General purpose: 5 lb (2.3 kg), weatherproof: 7 lb (3 kg), explosion-proof: 25 lb (11 kg).
Deadband: See deadband charts.

Suggested Specification

Differential pressure switch shall be operated by opposing bellows of (brass) (316 stainless steel). Bellows shall actuate (one) (two) (SPST) (SPDT) (DPDT), (mercury) (snap) switches over range of 0-(___) PSID. Switch shall be Mercoid® Differential Pressure Switch Model DP(___)-(___)-(___)-(___).

SWITCH DEADBAND - SINGLE STAGE psid [kg/cm²]

RANGE NUMBER	RANGE psid	MAX. PRESS. psi	APPROX. DEADBAND WITH MERCURY SWITCH			APPROX. DEADBAND WITH SNAP SWITCH		
			ADJ. MIN.		FIXED	ADJ. MIN.	FIXED	2 FIXED
			DPA33	DPA-533	DPS-233	DPA-7033-153	DPS-7233-153	DPS-7233-804
61	0-10 [0-0.7]	50 [3.5]	1 [0.07]	.75 [0.053]	.38 [0.027]	1.5 [0.11]	.5 [0.035]	.6 [0.042]
62	0-20 [0-1.4]	100 [7.0]	1.5 [0.11]	1 [0.07]	.5 [0.035]	2.5 [0.18]	1 [0.07]	1 [0.07]
64	0-30 [0-2.1]	300 [21]	3 [0.21]	2 [0.14]	.75 [0.053]	6 [0.42]	1.5 [0.11]	1.5 [0.11]
			DPA43	DPA-543	DPS-243	DPA-7043-153	DPS-7243-153	DPS-7243-804
62E	0-20 [0-1.4]	100 [7.0]	2 [0.14]	1.5 [0.11]	1 [0.07]	3 [0.21]	1.5 [0.11]	1.5 [0.11]
64E	0-30 [0-2.1]	300 [21]	3.5 [0.25]	2.5 [0.18]	1.5 [0.11]	6 [0.42]	2 [0.14]	2.5 [0.18]
65E	0-80 [0-5.6]	600 [42]	16 [1.12]	4 [0.28]	3 [0.21]	20 [1.4]	6 [0.42]	8 [0.56]

SWITCH DEADBAND - TWO STAGE psid [kg/cm²]

RANGE NUMBER	RANGE psid	MAX. PRESS. psi	DPA 400 WITH MERCURY SWITCHES		DPA 7400 WITH SNAP SWITCHES	
			MINIMUM SPREAD BETWEEN SWITCHES DPA433	FIXED DEADBAND APPROX. DPA433	MINIMUM SPREAD BETWEEN SWITCHES DPA7433	FIXED DEADBAND APPROX. DPA7433
61	0-10 0-0.7	50 3.5	2 [0.14]	.5 [0.035]	1.5 [0.11]	.6 [0.042]
62	0-20 0-1.4	100 7.0	4 [0.28]	1 [0.07]	3 [0.21]	1 [0.07]
64	0-30 0-2.1	300 21	8 [0.56]	1.5 [0.11]	6 [0.42]	1.5 [0.11]]
			DPA443	DPA443	DPA7443	DPA7443
62E	0-20 0-1.4	100 7.0	4 [0.28]	.75 [0.053]	3.5 [0.25]	1.5 [0.11]
64E	0-30 0-2.1	300 21	8 [0.56]	1 [0.07]	6.5 [0.46]	2.5 [0.18]
65E	0-80 0-5.6	600 42	16 [1.12]	6 [0.42]	20 [1.4]	12 [0.84]

MODEL CHART – SERIES DP

EXAMPLE	DPA	_	_ _33	_153	_	_	61	DPA-33-153-61 Differential Pressure Control, brass bellows, adjustable deadband, automatic reset, SPDT mercury switch, adjustable range 0-10 psid [0-0.7], operating range 30″ Hg. VAC – 50 psig [75 cm Hg- VAC -3.5].	
CONSTRUCTION	DP_							General purpose enclosure, NEMA-1 (standard)	CSA
RESET OPTIONS	A							Automatic reset, adjustable deadband, double adjustment	
	R					U		Manual reset, single adjustment – operates on decrease automatically	CSA
	R					L		Manual reset, single adjustment – operates on increase automatically	CSA
	S							Fixed deadband, single adjustment, automatic reset	
HOUSING OPTIONS		W						Weatherproof enclosure, NEMA-3R, 4, 4X	CSA
		E						Explosion-proof enclosure, NEMA-7, 9 – Class I, Group C & D, Class II, Group E, F & G	CSA
CIRCUIT (SWITCHING) OPTIONS FOR ELECTRICAL CODE SEE CHART BELOW.				2				SPST mercury switch, Elect Code A – opens on differential pressure increase	CSA
				3				SPST mercury switch, Elect Code A – closes on differential pressure increase	CSA
				153				SPDT mercury switch, Elect Code B	CSA
				156				SPDT: 2 each SPST mercury switches – 1 each opens on differential pressure increase, 1 each closes on differential pressure increase. Elect Code A	CSA
				804				DPDT: 2 each SPDT mercury switches, Elect Code B	CSA
				( )				Other circuits available, consult factory.	
	S		2_ _	2				SPST magnetic mercury switch, Elect Code I – opens on differential pressure increase. Fixed deadband.	CSA
	S		2_ _	3				SPST magnetic mercury switch, Elect Code I – closes on differential pressure increase. Fixed deadband.	CSA
			4_ _	4122				2 stage: 2 each SPST magnetic mercury switches – 1 each opens on differential pressure increase, 1 each opens on further increase. Elect rating per note †† below.	CSA
			4_ _	4132				2 stage: 2 each SPST magnetic mercury switches – 1 each closes on differential pressure increase, 1 each closes on decrease. Both open mid range. Elect rating per note †† below.	CSA
			4_ _	4129				2 stage: 2 each SPST magnetic mercury switches – 1 each closes on differential pressure increase, 1 each closes on further increase. Elect rating per note †† below.	CSA
			4_ _	4123				2 stage: 2 each SPST magnetic mercury switches – 1 each opens on differential pressure increase, 1 each opens on decrease. Both closed mid range. Elect rating per note †† below.	CSA
			5_ _	2				SPST magnetic mercury switch, Elect Code H – opens on differential pressure increase. Narrow adjustable deadband.	CSA
			5_ _	3				SPST magnetic mercury switch, Elect Code H – closes on differential pressure increase. Narrow adjustable deadband.	CSA
			70_ _	153				SPDT snap acting switch. Elect Code D, adjustable deadband.	
			70_ _	804				DPDT: 2 each SPDT snap acting switches, consult factory.	
	S		72_ _	153				SPDT snap acting switch, Elect Code E, Fixed deadband, Note ‡‡	
	S		72_ _	804				DPDT: 2 SPDT snap acting switches. Fixed deadband, Elect Code G. Note ‡‡	
			74_ _					2 stage: 2 each SPDT snap acting switches. Elect Code G. Note ‡‡	
OPTION					B			Optional: Acetal Bushed Movement	
BELLOWS MATERIALS			_ _33					Brass bellows. Ranges 61, 62, 64 only	CSA
			_ _43					Type 316 Stainless Steel bellows – ranges 62E, 64E, 65E only	CSA
ADJUSTABLE DIFFERENTIAL PRESSURE RANGES OPERATING PRESSURE RANGES							61	Adjustable range 0-10 psid, operating range 30″ Hg VAC -50 psig [75 cm Hg VAC -3.5]	CSA
							62	Adjustable range 0-20 psid, operating range 30″ Hg VAC -100 psig [75 cm Hg VAC -7.0]	CSA
							64	Adjustable range 0-30 psid, operating range 30″ Hg VAC -300 psig [75 cm Hg VAC -21]	CSA
							62E	Adjustable range 0-20 psid, operating range 30″ Hg VAC -100 psig [75 cm Hg VAC -7.0]	CSA
							64E	Adjustable range 0-30 psid, operating range 30″ Hg VAC -300 psig [75 cm Hg VAC -21]	CSA
							65E	Adjustable range 0-80 psid, operating range 30″ Hg VAC -600 psig [75 cm Hg VAC -42]	CSA

[kg/cm²]

Electrical Ratings DP Control

CODE	SUFFIX	AC CAPACITY 120V	AC CAPACITY 240V	AC CAPACITY 440V	DC CAPACITY HP 120V	DC CAPACITY HP 240V	AC	DC
A	-2, -3 -156	10A	5A	3A	10A	5A	3/4	1/3
B	-153 -804	4A	2A	**	4A	2A	1/8	NA
D	-153	15A	15A	15A	0.5A	0.25A	1/8	NA
E	-153	15A	15A	NA	‡	‡	†	NA
G	-804	5A	5A	NA	•	•	NA	NA
H	-2, -3	5A	2A	NA	2.5A	1A	1/8	1/10
I	*-2, -3	0.5A	0.25A	NA	0.25A	0.15A	NA	NA

* Also rated 1.0A at 24 VAC
† 1/4 HP at 120 VAC, 1/2 HP at 240 VAC
‡ DC controls up to 10A. Consult factory.
• 5A @ 30 VDC resistive.
** -153 Circuit available 1A @ 440V on special order.
†† DP-433 & DP-443 rated 0.3A at 120 VAC, 0.15A at 240 VAC, 0.9A at 24 VAC, 0.15A at 120 VDC, 0.07A at 240 VDC. Manual reset not available.
‡‡ Manual reset not available.

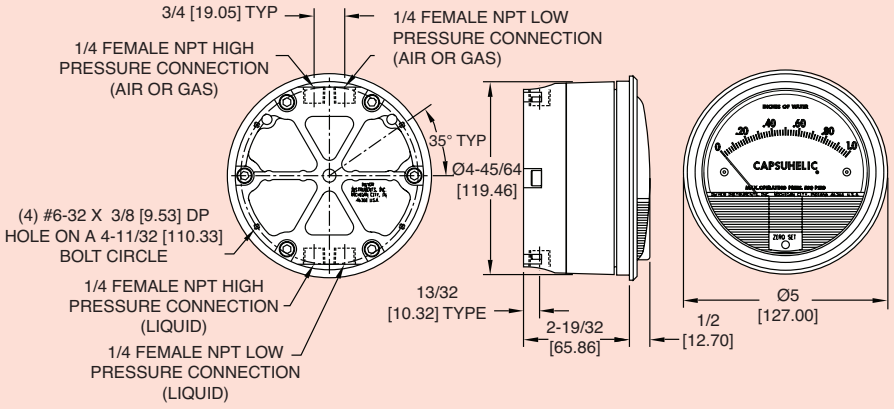
Series DP with Fluoroelastomer Diaphragm Seals

Seals may be connected with remote capillary (max. length 10 ft.) or mounted integrally with contrrols. Fluoroelastomer seal suitable up to 300 psig and temperature from -10 to 400°F.

Series 4000 Capsuhelic® Differential Pressure Gages

Measures Pressure, Vacuum or Differential, Suitable for Internal Pressures to 500 psig

Capsuhelic® Pressure Gage has a large, easy-to-read 4" (102 mm) dial.



Dimensions, Series 4000 Capsuhelic® Pressure Gages.

The Capsuhelic® gage is designed to give fast, accurate indication of differential pressures. The gage may be used as a readout device when measuring flowing fluids, pressure drop across filters, liquid levels in storage tanks and many other applications involving pressure, vacuum or differential pressure.

Using the basic design of Dwyer's time-proven Magnehelic® gage, the Capsuhelic® gage contains a simple, frictionless movement that permits full scale readings as low as 0.5 inch water column. The pressure being measured is held within a capsule which is an integral part of the gage. This containment of the pressure permits the use of the gage on system pressures of up to 500 psig, even when differentials to be read are less than 0.1 inch W.C.

The diaphragm-actuated Capsuhelic® gage requires no filling liquid which might limit its outdoor applications. Zero and range adjustments are made from outside the gage, and there is no need to disassemble the gage in normal service.

NOTE: May be used with Hydrogen where pressures are less than 35 psi.

SPECIFICATIONS

Service: Aluminum Case: Air and compatible gases and oil based liquids. Brass Case: Air and compatible gases and water based liquids.
Wetted Materials: Consult factory.
Housing: Die cast aluminum with impregnated hard coating, standard. Optional forged brass housing is required for water or water based fluids. Special material diaphragms available, contact factory.
Accuracy: ±3% of full scale at 70°F (21.1°C). (±2% on 4000S models, ±4% on 4200, 4210, 4215, 4220, 4300, 4400, and 4500).
Pressure Limits: -20˝ Hg to 500 psig. (-0.677 bar to 34.4 bar).
Temperature Limits: 20 to 200°F. (-6.67 to 93.3°C).
Size: 4˝ (101.6 mm) diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/4˝ female NPT high and low pressure taps, duplicated -one pair top for air and gas, and one pair bottom for liquids.
Weight: 3 lb, 3 oz (1.45 kg) aluminum case; 7 lb, 13 oz (3.54 kg) brass case.
Standard Accessories: Two 1/4˝ NPT plugs for duplicate pressure taps, four flush mounting adapters with screws and four surface mounting screws.

MOUNTING

Capsuhelic® gages may be flush mounted in a panel or surface mounted. Hardware is included for either. For flush mounting, a 4$^{13}/_{16}$˝ diameter cutout in panel is required. Where high shock or vibration are problems, order optional A-496 Heavy Duty flush mount bracket. Optional A-610 kit provides simple means of attaching gage to 1¼"-2" horizontal or vertical pipe. All standard models are calibrated for vertical mounting. Gages with ranges above 5 in. w.c. can be factory calibrated for horizontal or inclined mounting on special order.

Flush mounted in panel.

Back view shows flush mounting adapters.

Back view for surface mounting.

OPTIONS AND ACCESSORIES

Adjustable Signal flag — Integral with plastic gage cover; has external reset screw. May be ordered factory installed on gage or separately for field installation. Specify ASF suffix after model number.

A-314 Bleed Fitting — For easier, safer purging of trapped air when using gage with liquids. Also useful for draining condensate when installed in lower ports. To open, simply loosen hex nut. Solid brass.

Forged Brass Case — For applications involving water or water based liquids. To order, add suffix "B" after model number. Example: 4205B.

Transparent Scale Overlays — Available in bright red, green or yellow to accent critical pressure zones. Specify which color and portion of scale to be covered with each.

A-471 Portable Kit — Includes plastic case, mounting bracket, A-309 3-way manifold valve, (2) A-230 high pressure hoses and all necessary fittings. Assembly required. Gage not included

Straightforward design assures maintenance-free performance

Top low pressure connection (*for Air or Gas*) connects to chamber in back of diaphragm. High pressure air or gas port (cut away; not shown) connects with chamber in front of diaphragm through passageways in case.

Precision made case is offered in two materials. Standard is die cast aluminum coated inside for resistance to most oils and similar fluids. Optional forged brass case is recommended when using water or water based liquids. One case size for all pressure ranges — can be either surface or flush mounted.

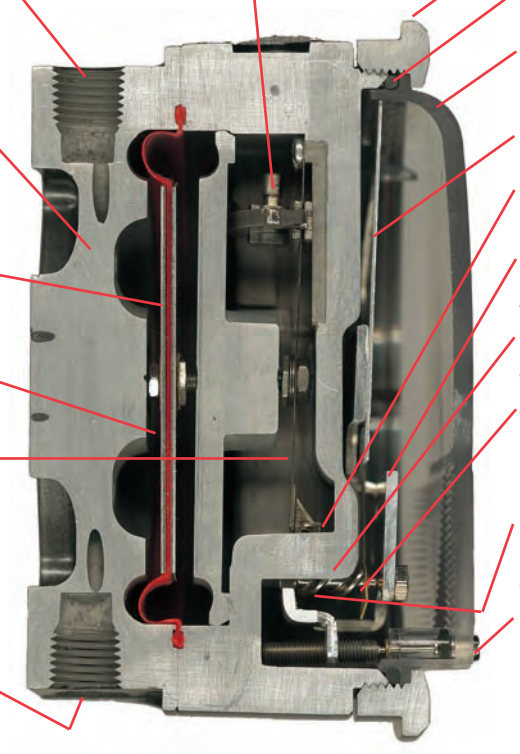
Silicone rubber diaphragm with integrally molded O-ring is sealed between the case and backplate. Diaphragm motion is restricted to prevent damage due to over-pressure.

Diaphragm support plate of stainless steel minimizes position or attitude sensitivity.

Calibrated range spring is a flat leaf of nickel plated spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length factory adjusted for calibration.

Bottom high pressure connection *(for Liquids)* connects to chamber in front of diaphragm. Low pressure liquid connection (not visible) connects with chamber in back of diaphragm through passageways in case.

Range spring calibration is set by custom camlock. Rate adjust and rate adjust lock are coaxial and are factory set and sealed.



Bezel provides flange for flush mounting in panel.

O-ring seal for cover assures dust tight integrity of case.

Clear plastic front cover is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision scale, screen printed on aluminum, is accurate and easy to read.

Samarium cobalt magnet mounted at end of range spring rotates helix without mechanical linkages.

"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Thin wall magnetic "window" is well braced and of minimum area for maximum pressure capability.

Jeweled bearings for helix are shock resistant mounted. They provide virtually friction-free rotation for helix. Rotation is damped with high viscosity silicone fluid.

Helix is precision milled from an alloy of high magnetic permeability, mounted in jeweled bearings, and rotates to align with magnetic field of magnet and transmit pressure indication to pointer.

Zero adjustment screw is conveniently located in plastic cover, accessible without removing cover. "O" ring seal provides dust seal.

Patent Nos. 4,011,759
4,030,365

SERIES 4000 CAPSUHELIC® GAGE — MODELS AND RANGES

Scales reading directly in flow, heights, etc., are also available.

MODELS

Model Number	Range, Inches of Water
*4000-0	0-.50
*4001	0-1.0
*4002	0-2.0
*4003	0-3.0
*4004	0-4.0
*4005	0-5.0
4006	0-6.0
4008	0-8.0
4010	0-10
4015	0-15
4020	0-20
4025	0-25
4030	0-30
4040	0-40
4050	0-50
4060	0-60
4080	0-80
4100	0-100
4150	0-150
4200	0-200
4300	0-300
4400	0-400
4500	0-500

Model Number	Range Feet of Water
4616B	0-16
4635B	0-35

Available with brass case only

Model Number	Range Zero Center Inches of Water
*4302	1-0-1
*4304	2-0-2
4310	5-0-5
4320	10-0-10
4330	15-0-15

Model Number	Range PSI
4201	0-1
4202	0-2
4203	0-3
4204	0-4
4205	0-5
4210	0-10
4215	0-15
4220	0-20
†4230S	0-30
†4240S	0-40
†4260S	0-60
†4280S	0-80
†42100S	0-100
†42200S	0-200
†42300S	0-300

Model Number	Range MM of Water
*4000-25MM	0-25
*4000-50MM	0-50
*4000-80MM	0-80
*4000-100MM	0-100

Special Purpose Ranges

Scale No. 4401
Square Root
Specify Range

Scale No. 4402
Blank Scale
Specify Range

Model Number	Range, CM of Water
4000-15CM	0-15
4000-20CM	0-20
4000-25CM	0-25
4000-40CM	0-40
4000-50CM	0-50
4000-80CM	0-80
4000-100CM	0-100
4000-150CM	0-150
4000-200CM	0-200
4000-250CM	0-250
4000-300CM	0-300

Zero Center Ranges

*4300-4CM	2-0-2
*4300-10CM	5-0-5
4300-30CM	15-0-15

Model Number	Range, Pascals
*4000-125PA	0-125
*4000-250PA	0-250
*4000-500PA	0-500
*4000-750PA	0-750

Zero Center Ranges

*4300-500PA	250-0-250

Model Number	Range, Kilopascals
*4000-1KPA	0-1
4000-1.5KPA	0-1.5
4000-2KPA	0-2
4000-3KPA	0-3
4000-4KPA	0-4
4000-5KPA	0-5
4000-8KPA	0-8
4000-10KPA	0-10
4000-15KPA	0-15
4000-20KPA	0-20
4000-25KPA	0-25
4000-30KPA	0-30

Zero Center Ranges

*4300-1KPA	.5-0- .5
4300-3KPA	1.5-0-1.5

Accessories
A-298 Flat Flush Mounting Bracket
A-309 3-way Manifold Valve
A-314 Bleed Fitting
A-370 Mounting Bracket
A-471 Portable Kit
A-496 Flush Mount Bracket
A-610 Pipe Mount Kit

Options

Add Options as Suffix, Example 4001-ASF
-ASF (Adjustable Signal Flag)
B (Brass Case)
Scale Overlays - Red, Green, Mirrored or combination. Specify Locations

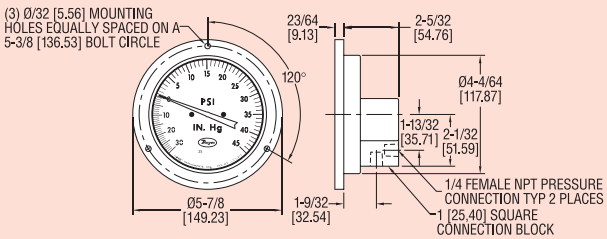
*These ranges available for vertical scale position only. †These ranges use Spiralhelic® movement.

Series 7000

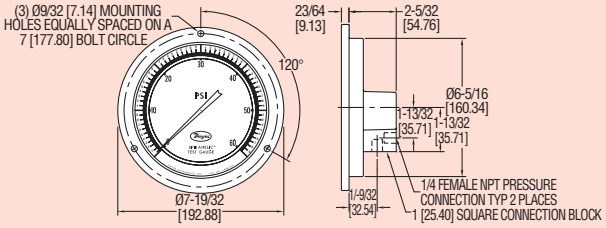
Spirahelic® Direct Drive Pressure Gages

Panel Mount, 4½", 6" & 8½" Dials, ASME Grades 2A, or 3A

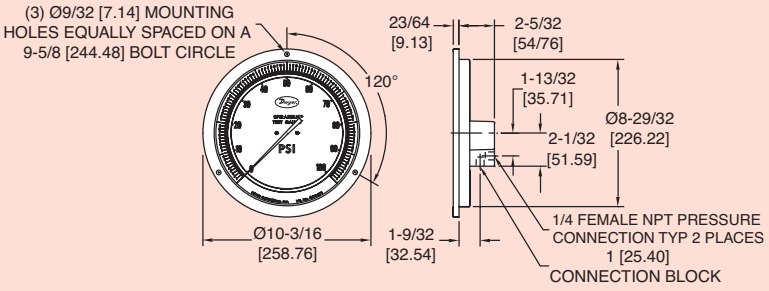
Model 7112
4-1/2" Dial,
Grade 2A
Accuracy



Model 7214A
6" Dial,
Grade 3A
Accuracy



Model 7314A
8-1/2" Dial,
Grade 3A
Accuracy



MODELS

4-1/2" Dial, Grade 2A Accuracy (1/2% of F.S.)			
Model No.	**Ranges (psig)**	**Model No.**	**Ranges (psig)**
7112-G030	30	7112-G600	600
7112-G060	60	7112-GC010	1000
7112-G100	100	7112-GC020	2000
7112-G200	200	7112-GC030	3000
7112-G300	300	7112-GC060	6000
		7112-GC100	10000

6" Dial, Grade 3A Accuracy (1/4% of F.S.) with Mirrored Scale			
Model No.	**Ranges (psig)**	**Model No.**	**Ranges (psig)**
7214A-G060	60	7214A-GC010	1000
7214A-G100	100	7214A-GC020	2000
7214A-G200	200	7214A-GC030	3000
7214A-G300	300	7214A-GC060	6000
7214A-G400	600		

8-1/2" Dial, Grade 3A Accuracy (1/4% of F.S.) with Mirrored			
Scale Model No.	**Ranges (psig)**	**Model No.**	**Ranges (psig)**
7314A-G060	60	7314A-GC010	1000
7314A-G100	100	7314A-GC020	2000
7314A-G200	200	7314A-GC030	3000
7314A-G300	300	7314A-GC060	6000
7314A-G600	600		

Inconel® is a registered trademark of Huntington Alloys Corporation.

SPECIFICATIONS

Service: Compatible gases & liquids.
Wetted Materials: Inconel® X-750 Bourdon Tube, Type 316L SS connection block (Grade 2A & 3A Accuracy).
Housing: Black polycarbonate case and clear acrylic cover.
Accuracy: Grade 2A (0.5% F.S.); Grade 3A (0.25% F.S.) with mirrored scale.
Pressure Limit: 150% of full scale. Gage will maintain its specifications for overpressures up to 150% maximum range. Normal operation should be between 25% and 75% of full scale.
Temperature Limits: -65 to 180°F (-53.9 to 82.2°C).
Sizes: 4-1/2" dial face (114.3 mm), 6" dial face (152.4 mm), 8-1/2" dial face (215.9 mm) – Design conforms to ASME B40.1.
Process Connections: Two 1/4" female NPT field selectable back or bottom connection.
Weight: 4-1/2" dial face: 16.3 oz (462.1 g); 6" dial face: 19.6 oz. (555.6 g); 8-1/2" dial face: 27.3 oz (773.9 g).
Standard Accessory: One 1/4" male NPT stainless steel plug.

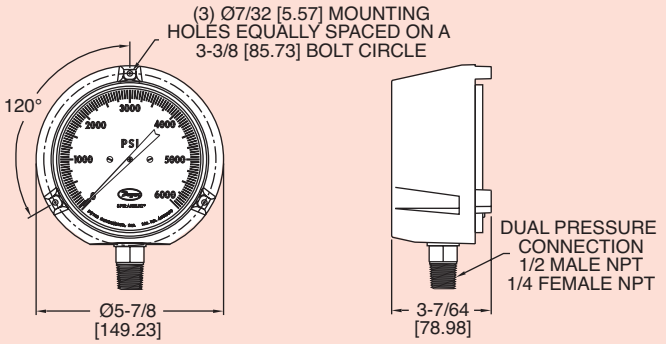
Accessories

A-341: Brass Adapter, 1/4" male NPT to G 1/2 A (per ISO 228/1) parellel thread 2-1/2" length
A-341-1: Brass Adapter, 1/2" male NPT x 1/4" female NPT 3-3/4" length

NOTE: Additional ranges and accuracy requirements are available. Please consult the factory for details.

Series 7000B Spirahelic® Direct Drive Pressure Gages

4½" Turret Mount Gage, ASME Grades A & 2A



MODELS

Grade A Accuracy (2%-1%-2%)	
Model Number	**Ranges (psig)**
7100B-G060	60
7100B-G100	100
7100B-G200	200
7100B-G300	300
7100B-G600	600
7100B-GC010	1000
7100B-GC020	2000
7100B-GC030	3000
7100B-GC060	6000

MODELS

Grade 2A Accuracy (1/2% of F.S.)	
Model Number	**Ranges (psig)**
7112B-G030	30
7112B-G060	60
7112B-G100	100
7112B-G160	160
7112B-G200	200
7112B-G300	300
7112B-G600	600
7112B-GC010	1000
7112B-GC020	2000
7112B-GC030	3000
7112B-GC060	6000
7112B-GC100	10000

Inconel® is a registered trademark of Huntington Alloys Corporation.

SPECIFICATIONS

Service: Compatible gases & liquids.
Wetted Materials: Grade A Accuracy: Beryllium Copper Bourdon Tube, nickel plated brass connection block.
Grade 2A Accuracy: Inconel® X-750 Bourdon Tube, Type 316L SS connection block.
Housing: Black polycarbonate case and clear acrylic cover.
Accuracy: Grade A (2%-1%-2%); Grade 2A (0.5% F.S.).
Pressure Limit: 150% of full scale. Gage will maintain its specifications for overpressures up to 150% maximum range. Normal operation should be between 25% and 75% of full scale.
Temperature Limits: -65 to 180°F (-53.9 to 82.2°C).
Size: 4-1/2″ (114.3 mm) dial face– Design conforms to ASME B40.1.
Process Connections: Dual size 1/2″ male NPT / 1/4″ female NPT, bottom connections.
Weight: 18.2 oz (516 g).

ACCESSORY

A-170, 316 Stainless Steel Pigtail Siphon 1/4″ male NPT

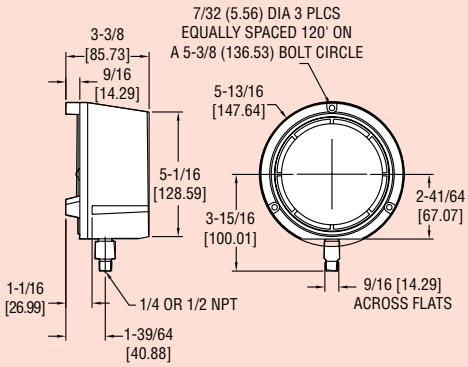
MODELS

Compound Gages - Grade 2A Accuracy (1/2% of F.S.)	
Model Number	**Ranges (psig)**
7112B-G030C	30″Hg-0-30
7112B-G045C	30″Hg-0-45
7112B-G060C	30″Hg-0-60
7112B-G100C	30″Hg-0-100

Series 760

Pressure Gage

4-1/2″ Dial, Liquid Filled, ±0.5% Full Scale Accuracy



Series 760 Liquid Filled Pressure Gages offer superior performance for applications where vibration, pulsation, mechanical shock, and pressure spikes are common. The gage is designed with a 316L stainless steel tube and socket for greater chemical compatibility. The units feature glycerin fill and a micrometer adjustable pointer.

MODELS

Model Number	Description
760-1	4-1/2″ Turret Mount Gage, 15 psi
760-2	4-1/2″ Turret Mount Gage, 30 psi
760-3	4-1/2″ Turret Mount Gage, 60 psi
760-4	4-1/2″ Turret Mount Gage, 100 psi
760-5	4-1/2″ Turret Mount Gage, 160 psi
760-6	4-1/2″ Turret Mount Gage, 30″ Hg vacuum

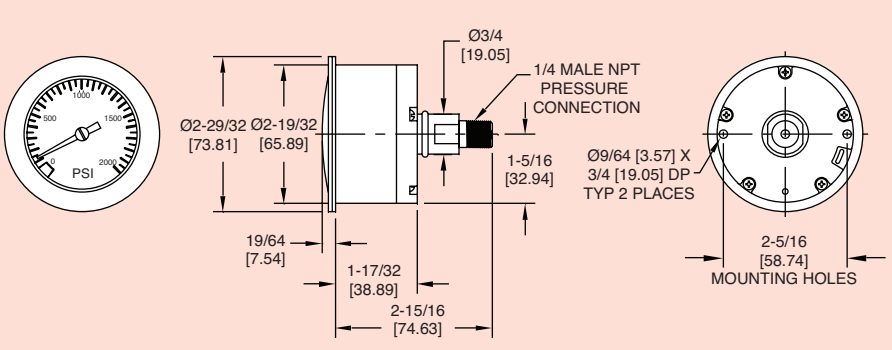
SPECIFICATIONS

Service: Clean, non-corrosive liquids or gases.
Wetted Materials: 316L Stainless Steel Bourdon tube & socket, stainless steel connection.
Fill Solution: Glycerin.
Housing: Fiberglass reinforced thermoplastic.
Window: Acrylic.
Accuracy: ±0.5% full scale, ASME B40.1, Grade 2A.
Pressure Limit: 130% full scale.
Size: 4-1/2″.
Process Connection: 1/4″ male NPT, bottom.
Weight: 29.5 oz (830 g).

Series 6000

Spirahelic® Pressure Gages

Reliability and Accuracy in a 2½" Solid-front Gage



Series 6000 Spirahelic® high pressure gages are ideal for applications demanding reliability, operator safety.

MODELS

Model Numbers	Range, PSI	Minor Divisions
6010	0-1000	10
6020	0-2000	50
6030	0-3000	100
6060	0-6000	200
6080	0-8000	200

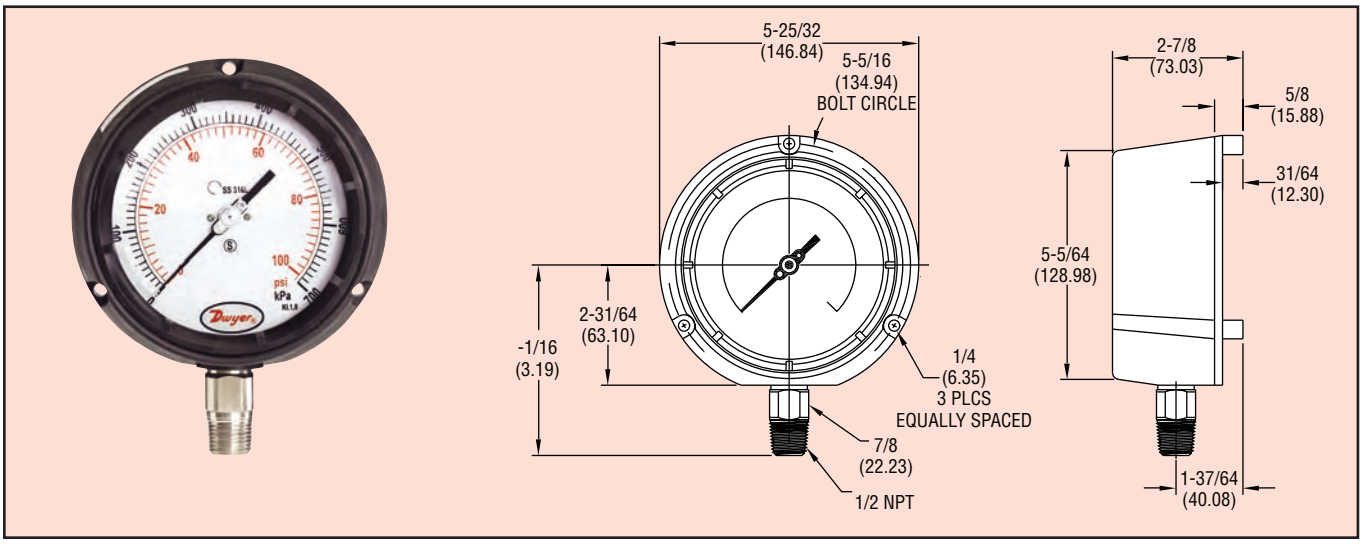
SPECIFICATIONS

Service: Compatible gases & liquids.
Wetted Materials: Beryllium Copper Bourdon Tube.
Housing: Mineral and glass filled nylon; high impact clear acrylic cover.
Accuracy: Grade A (2%-1%-2%).
Pressure Limit: 150% of full scale. Gage will maintain its specifications for overpressures up to 150% maximum range. Normal operation should be between 25% and 75% of full scale.
Temperature Limits: -65 to 180°F (-53.9 to 82.2°C).
Size: 2-1/2″ (63.5 mm) dial face – Design conforms to ASME B40.1.
Process Connections: 1/2″ male NPT, back connection.
Weight: 16 oz (453.6 g).
Standard Accessory: One 1/4″ male NPT stainless steel plug.

Series 761

Process Pressure Gage

Liquid-Fillable, ±0.5% Full Scale Accuracy



Series 761 Process Pressure Gages have a dual English/metric scale with ±0.5% full scale accuracy. Series 761 gages may be easily liquid filled in the field without the need for a separate kit. The gages are designed with 316L SS tube and socket for excellent chemical compatibility and are offered in a wide selection of ranges, from full vacuum, compound to 20,000 psi.

APPLICATIONS

Chemical, Refinery, Fertilizer, Petrochemical, Pharmaceutical, Power, Oil, Cement, Sugar, Food and Beverage, Pulp and Paper, and Waste Water.

SPECIFICATIONS

Service: Compatible gases and liquids.

Wetted Materials: 316L SS Bourdon tube & connection.

Housing: Fiberglass reinforced Polypropylene with safety glass.

Accuracy: ±0.5% full scale, ASME B40.1, Grade 2A.

Pressure Limit: 130% of full scale for ranges 8000 psi or less. 115% of full scale for ranges greater than 8000 psi.

Temperature Limit:

Ambient: -4 to 150°F (-20 to 65°C);

Process: 300°F max (150°C max).

Size: 4-1/2″ (115 mm).

Process Connection: 1/2″ male NPT.

Enclosure Rating: NEMA 3 (IP55).

Weight: 1.4 lb (650 g).

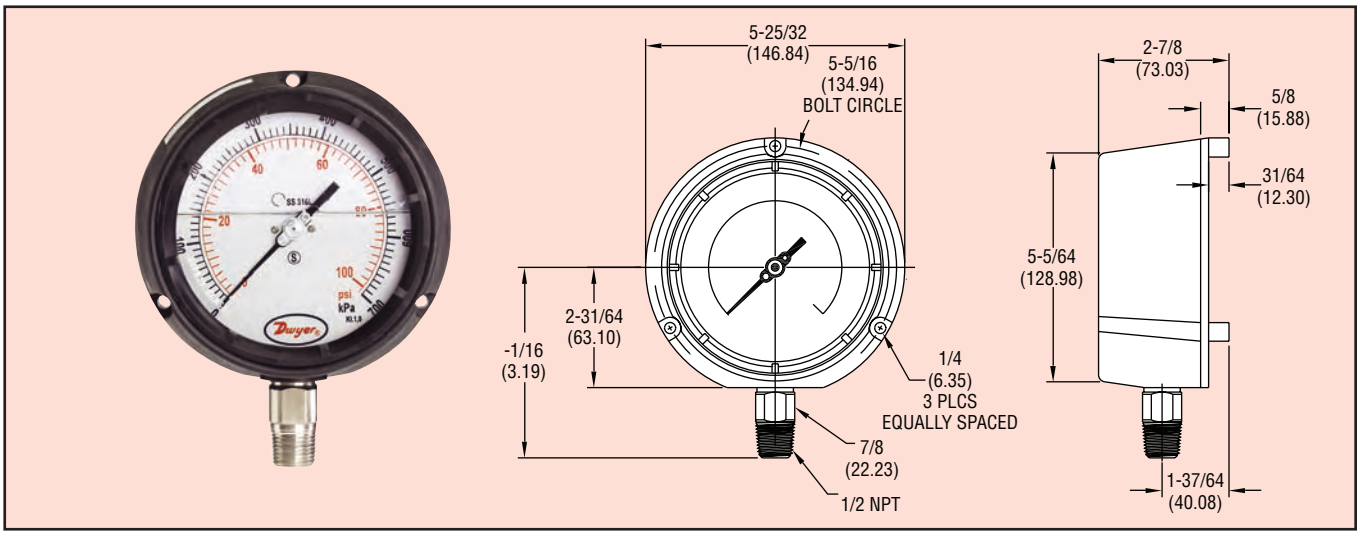
MODELS

Model Number	Range	Model Number	Range
761-1	0-15 psi (0 to 100 kPa)	**761-15**	0-3000 psi (0 to 20 MPa)
761-2	0-30 psi (0 to 200 kPa)	**761-16**	0-4000 psi (0 to 28 MPa)
761-3	0-60 psi (0 to 400 kPa)	**761-17**	0-5000 psi (0 to 34 MPa)
761-4	0-100 psi (0 to 700 kPa)	**761-18**	0-6000 psi (0 to 40 MPa)
761-5	0-160 psi (0 to 1100 kPa)	**761-19**	0-10000 psi (0 to 70 MPa)
761-6	0-30″ Hg Vac (0 to -100 kPa)	**761-20**	0-15000 psi (0 to 100 MPa)
761-7	0-200 psi (0 to 1400 kPa)	**761-21**	0-20000 psi (0 to 140 MPa)
761-8	0-300 psi (0 to 2000 kPa)	**761-22**	30″ Hg to 15 psi (-100 to 100 kPa)
761-9	0-400 psi (0 to 2800 kPa)	**761-23**	30″ Hg to 30 psi (-100 to 200 kPa)
761-10	0-500 psi (0 to 3400 kPa)	**761-24**	30″ Hg to 60 psi (-100 to 400 kPa)
761-11	0-600 psi (0 to 4000 kPa)	**761-25**	30″ Hg to 100 psi (-100 to 700 kPa)
761-12	0-1000 psi (0 to 7000 kPa)	**761-26**	30″ Hg to 150 psi (-100 to 1000 kPa)
761-13	0-1500 psi (0 to 10 MPa)	**761-27**	30″ Hg to 200 psi (-100 to 1400 kPa)
761-14	0-2000 psi (0 to 14 MPa)	**761-28**	30″ Hg to 300 psi (-100 to 2000 kPa)

Series 762

Process Pressure Gage

Glycerin Filled, ±1% Full Scale Accuracy



Series 762 Process Pressure Gages have a dual English/metric scale with ±1% full scale accuracy. Series 762 gages have a glycerin-filled housing, providing superior performance in applications where vibration, pulsation, mechanical shock, and pressure spikes are common. The gages are designed with 316L SS tube and socket for excellent chemical compatibility and are offered in a wide selection of ranges from full vacuum, compound to 20,000 psi.

APPLICATIONS

Chemical, Refinery, Fertilizer, Petrochemical, Pharmaceutical, Power, Oil, Cement, Sugar, Food and Beverage, Pulp and Paper, and Waste Water.

SPECIFICATIONS

Service: Compatible gases and liquids.

Wetted Materials: 316L SS Bourdon tube & connection.

Housing: Fiberglass reinforced Polypropylene with safety glass.

Fill Solution: Glycerin.

Accuracy: ±1% full scale.

Pressure Limit: 130% of full scale for ranges 8000 psi or less. 115% of full scale for ranges greater than 8000 psi.

Temperature Limit: Ambient: -4 to 150°F (-20 to 65°C); Process: 150°F max (65°C max).

Size: 4-1/2″ (115 mm).

Process Connection: 1/2″ male NPT.

Enclosure Rating: NEMA 3 (IP55).

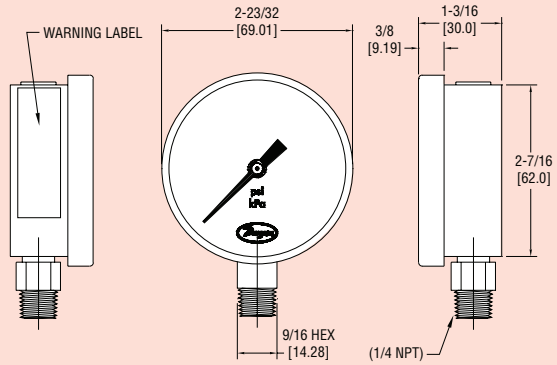
Weight: 1.6 lb (750 g).

MODELS

Model Number	Range	Model Number	Range
762-1	0-15 psi (0 to 100 kPa)	**762-15**	0-3000 psi (0 to 20 MPa)
762-2	0-30 psi (0 to 200 kPa)	**762-16**	0-4000 psi (0 to 28 MPa)
762-3	0-60 psi (0 to 400 kPa)	**762-17**	0-5000 psi (0 to 34 MPa)
762-4	0-100 psi (0 to 700 kPa)	**762-18**	0-6000 psi (0 to 40 MPa)
762-5	0-160 psi (0 to 1100 kPa)	**762-19**	0-10000 psi (0 to 70 MPa)
762-6	0-30″ Hg Vac (0 to -100 kPa)	**762-20**	0-15000 psi (0 to 100 MPa)
762-7	0-200 psi (0 to 1400 kPa)	**762-21**	0-20000 psi (0 to 140 MPa)
762-8	0-300 psi (0 to 2000 kPa)	**762-22**	30″ Hg to 15 psi (-100 to 100 kPa)
762-9	0-400 psi (0 to 2800 kPa)	**762-23**	30″ Hg to 30 psi (-100 to 200 kPa)
762-10	0-500 psi (0 to 3400 kPa)	**762-24**	30″ Hg to 60 psi (-100 to 400 kPa)
762-11	0-600 psi (0 to 4000 kPa)	**762-25**	30″ Hg to 100 psi (-100 to 700 kPa)
762-12	0-1000 psi (0 to 7000 kPa)	**762-26**	30″ Hg to 150 psi (-100 to 1000 kPa)
762-13	0-1500 psi (0 to 10 MPa)	**762-27**	30″ Hg to 200 psi (-100 to 1400 kPa)
762-14	0-2000 psi (0 to 14 MPa)	**762-28**	30″ Hg to 300 psi (-100 to 2000 kPa)

Series 63000M 2.5″ Stainless Steel Pressure Gage

Brass Wetted Parts, Glycerin Filled



The Series 63000M Liquid-Filled Pressure Gages provide superior performance in applications where vibration, pulsation, mechanical shock and pressure spikes are common. The Series 63000M gages have dual English/metric scales with ±1.6% full scale accuracy and are available in 2.5″ dial sizes. Units are designed with 304 SS housings and brass wetted parts. These gages can withstand ambient temperatures up to 140°F (60°C) and process temperatures up to 149°F (65°C).

MODELS

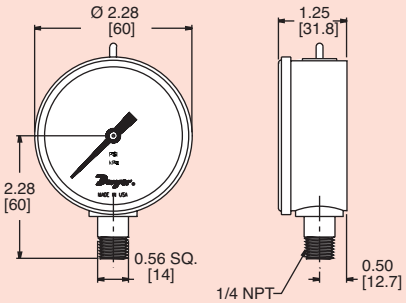
Model Number	Ranges
63030VM	0 to 30 in. Hg Vac (0 to -100 kPa)
63015M	0 to 15 psi (0 to 100 kPa)
63030M	0 to 30 psi (0 to 200 kPa)
63060M	0 to 60 psi (0 to 400 kPa)
63100M	0 to 100 psi (0 to 700 kPa)
63200M	0 to 200 psi (0 to 1400 kPa)
63300M	0 to 300 psi (0 to 2000 kPa)

SPECIFICATIONS

Service: Compatible gases and liquids.
Wetted Materials: Brass.
Housing: 304 SS.
Fill Solution: Glycerin.
Accuracy: ±1.6% full scale.
Pressure Limits: 130% of full scale.
Temperature Limits: Ambient: -4 to 140°F (-20 to 60°C); Process: 149°F max. (65°C max.).
Size: 2-1/2″ (63 mm).
Process Connection: 1/4″ male NPT.
Enclosure Rating: NEMA 3 (IP55).
Weight: 8.6 oz (245 g).

Series 64000 2.5″ Stainless Steel Pressure Gage

316 SS Wetted Parts, Glycerin Filled



Pressure spikes, vibration, and pulsation are overcome with the Series 64000 Liquid Filled Stainless Steel Pressure Gage. The units glycerin fill provides superior performance for many mechanical applications. All internal parts are constructed of 316 SS for greater chemical compatibility. The 2.5″ (63 mm) diameter gage features ±1.6% accuracy and is housed in a 304 stainless steel case.

MODELS

Model Number	Ranges
64030V	0 to 30″ Hg Vac (0 to -100 kPa)
64015	0 to 15 psi (0 to 100 kPa)
64030	0 to 30 psi (0 to 200 kPa)
64060	0 to 60 psi (0 to 400 kPa)
64100	0 to 100 psi (0 to 700 kPa)
64160	0 to 160 psi (0 to 1100 kPa)
64200	0 to 200 psi (0 to 1400 kPa)
64300	0 to 300 psi (0 to 2000 kPa)

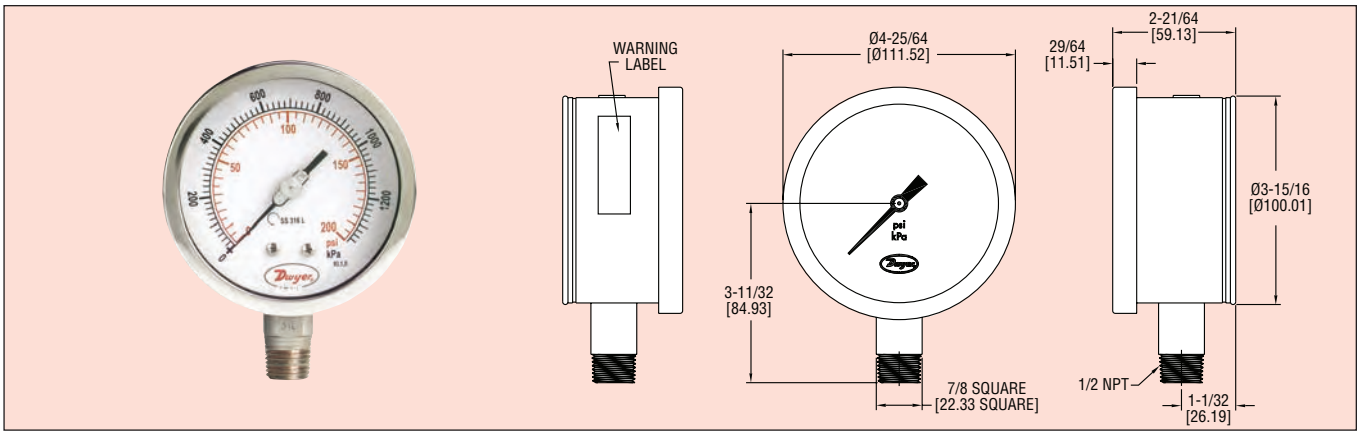
SPECIFICATIONS

Service: Compatible liquids or gases.
Wetted Materials: 316 SS.
Fill Solution: Glycerin.
Housing: 304 SS.
Accuracy: ±1.6% full scale.
Pressure Limit: 130% x full scale.
Temperature Limit: Ambient: -13 to 150°F (-25 to 65°C). Process: 60 to 150°F (15 to 65°C).
Size: 2-1/2″ (63 mm) diameter.
Process Connection: 1/4″ male NPT.
Enclosure Rating: NEMA3 (IP55).
Weight: 9 oz (255 g).

Series SGI

4″ Stainless Steel Safety Gage

0.5% Full Scale Accuracy, 316L SS Wetted Parts



The Series SGI Gages have dual English/metric scales with ±0.5% ASME Grade 2A Accuracy. The solid front design with baffle wall interposed between the sensing element and the window face, plus a pressure relieving back, provides the increased safety required for potentially dangerous applications.

Series SGI gages are designed with 304 SS housings and 316L SS wetted parts for excellent chemical compatibility. Units can withstand ambient temperatures up to 149°F (65°C) and process temperatures up to 518°F (270°C). Series SGI gages may be easily liquid filled in the field without the need for a separate kit. A wide selection of ranges are available from full vacuum, compound to 20,000 psi.

APPLICATIONS

Oil and Gas, Chemical, Refinery, Petrochemical, Cement, Pharmaceutical, Power, Pulp and Paper, Food and Beverage.

SPECIFICATIONS

Service: Compatible gases and liquids.

Wetted Materials: 316L SS.

Housing: 304 SS.

Accuracy: ±0.5% full scale.

Pressure Limit: 130% full scale for ranges <10,000 psi, 115% for 10,000 psi and greater.

Temperature Limits:

Ambient: -4 to 149°F (-20 to 65°C);

Process: 518°F max. (270°C max.).

Size: 4″ (100 mm).

Process Connections: 1/2″ male NPT.

Enclosure Rating: NEMA 3 (IP55).

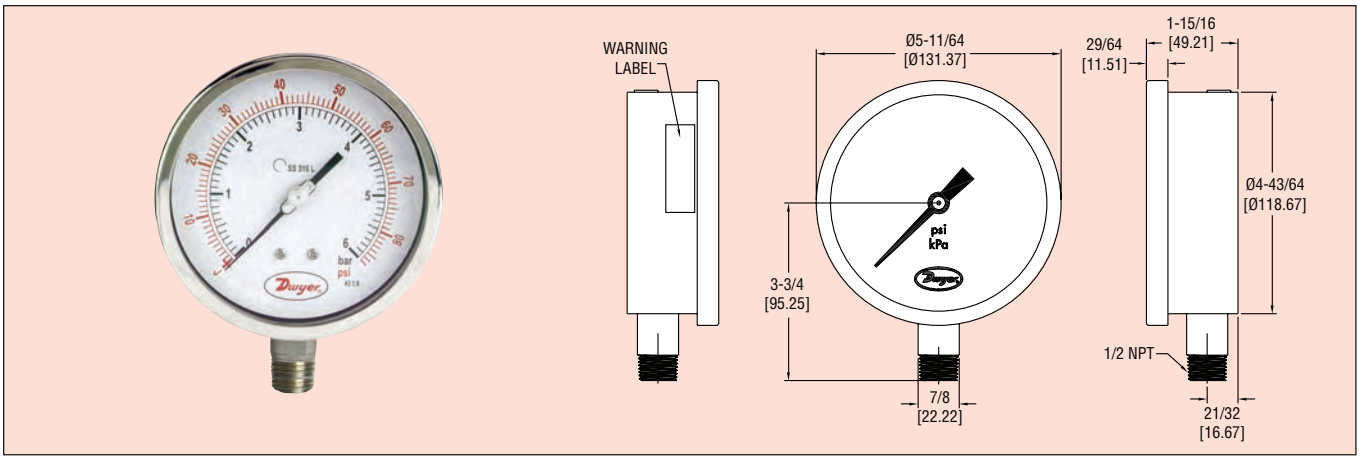
Weight: 1.3 lb (0.6 kg).

MODELS

Model Number	Ranges	Model Number	Ranges
SGI-F0124N	0-30″ Hg (-100-0 kPa)	**SGI-F1624N**	0-4000 psi (0-28 MPa)
SGI-F0224N	0-15 psi (0-100 kPa)	**SGI-F1724N**	0-5000 psi (0-34 MPa)
SGI-F0324N	0-30 psi (0-200 kPa)	**SGI-F1824N**	0-6000 psi (0-40 MPa)
SGI-F0424N	0-60 psi (0-400 kPa)	**SGI-F1924N**	0-10000 psi (0-70 MPa)
SGI-F0524N	0-100 psi (0-700 kPa)	**SGI-F2024N**	0-15000 psi (0-100 MPa)
SGI-F0624N	0-150 psi (0-1000 kPa)	**SGI-F2124N**	30″ Hg-0-15 psi (-100-0-100 kPa)
SGI-F0724N	0-200 psi (0-1400 kPa)	**SGI-F2224N**	30″ Hg-0-30 psi (-100-0-200 kPa)
SGI-F0824N	0-300 psi (0-2000 kPa)	**SGI-F2324N**	30″ Hg-0-60 psi (-100-0-400 kPa)
SGI-F0924N	0-400 psi (0-2800 kPa)	**SGI-F2424N**	30″ Hg-0-100 psi (-100-0-700 kPa)
SGI-F1024N	0-500 psi (0-3400 kPa)	**SGI-F2524N**	30″ Hg-0-150 psi (-100-0-1000 kPa)
SGI-F1124N	0-600 psi (0-4000 kPa)	**SGI-F2624N**	30″ Hg-0-200 psi (-100-0-1400 kPa)
SGI-F1224N	0-1000 psi (0-7000 kPa)	**SGI-F2724N**	30″ Hg-0-300 psi (-100-0-2000 kPa)
SGI-F1324N	0-1500 psi (0-10 MPa)	**SGI-F2924N**	0-20000 psi (0-140 MPa)
SGI-F1424N	0-2000 psi (0-14 MPa)		
SGI-F1524N	0-3000 psi (0-20 MPa)		

Series SGL 4.5″ Stainless Steel Industrial Pressure Gage

1% Full Scale Accuracy, 316 SS Wetted Parts, NEMA 4X



The Series SGL Gages have dual English/metric scales with ±1.0% full scale accuracy. For excellent chemical compatibility, the Series SGL gages are designed with 304 SS housings and 316L SS wetted parts. Units can withstand ambient temperatures up to 149°F (65°C) and process temperatures up to 572°F (300°C). Series SGL gages may be easily liquid filled in the field without the need for a separate kit. A wide selection of ranges are available from full vacuum, compound to 20,000 psi.

APPLICATIONS

Cryogenics, Pharmaceutical, Chemical, Petrochemical, Food and Beverage, Conventional and Nuclear Power, Pumps, Presses, Diesel Engines, Turbines and Compressors.

SPECIFICATIONS

Service: Compatible gases & liquids.
Wetted Materials: 316L SS.
Housing: 304 SS.
Accuracy: ±1.0% full scale.
Pressure Limit: 130% full scale for ranges <10,000 psi, 115% for 10,000 psi and greater.
Temperature Limits:
Ambient: -13 to 149°F (-25 to 65°C)
Process: 572°F max. (300°C max.).
Size: 4.5″ (115 mm).
Process Connections: 1/2″ male NPT.
Enclosure Rating: NEMA 4X (IP65).
Weight: 1.5 lb (0.70 kg).

MODELS

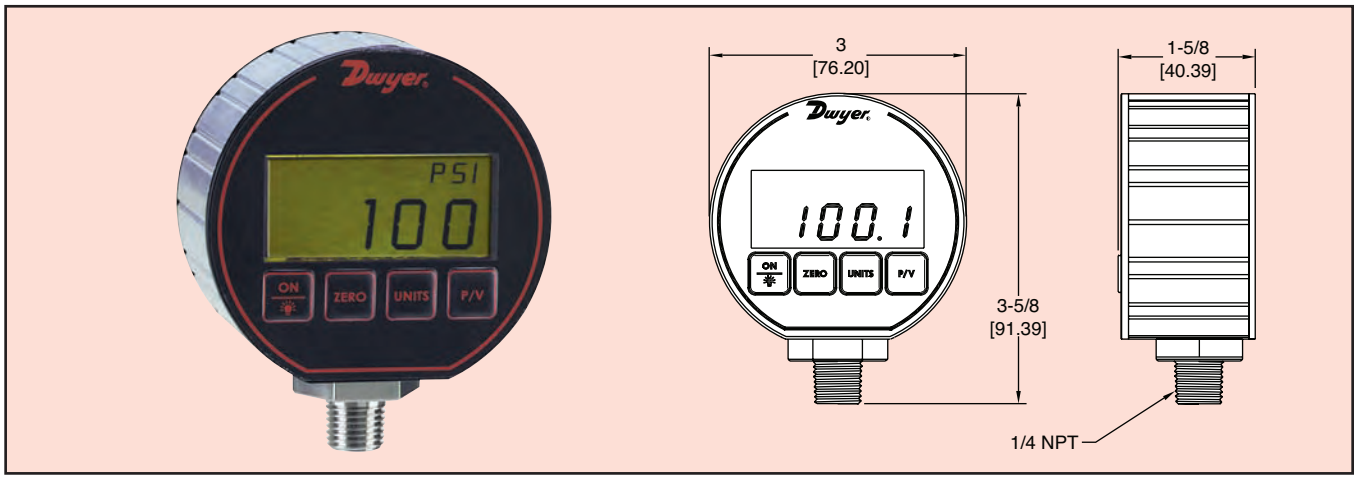
Model Number	Ranges	Model Number	Ranges
SGL-G0124N	0-30″ Hg (-100-0 kPa)	**SGL-G1624N**	0-4000 psi (0-28 MPa)
SGL-G0224N	0-15 psi (0-100 kPa)	**SGL-G1724N**	0-5000 psi (0-34 MPa)
SGL-G0324N	0-30 psi (0-200 kPa)	**SGL-G1824N**	0-6000 psi (0-40 MPa)
SGL-G0424N	0-60 psi (0-400 kPa)	**SGL-G1924N**	0-10000 psi (0-70 MPa)
SGL-G0524N	0-100 psi (0-700 kPa)	**SGL-G2024N**	0-15000 psi (0-100 MPa)
SGL-G0624N	0-150 psi (0-1000 kPa)	**SGL-G2124N**	30″ Hg-0-15 psi (-100-0-100 kPa)
SGL-G0724N	0-200 psi (0-1400 kPa)	**SGL-G2224N**	30″ Hg-0-30 psi (-100-0-200 kPa)
SGL-G0824N	0-300 psi (0-2000 kPa)	**SGL-G2324N**	30″ Hg-0-60 psi (-100-0-400 kPa)
SGL-G0924N	0-400 psi (0-2800 kPa)	**SGL-G2424N**	30″ Hg-0-100 psi (-100-0-700 kPa)
SGL-G1024N	0-500 psi (0-3400 kPa)	**SGL-G2524N**	30″ Hg-0-150 psi (-100-0-1000 kPa)
SGL-G1124N	0-600 psi (0-4000 kPa)	**SGL-G2624N**	30″ Hg-0-200 psi (-100-0-1400 kPa)
SGL-G1224N	0-1000 psi (0-7000 kPa)	**SGL-G2724N**	30″ Hg-0-300 psi (-100-0-2000 kPa)
SGL-G1324N	0-1500 psi (0-10 MPa)	**SGL-G2924N**	0-20000 psi (0-140 MPa)
SGL-G1424N	0-2000 psi (0-14 MPa)		
SGL-G1524N	0-3000 psi (0-20 MPa)		

Series DPG-100 Digital Pressure Gage

± 0.25% Full Scale Accuracy, NEMA 4X Housing

FM APPROVED

CE



Replace your outdated analog gages with the new **Series DPG-100 Digital Pressure Gage**. The Series DPG-100 has a high ±0.25% full scale accuracy. The 4 digit digital display will reduce the potential for errors in readings by eliminating parallax error commonly produced with analog gages.

Series DPG-100 is battery powered and has an auto-shut off to conserve battery life. Battery life, on average, will last 2000 hours. A 4 button key pad allows easy access to features without the need to work through complex menus or difficult key combinations. These features include backlight, peak and valley, tare or auto zero and conversion of the pressure units.

APPLICATIONS

- Lab and Research
- Compressors
- Irrigation Equipment
- Analog Gage Calibration
- Gas Mixing for Scuba Diving

SPECIFICATIONS

Service: Compatible liquids and gases (for FM listing see Agency Approvals below).
Wetted Materials: Type 316L SS.
Housing Materials: Black Polycarbonate front & back cover, anodized aluminum extruded housing with recessed grooves, Polycarbonate overlay, Buna-N O-rings, 316L SS sensor construction.
Accuracy: 0.25% F.S. +/- 1 least significant digit @ 70°F (21°C)
(Includes linearity, hysteresis, repeatability).
Pressure Limit: 2x pressure range for models ≤1000 psi; 5000 psi for 3000 psi range; 7500 psi for 5000 psi range.
Enclosure Rating: Designed to meet NEMA 4/4X (IP66).
Temperature Limits: 0 to 130°F (-18 to 55°C).
Thermal Effect: Between 70 to 130°F is 0.016%/F. Between 32 to 70°F is 0.026%/F. Between 10 to 32°F is 0.09%/F.
Size: 3.00″ OD x 1.90 deep (max).
Process Connection: 1/4″ male NPT.
Weight: 8.84 oz (275 g).
Display: 4 digit (.425 H x .234 W digits).
Power Requirements: Two AAA batteries.
Battery Life: 2000 hours typical; Low battery indicator.
Auto Shut-Off:
Gage: 60 minute auto shut off. Auto shut-off may be disengaged.
Backlight: 2 minute auto shut-off.
Agency Approvals: CE, FM approved to be intrinsically safe for Class I, Division I, Groups A, B, C and D, for ranges 0-15 to 0-3000 psi.

MODELS

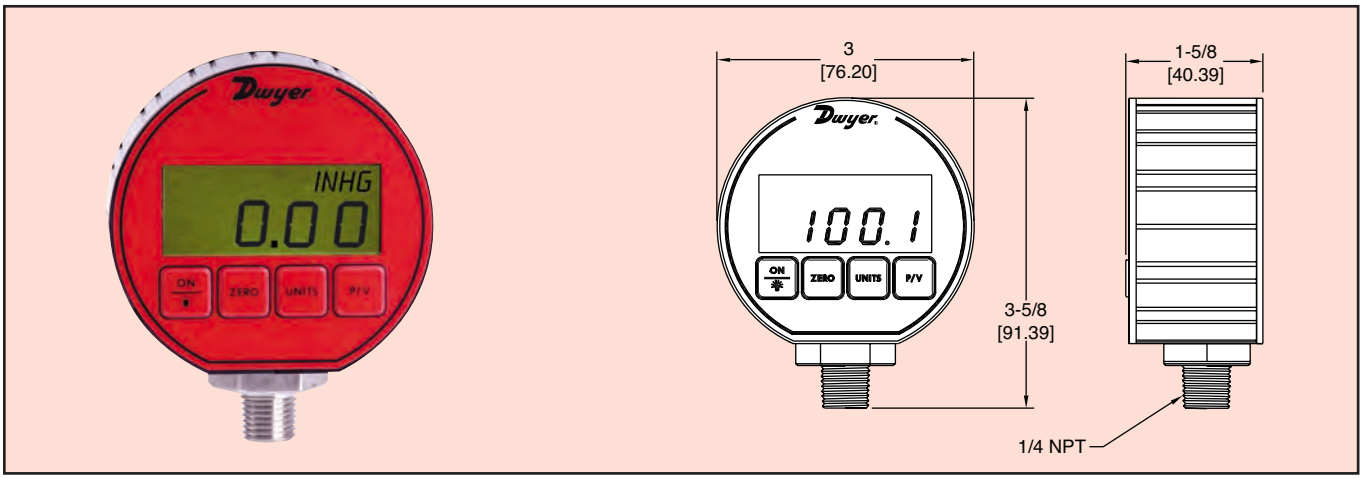
Model Number	Range psi	Pressure Ranges									
		kg/cm²	bar	in Hg	ft wc	kPa	oz/in²	in wc	mbar	cm wc	mm Hg
DPG-100*	-14.70-0	-1.033	-1.013	-29.93	-33.94	-101.4	-235.2	-407.3	-1013	-1034	-760.7
DPG-102	15.00	1.055	1.034	30.54	34.61	103.4	240	415.2	1034	1055	775.7
DPG-103	30.00	2.109	2.069	61.08	69.21	206.9	480	830.4	2069	2109	1551
DPG-104	50.00	3.515	3.448	101.8	115.4	344.8	800	1384	3448	3515	2586
DPG-105	100.0	7.03	6.895	203.6	230.7	689.5	1600	2768	6895	7031	5172
DPG-106	200.0	14.06	13.79	407.2	461.4	1379	3200	5536			
DPG-107	300.0	21.09	20.69	610.8	692.1	2069	4800	8304			
DPG-108	500.0	35.15	34.48	1018	1154	3448	8000				
DPG-109	1000	70.3	68.98	2036	2307	6895					
DPG-110	3000	210.9	206.9	6108	6921						
DPG-111*	5000	351.5	344.8								

Compound Ranges Available: DPG-120* Range: 30″ Hg-0-15 psi; DPG-121* Range: 30″ Hg-0-30 psi; DPG-122* Range: 30″ Hg-0-45 psi; DPG-123*: Range 30″ Hg-0-60 psi; DPG-124*: 30″ Hg-0-100 psi.

* Models DPG-100, DPG-111, DPG-120, DPG-121, DPG-122, DPG-123 and DPG-124 are not FM approved.

Series DPG-000 Digital Pressure Gage

± 0.5% Full Scale Accuracy, NEMA 4X Housing



Replace your outdated analog gages with the new **Series DPG-000 Digital Pressure Gage**. The Series DPG-000 possesses a ±0.5% full scale accuracy sensor. The 4 digit digital display will reduce the potential for errors in readings by eliminating parallax error commonly produced with analog gages.

The Series DPG-000 is battery powered and has an auto-shut off to conserve battery life. Battery life, on average, will last 2000 hours. A 4 button key pad allows easy access to features without the need to work through complex menus or difficult key combinations. These features include backlight, peak and valley, auto zero and conversion of the pressure units.

APPLICATIONS

- Lab and Research
- Compressors
- Irrigation Equipment
- Analog Gage Calibration

SPECIFICATIONS

Service: Liquids and compatible gases.
Wetted Materials: Type 316L SS.
Housing Materials: Polycarbonate front & back cover, anodized aluminum extruded housing with recessed grooves, Polycarbonate Overlay, Buna-N O-Rings, 316L SS Sensor Construction.
Accuracy: 0.50% F.S. +/- 1 least significant digit 32 to 130°F (0 to 55°C). (Includes linearity, hysteresis, repeatability) ±2% F.S. @ 10°F. ±5% F.S. @ 0°F.
Pressure Limit: 2x pressure range for models ≤1000 psi; 5000 psi for 3000 psi range; 7500 psi for 5000 psi range.
Enclosure Rating: Designed to meet NEMA 4/4X (IP65).
Temperature Limits: 0 to 130°F (-18 to 55°C).
Thermal Effect: Between 70 to 130°F is 0.016%/F. Between 32 to 70°F is 0.026%/F. Between 10 to 32°F is 0.09%/F. Between 0 to 10°F is 0.50%/F.
Size: 3.00″ OD x 1.90 Deep (max).
Process Connection: 1/4″ male NPT.
Weight: 8.84 oz (275 g).
Display: 4 digit (.425 H x .234 W digits).
Power Requirements: Two AAA batteries.
Battery Life: 2000 hours typical; Low battery indicator.
Auto Shut-Off:
Gage: 60 minute auto shut off. Auto shut-off may be disengaged.
Backlight: 2 minute auto shut-off.
Agency Approvals: CE.

MODELS

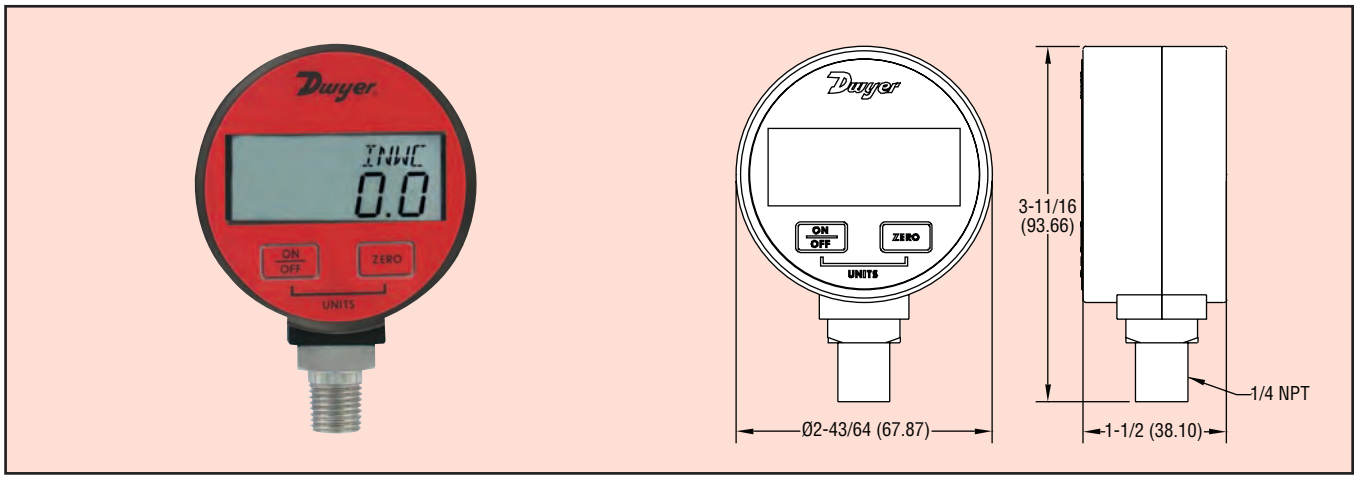
Model Number	Range psi	Pressure Ranges									
		kg/cm²	bar	in Hg	ft wc	kPa	oz/in²	in wc	mbar	cm wc	mm Hg
DPG-000	-14.70-0	-1.033	-1.013	-29.93	-33.94	-101.4	-235.2	-407.3	-1013	-1034	-760.7
DPG-002	15.00	1.055	1.034	30.54	34.61	103.4	240	415.2	1034	1055	775.7
DPG-003	30.00	2.109	2.069	61.08	69.21	206.9	480	830.4	2069	2109	1551
DPG-004	50.00	3.515	3.448	101.8	115.4	344.8	800	1384	3448	3515	2586
DPG-005	100.0	7.03	6.895	203.6	230.7	689.5	1600	2768	6895	7031	5172
DPG-006	200.0	14.06	13.79	407.2	461.4	1379	3200	5536			
DPG-007	300.0	21.09	20.69	610.8	692.1	2069	4800	8304			
DPG-008	500.0	35.15	34.48	1018	1154	3448	8000				
DPG-009	1000	70.3	68.98	2036	2307	6895					
DPG-010	3000	210.9	206.9	6108	6921						
DPG-011	5000	351.5	344.8								

Compound Range available: DPG-020 Range: 30″ Hg-0-15 psi

Series DPGA

Digital Pressure Gage

Economic Gage For Air & Compatible Gases



The Series DPGA is the only economic digital pressure gage with selectable engineering units on the market. With its 1% accuracy and digital push-button zero, the DPGA is the perfect choice for digitally monitoring the pressures of air and compatible gases.

SPECIFICATIONS

Service: Air and compatible gases.
Wetted Materials: 316L SS, Silicone sensor.
Housing Materials: ABS plastic.
Accuracy: ±1.0% F.S. (Includes linearity, hysteresis, repeatability).
Pressure Limits: 2X pressure range. Vacuum range max. pressure is 30 psig.
Temperature Limits: 30 to 120°F (-1 to 49°C).
Thermal Effect: 0.05% FS/°F.
Size: 2.62˝ O.D. x 1.52˝ deep.
Process Connections: 1/4˝ male NPT.
Display: 4-digit LCD (.425˝ H x .234˝ W digits).
Power Requirements: 9 volt alkaline battery. Battery included but not connected.
Auto Shut-off: 20 minute auto shut-off.
Weight: 5.6 oz (160 g).
Agency Approvals: CE.

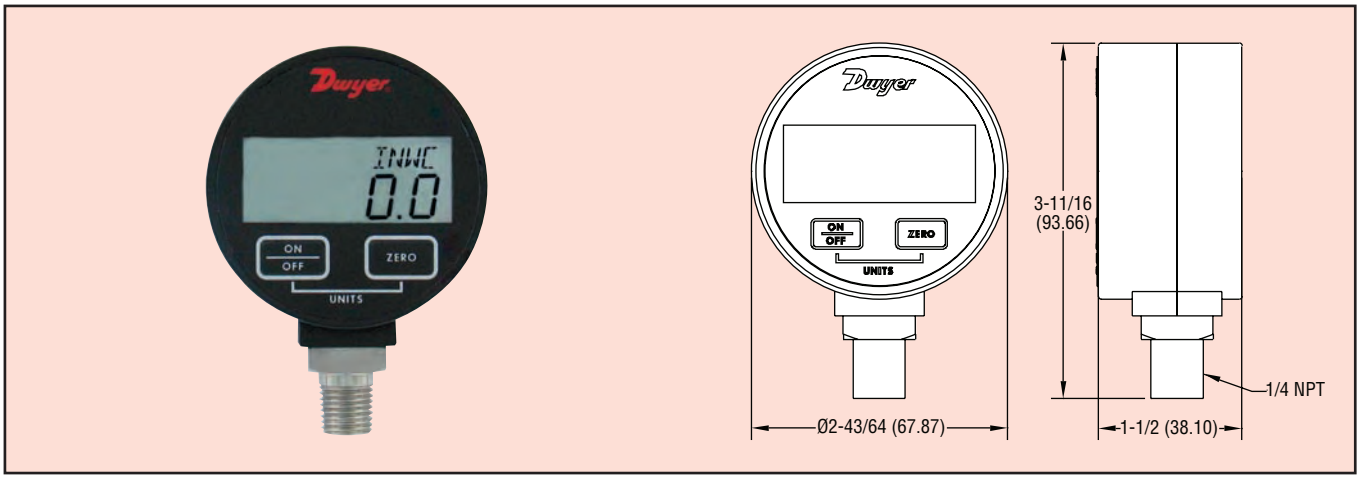
MODELS

Model Number	Range	Pressure Ranges											Resolution
		psi	kg/cm²	bar	in Hg	ft wc	kPa	oz/in²	in wc	mbar	cm wc	mm Hg	psi
DPGA-04	0 to 5 psi	5.000	.3515	.3447	10.18	11.53	34.47	80.0	138.4	344.7	351.5	258.6	0.002
DPGA-05	0 to 15 psi	15.00	1.055	1.034	30.54	34.60	103.4	240.0	415.2	1034	1055	776	0.01
DPGA-06	0 to 30 psi	30.00	2.109	2.068	61.1	69.2	206.8	480.0	830	2068	2109	1551	0.01
DPGA-07	0 to 50 psi	50.00	3.515	3.447	101.8	115.3	344.7	800	1384	3447	3515	2586	0.02
DPGA-08	0 to 100 psi	100.0	7.03	6.89	203.6	230.7	689	1600	2768				

Series DPGW

Digital Pressure Gage

Economic Gage For Compatible Liquids & Gases



The Series DPGW is the only economic digital pressure gage for liquids with the ability to select engineering units on the market. With its 1% accuracy and digital push-button zero, the DPGW is the perfect choice for digitally monitoring the pressures of compatible liquids and gases.

SPECIFICATIONS

Service: Compatible liquids and gases.
Wetted Materials: Type 316L SS.
Housing Materials: ABS plastic.
Accuracy: ±1.0% F.S. (Includes linearity, hysteresis, repeatability).
Pressure Limits: 2X pressure range. Vacuum range max pressure is 30 psig.
Temperature Limits: 30 to 120°F (-1 to 49°C).
Thermal Effect: 0.05% FS/°F.
Size: 2.62″ O.D. x 1.52″ deep.
Process Connections: 1/4″ male NPT.
Display: 4-digit LCD (.425 H x .234 W digits).
Power Requirements: 9 volt alkaline battery. Battery included but not connected.
Auto Shut-off: 20 minute auto shut-off.
Weight: 5.6 oz (160 g).
Agency Approvals: CE.

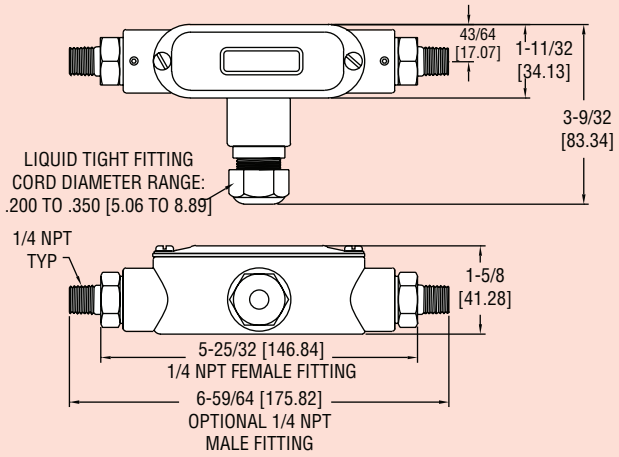
MODELS

Model Number	Range	Pressure Ranges											Resolution
		psi	kg/cm^2	bar	in Hg	ft wc	kPa	oz/in^2	in wc	mbar	cm wc	mm Hg	psi
DPGW-04	0 to 5 psi	5.000	.3515	.3447	10.18	11.53	34.47	80.0	138.4	344.7	351.5	258.6	0.002
DPGW-05	0 to 15 psi	15.00	1.055	1.034	30.54	34.60	103.4	240.0	415.2	1034	1055	776	0.01
DPGW-06	0 to 30 psi	30.00	2.109	2.068	61.1	69.2	206.8	480.0	830	2068	2109	1551	0.01
DPGW-07	0 to 50 psi	50.00	3.515	3.447	101.8	115.3	344.7	800	1384	3447	3515	2586	0.02
DPGW-08	0 to 100 psi	100.0	7.03	6.89	203.6	230.7	689	1600	2768				0.1

Series 629 Wet/Wet Differential Pressure Transmitter

0.5% Accuracy, NEMA 4X Enclosure

Series 629 shown with optional cable gland.



The **Series 629 Differential Pressure Transmitter** monitors differential pressure of air and compatible gases and liquids with 0.5% accuracy. The design employs dual pressure sensors converting pressure changes into a standard 4-20 mA output signal for two wire circuits. Small internal volume and minimum moving parts result in exceptional response and reliability. Terminal block, zero and span adjustments are easily accessed under the top cover. The Series 629 Differential Pressure Transmitter is designed to meet NEMA-4X (IP66) construction.

APPLICATIONS

Monitor Differential Pressures Across:

- Flow Elements
- Heat exchangers
- Filters
- Pumps
- Coils

MODELS

Model Number	Pressure Limits		
	Range (psid)	Working* Pressure (psid)	Over Pressure (psi)
629-02-CH-P2-E5-S1	10	20	100
629-03-CH-P2-E5-S1	25	50	250
629-04-CH-P2-E5-S1	50	100	250
629-05-CH-P2-E5-S1	100	200	500

***** Pressures exceeding the working pressure limit may cause a calibration shift of up to ±3% of full scale.

SPECIFICATIONS

Service: Compatible gases & liquids.
Wetted Materials: Types 316, 316L SS.
Accuracy: +/- 0.5% F.S. (includes linearity, hysteresis & repeatability).
Temperature Limits: 0 to 200°F (-18 to 93°C).
Compensated Temperature Limits: 0 to 175°F (-18 to 79°C).
Pressure Limits: See chart.
Thermal Effect: 0.02%/°F (0.036%/°C) includes zero & span.
Power Requirements: 13-30 VDC (2-wire).
Output Signal: 4 to 20 mA. Optional 0-5, 1-5, 0-10, 1-6 or 2-10 VDC.
Response Time: 50 msec.
Loop Resistance: 0-1300 ohms maximum for current output. For voltage outputs, minimum load resistance: 2000 ohms.
Electrical Connections: Terminal block; 1/2˝ female NPT conduit.
Process Connections: 1/4˝ female NPT.
Enclosure Rating: Designed to meet NEMA 4X (IP66).
Mounting Orientation: Not position sensitive.
Weight: 10.1 oz (286 g).
Agency Approvals: CE.

OPTIONS

-3V, 3 Way Valve Package for Chillers
-LED, 4.5 Digit LED Display

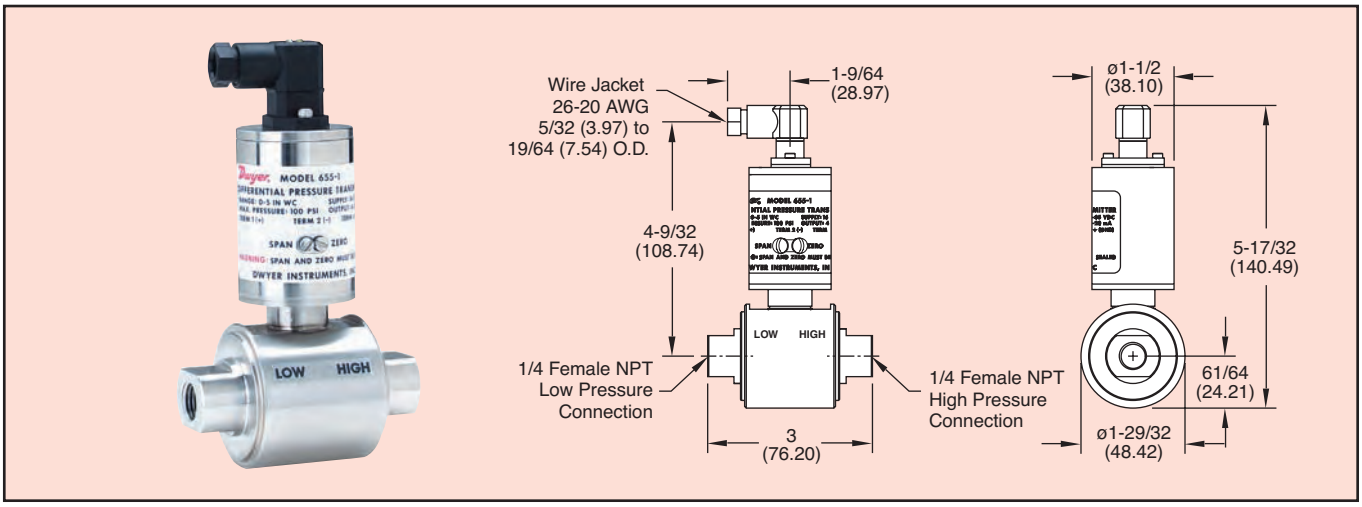
ACCESSORIES

A-228, Stainless steel flex hose, 12˝ (30.48 cm) long, 1/8˝ male NPT connections.
A-229, Stainless steel flex hose, 18˝ (45.72 cm) long, 1/8˝ male NPT connections.
A-332, Brass adapter, 1/8˝ female NPT to 1/4˝ male NPT.

Series 655

Wet/Wet Differential Pressure Transmitter

Low Range, 0-5˝ w.c., High Maximum Working Pressure



The Series 655 Wet/Wet Differential Pressure Transmitter converts a positive or a positive differential pressure measurement into a standard 4-20 mA output signal. Designed for use as a wet/wet differential pressure transmitter, units can be used to measure gas or liquid pressures compatible with 316/316L SS wetted parts. With an accuracy of ±0.5% FS, the Series 655 Pressure Transmitter can measure low differential pressures, but can withstand working pressures to a maximum of 300 psi (20.7 bar).

FEATURES

- Wet/Wet Low Differential Pressure
- Withstands High Pressure
- Excellent Wetted Materials 316/316L SS
- External Span and Zero Adjustments ±10% of Span
- Highly Accurate ±0.5% Full Scale

APPLICATIONS

- Refrigeration & HVAC Equipment
- Chill Water Line Pump Monitoring
- Water Filter Monitoring
- Process Control

MODELS

Model	Range
655-1	0-5˝ w.c. (1.24 kPa)
655-2	0-8˝ w.c. (1.99 kPa)
655-3	0-10˝ w.c. (2.49 kPa)
655-4	0-20˝ w.c. (4.98 kPa)
655-5	0-1 psid (6.895 kPa)

SPECIFICATIONS

Service: Compatible gases & liquids.
Wetted Materials: Types 316, 316L SS.
Accuracy: ±0.5% F.S. (Includes linearity, hysteresis & repeatability).
Stability: ±1% F.S./yr.
Temperature Limits: 0 to 140°F (-17.8 to 60°C).
Compensated Temperature Limits: 40 to 120°F (4.44 to 48.9°C).
Pressure Limits: 300 psi (20.7 bar) continuous; 2000 psi (137.8 bar) burst. A zero shift of up to +/- 2% F.S. may occur when 300 psi pressure is applied.
Thermal Effect: 0.025% F.S./ºF (0.045% F.S./°C).
Power Requirements: 16-35 VDC (2-wire).
Output Signal: 4 to 20 mA.
Zero & Span Adjustments: Accessible potentiometers. ±10% of span.
Loop Resistance: DC; 0-1250 ohms maximum.
Current Consumption: DC; 38 mA max.
Electrical Connections: 3 position plastic terminal block.
Process Connections: 1/4˝ female NPT.
Enclosure Rating: Designed to meet NEMA 4X (IP66).
Mounting Orientation: Not position sensitive.
Weight: 1 lb, 11.7 oz (785 g).

OPTIONS

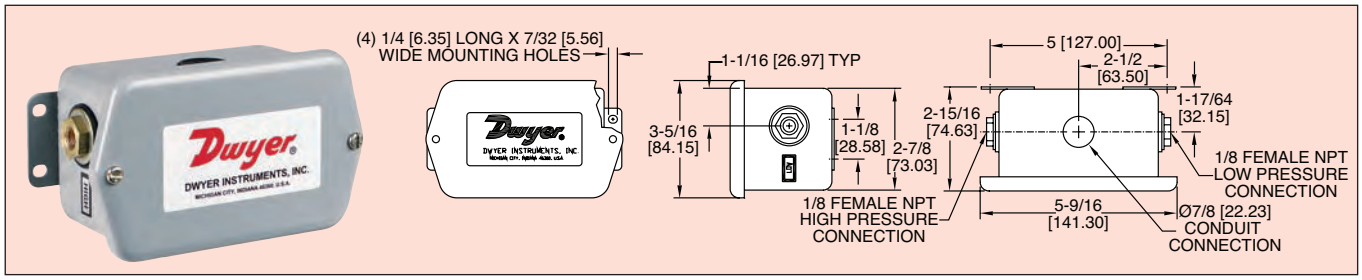
A-228, Stainless steel flex hose, 12˝ (30.48 cm) long, 1/8˝ male NPT connections.

A-229, Stainless steel flex hose, 18˝ (45.72 cm) long, 1/8˝ male NPT connections.

A-332, Brass adapter, 1/8˝ female NPT to 1/4˝ male NPT.

Series 647 Wet/Wet Differential Pressure Transmitter

Ranges from 0 to 1˝ w.c., ±1.0% Accuracy, NEMA 4 Enclosure, 2-Wire



Monitor differential pressure in air/liquid flow systems, HVAC automation, pneumatic systems and process control with the Series 647 Wet/Wet Differential Pressure Transmitter. Units are temperature compensated and provide a 4 to 20 mA output signal which can be interfaced with chart recorders, data loggers and computerized monitoring and control systems.

MODELS

Model Number	Range	Model Number	Range
647-0	0 to 1˝ w.c.	**647-5**	0 to 1 psid
647-1	0 to 3˝ w.c.	**647-6**	0 to 5 psid
647-2	0 to 25˝ w.c.	**647-7**	0 to 15 psid
647-3	0 to 5˝ w.c.	**647-8**	0 to 30 psid
647-4	0 to 10˝ w.c.		

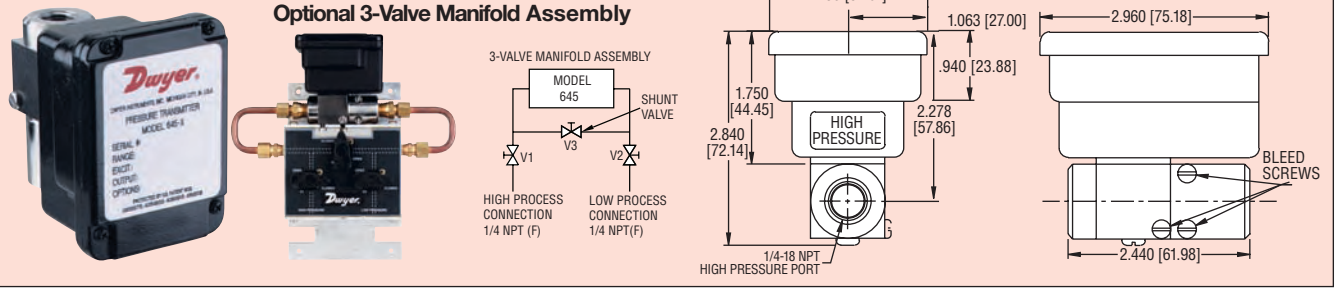
SPECIFICATIONS

Service: Compatible gases or liquids on both pressure and reference sides.
Wetted Materials: Brass, vinyl, glass-filled polyester, silicon, and florosilicone.
Accuracy: ±1.0% FS.
Stability: ±1.5% FS output/year.
Temperature Limits: 32 to 122°F (0 to 50°C).
Pressure Limits: Ranges 1˝ w.c. to 5 psi: 20 psi, 15 psi range: 45 psi, 30 psi range: 60 psi.
Thermal Effects: Zero: ±0.05% FS/°F, Span: ±0.05% rdg/°F.
Power Requirements: 18 to 30 VDC.
Output Signal: 4 to 20 mA, 2-wire.
Zero and Span Adjustments: Adjustable, ±10%.
Loop Resistance: 400Ω @ 18 VDC, 600Ω @ 24 VDC, 1000Ω @ 30 VDC.
Electrical Connection: Screw terminals, reverse polarity protected.
Process Connections: Two 1/8˝ female NPT.
Housing: Gasketed steel epoxy painted, NEMA 4 (IP56).
Weight: 14 oz (397 g).
Agency Approvals: CE.

Series 645 Wet/Wet Differential Pressure Transmitter

±0.25% Accuracy, Quick Response, 2-Wire Design

NEW
Optional 3-Valve Manifold Assembly



Series 645 Wet/Wet Differential Pressure Transmitters are designed for use with compatible gases and liquids which can be applied to both the pressure and reference ports. Quick response capacitance sensor delivers a 4 to 20 mA output signal proportional to differential pressure with ±.25% accuracy. The Series 645 transmitters are ideal for process control, filter condition monitoring, refrigeration equipment, pump speed control, HVAC equipment, and liquid level measurement. For ease of installation and maintenance, order optional 3-valve manifold assembly. Bleed ports allow for total elimination of air in the line and pressure cavities.

MODELS

Model Number*	Range	Model Number*	Range
645-0	0 to 1 psid	**645-10**	±0.5 psid
645-1	0 to 2 psid	**645-11**	±1 psid
645-2	0 to 5 psid	**645-12**	±2.5 psid
645-3	0 to 10 psid	**645-13**	±5 psid
645-4	0 to 25 psid	**645-14**	±10 psid
645-5	0 to 50 psid	**645-15**	±25 psid
645-6	0 to 100 psid	**645-16**	±50 psid

* For optional 3-Valve Manifold Assembly, specify -3V as suffix

SPECIFICATIONS

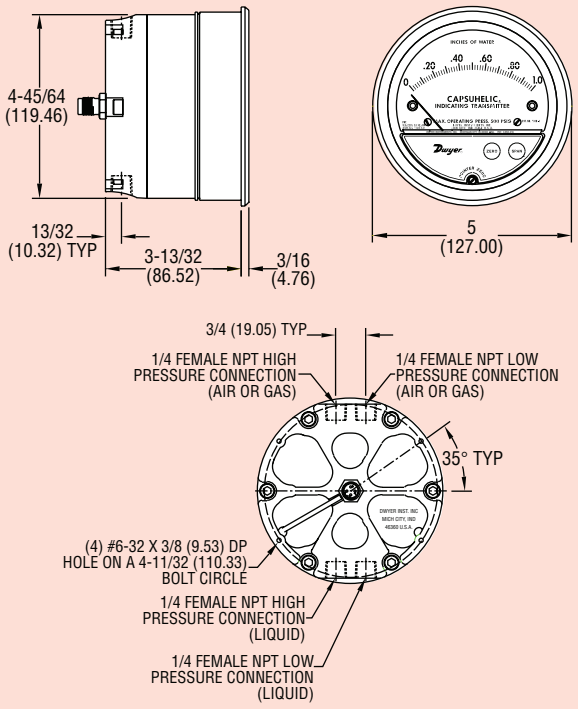
Service: Compatible gases or liquids on both pressure and reference sides.
Wetted Materials: 17-4 PH stainless steel, 300 Series stainless steel, Fluoroelastomer and Silicone O-rings and bleed screw seals.
Accuracy: ±0.25% FS (RSS).
Temperature Limits: Operating: 0 to 175°F (-22 to 80°C), Storage: -65 to 260°F (-54 to 126°C).
Pressure Limits: (High side) 1 to 5 psi: 20 x FS, 10 to 25 psi: 10 x FS, 50 psi: 5 x FS, 100 psi: 2.5 x FS; (Low side) 2.5 x FS.
Thermal Effects: (includes zero and span) ±0.02% FS/°F, 30 to 150°F (-1 to 65°C).
Power Requirements: 11 to 30 VDC.
Output Signal: 4 to 20 mA, 2-wire.
Zero and Span Adjustments: Adjustable, ±1 mA, non-interactive.
Response Time: 30 to 50 msec.
Loop Resistance: 0 to 1000Ω.
Electrical Connection: Barrier strip terminal block with conduit enclosure and .875˝ (22 mm) diameter conduit opening.
Process Connection: 1/4˝-18 female NPT.
Housing: Stainless steel/ Aluminum, NEMA 4X (IP56).
Weight: 14.4 oz (0.4 kg).
Agency Approvals: CE.

3-Valve Manifold Assembly
Manifold: Brass.
Valve Type: 90° On/Off.
Process Connection: 1/4˝-18 female NPT.

Series 631 Wet/Wet Differential Pressure Transmitter

Ranges Down to 0.5″ w.c. with 500 psi Static Pressure Rating

Series 631B



The Dwyer Series 631 Differential Pressure Transmitter monitors differential pressure of air and compatible gases and liquids with accuracy. The design employs converting pressure changes into a standard 4-20 mA output signal for two wire circuits. Digital push-button, zero and span adjustments are easily accessed on the front cover. The Series 631 Differential Pressure Transmitter is designed to meet NEMA 4X (IP66) construction. Robust housing offers 500 psi static pressure rating on ranges down to 0.5″ w.c.

MODELS

Model	Range
631B-0	0-0.5″ w.c.
631B-1	0-1″ w.c.
631B-2	0-2″ w.c.
631B-3	0-5″ w.c.
631B-5	0-25″ w.c.

ACCESSORY

A-164, 16″ cable with M-12 4-pin female connector

SPECIFICATIONS

Service: Compatible gases & liquids.

Wetted Materials: Brass, silicone, 300 SS.

Accuracy: Transmitter Output: ±2% F.S. (includes linearity, hysteresis and repeatability). Gage: ±3% of full scale at 70°F (21.1°C).

Stability: ±1% F.S./yr.

Temperature Limits: 20 to 120°F (-6.67 to 48.9°C).

Pressure Limits: -20″ Hg to 500 psig (-0.677 bar to 34.4 bar).

Thermal Effect: 0.025%/°F (0.045%/°C) includes zero & span.

Power Requirements: 10-35 VDC.

Output Signal: 4 to 20 mA.

Response Time: 50 msec.

Loop Resistance: 0-1250 ohms maximum.

Electrical Connections: M-12 circular 4 pin connector.

Process Connections: 1/4″ female NPT high and low pressure taps, duplicated - one pair top for air and gas, and one pair bottom for liquids.

Enclosure Rating: Designed to meet NEMA 4X (IP66).

Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.

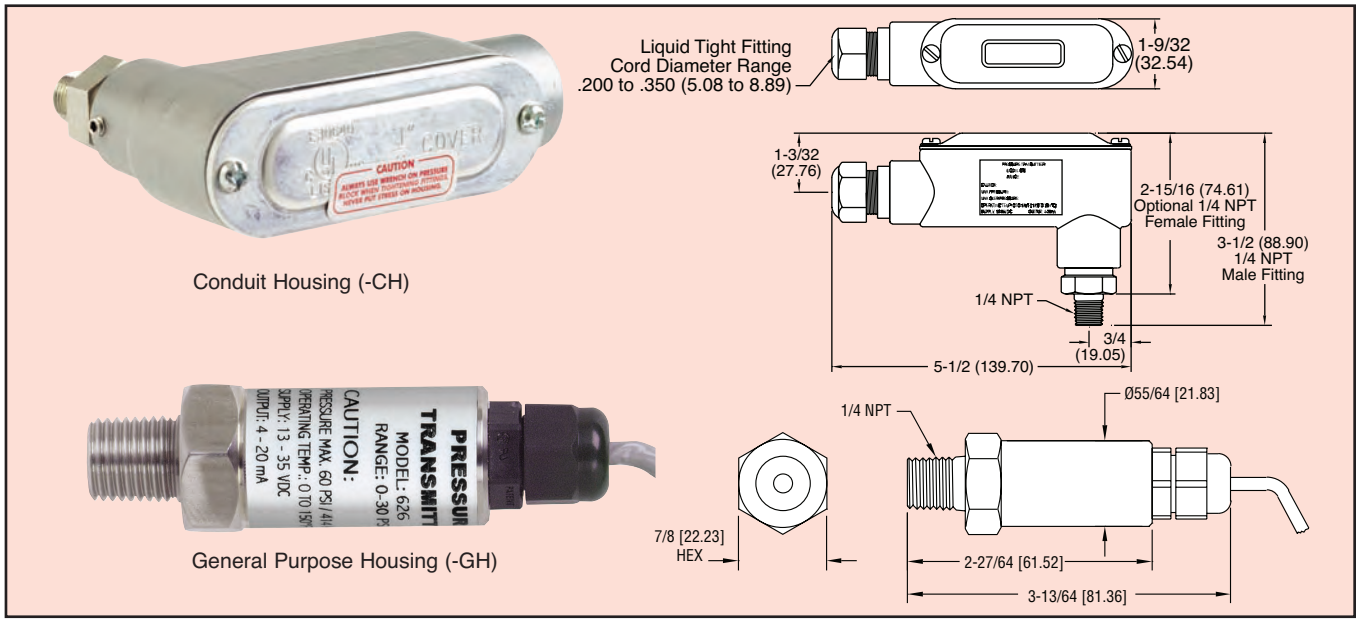
Weight: 8 lb, 4 oz (3.74 kg).

Agency Approvals: CE.

Series 626 & 628

Industrial Pressure Transmitter

Complete Offering of Ranges, Connections and Outputs



The Series 626 Pressure Transmitters possess a highly precise 0.25% piezo-resistive sensor contained in a compact, rugged, NEMA 4X stainless steel general purpose housing or cast aluminum conduit housing.

The Series 628 Pressure Transmitters are ideal for OEMs with 1% full scale accuracy sensors. The transmitter is also available in the general purpose stainless steel housing and the cast aluminum conduit housing.

The highly corrosive resistant 316L stainless steel wetted parts allow the series 626 and 628 transmitters to measure the pressure in a multitude of processes from hydraulic oils to chemicals. The series 626 and 628 are available in ranges of vacuum, compound to 5000 psi with a variety of optional outputs, process connections and electrical terminations to allow you to select the right transmitter for your application.

APPLICATIONS

- Compressors
- Pumping Systems
- Irrigation Equipment
- Hydraulic
- Industrial Process Monitoring

SPECIFICATIONS

Service: Compatible gases and liquids.
Wetted Materials: Type 316 SS, 316L SS.
Accuracy: 626: 0.25% full scale. 628: 1% full scale (includes linearity, hysteresis, and repeatability).
Temperature Limit: 0 to 200°F (-18 to 93°C).
Compensated Temperature Range: 0 to 175°F (-18 to 79°C).
Thermal Effect: 626: ±0.02% FS/°F. 628: ±0.04% FS/°F (includes zero and span).
Pressure Limits: See table.
Power Requirements: 13 to 30 VDC.
Output Signal: 4 to 20 mA. Optional 0-5, 1-5, 0-10, 1-6 or 2-10.
Response Time: 50 msec.
Loop Resistance: 0 - 1300 ohms maximum for current. For voltage outputs, minimum load resistance: 2000 ohms.
Current Consumption: 38 mA (maximum).
Electrical Connections: Conduit Housing (-CH): terminal block, 1/2˝ female NPT conduit. General Purpose Housing (-GH): cable, DIN connector, or M-12 4 pin connector.
Process Connection: 1/4˝ male or female NPT and BSPT.
Enclosure Rating: NEMA 4X (IP66).
Mounting Orientation: Mount in any position.
Weight: 10 oz (283 g).
Agency Approvals: CE.

PRESSURE LIMITS

Range Number	Pressure Range (psig)	Maximum Pressure (psig)	Over Pressure (psig)	Range Number	Pressure Range (psig)	Maximum Pressure (psig)	Over Pressure (psig)
00	30˝ Hg-0	30	150	11	0-150	300	750
01	30-0-15	30	150	12	0-200	400	1000
02	30-0-30	60	300	13	0-300	600	1500
03	30-0-45	100	300	14	0-500	1000	2500
04	30-0-60	200	500	15	0-1000	2000	5000
05	30-0-100	200	500	16	0-1500	3000	5000
06	0-5	10	50	17	0-2000	4000	5000
07	0-15	30	150	18	0-3000	6000	7500
08	0-30	60	300	19	0-5000	7500	10000
09	0-50	100	300				
10	0-100	200	500				

MODEL ORDERING CHART

Accuracy	626 628							0.25% Full Scale Accuracy 1.0% Full Scale Accuracy
Range		-00 -01 -02 -03 -04 -05 -06 -07 -08 -09 -10 -11 -12 -13 -14 -15 -16 -17 -18 -19						0-30˝ Hg Vacuum 30-0-15 psi 30-0-30 psi 30-0-45 psi 30-0-60 psi 30-0-100 psi 0-5 psi 0-15 psi 0-30 psi 0-50 psi 0-100 psi 0-150 psi 0-200 psi 0-300 psi 0-500 psi 0-1000 psi 0-1500 psi 0-2000 psi 0-3000 psi 0-5000 psi
Housing			-CH -GH					Conduit Housing General Purpose Housing
Process Connection				-P1 -P2 -P3 -P4 -P5				1/4˝ male NPT 1/4˝ female NPT 1/4˝ male BSPT 1/4˝ female BSPT Refrigerant Valve Depressor
Electrical Connection					-E1 -E2 -E3 -E4 -E5 -E6			Cable Gland with 3’ of Prewired Cable Cable Gland with 6’ of Prewired Cable Cable Gland with 9’ of Prewired Cable DIN Connector Available with -GH Housing Only 1/2˝ female NPT Conduit Available with -CH Housing Only M-12 4 Pin Connector
Signal Output						-S1 -S2 -S3 -S4 -S5 -S6		4-20 mA 1-5 Volt 2-10 Volt 0-5 Volt 0-10 Volt 1-6 Volt
Options							-AT -NIST -LED	Aluminum Tag NIST Traceable Certificate Bright Red LED Display Available with -CH Housing Only

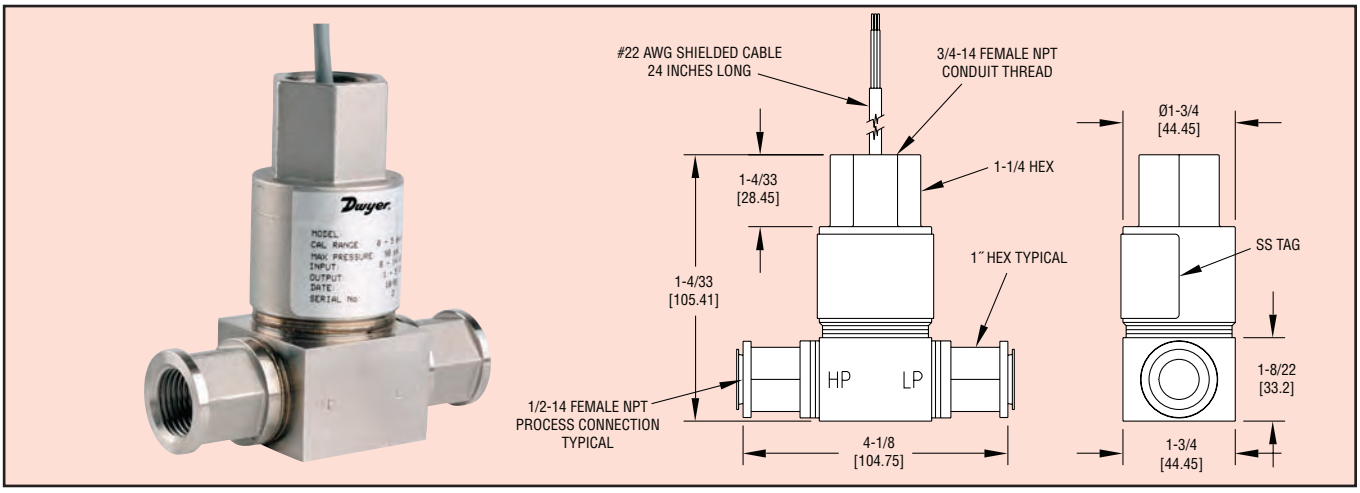
626 with LED Display

Note: LED option is not NEMA 4X rated.

Series 636D

Fixed Range Differential Pressure Transmitter

Explosion-proof, 0.5% Accuracy



The Series 636D Differential Pressure Transmitter can be used for measuring pressures of liquids, gases, & vapors. All available ranges have an excellent 0.5% F.S. accuracy with a 4-20 mA output standard or optional 1-5 VDC output. The NEMA 4 housing is an all 316 welded construction that is designed to withstand the harshest environmental conditions. With all 316L wetted materials this transmitter is compatible with most media. These units are CSA approved explosion-proof for use in the specified hazardous locations and meet NACE standards for off-shore applications.

APPLICATIONS

Monitoring Differential Pressure for:

- Oil & Gas Applications
- Level Measurements in Non-Vented Liquid Tanks
- Filtration Systems
- Compressor Control
- Process Control

MODELS

Model Number 4-20 mA Out	Range	Model Number 1-5 VDC Out	Range
636D-0	0-6 psid	**636D-0-LP**	0-6 psid
636D-1	0-15 psid	**636D-1-LP**	0-15 psid
636D-2	0-30 psid	**636D-2-LP**	0-30 psid
636D-3	0-60 psid	**636D-3-LP**	0-60 psid
636D-4	0-100 psid	**636D-4-LP**	0-100 psid
636D-5	0-150 psid	**636D-5-LP**	0-150 psid
636D-6	0-200 psid	**636D-6-LP**	0-200 psid
636D-7	0-300 psid	**636D-7-LP**	0-300 psid
636D-8	0-500 psid	**636D-8-LP**	0-500 psid

SPECIFICATIONS

Service: Compatible gases, liquids, or vapors.

Wetted Materials: Types 316L SS.

Accuracy: BFSL: ±0.5% F.S. (includes linearity, hysteresis, & repeatability).

Stability: ±1.0 F.S./yr.

Pressure Limits: 3 x full scale differential pressure; Burst: 2500 psig.

Temperature Limits:

Ambient Operating: -40 to 140°F (-40 to 60°C).
Process Interface: -40 to 212°F (-40 to 100°C).
Storage: -40 to 212°F (-40 to 100°C).

Compensated Temperature Range: -20 to 160°F (-29 to 71°C).

Thermal Effect: ±2% F.S./50°F (reference to 77°F).

Power Requirements: 12-30 VDC for 4-20 mA outputs; 8-14 VDC for 1-5 VDC outputs, both with reverse polarity protection.

Output Signal: 4-20 mA DC or 1-5 VDC.

Zero and Span Adjustment: Fixed.

Response Time: 20 ms.

Loop Resistance: 900 ohms max @ 30 VDC for current outputs. For voltage outputs, minimum lead resistance 50k ohms.

Current Consumption: 4-20 mA for current output models; 3 mA for voltage output models.

Electrical Connections: 2 ft, 22 AWG cable; 3/4˝ female NPT conduit.

Process Connections: Two 1/2˝ female NPT.

Enclosure Rating: NEMA 4 (IP65).

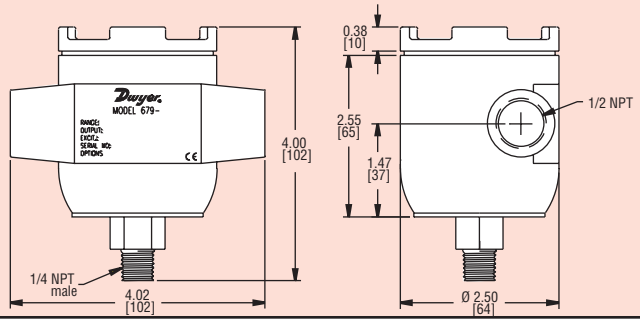
Mounting Orientation: ±0.05 psi/90° rotation from horizontal.

Weight: 1.8 lb (0.82 kg).

Agency Approvals: CSA approved explosion-proof for Class I, Division 1, Groups B, C, and D; Class II, Groups E, F, and G; Class III.

Series 679 Weatherproof Pressure Transmitter

±0.25% FS Accuracy, Compatible with Corrosive Materials, 4-20 mA Output CE



The Series 679 Pressure Transmitter is compatible with a wide range of gases and liquids, and is specially designed for weatherproof service (NEMA 4/IP56). The Model 679 can measure pressures with an accuracy of ±.25%. This model provides a 4-20 mA output and is field adjustable.

MODELS

Model Number	Range	Overpressure
679-0	0 to 25 psi	100 psi
679-1	0 to 50 psi	150 psi
679-2	0 to 100 psi	300 psi
679-3	0 to 250 psi	500 psi
679-4	0 to 500 psi	1000 psi
679-5	0 to 1000 psi	2000 psi
679-6	0 to 3000 psi	4500 psi
679-7	0 to 5000 psi	7500 psi
679-8	0 to 10,000 psi	12,000 psi

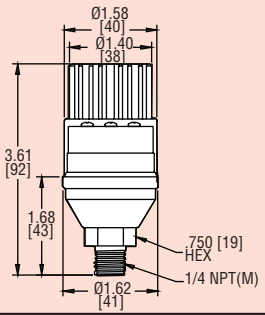
SPECIFICATIONS

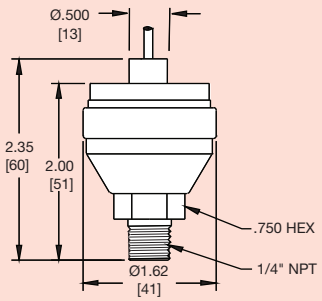
Service: Corrosive liquids and gases.
Accuracy: ±.25% FS (includes non-linearity, hysteresis and non-repeatability).
Pressure Limits: See table.
Output: 4-20 mA, 2-wire.
Supply Voltage: 9-30 VDC.
Loop Resistance: 800 ohms.
Zero and Span Adjustment: ±15%, non-interactive.
Stability: Less than .5% FS/year.
Temperature Limits: -40 to 260°F (-40 to 125°C) 10 to 90% RH, non-condensing.
Compensated Temperature Range: -4 to 176°F (-20 to 80°C).
Pressure Connection: 1/4″ male NPT.
Wetted Parts: Corrosive resistant 17-4 PH SS.
Enclosure: Aluminum.
Electrical Connections: Two 1/2″ conduit ports.
Weight: 13.4 oz (380 g).
Agency Approvals: CE.

Series 673 Pressure Transmitter

±0.25% Full Span Accuracy, 4-20 mA Signal, Ranges to 1000 psi CE

NEW CONDUIT VERSION





The low cost Series 673 Pressure Transmitter is a fixed range transmitter designed for harsh environments and suitable for high shock and vibration applications. Constructed of stainless steel, the Series 673 provides a 4 to 20 mA output signal with 0.25% accuracy. Use the Series 673 in industrial OEM equipment, hydraulic systems, HVAC equipment, industrial engines and compressor control.

MODELS

Model Number*		Range	Model Number*		Range
673-1	**673-1C**	0-1 psi	**673-7**	**673-7C**	100 psi
673-2	**673-2C**	0-2 psi	**673-8**	**673-8C**	200 psi
673-3	**673-3C**	0-5 psi	**673-9**	**673-9C**	500 psi
673-4	**673-4C**	0-10 psi	**673-10**	**673-10C**	1000 psi
673-5	**673-5C**	0-25 psi	**673-13**	**673-13C**	-14.7-30 psig
673-6	**673-6C**	50 psi	**673-14**	**673-14C**	-14.7-100 psig

* The model numbers followed by a "C" represent the conduit version.

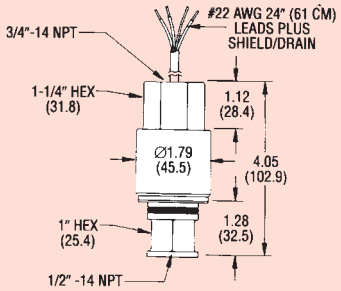
SPECIFICATIONS

Service: Liquid, gas, or vapor.
Wetted Materials: 17-4 PH SS.
Accuracy: ±0.25% FS (RSS), (includes non-linearity, hysteresis and non-repeatability).
Temperature Limits: -40 to 260°F (-40 to 125°C).
Pressure Limits: 2 x maximum range.
Compensated Temperature Range: 4 to 212°F (-20 to 100°C).
Thermal Errors: Zero: ±3.6% FS/100°F(100°C); Span: ±2.7% FS/100°F(100°C).
Supply Voltage: 9-30 VDC.
Output: 4-20 mA, 2-wire.
Zero & Span Adjustment: Fixed.
Response Time: <60 msec.
Loop Resistance: 0 to 800Ω.
Stability: 0.5% FS/year.
Shock: 200 g.
Vibration: 20 g.
Electrical Connections: 2 ft (61 cm) multiconductor cable.
Conduit Connection: 1/4″-18 (22.3 mm) knockout.
Enclosure: Stainless Steel and Valox.
Weight: 2.3 oz (65 g).
Agency Approvals: CE.

Series 636

Fixed Range Pressure Transmitter

Stainless Steel, Explosion-proof, Accuracy ±0.30%, 4-20 mA or 1-5 VDC Signal



The Series 636 Pressure Transmitter is a low cost, fixed range, stainless steel transmitter with ±0.30% accuracy. It is designed to continuously measure pressure for years in even the toughest environmental and media conditions. Select from 4 ranges to 0-300 psig (0-20 bar) with choice of 4-20 mA output (model 636) or 1-5 VDC output (model 636LP). Transmitters are explosion-proof, (FM approved) and meet NACE standards for offshore applications.

MODELS

Model Number		Operating Range, PSI	Operating Range, Bar
4-20 mA OUT	1-5 VDC OUT		
636-0	636-0-LP	0-15	0-1
636-1	636-1-LP	0-30	0-2
636-2	636-2-LP	0-100	0-7
636-3	636-3-LP	0-300	0-20

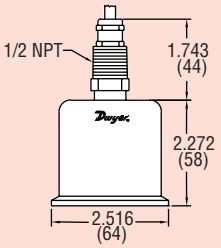
SPECIFICATIONS

Service: Liquid, gas or vapor.
Wetted Materials: 316 L SS.
Fill Fluid: DC 200 Silicone (Standard).
Accuracy: ±0.30% of calibrated span.
Stability: ±0.5% of upper range limit for six months.
Temperature Limits: Electronics (Ambient): -40 to 140°F (-40 to 60°C); Process interface: -40 to 212°F (-40 to 100°C).
Pressure Limits: 300% upper range limit.
Compensated Temperature Range: -20 to 180°F (-29 to 82°C).
Thermal Effect: (includes zero and span). Between -20 and 180°F (-29 and 82°C). ±2.0% per 50°F (28°C).
Power Requirements: 12 to 30 VDC (636), 8 to 14 VDC (636LP), reverse polarity protection.
Output Signal: 4-20 mA DC, limited to 30 mA DC (636), 1-5 VDC (636LP).
Zero & Span Adjustments: Null: 4.0mA ±2% span (636),1VDC ±1% span (636LP); Span: 16.0 mA ±1% span (636), 4 VDC ±1% span (636LP).
Loop Resistance: 900 ohms max @ 30V.
Electrical Connection: 3/4″ female NPT 24″ (61 cm), 22 AWG.
Process Connection: 1/2″ female NPT.
Weight: 0.83 lb (374 g).
Enclosure Rating: NEMA 4 (IP65).
Agency Approvals: CE, FM, CSA. FM and CSA approved explosion-proof for Class I, Division 1, Groups B, C, & D, Class II, Groups E, F, & G Class III.

Series 681

Sanitary Pressure Transmitter

No Liquid Fill Diaphragm, Sanitary Clamp Fitting



The Series 681 Sanitary Pressure Transmitter is designed for applications in food, dairy, beverage and pharmaceutical processing, liquid level control, and sanitary pipelines. The unit is fully sealed to withstand high pressure washdown in Clean-in-Place (CIP) and Sterilize-in-Place (SIP) installations. The Series 681 is designed with a unique, no liquid fill diaphragm and a sanitary clamp pressure fitting for easy installation with negligible clamping effect. A conduit fitting, shielded cable with vent tube and sealed screws for zero and span adjustment combine to make the Series 681 completely watertight.

MODELS

Model Number	Range	Overpressure	Sanitary Clamp Connection
681-02	0 to 1 psi	50 psi	2″
681-12	0 to 2 psi	100 psi	2″
681-22	0 to 5 psi	150 psi	2″
681-32	0 to 10 psi	150 psi	2″
681-42	0 to 15 psi	150 psi	2″
681-52	0 to 30 psi	150 psi	2″
681-62	0 to 60 psi	180 psi	2″
681-72	0 to 100 psi	200 psi	2″
681-101	0 to 300 psi	1000 psi	1-1/2″

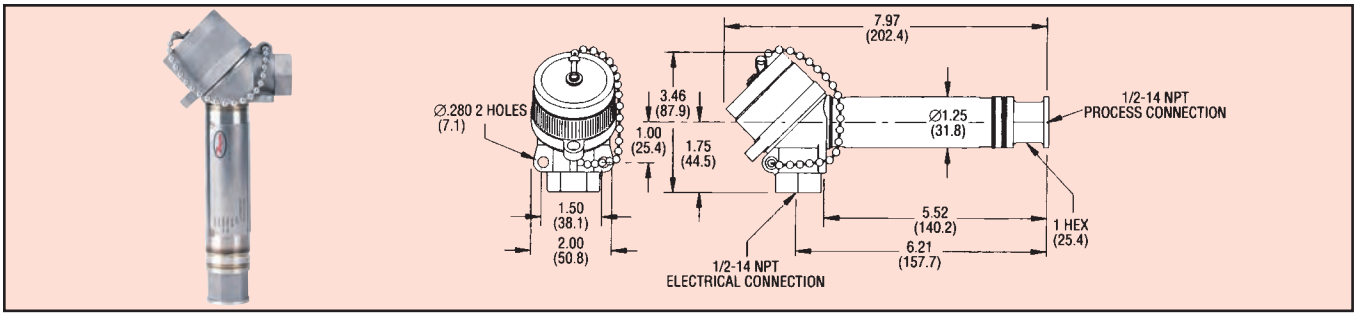
SPECIFICATIONS

Service: Compatible liquids and gases.
Wetted Parts: 316L SS.
Accuracy: ±.20% FS (includes non-linearity, hysteresis and non-repeatability).
Temperature Limits: -40 to 260°F (-40 to 125°C) 10 to 90% RH, non-condensing.
Pressure Limits: See table.
Compensated Temperature Range: 20 to 180°F (-7 to 80°C).
Thermal Effect: Zero and span shift: ±2.0% FS/100°F (% FS/50°C).
Power Requirements: 9-30 VDC.
Output Signal: 4-20 mA, 2-wire.
Zero and Span Adjustment: ± 0.5 mA, non-interactive.
Response Time: ≤10 ms.
Loop Resistance: 800 ohms.
Electrical Connections: 1/2″ conduit fitting and strain relief with 15 ft (4.5 m) cable.
Process Connection: 2″ or 1-1/2″ sanitary clamp fitting male NPT.
Clamping Effect: Zero and span shift: ±0.15% FS for ranges up to 30 psi; ±0.25% FS for ranges >30 psi.
Enclosure Rating: 304 SS.
Weight: 8 oz (227 g).
Agency Approvals: CE.

Series 637 Adjustable Range Pressure Transmitter

CE FM APPROVED

Stainless Steel, Intrinsically Safe, Explosion-proof, Accuracy ±0.25%, 4-20 mA Signal



Series 637 Pressure Transmitters are durable and compact with all welded 316 SS construction and exceptional ±0.25% accuracy. Four ranges are offered up to 0-300 psig (0-20 bar). Zero and span are adjustable to ±10% each; range turndown is a full 5:1. Integral junction box simplifies field wiring. Output is 4-20 mA with 12-40 VDC power supply. Units are explosion-proof, intrinsically safe with FM approval and they meet NACE standards for offshore applications.

MODELS

Model Number	Stock Range, PSI	Minimum Range, PSI	Stock Range, Bar	Minimum Range, Bar
637-0	0-15	0-3	0-1	0-0.2
637-1	0-30	0-6	0-2	0-0.4
637-2	0-100	0-20	0-7	0-1.4
637-3	0-300	0-60	0-20	0-4

SPECIFICATIONS

Service: Liquid, gas or vapor.
Wetted Materials: 316 L SS.
Body: 316 SS.
Accuracy: ±0.25% of calibrated span.
Stability: ±0.5% of upper range limit for six months.
Temperature Limits: Process Interface -40 to 212°F (-40 to100°C).
Pressure Limits: 300% full scale.
Compensated Temperature: -20 to 180°F (-29 to 82°C).
Thermal Effect: (includes zero and span) ±.02% upper range /°F (30 to 130°F) ±.032% upper range /°F (-20 to 180°F).
Power Requirements: 12 to 40 VDC with rev. polarity protection.
Output Signal: 4-20 mA DC, max. 30 mA DC (2-wire).
Zero and Span Adjustment: ±10% each.
Loop Resistance: 600 ohms @ 24 VDC; max. ohms = (supply voltage -12) x 50.
Electrical Connection: 1/2˝ female NPT.
Process Connection: 1/2˝ female NPT.
Response Time: Time constant of 20 ms.
Weight: 1.67 lb (752 g).
Agency Approvals: CE, FM.

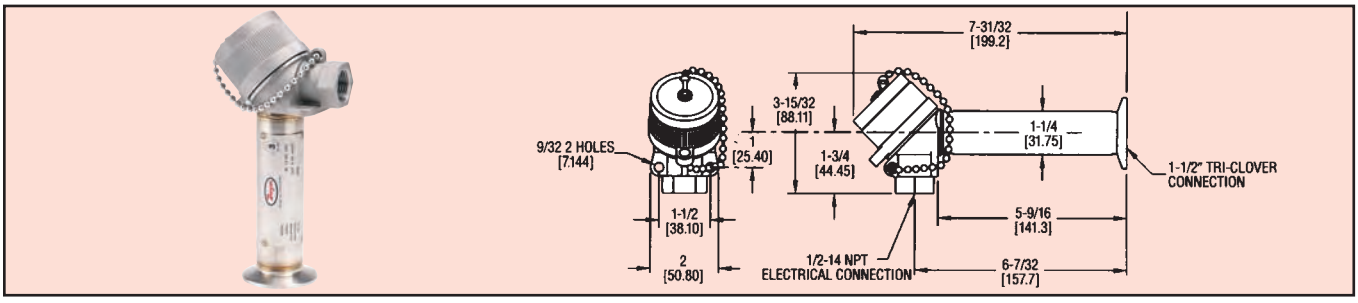
Suggested Specifications

Pressure transmitter body shall be 316 SS with 4 adjustable ranges 0 to 300 psig (0 to 20 bar) with 5:1 turndown and accuracy of ±0.25%. Unit shall be FM approved intrinsically safe for Class I, II, & III, Division 1, Group B, C, D, E, F & G for Hazardous Locations, and explosion-proof for Class I, Div. 1, Groups B, C, D; Dust-ignition proof for Class II, Div. 1, Groups E & G and suitable for Class III, Div. 1; Hazardous Locations, NEMA 4 Enclosure. Transmitter shall be Dwyer® Pressure Transmitter Model No. 637____.

Series 637S Sanitary Pressure Transmitter

CE

Meets NACE Standards, Accuracy ±0.25%



Low cost, durable sanitary pressure transmitter is designed for use in food, dairy, beverage and pharmaceutical industries. This unit features superior ±0.25% accuracy and up to 5:1 turndown. Calibration is quick and easy with field accessible zero and span adjustments. All stainless steel construction resists the corrosive effects of caustic washes used in most food processing cleaning procedures. 1-1/2˝ sanitary clamp process connection is suitable for Clean-in-Place (CIP) applications, eliminating the need for expensive bypass piping, valving or removal requirements for steam cleaning.

MODELS

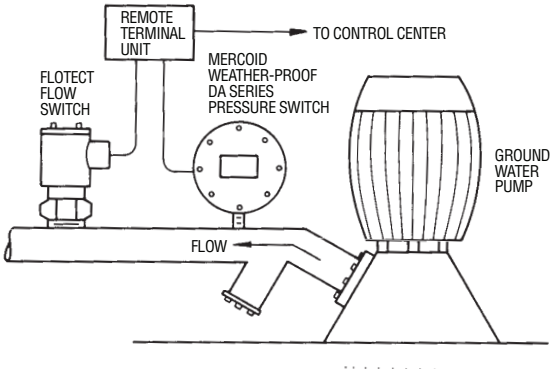
Model Number	Stock Range, PSI (bar)	Min. Range PSI (bar)
637S-0	0-15 (0-1)	0-6 (0-0.4)
637S-1	0-30 (0-2)	0-15 (0-1)
637S-2	0-100 (0-7)	0-20 (0-1.4)
637S-3	0-300 (0-20)	0-60 (0-4)

SPECIFICATIONS

Service: Liquid, gas or vapor.
Wetted Materials: 316L SS.
Body: 316 SS.
Accuracy: ±0.25% of calibrated span.
Temperature Limits: Process interface -40 to 212°F (-40 to 100°C).
Pressure Limits: 300% full scale.
Compensated Temperature Range:
-20 to 180°F (-25 to 80°C).
Thermal Effect: (Includes zero and span) ±1% of upper range limit per 50°F (30 to 130°F); ±1.6% of upper range limit per 50°F (10 to 180°F).
Power Requirements: 12-40 VDC with reverse polarity protection.
Output Signal: 4-20 mA DC, max. 30 mA DC (2-wire).
Zero and Span Adjustments: ±10% each.
Response Time: Time constant, 20 ms.
Loop Resistance: 600 ohms @ 24 VDC; max. ohms = (supply voltage -12) x 50.
Electrical Connection: 1/2˝ female NPT.
Process Connection: 1-1/2˝ sanitary clamp.
Weight: 1.67 lb (752 g).
Agency Approvals: CE.

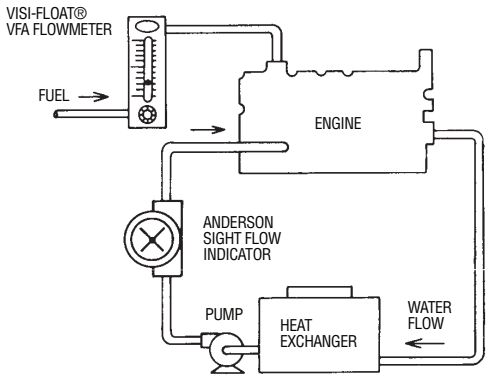
Suggested Specifications

Sanitary Pressure transmitter shall be 316 SS construction with 5:1 turndown and ±0.25% F.S. accuracy. Unit shall meet NACE standards. Transmitter shall have 1-1/2" sanitary clamp process connection and be suitable for Clean-in-Place (CIP) applications. Unit shall have field accessible zero and span adjustments. Transmitter shall be Dwyer® Sanitary Pressure Transmitter Model No. 637S____.



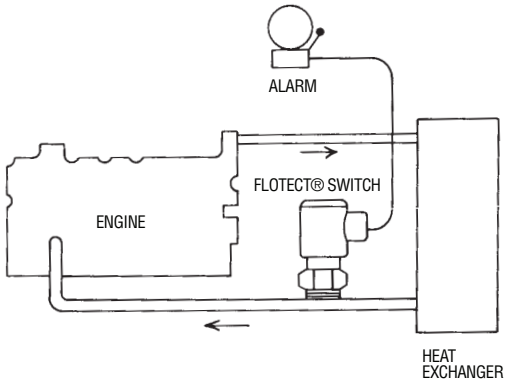
Flow and pressure switches protect large municipal water system pumps from damage.

Municipal water systems supplied by deep wells located at many locations throughout the system require releable alarms at each pump in case of low suction or high discharge pressure conditions which can damage the pump. The highly reliable Mercoid® DA Series pressure switch can protect against both conditions. Many systems also employ a Flotect® flow switch for added low suction alarm evidenced by low or no water flow. Both switches signal alarms to a remote terminal unit at the pumping location which, in turn, relays the alarm conditions and location to the central water system control station. The integral weather-proof construction of the Flotect® switch and optional weather-proof DA switch housing allow these controls to be located at outdoor pumping stations.



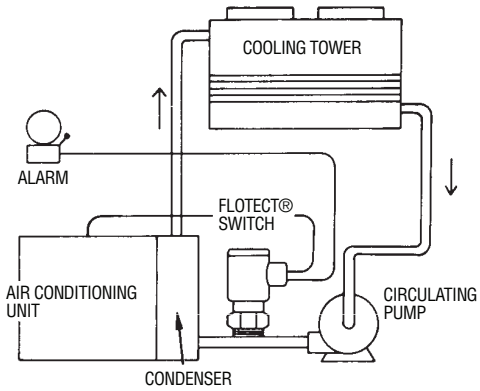
Fuel and cooling flow to large engines and compressors monitored by Dwyer flowmeters and Anderson Sight Flow Indicators.

By indicating flow of cooling water to engines, compressors and other machinery, Sight Flow Indicators permit the operator to monitor the proper flow to protect the equipment. Engine fuel flow can be measured with a flowmeter. The Dwyer® VFA flowmeter series is compatible with and can monitor the low flows encountered in fuel oil systems. W.E. Anderson® Flotect® switches (not shown), when inserted in the cooling water lines, can provide an alarm or system shutdown should the flow fall below a safe limit.



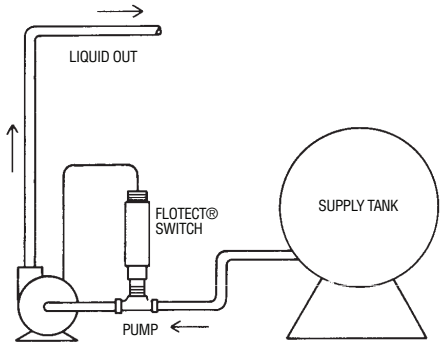
If cooling water flow fails, Flotect® flow switch sounds alarm or stops engine.

To insure the vital flow of cooling water to a large engine, a W.E. Anderson® V4 Flotect® flow switch can be placed in the cooling water line. It will sound an alarm if the flow falls below a safe minimum, or can even be connected to shut off the engine.



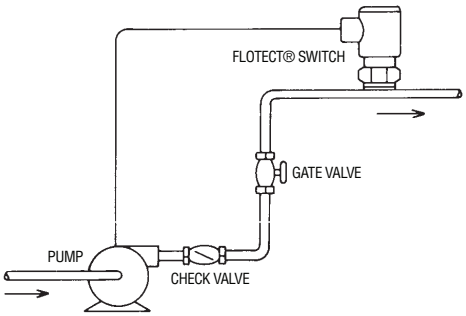
Flotect® flow switch insures cooling water circulation before air conditioning compressor motor starts.

Large air conditioning and refrigeration systems which include water cooled condensers require that the water must circulate through the condenser and cooling tower in sufficient volume before the compressor is started. Here the W.E. Anderson® Flotect® flow switch is connected to the compressor control circuit to prevent starting or to shut down the compressor if the flow of cooling water falls below that required for proper operation. A dual Flotect® switch (available as an option) will also trigger a remote alarm to signal the operator of the shutdown as soon as it occurs.



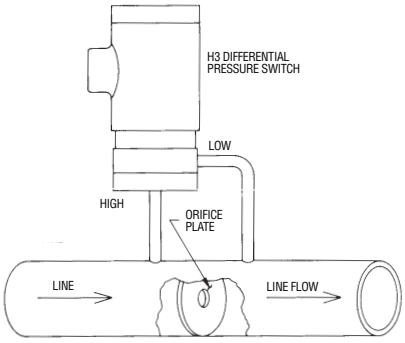
W.E. Anderson® Flotect® switch stops pump when flow stops.

When the liquid in this supply tank is exhausted, the W.E. Anderson® V6 Flotect® switch senses the loss of flow and stops the pump motor, preventing pump cavitation and saving energy.



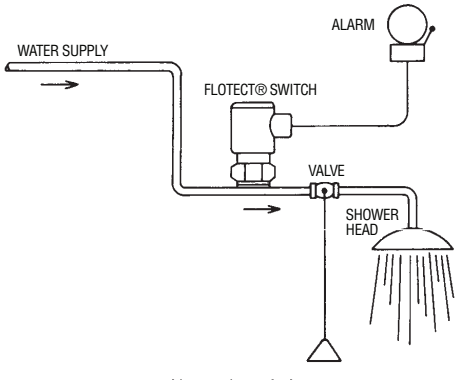
One of many options, a Neoprene boot over Flotect® flow switch vane hinge protects it from buildup of solids.

This W.E. Anderson® V4 Flotect® flow switch has an optional Neoprene boot (inside the pipe) to protect the vane hinge from an accumulation of solids. Installed on a storm sewer lift pump, the switch will stop the pump motor when flow ceases or falls below the set minimum, preventing pump cavitation and wasted power.



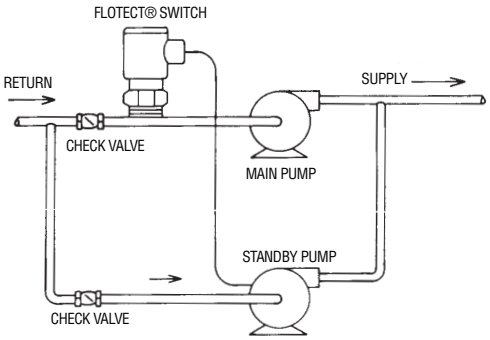
Pressure switch monitors flow in high pressure system.

In a liquid process high pressure line, the process may be adversely affected by flows above (or below) the desired flow. The W.E. Anderson® Model H3 can monitor flow in systems with operating pressures up to 1500 psig as a function of pressure drop across a calibrated orifice plate. The H3 set point is adjusted so that an alarm sounds or the process is automatically shut down if flow exceeds (or falls below) the desired rate.



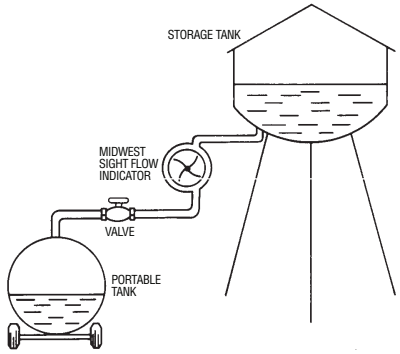
Use of this emergency industrial shower automatically actuates W.E. Anderson® Flotect® flow switch, which sounds alarm to bring help.

In this emergency industrial shower, a V4 Flotect® flow switch has been mounted in the water supply pipe. It will activate either an audible or visual alarm (or both) to summon help when the shower is used by an employee who has been accidentally contaminated by hazardous material.



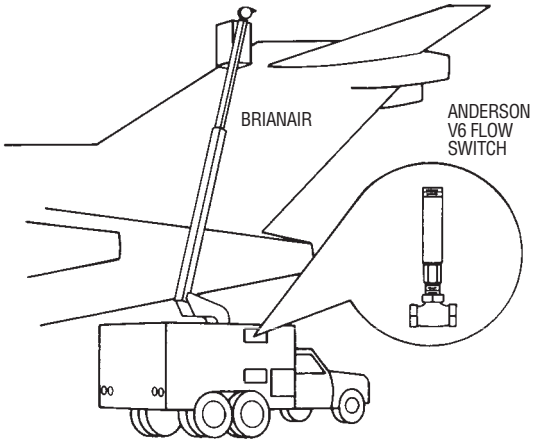
When main pump fails, Flotect® flow switch transfers to standby pump to maintain vital fluid circulation.

When proper fluid circulation in a system is critical, the W.E. Anderson® Flotect® flow switch will automatically start a standby pump should the main pump fail. The flow in the main path of the parallel system illustrated keeps the Flotect® flow switch in an open position. When the main pump fails, the flow will cease. The flow switch then closes, starting the standby pump.



Midwest sight flow indicator reveals flow or stoppage.

In this gravity feed system delivering liquid fertilizer to portable tanks, a Midwest Model 100 sight flow indicator was installed. The operator can see the rotating vanes to check for adequate flow at any time.



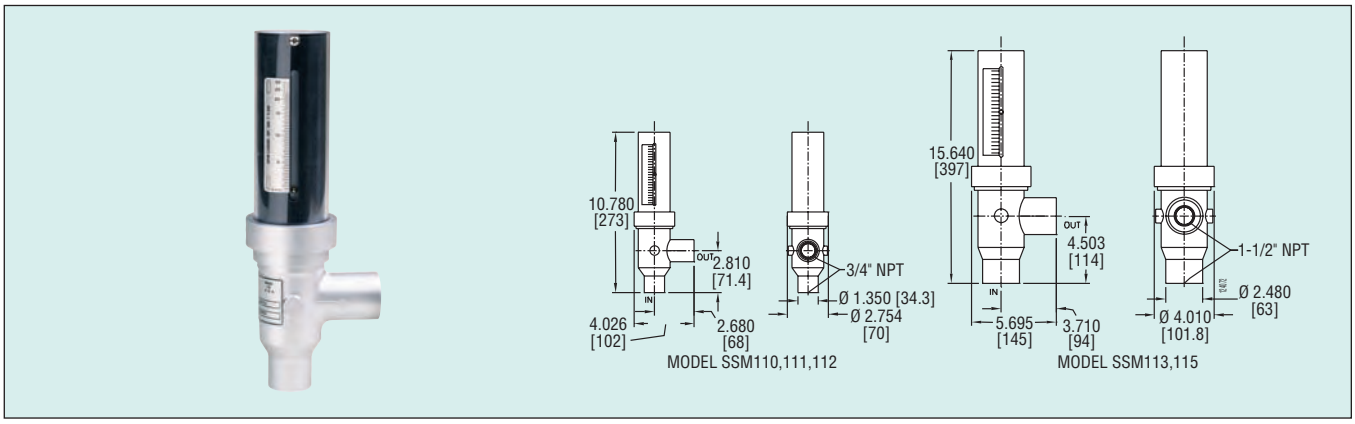
W.E. Anderson® flow switch protects aircraft de-icing equipment.

This aircraft de-icer saves time and heating fuel by heating only the fluid dispensed, not the entire tank. With the de-icing fluid heated by three large heat exchangers operating in parallel, de-icing can begin within 90 seconds regardless of ambient temperature. Three Anderson Model V6 flow switches are used to sense adequate flow of de-icing fluid through the heat exchanger, one switch on each exchanger. Should fluid flow be interrupted or drop below a safe level, the burner for the affected heat exchanger will shut down. The V6 flow switch is well suited to this application because of its reliability and inherently weather-proof design.

Series SSM

Stainless Steel Flowmeter

±2% Accuracy Up to 600°F (316°C) and 1000 psi (68.9 bar), Direct Reading Scale



Series SSM 316 SS Flowmeters are ideal for dirty or opaque fluids, high temperature and high pressure service and harsh environments. The direct reading scale provides ±2% accuracy with a rangeability of 25:1. Flowmeters can quickly be disassembled without removing the body from the pipeline for easy cleaning.

MODELS

Model Number	Range	Connection	Pressure Drop
SSM110*	0.20 to 5.40 GPM	3/4″ female NPT	17.2″ H_2O
SSM111*	0.20 to 10.0 GPM	3/4″ female NPT	22.0″ H_2O
SSM112*	0.50 to 23.0 GPM	3/4″ female NPT	75.0″ H_2O
SSM113*	1.00 to 35.0 GPM	1-1/2″ female NPT	18.5″ H_2O
SSM115*	2.00 to 75.0 GPM	1-1/2″ female NPT	80.0″ H_2O

* Models are calibrated with water at 70°F (21°C) @ 760 mm Hg, Sp.G.=1.00.

Accessories
No. SSM8, Hot Top for 3/4″ models
No. SSM9, Hot Top for 1-1/2″ models

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: T316 SS, Alnico magnet, Fluoroelastomer O-ring.
Temperature Limits: 600°F (316°C), temperatures above 300°F (149°C) requires "hot top" sold separately.
Pressure Limits: 3/4″ models: 1000 psig (68.9 bar) @ 250°F (121°C), 1-1/2″ models: 800 psig (55 bar) @ 250°F (121°C).
Accuracy: ±2% full scale.
Repeatability: ±0.5% of indicated flow rate.
Process Connection: 3/4″ or 1-1/2″ female NPT.
Scale Length: 3/4″ models: 3.2″ (8 cm), 1-1/2″ models: 5.2″ (13 cm).
Rangeability: 25:1.
Weight: 3/4″ models: 5 lb (2.3 kg), 1-1/2″ models: 13 lb (5.9 kg).

Models F222 & F451 Liquid/Particle Filters

Compressed air filters protect equipment and instrumentation from harmful contaminant's such as dirt, water and oil. Liquids are continuously coalesced and released through the manual drain valves. Replaceable filter element removes particles and droplets as small as 0.01 micron with 93% efficiency. Units have 1/4″ female NPT inlet and outlet and manual drain valve.

SPECIFICATIONS

Filtration Efficiency: 93% (removal of 0.01 micron particles).
Maximum Pressure: 150 psig (10 bar).
Maximum Temperature: 130°F (54°C).
Max. Flow at 100 psig: 22 scfm (F222); 45 scfm (F451).
Inlet & Outlet Ports: 1/4″ female NPT.
Mounting: In-line only (F222); 1/4-20 mounting holes (F451).
Materials of Construction:
Anodized Aluminum head, Polycarbonate bowl, cadmium plated steel tie rod, nylon internals, Buna-N seal.
Weight: 0.5 lb (0.2 kg) (F222); 1.1 lb (0.5 kg) (F451).

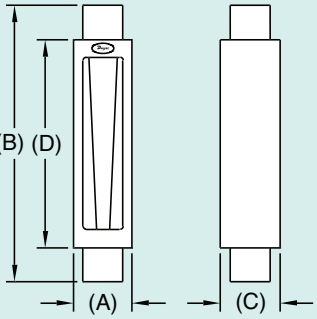
Model F222 Liquid/Particle Filter
Model 1201-2 Replacement Filters for F222 (pk of 3)
Model F451 Liquid/Particle Filter
Model 1201-3 Replacement Filters for F451 (pk of 3)

Series IF

Industrial Direct Reading Flowmeter

Air/Water Direct Reading Scale, 304 SS Protective Shield, ±3% Accuracy

Higher Flow Rates Available



Dimensions

Tube size	Female NPT	A	B	C	D
1 and 2	1/2″	2 [50.8]	9.54 [242]	2.25 [57.2]	8.04 [204]
3 and 4	1″	3.5 [89]	13.69 [348]	3.75 [95.3]	10.50 [267]
5 and 6	2″	5 [127]	15.59 [396]	5.25 [133]	11.55 [293]

Ideal for industrial applications, the Series IF Industrial Direct Reading Flowmeters are fully enclosed in a brushed stainless steel case. The flowmeters can directly measure flow rates up to 116 GPM (439 lpm) for water and 250 SCFM (7080 lpm) for air service. The detachable, clear 3/16″ thick polycarbonate front shield provides protection at maximum rated temperature and pressure. Each unit is designed with female NPT end fittings for easy in-line installation.

MODELS

Model Number	Maximum Flow Rate Water GPM	Maximum Flow Rate Air SCFM	Tube Size	Pressure Drop (in. H_2O)
IF2700	0.25	1.2	1	—
IF2701	0.36	1.7	1	2
IF2702	0.76	3.3	1	5
IF2703	1	4.2	2	6
IF2704	1.5	6.5	2	—
IF2705	2.2	8.5	2	10
IF2706	3.8	16	3	10
IF2707	5	21.5	3	14
IF2708	6	25.5	4	5
IF2709	7.4	30	4	6
IF2710	9.6	40	4	10
IF2711	11	47.5	4	13
IF2712	14	62	4	24
IF2713	20	90	4	39
IF2714	22	90	5	16
IF2715	26	—	4	70
IF2716	41	160	6	5
IF2717	44	180	5	30
IF2718	60	245	6	16
IF2719	61	250	5	40
IF2720	86	—	6	25
IF2721	116	—	6	45

SPECIFICATIONS

Service: Liquids or gases.

Wetted Materials: Flowtube: Borosilicate glass; Float, Guide Rods, Float Stops, End Fittings: 316 SS; O-Rings: Fluoroelastomer.

Temperature Limit: 200°F (93°C).

Pressure Limit: 200 psi (13.8 bar); 250 psi for tube size 5 & 6.

Accuracy: ±3% of full scale.

Repeatability: ±0.5% of full scale.

Turndown Ratio: 10:1.

Scale: Dual scale GPM and scfm.

Process Connection: See table.

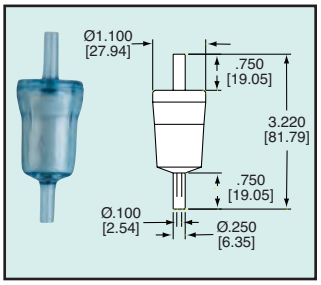
Mounting: Vertical.

Front Shield: Polycarbonate.

Side Panels: 304 SS.

Flowmeter Accessories and Options

Model F195 Disposable In-Line Filter



Model F195 Disposable In-Line Filter

Remove 99.99% of unwanted particles from within your gas flow with the Model F195 Disposable In-Line Filter. Encapsulated microfiber filter elements are able to filter particles as small as 0.1 micron. Filters are completely disposable – simply remove the filter from your line and throw it away when it becomes dirty. The transparent nylon housing makes it simple to determine if the filter needs to be changed.

SPECIFICATION

Filtration Efficiency: 99.99% (removal of 0.1 micron particles).
Housing Construction: Nylon.
Filter Tube Dimensions: 0.5″ ID × 1.3″ length.
Maximum Temperature: 230°F @ 0 psig (110°C @ 0 bar), 120°F @125 psig (49°C @ 9 bar).
Maximum Pressure: 125 psig (8.6 bar).
Maximum Differential Pressure: 60 psi (4 bar) (in-to-out flow direction), 20 psi (1.4 bar) (out-to-in flow direction).
Internal Volume: 11.5 cc (11.5 ml).
Connections: Barbed for 1/4″ (I.D. tubing.

Line Pressure vs. Flow

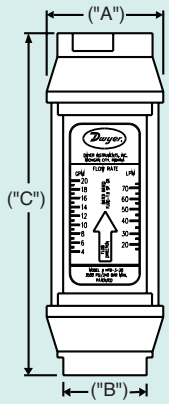
Line Pressure (psig)	1.5	10	20	30	40	60	80	100	125
Gas Flow (scfm)	0.6	0.9	1.3	1.6	2.0	2.7	3.5	4.2	5.7

* 1.5 psi pressure drop.

Series HF

In-Line Flow Monitors

For Air, Water or Caustic Fluids, ±2.5% Accuracy, Unrestricted Mounting



Connection Size	"A" Reference	"B" Wrench Flats	"C" Reference
⅛ NPT	1¼" (32mm)	1⅛"(17mm)	4¹³⁄₁₆" (122mm)
¼ to ½ NPT	1⅞" (48mm)	1¼" (32mm)	6⁹⁄₁₆" (167mm)
¾ to 1 NPT	2⅜" (60mm)	1¾" (45mm)	7⅛" (181mm)
1½ NPT	3½ (89mm)	2¼" (57mm)	10⅛" (257mm)

Low Cost, Series HF In-Line Flow Monitors have a patented design based on a floating sharp-edged orifice disk and variable area flow measurement to yield accuracy of ±2.5% over center one-third of scale. This unique design allows accurate performance with fluid viscosities up to 500 SSU. All internal wetted parts are contained inside a sealed metal tubular casing assuring a virtually maintenance-free unit. Flowing media forces linear motion of a spring loaded, sharp edge orifice disk and ring shaped transfer magnet which both ride on a tapered center shaft. The transfer magnet drives a clearly visible magnet follower located outside the flow tube, protected under the clear Polycarbonate tube. A ring on the magnet follower indicates flow rate on the direct reading scale. Rubber bumpers are provided for external impact resistance.

Designed for single-direction flow, Series HF Monitors are recommended for use with system filtration of at least 74 microns or a 200 mesh screen. Some applications may also require magnetic filtration. These flowmeters do not require inlet or outlet straight plumbing and can be mounted horizontally, vertically, or inverted.

APPLICATIONS

HF Flow Monitors can be used to set flow rates, fluid motor and cylinder speeds. Check pump high pressure performance, pressure relief valve settings, fluid handling systems in agricultural, construction or industrial machinery, power tools and equipment. Monitor; petrochemical operations with brass or stainless steel models. Industrial pnuematic systems air flow can be monitored with the HFA models which are calibrated at 100 psig inlet pressure.

SPECIFICATIONS

Service: Compatible gases or liquids.
Wetted Materials: Body: Aluminum, brass or 304 SS; Seals: Buna-N or Fluoroelastomer; Magnet: PTFE coated Alnico; Other internal parts: 304 SS.
Maximum Viscosity: 500 SSU.
Temperature Limits: HFA, HFL, HFB and HFS Models: 240°F (116° C); HFH Models: 400°F (204°C).
Pressure Limits: HFA Models: 600 psig (41 bar); HFL, HFB and HFH Models: 3500 psig (240 bar); HFS Models: 6000 psig (413 bar).
Accuracy: ±4% FS over entire range; ±2.5% over center third of the measuring range.
Repeatability: ±1% of full scale.
Shipping Weight: 1/8 to 1/2″ female NPT Models; 2 lb (0.9 kg); 3/4 to 1″ female NPT Models: 3.5 lb (1.59 kg); 1-1/2″ female NPT Models: 11 lb (5 kg); 2″ female NPT Models: 13.5 lb (6.12 kg).

MODELS

Aluminum body for air or other non-corrosive gases:
Wetted Parts: Aluminum, PTFE coated Alnico, 304 SS and Buna-N

Model Number	Connection Size	Range, Air SCFM
HFA-0-12	1/8″ female NPT	2-12
HFA-1-12	1/4″ female NPT	2-12
HFA-1-22	1/4″ female NPT	2-22

Aluminum body for oil based fluids:
Wetted Parts: Aluminum, PTFE coated Alnico, 304 SS and Buna-N

Model Number	Connection Size	Range, GPM (LPM) Oil
HFL-2-05	1/2″ female NPT	0.5-5 (1-19)
HFL-4-25	1″ female NPT	2-25 (7.5-95)

Brass body for water based fluids (non-steam):
Wetted Parts: Brass, PTFE coated Alnico, 304 SS and Buna-N

Model Number	Connection Size	Range, Water GPM (LPM)
HFB-0-01	1/8″ female NPT	.05-1 (.19-3.8)
HFB-0-02	1/8″ female NPT	.2-2 (.75-7.5)
HFB-2-05	1/2″ female NPT	0.5-5.0 (1-19)
HFB-3-15	3/4″ female NPT	2-15 (7.5-55)
HFB-3-20	3/4″ female NPT	2-20 (7.5-75)
HFB-4-35	1″ female NPT	5-35 (19-130)
HFB-5-50	1-1/2″ female NPT	5-50 (19-189)
HFB-5-100	1-1/2″ female NPT	10-100 (38-379)
HFB-6-75	2″ female NPT	8-75 (31-284)
HFB-6-150	2″ female NPT	20-150 (76-568)

304 SS body for high-pressure fluids:
Wetted Parts: 304 SS, Fluoroelastomer and PTFE

Model Number	Connection Size	Range, Water GPM (LPM)
HFS-0-01	1/8″ female NPT	.05-1 (.19-3.8)
HFS-2-02	1/2″ female NPT	0.2-2.0 (0.75-7.5)
HFS-2-10	1/2″ female NPT	0.5-10 (1.9-38)

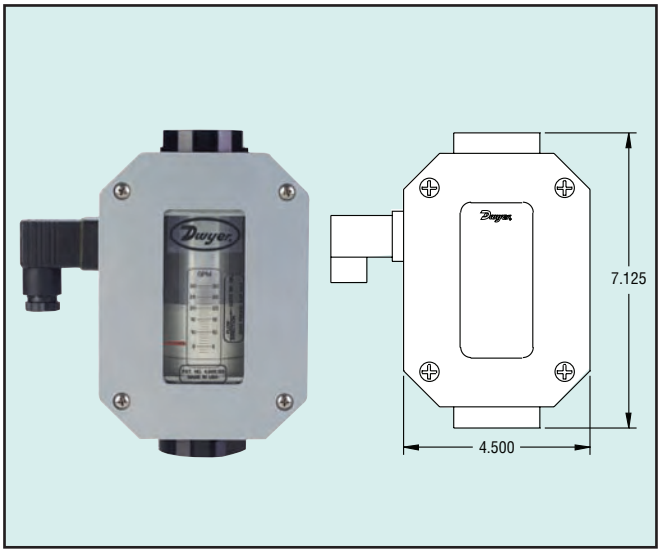
Brass Body High Temperature 400°F for water based fluids:
Wetted Parts: Brass, PTFE coated Alnico, 304 SS and Fluoroelastomer

Model Number	Connection Size	Range, Water GPM (LPM)
HFH-2-05	1/2″ female NPT	0.5-5.0 (1-19)
HFH-2-10	1/2″ female NPT	1-10 (3.8-38)
HFH-4-35	1″ female NPT	5-35 (19-130)

Series HFO

In-Line Flow Alarms

Latching Alarm Capabilities, For Air, Water or Caustic Fluids, Unrestricted Mounting



The Series HFO Flow Alarm provides continuous monitoring and control of flow rate levels. The flow alarm can be configured to open or close a contact for an increasing or decreasing set point. The unit includes two 10A SPDT limit switches with field adjustable alarm settings. Integral direct reading scale provides local indication of flow rate. The flow alarm is designed to mount in any orientation and does not require inlet or outlet straight plumbing. The Series HFO is constructed with a rugged cast aluminum NEMA 4X (IP65) enclosure for installations outdoors or in harsh environments.

APPLICATIONS

Monitoring flow in chemical processing, waste water processing, lubrication systems, process control, solar systems, drain lines and pump testing

SPECIFICATIONS

Service: Compatible gases or liquids.

Wetted Materials: Body: Aluminum, brass or 304 SS; Seals: Buna-N or Fluoroelastomer; Magnet: PTFE coated Alnico; Other internal parts: 304 SS.

Viscosity: 500 SSU.

Temperature Limits: 240°F (116°C).

Pressure Limits: See Chart.

Enclosure Rating: NEMA 4X (IP65).

Accuracy: Measuring ±4% FS over entire range; ±2.5% over center third of the measuring range.

Repeatability: ±1% of full scale.

Switch Type: SPDT, 10A @ 250 VAC; 0.5A @ 125 VDC, (resistive).

Shipping Weight: 1/4 to 1/2″ female NPT Models: 3 lb (1.4 kg); 3/4 to 1″ female NPT Models: 4.5 lb (2.0 kg); 1-1/2″ female NPT Models: 12 lb (5.4 kg).

MODELS

Aluminum body for air or other non-corrosive gases: 600 psig (41 bar)
Wetted Parts: Aluminum, PTFE coated Alnico, 304 SS and Buna-N

Model Number	Connection Size	Range, Air SCFM (LPM)
HFO-21112	1/4″ female NPT	1.5-12 (42.5-340)
HFO-21123	1/4″ female NPT	4-23 (113-651)

Brass body for water based fluids (non-steam): 3500 psig (240 bar)
Wetted Parts: Brass, PTFE coated Alnico, 304 SS and Buna-N

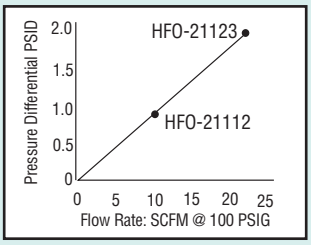
Model Number	Connection Size	Range, Water GPM (LPM)
HFO-22205	1/2″ female NPT	0.5-5.0 (1-19)
HFO-22315	3/4″ female NPT	1-15 (3.8-55)
HFO-22320	3/4″ female NPT	2-20 (7.5-75)
HFO-22440	1″ female NPT	4-40 (5-151)
HFO-22550	1-1/2″ female NPT	5-50 (19-189)

304 Stainless Steel body for high-pressure fluids: 6000 psig (413 bar)
Wetted Parts: 304 SS, Fluoroelastomer and PTFE

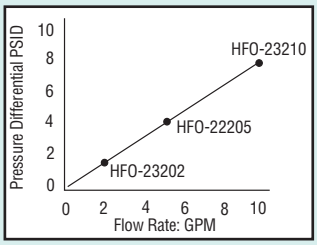
Model Number	Connection Size	Range, Water GPM (LPM)
HFO-23202	1/2″ female NPT	0.2-2.0 (0.75-7.5)
HFO-23210	1/2″ female NPT	1-10 (3.8-38)

PRESSURE DIFFERENTIAL VS. FLOW RATE

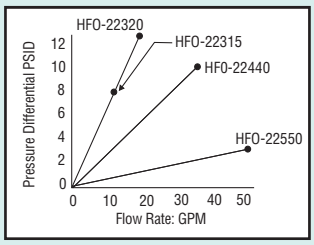
1/4″ FEMALE NPT



1/2″ FEMALE NPT



3/4″, 1″ & 1-1/2″ FEMALE NPT



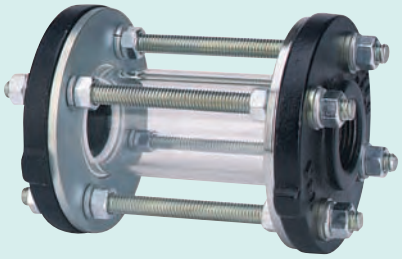
MIDWEST Sight Flow Indicators

Inexpensive Protection for Expensive Equipment and Systems

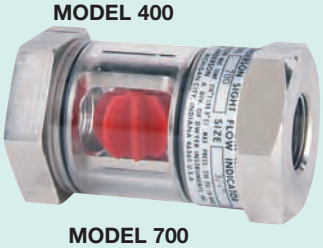
MODEL 100, 100MP

MODEL 300, 300MP

MODEL 360F



MODEL 400



MODEL 700

Patent No. 5,103,757

Midwest Sight Flow Indicators are manufactured of quality materials and safety tested to assure long, dependable service at economical prices. Available in window viewing style in the 100 and 300 Series and tube viewing style in the 400 and 700 Series with connection choices of female NPT, BSPP, or BSPT threaded and flanged. Series 700 has impeller and internal wipers for cleaning sight tube, which is perfect for fluids with suspended solids. Just rotate the glass tube and restore full 360° visibility without disrupting the flow.

Models

- 100 - Single window with impeller
- 300 - Double window with impeller
- 350 - Double window with no indicator
- 360 - Double window with flapper
- 400 - Tube type with no indicator
- 700 - Tube type with impeller and internal wipers to clean glass tube

Applications

Ideal to prove flow of coolant, lubricants, fuel lines, etc. on turbines, engines, compressors, and other large machinery. Great for monitoring filter efficiency, pump operation, and flow direction.

Sight Flow Indicator Dimensions and Weight

Model Number	Body Size	Length	Depth	Height	Flange Diameter	Viewing Area Diameter	WEIGHT Lbs (kg)
100 Series	1/4, 3/8	3.000 (76)	1.813 (46)	2.125 (54)	-		1.1 (0.5)
	1/2, 3/4	4.000 (102)	2.250 (57)	2.563 (65)	-	-	1.5 (0.7)
	1, 1-1/4	4.375 (111)	2.563 (65)	2.625 (67)	-	-	2.7 (1.2)
	1-1/2, 2	5.688 (144)	3.250 (830)	3.625 (83)	-	-	5.5 (2.5)
300 Series	1/4, 3/8	3.063 (78)	2.250 (57)	2.125 (54)	-	-	1.7 (0.8)
	1/2, 3/4	4.063 (103)	2.750 (70)	2.563 (65)	-	-	2.6 (1.2)
	1, 1-1/4	4.375 (111)	3.125 (79)	2.563 (65)	-	-	3.0 (1.4)
	1-1/2, 2	5.500 (140)	3.688 (93)	4.063 (103)	-	-	7.0 (3.2)
700 Series	1/4, 3/8	2.750 (70)	-	1.500 (38)	-	-	0.9 (0.4)
	1/2, 3/4	3.688 (94)	-	2.250 (57)	-	-	2.4 (1.1)
	1, 1-1/4,	4.875 (124)	-	2.750 (70)	-	-	5.1 (2.3)
	1-1/2			(across flats)	-	-	
400 Series	1/2	4.500 (144)	-		3.500 (89)	1.500 (38)	3.8 (1.7)
	3/4	5.125 (130)	-	-	3.875 (98)	1.750 (44)	4.8 (2.2)
	1	5.625 (143)	-	-	4.250 (108)	2.000 (51)	6.2 (2.8)
	1-1/4	5.750 (146)	-	-	4.625 (117)	2.000 (51)	7.6 (3.5)
	1-1/2	5.875 (149)	-		5.000 (127)	2.500 (64)	8.7 (4.0)
	2	6.125 (156)	-	-	6.000 (152)	3.000 (76)	13 (6.0)
	3	6.250 (159)	-	-	7.500 (191)	4.000 (102)	17 (7.7)
	4	6.250 (159)	-	-	9.00 (229)	5.000 (127)	25 (11.0)
400F Series	1	5.000 (127)	-	-	4.250 (108	2.000 (51)	7 (3.2)
	1-1/4	5.125 (130)	-	-	4.625 (117)	2.000 (51)	8 (3.6)
	1-1/2	5.250 (133)	-	-	5.000 (127)	2.500 (64)	12 (5.4)
	2	5.370 (137)	-	-	6.000 (152)	3.000 (76)	14 (6.4)
	3	5.750 (146)	-	-	7.500 (191)	4.000 (102)	23 (10.4)
	4	5.750 (146)	-	-	9.000 (229)	5.000 (127)	31 (14.1)
300F Series	1-1/2	6.375 (162)	-	-	5.000 (127)	2.313 (58)	12 95.5)
	2	6.500 (165)	-	-	6.000 (152)	2.313 (58)	16 (7.5)
	3	8.875 (225)	-	-	7.500 (191)	3.000 (76)	38 (17)
	4	10.250 (260)	-	-	9.000 (229)	4.000 (102)	56 (25)
	6	12.500 (318)	-	-	11.000 (279)	6.000 (152)	120 (55)

Dimensions are in inches (mm)

Minimum Flows for Impeller Rotation
Maximum Allowable Flow

Size	Min. Flow, Model 100				Min. Flow, Model 300				Max. Flows (100, 300)				Pressure Drop at Max Flow			
	Water		Air		Water		Air		Water		Air		Water		Air	
	GPM	LPM	SCFM	LPM	GPM	LPM	SCFM	LPM	GPM	LPM	SCFM	LPM	psid	bar	psid	bar
1/4˝	0.10	0.38	2.5	70.8	0.10	0.38	3.0	85.0	3.5	13.25	13	368.1	5	0.35	3	0.21
3/8˝	0.10	0.38	2.5	70.8	0.10	0.38	3.0	85.0	3.5	13.25	13	368.1	5	0.35	3	0.21
1/2˝	0.15	0.57	2.5	70.8	0.25	0.95	3.0	85.0	10	37.85	23	651.3	5	0.35	3	0.21
3/4˝	0.15	0.57	2.5	70.8	0.50	1.89	6.0	169.9	10	37.85	23	651.3	5	0.35	3	0.21
1˝	0.70	2.65	9.0	254.9	0.50	1.89	7.0	198.2	30	113.55	38	1076.0	5	0.35	3	0.21
1-1/4˝	1.00	3.79	9.0	254.9	1.25	4.73	8.0	226.5	39	147.62	90	2548.5	5	0.35	3	0.21
1-1/2˝	2.5	9.46	20.0	566.3	1.25	4.73	11.0	311.5	99	374.72	-	-	5	0.35	3	0.21
2˝	5.5	20.82	42.0	1189.3	1.50	5.68	13.0	368.1	105	397.43	-	-	5	0.35	3	0.21

MODEL CHART - 100 & 300 SERIES
Window Style with Threaded Connections

SPECIFICATIONS
Service: Compatible gases and liquids.
Wetted Materials: Window: Tempered glass. Body: Bronze or 316 SS. Gasket: Buna-N, Fluoroelastomer, or PTFE. Indicator: ABS or 316 SS impeller (100 and 300), 304 SS or 316 SS Flapper (360).
Temperature Limit: 200°F (93°C).
Pressure Limit: 125 psig (8.62 bar), 150 psig (10.34 bar) on "MP" Models.
Connections: Threaded.

Example	SFI	300	SS	2	G2	SFI-300SS-2-G2 Sight Flow Indicator; double window, temper glass, Fluoroelastomer gaskets, 316SS body, ABS impeller, 2 inch female NPT connections.
Model Designator	SFI					Sight flow indicator, tempered glass standard, Buna-N gaskets standard, female NPT connections standard.
Body Style		100 300 350 360				Single window, bronze body, ABS Impeller Double window, bronze body, ABS Impeller Double window, bronze body, no moving indicator Double window, bronze body, 304SS flapper
Body Options			SS MP			316SS body option for 300, 350, 360 150 psig maximum pressure option for 100 and 300, includes Fluoroelastomer gaskets
Body Size				1/4 3/8 1/2 3/4 1 1-1/4 1-1/2 2		1/4 inch connection size 3/8 inch connection size 1/2 inch connection size 3/4 inch connection size 1 inch connection size 1-1/4 inch connection size 1-1/2 inch connection size 2 inch connection size
Options					W2 G1 G2 S2 S3 I1 I2 I3 F1 BSPT BSPP	Plexiglass window PTFE gasket Fluoroelastomer gasket 316SS Shaft (Not on 350 Model) Monel Shaft (Not on 350 Model) ABS impeller with bronze bushing (Not on 350, 360) 316SS impeller (Not on 350, 360) No impeller (100 only) 316SS Flapper (360 only) BSPT threads BSPP threads

(Maximum flow on impeller models: 5FPS with liquids, 5000 FPM with gases)

MODEL CHART - 700 SERIES
Tube Style with Threaded Connections

SPECIFICATIONS
Service: Compatible gases and liquids.
Wetted Materials: Tube: Tempered Borosilicate. Body: Brass or 316 SS. Gasket: Fluoroelastomer. Indicator: Acetal.
Temperature Limit: 212°F (100°C).
Pressure Limit: 230 psig (15.86 bar).
Connections: Threaded.

Example	SFI	700SS	1-1/2		SFI-700SS-1-1/2 Sight Flow Indicator; tube type with 8 blade Acetal impeller and integral wipers to clean tube interior, tempered borosilicate tube, Fluoroelastomer gaskets, 316SS body, 1-1/2 inch female NPT connections
Model Designator	SFI				Sight flow indicator, tube type with 8 blade Acetal impeller and integral wipers to clean tube interior, tempered borosilicate tube, Fluoroelastomer gaskets
Body Style		700 700SS			Brass body 316SS body
Body Size			1/4 3/8 1/2 3/4 1 1-1/4 1-1/2		1/4 inch female NPT connection size 3/8 inch female NPT connection size 1/2 inch female NPT connection size 3/4 inch female NPT connection size 1 inch female NPT connection size 1-1/4 inch female NPT connection size 1-1/2 inch female NPT connection size
Options				BSPT BSPP	BSPT threads BSPP threads

MODEL CHART - 300F SERIES
Window Style with Flanged Connections

SPECIFICATIONS
Service: Compatible gases and liquids.
Wetted Materials: Window: Tempered glass. Body: Carbon Steel or 316 SS. Gasket: Buna-N, Fluoroelastomer, or PTFE. Indicator: 316 SS Flapper (360).
Temperature Limit: 200°F (93°C).
Pressure Limit: 150 psig (10.34 bar).
Connections: Flanged.

Example	SFI	360FSS	1-1/2	G1	SFI-360FSS-1-1/2-G1 Sight Flow Indicator; double window, tempered glass, PTFE gasket, 316SS body, 304SS flapper, 1-1/2 inch raised face flange connections
Model Designator	SFI				Sight flow indicator, double window, tempered glass, Buna-N gaskets standard, raised face flange connections
Body Style		350FCS 350FSS 360FCS 360FSS			Carbon steel body, no moving indicator 316SS body, no moving 316SS indicator Carbon steel body, 316SS flapper 316SS body, 316SS flapper
Body Size			1-1/2 2 3 4 6		1-1/2 inch raised face flange connection size 2 inch raised face flange connection size 3 inch raised face flange connection size 4 inch raised face flange connection size 6 inch raised face flange connection size
Options				G1 G2	PTFE gasket Fluoroelastomer gasket

MODEL CHART - 400 SERIES
Tube Style with Threaded or Flanged Connections

SPECIFICATIONS
Service: Compatible gases and liquids.
Wetted Materials: Tube: Borosilicate. Body: Cast Iron or 316 SS. Gasket: PTFE.
Temperature Limit: 200°F (93°C).
Pressure Limit: 50 psig (3.45 bar).
Connections: Threaded or Flanged.

Example	SFI	400	1-1/2	SFI-400SS-1-1/2 Sight Flow Indicator; tube type, borosilicate tube, PTFE gaskets, 316SS body, 1-1/2 inch female NPT connections
Model Designator	SFI			Sight flow indicator, tube type, borosilicate tube, PTFE gaskets
Body Style		400CI 400SS 400F		Female NPT connections, cast iron body (only for 1 through 2 inch sizes) Female NPT connections, 316SS body Raised face flange connection, 316SS body (only for 1 inch and up sizes)
Body Size			1/2 3/4 1 1-1/4 1-1/2 2 3 4	1/2 inch connection size 3/4 inch connection size 1 inch connection size 1-1/4 inch connection size 1-1/2 inch connection size 2 inch connection size 3 inch connection size 4 inch connection size

(Best for use in vertical pipelines where there are no mechanical strains)

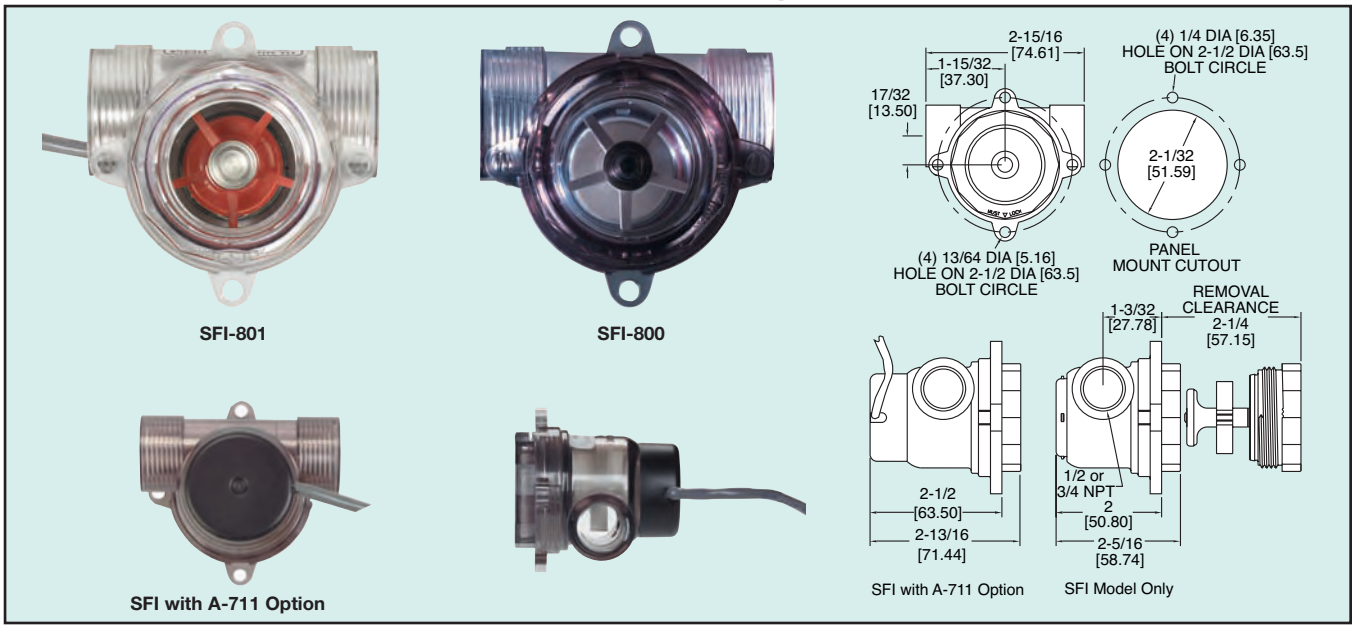
Series SFI-800

Sight Flow Indicator/Transmitter

Low Cost, Optional Output for Flow Rate and Totalization

New UV Stabilized Polycarbonate Model

CE



The Series SFI-800 Sight Flow Indicator is a low cost, durable rotor style flow indicator with optional output sensor. Constructed of clear Polysulfone, enabling 360° viewing of the rotor, the SFI-800 has excellent pressure ratings, temperature ratings and chemical compatibility.

The **Series SFI-801** Sight Flow Indicator is similar to the SFI-800 except it is made of UV stabilized materials. It can be used in outdoor applications where indication of flow or control is needed. The materials are not FDA approved. The SFI-801 also features an easily viewed bright red impeller.

The optional **A-711** output sensor has a VDC output with pulsing for flow totalization and a proportional frequency change for flow rate. For added versatility there are two output choices of 5 VDC or a VDC equal to the input power supplied. The output is compatible with digital rate meters/totalizers and other electronic systems. The Series SFI-800 is compact, panel mountable and the A-711 output sensor package can be ordered factory assembled or can be easily installed on an existing unit in the field.

- ***Clear Polysulfone or Polycarbonate housing enables rotor visibility from almost all angles***
- ***Output package is easily field installed on indication only model***
- ***Model SFI-800 constructed of all FDA approved wetted materials***
- ***Model SFI-801 is UV stabilized for outdoor applications***
- ***There are no magnets in the rotor to attract ferrous materials***

SPECIFICATIONS

Service: Compatible fluids.

Wetted Materials:

Body: SFI-800: Polysulfone, SFI-801: UV Stabilized Polycarbonate.

Window: SFI-800: Polysulfone, SFI-801: UV Stabilized Polycarbonate.

Rotor: SFI-800: White Polysulfone, SFI-801: Red UV Stabilized PBT.

Rotor Pin: 316 SS.

Thrust Washers: 300 Series SS.

O-Ring: SFI-800: Fluoroelastomer (NSF Grade), SFI-801: Buna-N.

Temperature Limits: SFI-800: -20 to 212°F (-28 to 100°C); SFI-801: -20 to 130°F (-28 to 55°C).

Pressure Limits: SFI-800: 150 psi (10.34 bar); SFI-801: 125 psi (8.62 bar).

Viscosity Max: 200 SSU.

Weight: SFI only: 3.35 oz (95 g); SFI with A-711: 5.0 oz (142 g).

ELECTRICAL SPECIFICATIONS (for A-711 Option Only)

Temperature Limits: -20 to 212°F (-28 to 100°C).

Power Requirements: 8 to 28 VDC.

Output Signal: White lead: 5 VDC. Green lead: 8 to 28 VDC equal to supply voltage. Pulsed output with frequency rate proportional to flow rate.

Accuracy: ±5% of F.S.

Frequency Output Range: 0 to 100 Hz.

Electrical Connections: Black lead - Ground; White lead: 5 VDC out pulse; Green lead: 8 to 28 VDC out pulse; Red lead: 8 to 28 VDC supply.

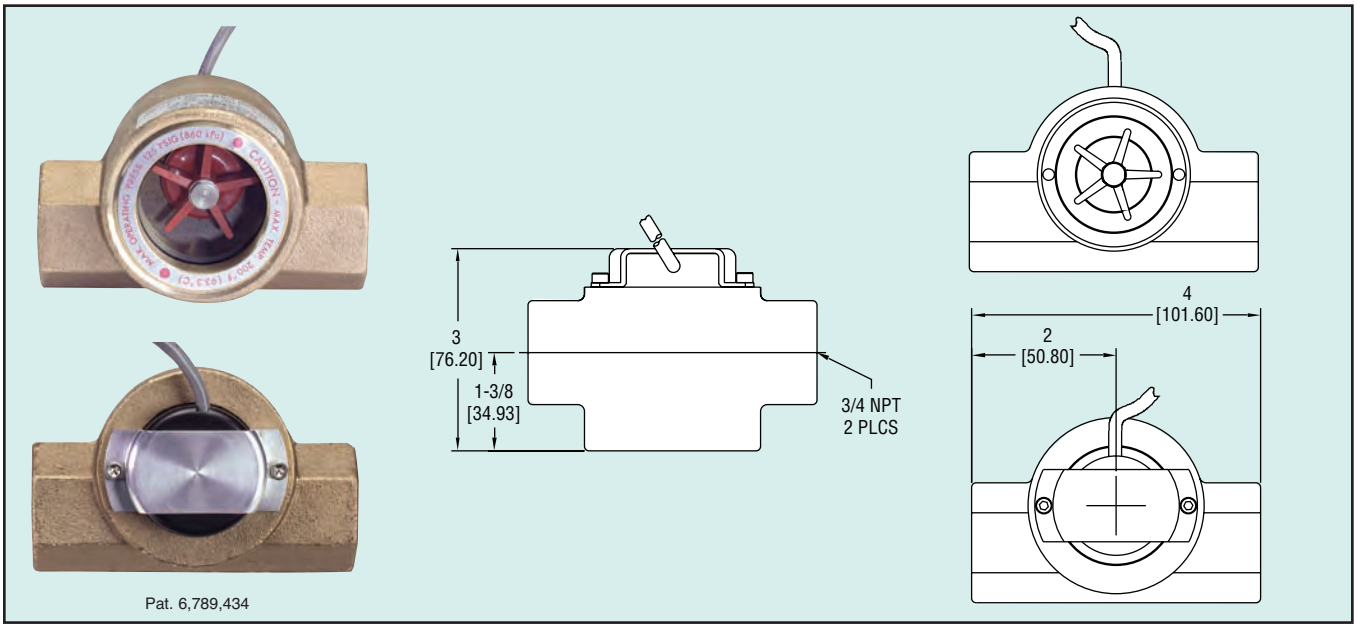
MODELS

Model Number	Description	Range GPM (LPM)	Connection Female NPT
SFI-800-1/2	Polysulfone Indicator Only	2 - 20 (7.6 - 75.5)	1/2″
SFI-801-1/2	Polycarbonate Indicator Only	2 - 20 (7.6 - 75.5)	1/2″
SFI-800-3/4	Polysulfone Indicator Only	3 - 35 (11.4 - 132.5)	3/4″
SFI-801-3/4	Polycarbonate Indicator Only	3 - 35 (11.4 - 132.5)	3/4″
SFI-800-1/2-A711	Polysulfone Indicator with A-711 Sensor	2 - 20 (7.6 - 75.5)	1/2″
SFI-801-1/2-A711	Polycarbonate Indicator with A-711 Sensor	2 - 20 (7.6 - 75.5)	1/2″
SFI-800-3/4-A711	Polysulfone Indicator with A-711 Sensor	3 - 35 (11.4 - 132.5)	3/4″
SFI-801-3/4-A711	Polycarbonate Indicator with A-711 Sensor	3 - 35 (11.4 - 132.5)	3/4″
A-711	Output Sensor Package		

Series
SFI-100T

Sight Flow Indicator/Transmitter

Output for Flow Rate and Totalization



Pat. 6,789,434

The SFI-100T is a low cost and durable flow transmitter that combines our popular 100 Series Sight Flow indicator with our A-711T output sensor. The SFI-100T sight flow indicator is constructed of a robust, solid brass body and a tempered glass window. A bright red impeller is featured for great visual indication of flow through the window. The front window can be easily unscrewed to clean out the sight flow indicator. Ideal for outdoor applications, the flow transmitter is weatherproof and unaffected by UV light.

The **A-711T** output sensor has a VDC output with pulsing for flow totalization and a proportional frequency change for flow rate. For added versatility there are two output choices of 5 VDC or a VDC equal to the input power supplied. The output is compatible with digital rate meters/totalizers and other electronic systems.

- ***Output package is easily field replaceable***
- ***Weatherproof construction***
- ***UV stabilized for outdoor applications***
- ***There are no magnets in the rotor to attract ferrous materials***

SPECIFICATIONS

Service: Compatible fluids.
Wetted Materials:
Body: Brass.
Window: Tempered glass.
Rotor: Red UV stabilized PBT.
Rotor Pin: 316 SS.
Thrust Washers: 300 series SS.
Gasket: Buna-N.
Temperature Limits: -20 to 200°F (-28 to 93°C).
Pressure Limits: 125 psi (8.62 bar).
Viscosity Max: 200 SSU.
Weight: SFI only: 1.5 lb (0.7 kg); with A-711T: 1.8 lb (0.8 kg).

ELECTRICAL SPECIFICATIONS (for A-711T Option Only)

Temperature Limits: -20 to 212°F (-28 to 100°C).
Power Requirements: 8 to 28 VDC.
Output Signal: White lead: 5 VDC. Green lead: 8 to 28 VDC equal to supply voltage. Pulsed output with frequency rate proportional to flow rate.
Accuracy: ±5% of F.S.
Frequency Output Range: 0 to 100 Hz.
Electrical Connections: Black lead: Ground; White lead: 5 VDC out pulse; Green lead: 8 to 28 VDC out pulse; Red lead: 8 to 28 VDC supply.

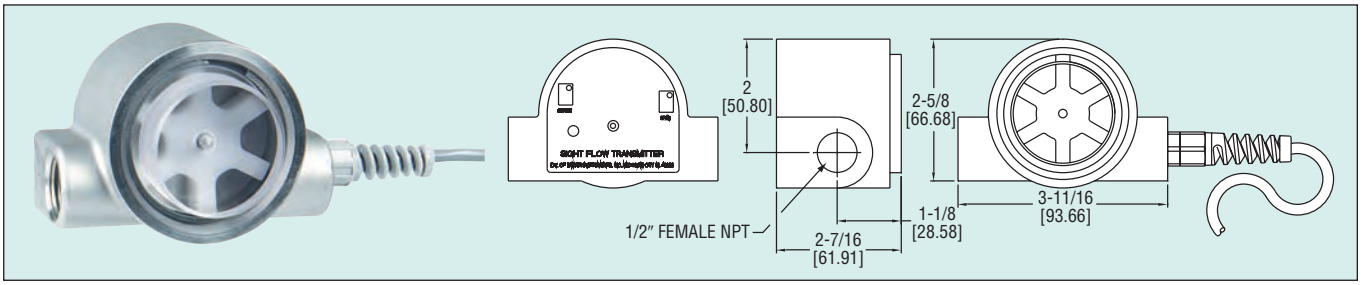
MODELS

Model Number	Description	Range GPM (LPM)	Connection Female NPT
SFI-100T-1/2-A711T	Brass Indicator with A-711T Sensor	2 - 20 (7.6 - 75.5)	1/2″
SFI-100T-3/4-A711T	Brass Indicator with A-711T Sensor	3 - 35 (11.4 - 132.5)	3/4″
A-711T	Output Sensor Package		

Series SF

Sight Flow Transmitter

±2% FS Accuracy, 4 to 20 mA Output, Pressure up to 500 psig (34 bar)



Series SF Sight Flow Transmitter integrates tangential turbine technology with hermetically sealed circuitry to provide accurate flow measurement and control in the harshest environments. The 2-wire loop-powered design transmits a 4 to 20 mA signal proportional to flow rate. Models can accurately measure flow in both directions and can be mounted in any orientation. Model SF11 has a clear polycarbonate viewing cover for visible indication of flow. Units feature LED power indication, adjustable zero and span, polarity protection and over current limiting.

MODELS

Model Number	Cover Material
SF10	316 Stainless Steel
SF11	Clear Polycarbonate

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: 316 SS shaft and case, Iglide® bearings, Buna-N seal and acetal copolymer, (polycarbonate cover on Model SF11).
Flow Range: 1.5 to 15 GPM (5.7 to 56.8 LPM).
Accuracy: ±2% FS.
Repeatability: 0.5% full scale.
Temperature Limits: 20 to 225°F (–7 to 107°C).
Pressure Limits: 500 psig (34 bar) Model SF10, 200 psig (14 bar) Model SF11.
Response Time: 2 seconds to 90% (step change in flow rate).
Supply Voltage: 12 to 35 VDC.
Output: 4 to 20 mA.
Loop Resistance: 1150 ohms max.
Connections: 1/2″ female NPT. Wire Leads: 22 AWG x 9' (2.7 m).
Max. Particle Size: 100µm.
Agency Approvals: CE.

APPLICATIONS

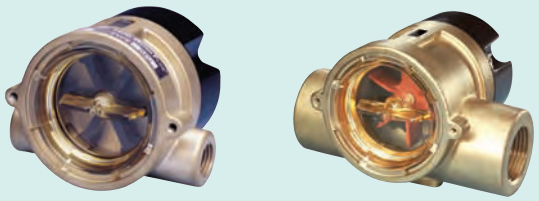
Ideal for measuring flow rates in cooling and lubrication circuits, HVAC systems, aggressive chemical metering, and batching systems.

Iglide® is a registered trademark Iguss Spritzgussteile fu r die Industrie GmbH.

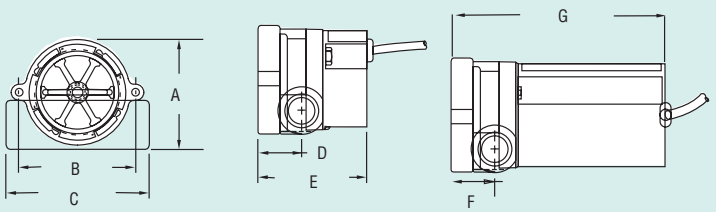
Series SF2

Sight Flow Meters

SPDT or Pulse Output, Visual Flow Confirmation, Brass Body


SF2-1

SF2-2



Series SF2 Sight Flow Meters combine visual confirmation of flow with a relay or pulse output. The brass, unibody construction, one piece composite rotor, and ceramic shaft delivers durability with broader chemical, temperature, and pressure capabilities. For specific flow setpoint switching, select SF2-1 meters with a SPDT relay output. Setpoints are fully adjustable over the specified flow range. The dynamic operation of the rotor guards against jamming and false actuation. For flow rate monitoring or metering applications, select SF2-2 meters with a pulse output proportional to the rate of flow. The 4.5 to 24 VDC pulse output is compatible with most digital logic families.

MODELS

SPDT Relay Output			
Model Number	**Range (GPM)**	**Input**	**Connection**
SF2-104	0.5 to 5.0	24 VDC	1/4″ female NPT
SF2-101	0.5 to 5.0	110 VAC	1/4″ female NPT
SF2-114	4.0 to 20.0	24 VDC	1/2″ female NPT
SF2-111	4.0 to 20.0	110 VAC	1/2″ female NPT
SF2-124	5.0 to 30.0	24 VDC	3/4″ female NPT
SF2-121	5.0 to 30.0	110 VAC	3/4″ female NPT
SF2-134	8.0 to 60.0	24 VDC	1″ female NPT
SF2-131	8.0 to 60.0	110 VAC	1″ female NPT
Pulsed Output			
Model Number	**Range (GPM)**	**Input**	**Connection**
SF2-204	0.5 to 5.0	4.5 to 24 VDC	1/4″ female NPT
SF2-214	4.0 to 20.0	4.5 to 24 VDC	1/2″ female NPT
SF2-224	5.0 to 30.0	4.5 to 24 VDC	3/4″ female NPT
SF2-234	8.0 to 60.0	4.5 to 24 VDC	1″ female NPT

DIMENSIONS in [mm]

Model	A	B	C	D	E	F	G
SF2-104	2.37 [60]	2.50 [64]	3.01 [76]	0.87 [22]	2.32 [59]	—	—
SF2-101	2.37 [60]	2.50 [64]	3.01 [76]	—	—	0.80 [20]	4.50 [114]
SF2-114	2.37 [60]	2.50 [64]	3.01 [76]	0.87 [22]	2.32 [59]	—	—
SF2-111	2.37 [60]	2.50 [64]	3.01 [76]	—	—	0.87 [22]	4.50 [114]
SF2-124	2.57 [65]	2.50 [64]	3.94 [100]	1.06 [27]	2.32 [59]	—	—
SF2-121	2.57 [65]	2.50 [64]	3.94 [100]	—	—	1.06 [27]	4.76 [121]
SF2-134	2.57 [65]	2.50 [64]	3.94 [100]	1.06 [27]	2.32 [59]	—	—
SF2-131	2.57 [65]	2.50 [64]	3.94 [100]	—	—	1.06 [27]	4.76 [121]
SF2-204	2.37 [60]	2.50 [64]	3.01 [76]	.87 [22]	2.32 [59]	—	—
SF2-214	2.37 [60]	2.50 [64]	3.01 [76]	.87 [22]	2.32 [59]	—	—
SF2-224	2.57 [65]	2.50 [64]	3.94 [100]	1.06 [27]	2.95 [75]	—	—
SF2-234	2.57 [65]	2.50 [64]	3.94 [100]	1.06 [27]	2.95 [75]	—	—

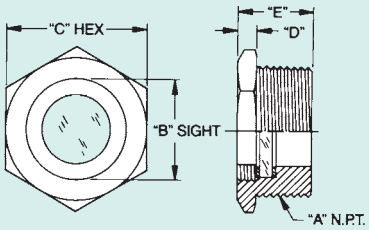
SPECIFICATIONS

Service: Liquids compatible with wetted parts.
Wetted Materials: Brass body, ceramic pin, PPS rotor, Polysulfone lens, and Fluoroelastomer O-ring.
Accuracy: Relay output: ±5%; Pulsed output:±7% for ranges up to 5.0 GPM, ±15% for ranges up to 60.0 GPM.
Temperature Limits: -20 to 212°F (-29 to 100°C).
Pressure Limit: 200 psig (13.8 bar) @ 70°F.
Power Requirements: See table.
Output: SPDT: 1 Amp, 24 VDC resistive; 0.3 Amp, 110 VAC or 4.5 VDC to 24 VDC pulse depending on model.
Electrical Connections: Relay output models: 20AWG PVC-jacketed, 24″ cable; Pulsed output models: 22AWG PVC-jacketed, 24″ cable.
Process Connections: See table.
Setpoint Differential: 15% max for relay output models.
Maximum Viscosity: 200 SSU.
Agency Approvals: CE.

Series 500

Sight Window

Shows Level or Contents of Tanks, Pipelines; Tempered, Replaceable Glass Window



Tough, tempered glass window resists chemical attack and abrasion. Seamless gasket assures perfect seal and is easily field replaceable. In addition to the standard brass body, Model 500 Sight Windows are also available in carbon steel or 316 SS to suit a wide range of chemical compatibility.

Suggested Specifications

Sight windows shall be gasketed glass style with standard NPT connections. Body shall be (brass)(carbon steel)(316 SS). Sight windows shall be W.E. Anderson® Sight Window Model No.SFI-500(B) (CS) (SS) - size. (Example: SFI-500B-¾ will have brass body with ¾" NPT connection).

APPLICATIONS

- Hydraulic Tanks
- Pressure Vessels
- Coolant Tanks
- Hydraulic Lines
- Oil Reservoirs

	Dimensions — Inches (mm)				
Model No.	A	B	C	D	E
SFI-500-¾	¾	¾ (19)	1⅜ (35)	45⁄64 (18)	1⅜ (35)
SFI-500-1	1	15⁄16 (24)	1⅜ (35)	45⁄64 (18)	1⅜ (35)
SFI-500-1¼	1¼	1¼ (32)	2⅛ (54)	27⁄32 (22)	1⅝ (40)
SFI-500-1½	1½	1 27⁄64 (37)	2⅛ (54)	27⁄32 (22)	1⅝ (40)
SFI-500-2	2	1¼ (32)	2½ (64)	15⁄32 (12)	1 21⁄32 (42)

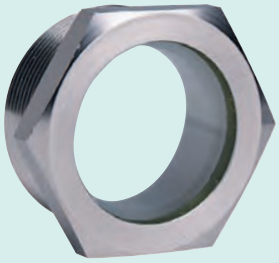
SPECIFICATIONS

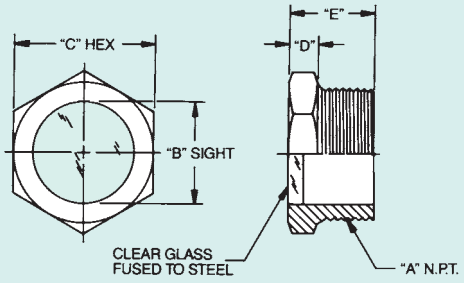
Service: Compatible gases and liquids.
Wetted Materials:
Window: Tempered glass.
Body: Brass, carbon steel, or 316 SS.
Gasket: Buna-N on Brass and carbon steel body, PTFE on 316 SS body.
Temperature Limit: 200°F (93°C).
Pressure Limit: 125 psig (8.6 bar).
Connections: 3/4″ to 2″ male NPT.

Series 550

Sight Window

Shows Level or Contents of Tanks, Pipelines; Fused Glass and Steel Construction





Fused glass style sight windows feature glass to metal bond for utmost reliability. Plated steel bodies have convenient hex wrench surfaces. Connections are standard NPT in sizes from ¼" to 2". Windows are clear, ripple free, and flush with the front face, having no recess on which dirt might collect.

SUGGESTED SPECIFICATION

Sight windows shall be fused glass style with standard NPT connection. Body shall be plated steel. Sight windows shall be W.E. Anderson® sight window Model No. SFI-550 - size. (Example: SFI-550-¾" will have ¾" NPT connection).

APPLICATIONS

- Hydraulic Tanks
- Pressure Vessels
- Coolant Tanks
- Hydraulic Lines
- Oil Reservoirs

	Dimensions — Inches (mm)				
Model No.	A	B	C	D	E
SFI-550-¼	¼	11⁄32 (9)	⅝ (16)	3⁄16 (5)	⅝ (16)
SFI-550-⅜	⅜	7⁄16 (11)	¾ (19)	7⁄32 (6)	23⁄32 (18)
SFI-550-½	½	9⁄16 (14)	15⁄16 (24)	7⁄32 (6)	25⁄32 (19)
SFI-550-¾	¾	¾ (19)	1 1⁄16 (27)	5⁄16 (8)	15⁄16 (24)
SFI-550-1	1	15⁄16 (24)	1⅜ (35)	5⁄16 (8)	1 1⁄16 (27)
SFI-550-1¼	1¼	1 3⁄16 (30)	1¾ (45)	13⁄32 (10)	1 1⁄32 (31)
SFI-550-1½	1½	1 7⁄16 (37)	2 (51)	13⁄32 (10)	1 7⁄32 (31)
SFI-550-2	2	1⅞ (48)	2½ (64)	13⁄32 (10)	1 3⁄32 (33)

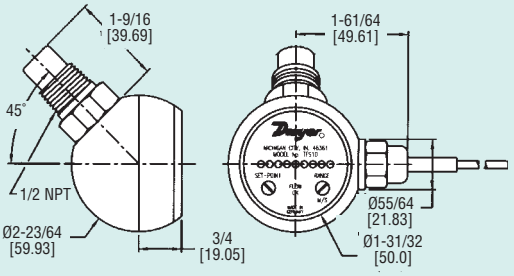
SPECIFICATIONS

Service: Compatible gases and liquids.
Wetted Materials:
Window: Glass.
Body: Plated steel.
Temperature Limit: 200°F (93°C).
Pressure Limit: 125 psig (8.6 bar).
Connections: 1/4″ to 2″ male NPT.

Series TFS

Thermal Flow Switch

Adjustable Setpoint, LED Flow Indication, NO or NC Output



The Series TFS Flow Switch with adjustable setpoint offers precise flow monitoring of water-based fluids. Units have five selectable flow range settings from 0.2 m/s (0.66 ft/s) to 3.0 m/s (9.8 ft/s). Flow is indicated as a percentage of the flow range on a string of LEDs. The setpoint, adjustable from 15% to 90% of the flow range setting, is displayed as a flashing LED.

MODELS

Model Number	Switching Output
TFS10	PNP, normally open
TFS11	PNP, normally closed

SPECIFICATIONS

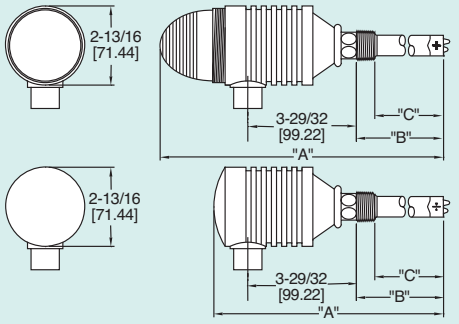
Service: Water-based fluids.
Wetted Material: 303 SS.
Measuring Ranges: 0.2 m/s (0.66 ft/s), 0.4 m/s (1.3 ft/s), 1.0 m/s (3.3 ft/s), 2.0 m/s (6.6 ft/s), and 3.0 m/s (9.8 ft/s).
Repeatability: Less than 2.0%.
Linearity: Less than 5%.
Hysteresis: 10% (approximate).
Temperature Limits: -4 to 176°F (-20 to 80°C).
Pressure Limits: 435 psi (30.0 bar).
Housing Material: Glass fiber reinforced PBTP (Ultradur), meets IP65.
Setpoint Range: 15% to 90% of range setting.
Response Time: 2 to 10 seconds (relative to range setting).
Supply Voltage: 18 to 30 VDC, including residual ripple.
Switching Current: 400 mA maximum.
Power Consumption: 1 watt (approximate).
Electrical Connection: Plug-in 78″ (198 cm) oilflex cable (included).
Process Connection: ½″-14 male NPT.
Weight: 0.66 lb (301 g).
Agency Approvals: CE.

Series TSP

Liquid Flow Controller

NO or NC Relay Output, Adjustable Time Delay

Model	DIM "A"	DIM "B"	DIM "C"
TSP110	6.5" (16.5 cm)	1.3" (3.3 cm)	.7" (1.8 cm)
TSP210	6.5" (16.5 cm	1.3" (3.3 cm	.7" (1.8 cm)
TSP120	7.9" (20 cm)	2.8" (7 cm)	2.1" (5.3 cm)
TSP220	7.9" (20 cm)	2.8" (7 cm)	2.1" (5.3 cm)
TSP110S	8.3" (21 cm)	1.3" (3.3 cm	.7" (1.8 cm)
TSP210S	8.3" (21 cm)	1.3" (3.3 cm	.7" (1.8 cm)
TSP120S	9.8" (25 cm)	2.8" (7 cm)	2.1" (5.3 cm)
TSP220S	9.8" (25 cm)	2.8" (7 cm)	2.1" (5.3 cm)



Protect pumps and valves from dry running with the Series TSP Liquid Flow Controller. The Series TSP combine a liquid flow switch with a failsafe relay controller to detect a flow or no flow situation and provides switching for direct actuation of pumps and valves. Controller features adjustable time delay, selectable NO or NC operation, and LED indication of sensor, relay, and power status. Four models (TSP1105, TSP2105, TSP1205, TSP2205) are designed with an integral flash alarm to provide immediate indication of local alarm conditions.

MODELS

Model Number	Flash Alarm	Wetted Parts	Sensor Length
TSP110	No	PP	Short
TSP210	No	PVDF	Short
TSP120	No	PP	Long
TSP220	No	PVDF	Long
TSP110S	Yes	PP	Short
TSP210S	Yes	PVDF	Short
TSP120S	Yes	PP	Long
TSP220S	Yes	PVDF	Long

SPECIFICATIONS

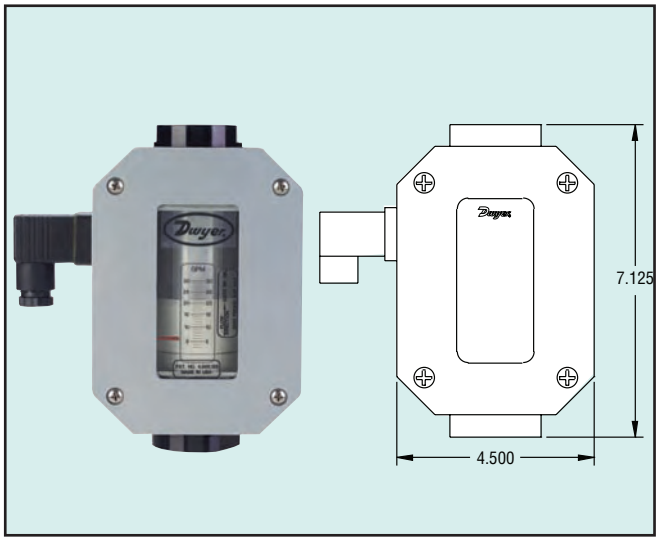
Service: Compatible liquids.
Wetted Materials: Polypropylene/PPS or Polyvinylidene Flouride.
Temperature Limits: -40 to 158°F (-40 to 70°C).
Pressure Limits: 150 psi (10 bar) @ 77°F (25°C), derated 1.67 psi (.113 bar) per °C above 25°C.
Relay Output: 1 SPDT Form C, isolated and sealed.
Relay Load: 250 VAC, 10 A resistive, 1/2 hp.
Switching Mode: Selectable NO or NC.
Supply Voltage: 120/240 VAC, 50/60 Hz, selectable.
Current Consumption: .25 amps maximum.
Sensor Voltage Supply: 13 VDC, 1 Watt max., nominal.
Sensor Trigger Point: Dry <10 mA, wet >10 mA.
Time Delay: Adjustable, 0.15 to 60 seconds.
Flash Type: *Xenon tube.
Flash Frequency: *1 per second.
Brightness: *>50,000 CP.
Strobe Life: *10 M cycles.
Conduit Connection: 1/2″ NPT.
Mounting Connection: 3/4″ NPT.
Enclosure: Polypropylene, flame retardant, probe NEMA 4X/IP65.
Agency Approvals: CSA, CE.

*Applies to models with flash alarm only.

Series HFT

In-Line Flow Transmitters

Local Flow Indication, Unrestricted Mounting, 4-20mA, 0-5 V, and 1-5 V Output



SPECIFICATIONS

Service: Compatible gases or liquids.

Wetted Materials: Body: Aluminum, brass or 304 SS; Seals: Buna-N or Fluoroelastomer; Magnet: PTFE coated Alnico; Other internal parts: 304 SS.

Viscosity: 500 SSU.

Accuracy: ±4% FS over entire range; ±2.5% over center third of the measuring range.

Repeatability: ±1% of full scale.

Response Time: <100 msec.

Output Signal: 4-20 mA; 0-5 V; 1-5 V.

Temperature Limits: 240°F (116°C).

Pressure Limits: See Chart.

Power Requirements: 12-35 VDC.

Enclosure Rating: NEMA 4X (IP65).

Shipping Weight: 1/4 to 1/2″ female NPT Models: 3 lb (1.4 kg); 3/4 to 1″ female NPT Models: 4.5 lb (2.0 kg); 1-1/2″ female NPT Models: 12 lb (5.4 kg).

The Series HFT combines a direct reading HF flowmeter with electronics to provide a proportional analog output of 4-20, 0-5, and 1-5 VDC. Use the output to drive data acquisition devices, meters, or analog input cards. The entire assembly is housed in a rugged cast aluminum NEMA 4X enclosure. The unit can be installed in outdoor applications or harsh environments where liquid tight seals are required. The flow transmitter does not require input or output straight plumbing, and can be mounted in any orientation.

APPLICATIONS

HFT Flow Transmitters can be used to set flow rates, fluid motor and cylinder speeds. Check pump high pressure performance, pressure relief valve settings, fluid handling systems in agricultural, construction or industrial machinery, power tools and equipment. Monitor air with aluminum models; petrochemical operations with brass or stainless steel models.

MODELS

Aluminum body for air or other non-corrosive gases: 600 psig (41 bar)
Wetted Parts: Aluminum, PTFE coated Alnico, 304 SS and Buna-N

Model Number	Connection Size	Range, Air SCFM
HFT-1112	1/4″ female NPT	1.5-12
HFT-1123	1/4″ female NPT	4-23

Brass body for water based fluids (non-steam): 3500 psig (240 bar)
Wetted Parts: Brass, PTFE coated Alnico, 304 SS and Buna-N

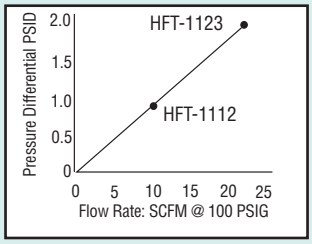
Model Number	Connection Size	Range, Water GPM (LPM)
HFT-2205	1/2″ female NPT	0.5-5.0 (1-19)
HFT-2315	3/4″ female NPT	1-15 (3.8-55)
HFT-2320	3/4″ female NPT	2-20 (7.5-75)
HFT-2440	1″ female NPT	4-40 (5-51)
HFT-2550	1-1/2″ female NPT	5-50 (19-189)

304 Stainless Steel body for high-pressure fluids: 6000 psig (413 bar)
Wetted Parts: 304 SS, Fluoroelastomer and PTFE

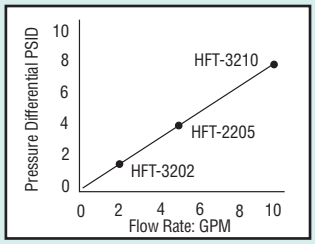
Model Number	Connection Size	Range, Water GPM (LPM)
HFT-3202	1/2″ female NPT	0.2-2.0 (0.75-7.5)
HFT-3210	1/2″ female NPT	0.5-10 (1.9-38)

PRESSURE DIFFERENTIAL VS. FLOW RATE

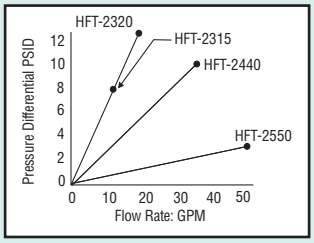
1/4″ FEMALE NPT



1/2″ FEMALE NPT



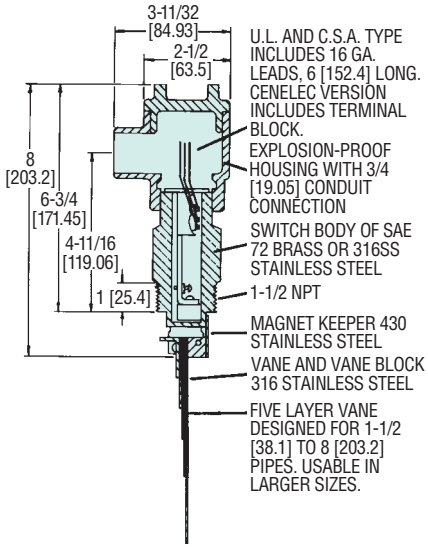
3/4″, 1″ & 1-1/2″ FEMALE NPT



Series V4

FLOTECT® Vane Operated Flow Switch

Field Adjustable — Dependable Protection Against Flow Variation or Stopping in Pipelines for Fluids, Gases and Flowing Solids



Rugged and reliable the Series V4 Flotect® flow switch operates automatically to protect equipment and pipeline systems against damage from reduction or loss of flow. The V4 is time tested being installed in thousands of pipelines and processing plants around the world. A unique magnetically actuated switching design gives superior performance. There are no bellows, springs, or seals to fail. Instead, a free-swinging vane attracts a magnet within the solid metal switch body, actuating a snap switch by means of a simple lever arm.

FEATURES

- Leak proof body machined from bar stock
- Choice of custom vane calibrated for your application, Model V4, or field adjustable multilayer vane, Model V4-2-U (see set point chart)
- Weatherproof, designed to meet NEMA 4
- Explosion-proof (listing included in specifications)
- Installs directly and easily into pipeline with a thredolet, tee, or flange (see application drawings)
- Can be used in pipes 1-1/2˝ and up
- Electrical assembly can be easily replaced without removing the unit from installation so that the process does not have to be shut down
- High pressure rating of 1000 psig (69 bar) with the brass body and 2000 psig (138 bar) with the 316 SS body

APPLICATIONS

- Protects pumps, motors and other equipment against low or no flow
- Controls sequential operation of pumps
- Automatically starts auxiliary pumps and engines
- Stops liquid cooled engines, machines and processing when coolant flow is interrupted
- Shuts down burner when air flow through heating coil fails
- Controls dampers according to flow

SPECIFICATIONS

Service: Gases or liquids compatible with wetted materials.
Wetted Materials:
Vane: 316 SS.
Body: Brass or 316 SS standard.
Magnet Keeper: 430 SS standard, 316 SS optional.
Options: Other materials also available, consult factory (e.g. PVC, Hastelloy, Nickel, Monel, Titanium).
Temperature Limit: -4 to 275°F (-20 to 135°C) standard, MT high temperature option 400°F (205°C) [MT option not UL, CSA, ATEX, or SAA].
Pressure Limit: Brass body 1000 psig (69 bar), 316 SS body 2000 psig (138 bar), optional 5000 psig (345 bar) available with 316 SS body and SPDT switch only.
Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups C and D; Class II, Groups E, F, and G.
ATEX CE 0344 Ex II 2 G EEx d IIB T6 -20°C≤Tamb≤75°C
EC-Type Certificate No.: KEMA 03ATEX 2383
SAA: Exd II C T6 (T amb=60°C). Zone I. Also FM approved.
Switch Type: SPDT snap switch standard, DPDT snap switch optional.
Electrical Rating: UL, FM, ATEX and SAA models 10A @ 125/250 VAC (V~). CSA models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V⎓). MV option: 1A @125 VAC (V~); 1A res., .5A ind. @ 30 VDC (V⎓). MT option: 5A @ 125/250 VAC (V~). [MT and MV option not UL, CSA, FM, ATEX or SAA].
Electrical Connections: UL and CSA models: 16 AWG, 6˝ (152 mm) long. ATEX and SAA unit: Terminal block.
Conduit Connection: 3/4˝ female NPT.
Process Connection: 1-1/2˝ male NPT.
Mounting Orientation: Within 5° of vertical for proper operation. Units for horizontal installation (vertical pipe with up flow) available.
Set Point Adjustment: For universal vane: five vane combinations.
Weight: 4 lb 8 oz (1.9 kg).
Agency Approvals: UL, CSA, CE, FM, SAA, and ATEX.

MODELS

Model	Description
V4-2-U	Brass body, universal vane
V4-SS-2-U	316SS* body, universal vane
V4	Brass body, custom vane
V4-SS	316SS* body, custom vane

*316SS body with 430SS magnet keeper.

Options (add as a suffix to the model number):
-D, DPDT Contacts
-MV, Gold Plated Contacts, options for dry circuits (see electrical rating in specification, no listings or approvals)
-MT, High Temperature, option rated 400° F (204° C) (see electrical rating in specifications, no listings or approvals
-TRI (increasing flow), -TRD (decreasing flow), Time Delay Relay, option with 2 SPDT contacts, adjustable from 0-1 to 0-31 minutes. (no listings or approvals)
-316, 316 SS Magnet Keeper, option to replace standard 430 SS
-SAA, SAA listed construction
-V, Vertical Up Flow, option for upward flow in vertical pipe
-AT, ATEX listed construction

Consult factory for price and availability of fittings for V4 installation. Thredolets, bushings, and tees are available in a variety of sizes and materials.

For custom vane models, please supply factory with following information: pipe size, flow direction (horizontal, up), mounting, pressure, temperature, specific gravity, flow rates (maximum normal, actuation/deactuation*), etc.
*When both values are supplied, note which is critical.

V4 Universal Vane Flow Charts

Values shown in both charts are nominal. If normal flows exceed actuation rates by less than 10%, custom vanes are recommended. Figures are based on standard vertical installation in a 1-1/2" thredolet in a horizontal run of pipe.

APPROXIMATE ACTUATION/DEACTUATION FLOW RATES FOR COLD WATER.
UPPER FIGURES IN GPM. LOWER FIGURES IN LPM

VANE LAYERS	1.5"PIPE	2"PIPE	3"PIPE	4"PIPE	6"PIPE	8"PIPE	10"PIPE	12"PIPE	14"PIPE	16"PIPE	18"PIPE	20"PIPE
1	7-3 26.67-11.67	15-8 56.7-30	45-22 167-83.3	95-40 367-150	210-120 800-450	375-175 1417-667	600-300 2267-1133	900-450 3400-1700	1200-600 4550-2267	1400-800 5300-3033	2000-1000 7567-3783	2400-1200 9083-4550
1&2		7-4 26.7-15	23-14 86.7-53.3	50-35 190-132	130-90 500-333	230-150 867-567	450-250 1700-950	650-350 2467-1317	900-500 3400-1900	1200-650 4550-2467	1450-800 5483-3033	1800-1000 6817-3783
1,2,&3			11-7 41.7-26.7	27-19 102-71.7	80-60 300-233	160-115 600-433	300-180 1133-683	450-275 1700-1033	600-350 2267-1317	750-450 2750-2083	1000-600 3783-2267	1200-700 4550-2650
1,2,3,&4				17-12 65-45	60-45 233-167	120-90 450-333	230-150 867-567	310-200 1167-750	430-280 1633-1067	550-360 2083-1367	700-450 2650-1700	850-550 3217-2083
1,2,3,4,&5					40-30 152-113	80-65 300-250	135-100 517-383	200-140 750-533	290-200 1100-750	360-250 1367-950	460-325 1733-1233	575-400 2183-1517

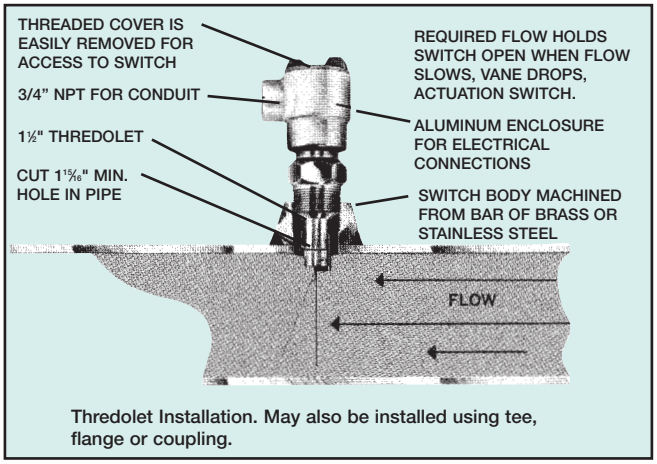
Actuation rates are based on cold water at a specific gravity of 1.0. For fluids of different specific gravity, actuation rates may be approximated by dividing the rate shown by the square root of the specific gravity.

APPROXIMATE ACTUATION/DEACTUATION FLOW RATES FOR AIR.
UPPER FIGURES IN SCFM. LOWER FIGURES IN LPS

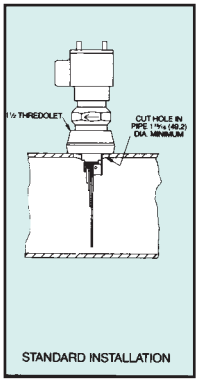
VANE LAYERS	1.5"PIPE	2"PIPE	3"PIPE	4"PIPE	6"PIPE	8"PIPE	10"PIPE	12"PIPE	14"PIPE	16"PIPE	18"PIPE	20"PIPE
1	32-17 15-8	65-32 30-20	210-105 100-50	400-200 190-90	950-475 450-220	1550-850 730-400	2400-1300 1100-600	3450-1900 1600-900	4700-2600 2200-1200	6400-3500 3000-1700	8000-4400 3800-2100	10000-5500 4700-2600
1&2		23-13 10-6	120-70 60-30	195-140 90-70	550-375 260-180	1100-700 520-330	1850-1200 870-570	2700-1750 1300-800	3400-2200 1600-1000	4800-3100 2300-1500	6000-3900 2800-1800	7400-4800 3500-2300
1,2,&3			60-48 30-20	135-100 60-50	375-265 180-130	725-500 340-240	1200-850 570-400	1850-1300 870-610	2600-1800 1200-800	3350-2350 1600-1100	4300-3000 2000-1400	5300-3700 2500-1700
1,2,3,&4				65-50 30-20	260-200 120-90	500-400 240-190	875-700 410-330	1250-1000 590-470	1900-1500 900-710	2500-2000 1200-900	3100-2500 1500-1200	3900-3100 1800-1500
1,2,3,4,&5					130-100 60-50	310-250 150-120	650-525 310-250	1000-800 470-380	1600-1250 760-590	2200-1750 1040-830	2800-2250 1300-1100	3550-2850 1700-1300

Actuation rates are based on air at standard conditions. For gases at other pressures, temperatures, or specific gravities, consult factory for equivalent flow approximations.

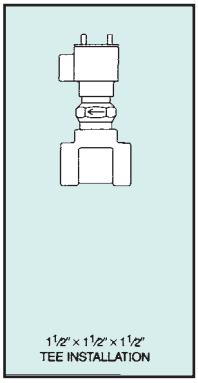
APPLICATION DRAWINGS FOR FLOTECT® AUTOMATIC FLOW SWITCHES



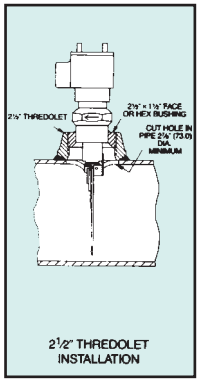
Thredolet Installation. May also be installed using tee, flange or coupling.



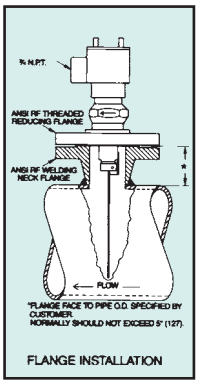
STANDARD INSTALLATION



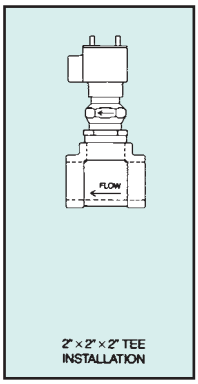
1½" × 1½" × 1½" TEE INSTALLATION



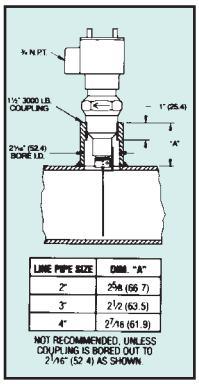
2½" THREDOLET INSTALLATION



FLANGE INSTALLATION

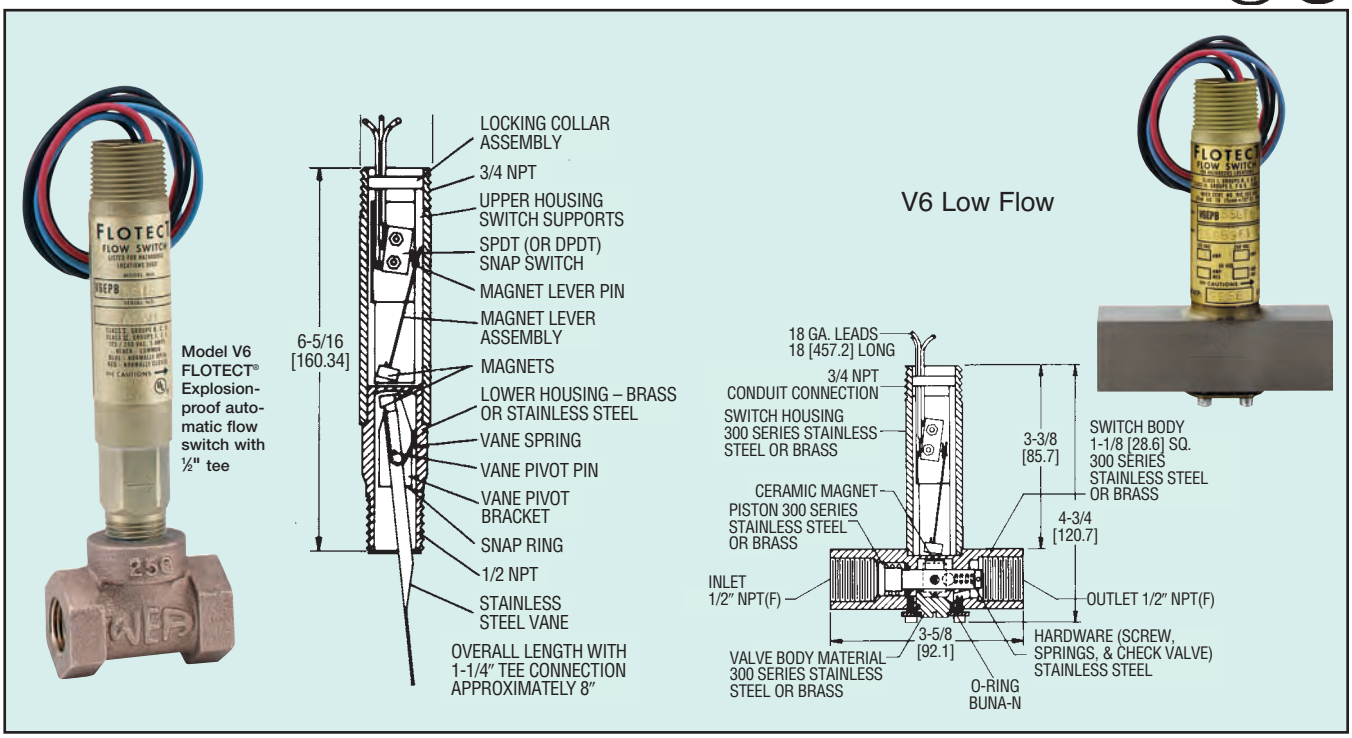


2" × 2" × 2" TEE INSTALLATION



Series V6 FLOTECT® Mini-Size Flow Switches

Monitor Flow in ½ to 2" Pipe, Explosion-Proof — Leak Proof Body



Surprisingly compact, the Series V6 Flotect® Flow Switch is engineered to specifically monitor liquid, gas, or airflows. Operation is simple and dependable with no mechanical linkage as the flow switch is magnetically actuated. The lower body holds the flow vane and one magnet, which controls the switch actuating magnet in the separate upper housing. In most applications the switch is normally off with the pipeline flow forcing the vane against the vane spring. As the flow decreases the vane spring pushes back the vane, actuating the switch to signal an alarm or shutdown. Tees are available for installation in pipelines from 1/2″ to 2″, with bushings added the unit is easily adapted to 1/4″ and 3/8″ piping.

FEATURES

- Leak proof lower body machined from bar stock
- Choice of models in a tee with calibrated vane or field adjustable trimmable vane
- Weatherproof
- Explosion-proof (listing included in specifications)
- Electrical assembly can be easily replaced without removing the unit from the installation so that the process does not have to be shut down
- High pressure rating of 1000 psig (69 bar) with brass body and 2000 psig (138 bar) on the 316 SS body (see specifications)
- Low flow model offers field adjustable set point
- Easy installation, simply insert the tee in the pipeline and complete electrical connections

APPLICATIONS

- Protects pumps, motors and other equipment against low or no flow
- Controls sequential operation of pumps
- Automatically starts auxiliary pumps and engines
- Stops liquid cooled engines, machines and processing when coolant flow is interrupted
- Shuts down burner when air flow through heating coil fails
- Controls dampers according to flow
- Signals alarm when emergency shower in use

SPECIFICATIONS

Service: Gases or liquids compatible with wetted materials.
Wetted Materials: Standard V6 Models: Vane: 301 SS; Lower Body: brass or 303 SS; Magnet: ceramic; Other: 301, 302 SS; Tee: brass, iron, forged steel, or 304 SS.
V6 Low Flow Models: Lower Body: brass or 303 SS; Tee: brass or 304 SS; Magnet: ceramic; O-ring: Buna-N standard, Fluoroelastomer optional; Other: 301, 302 SS.
Temperature Limits: -4 to 220°F (-20 to 105°C) Standard, MT high temperature option 400°F (205°C) (MT not UL, CSA or ATEX). ATEX compliant AT option ambient temperature -4 to 167°F (-20 to 75°C), process temperature: -4 to 220°F (-20 to 105°C).
Pressure Limit: Brass lower body with no tee models 1000 psig (69 bar), 303 SS lower body with no tee models 2000 psig (138 bar). Brass tee models 250 psi (17.2 bar), iron tee models 1000 psi (69 bar), forged and stainless steel tee models 2000 psi (138 bar), low flow models 1450 psi (100 bar).
Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups A, B, C and D; Class II, Groups E, F, and G. (Group A on stainless steel body models only).
ATEX CE 0344 Ex II 2 G EEx d IIC T6 Process Temp≤75°C.
EC-type Certificate No.: KEMA 04ATEX2128.
Switch Type: SPDT snap switch standard, DPDT snap switch optional.
Electrical Rating: UL models: 5A @125/250 VAC (V~). CSA and ATEX models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V⎓). MV option: .1A @ 125 VAC (V~). MT option: 5A @125/250 VAC (V~). [MT option not UL, CSA or ATEX].
Electrical Connections: UL models: 18 AWG, 18″ (460 mm) long. ATEX and CSA models: terminal block.
Upper Body: Brass or 303 SS.
Conduit Connections: 3/4″ male NPT standard, 3/4″ female NPT on junction box models.
Process Connection: 1/2″ male NPT on models without a tee.
Mounting Orientation: Switch can be installed in any position but the actuation/deactuation flow rates in the charts are based on horizontal pipe runs and are nominal values.
Set Point Adjustment: Standard V6 models none. Without tee models vane is trimmable. Low flow models are field adjustable in the range shown. See set point charts on opposite page.
Weight: 2 to 6 lb (.9 to 2.7 kg) depending on construction.
Options not Shown: Custom calibration, bushings, PVC tee, reinforced vane.
Agency Approvals: UL, CSA, CE, and ATEX.

Example	V6	EP	B	B	S	2	B	MT	V6EPB-B-S-2-B-MT flow switch; brass upper housing, brass lower housing, brass tee with 3/4˝ NPT connections, SPDT snap switch, and high temperature option
Series	V6								Series V6 flow switch
Construction		EP							Explosion proof
Upper Body			B S						Brass Stainless Steel
Lower Body				B S					Brass Stainless Steel
Circuit (Switch)					S D				SPDT DPDT
Tee Connection Size						1 2 3 4 5 6 LF			1/2˝ NPT 3/4˝ NPT 1˝ NPT 1-1/4˝ NPT 1-1/2˝ NPT 2˝ NPT Low Flow Model (1/2˝ NPT connections)
Tee Material							MI FS B S 0		Iron Forged Steel Brass Stainless Steel No tee, field trimmable vane (For LF Model no tee material chosen, tee material matches lower housing choice)
Options								CSA AT MV MT VIT	CSA approved construction with junction box* ATEX approved construction with junction box Gold contacts on snap switch for dry circuits (see specifications for ratings) High temperature option rated 400°F (205°C) (see specifications for ratings)* Fluoroeleastomer O-rings in place of Buna-N on low flow models

*Options that do not have ATEX.

V6 Set Point Charts - Factory Installed Tee

APPROXIMATE ACTUATION-DEACTUATION FLOW RATES FOR AIR
Upper figures are SCFM, Lower figures in LPM

Pipe Size	Actuate	Deactuate
½"	6.50 180	5.00 120
¾"	10.0 300	8.00 240
1	14.0 420	12.0 360
1¼"	21.0 600	18.0 540
1½"	33.0 960	30.0 840
2	43.0 1200	36.0 1020

APPROXIMATE ACTUATION-DEACTUATION FLOW RATES FOR COLD WATER
Upper figures are GPM, Lower figures in LPM

Pipe Size	Actuate	Deactuate
½"	1.50 5.667	1.00 3.83
¾"	2.00 7.5	1.25 4.67
1	3.00 11.33	1.75 6.67
1¼"	4.00 15.17	3.00 11.3
1½"	6.00 22.67	5.00 18.9
2	10.00 37.83	8.50 32.2

V6 Low Flow Set Point Chart

MIN-MAX FLOW RATES IN ½" PIPE		
MEDIA	**ACTUATE**	**DEACTUATE**
GPM-Water	.04-0.75	.03-0.60
LPM-Water	.15-2.84	.11-2.27
SCFM-Air	.18-2.70	.15-2.0
LPS-Air	.09-1.3	.07-.95

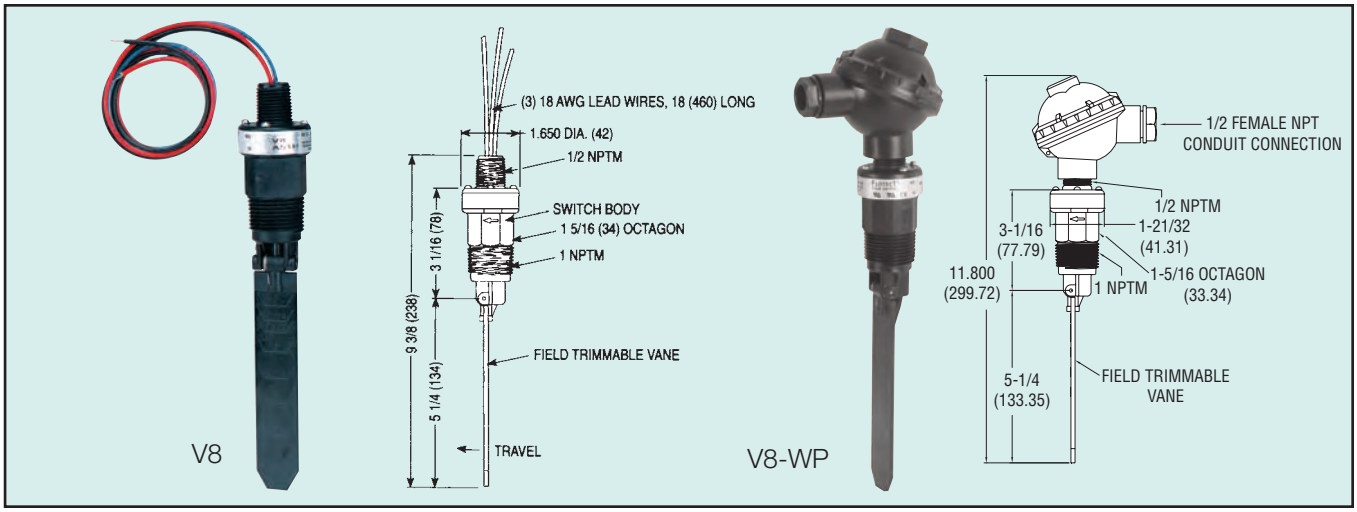
Pressure drop (head loss) is a function of both set point and flow rate. Typically, pressure drop at actuation flow rate listed will be 5-10 psid (.34-.69 bar). Pressure drops at other flow rates will vary in proportion to the (change in flow).

V6 Models

Model Number	Size	Lower Body	Tee
V6EPB-B-S-1-B	1/2˝	Brass	Brass
V6EPB-B-S-2-B	3/4˝	Brass	Brass
V6EPB-B-S-3-B	1˝	Brass	Brass
V6EPB-B-S-4-B	1-1/4˝	Brass	Brass
V6EPB-B-S-5-B	1-1/2˝	Brass	Brass
V6EPB-B-S-6-B	2˝	Brass	Brass
V6EPB-B-S-1-MI	1/2˝	Brass	Iron
V6EPB-B-S-2-MI	3/4˝	Brass	Iron
V6EPB-B-S-3-MI	1˝	Brass	Iron
V6EPB-B-S-4-MI	1-1/4˝	Brass	Iron
V6EPB-B-S-5-MI	1-1/2˝	Brass	Iron
V6EPB-B-S-6-MI	2˝	Brass	Iron
V6EPB-S-S-1-MI	1/2˝	SS	Iron
V6EPB-S-S-2-MI	3/4˝	SS	Iron
V6EPB-S-S-3-MI	1˝	SS	Iron
V6EPB-S-S-4-MI	1-1/4˝	SS	Iron
V6EPB-S-S-5-MI	1-1/2˝	SS	Iron
V6EPB-S-S-6-MI	2˝	SS	Iron
V6EPB-S-S-1-FS	1/2˝	SS	FS
V6EPB-S-S-2-FS	3/4˝	SS	FS
V6EPB-S-S-3-FS	1˝	SS	FS
V6EPB-S-S-4-FS	1-1/4˝	SS	FS
V6EPB-S-S-5-FS	1-1/2˝	SS	FS
V6EPB-S-S-6-FS	2˝	SS	FS
V6EPB-S-S-1-S	1/2˝	SS	SS
V6EPB-S-S-2-S	3/4˝	SS	SS
V6EPB-S-S-3-S	1˝	SS	SS
V6EPB-S-S-4-S	1-1/4˝	SS	SS
V6EPB-S-S-5-S	1-1/2˝	SS	SS
V6EPB-S-S-6-S	2˝	SS	SS
V6EPB-B-S-6-0	No Tee	Brass	None
V6EPB-S-S-6-0	No Tee	SS	None
V6EPB-B-S-LF	1/2˝	Brass	LF, Brass
V6EPB-S-S-LF	1/2˝	SS	LF, SS

Series V8 FLOTECT® Vane Operated Flow Switch

Field Adjustable — 1 to 6 Inch Pipe, Leak Proof Body



V8 Flotect® Flow Switch Protects Equipment: Operation is simple and dependable. In most applications, the switch is normally off while there is sufficient flow of liquid or air. When flow stops, the vane spring moves the vane, actuating a single pole double throw switch rated 5A @ 120/250 VAC to start or stop motor, pump, engine, etc. Operate a damper or valve; shut down a burner or actuate an alarm or signal, protecting unattended equipment from damage or loss of production.

The V8 Flotect® Flow Switch has a leak proof body and vane constructed of tough durable polyphenylene sulfide which has excellent chemical resistance. The full size trimmable vane is provided with molded-in graduations allowing for installation in a 1 inch through 6 inch pipe. Operating pressures are up to 150 psig (10 bar) and temperatures to 212°F (100°C). The V8 flow switch can be used in various chemical processes, industrial systems and similar applications where process conditions are compatible with polyphenylene sulfide, ceramic 8 and 316SS. The V8 Flotect® flow switch is UL recognized as an industrial motor controller per UL standard 508, suitable for mounting in a protected environment.

Cold Water Flow Rates Approximate actuation/deactuation **GPM** upper, **LPM** lower		**Air Flow Rates** Approximate actuation/deactuation **SCFM** upper, **LPM** lower	
Pipe Size		**Pipe Size**	
1"	10.8/9.1 40.9/34.6	1"	39/32.6 1105/923
1¼"	9.8/8.3 37.2/31.4	1¼"	37.5/32.2 1062/912
1½"	8.6/6.8 32.4/25.7	1½"	33.4/26.7 945/757
2"	10.9/8.8 41.2/33.4	2"	43/36.8 1218/1042
3"	12.9/8.9 48.8/33.5	3"	52.7/38.9 1493/1100
4"	21.1/13.8 79.7/52.2	4"	87.6/63.6 2482/1802
6"	45/33 170.2/124.7	6"	168.6/137.4 4775/3890

Suggested Specifications

Automatic Polyphenylene Sulfide plastic flow switch shall be vane operated to actuate a single pole, double throw snap switch. Motion of the vane shall actuate switch by action of a magnet which controls the switch inside the one piece leak proof switch body. Control shall be suitable for pressure up to 150 psig (10 bar) and temperature to 212°F (100°C). Switch shall be W.E. Anderson® flow switch Model No. V8.

APPLICATIONS

Applications are chemical processing, air conditioning, refrigeration, heating systems, cooling lines, machinery, liquid transfer systems, water treatment, food processing, and machine tools. Also, other applications compatible with the materials of construction.

SPECIFICATIONS

Service: Compatible gases or liquids.
Wetted Materials:
Vane and Body: Polyphenylene Sulfide (PPS).
Pin and Spring: 316 SS or Inconel.
Magnet: Ceramic 8.
Temperature Limit: 212°F (100°C).
Pressure Limit: 150 psig (10.34 bar).
Enclosure Rating: General purpose, WP option is weatherproof.
Switch Type: SPDT snap switch, MV option: SPDT gold contact snap switch.
Electrical Rating: 5A @ 125/250 VAC, 5A resistive, 3A inductive @ 30 VDC. MV option: 1A @ 125 VAC, 1A resistive, 0.5A inductive @ 30 VDC.
Electrical Connections: 18 AWG, 18˝ (460 mm) long.
Conduit Connection: 1/2˝ male NPT.
Process Connection: 1˝ male NPT.
Mounting Orientation: Switch can be installed in any position but the actuation/deactuation flow rates are based on horizontal pipe runs and are nominal values.
Set Point Adjustment: Vane is trimmable.
Weight: 4.5 oz (0.13 kg).
Agency Approvals: CE, UL 508 for US and Canada.

V8 Flow Switch

OPTIONS

Gold Plated Contacts, for dry circuits. Rated 1A @ 125 VAC; 1A resistive, 0.5A inductive @ 30 VDC. To order add suffix -MV. Example: **V8-MV**

Inconel® Alloy Option. Inconel® Alloy replaces standard 316 SS wetted parts. Wetted parts are Inconel® Alloy, ceramic 8, and Polyphenylene Sulfide. To order add suffix -INC. Example: **V8-INC**

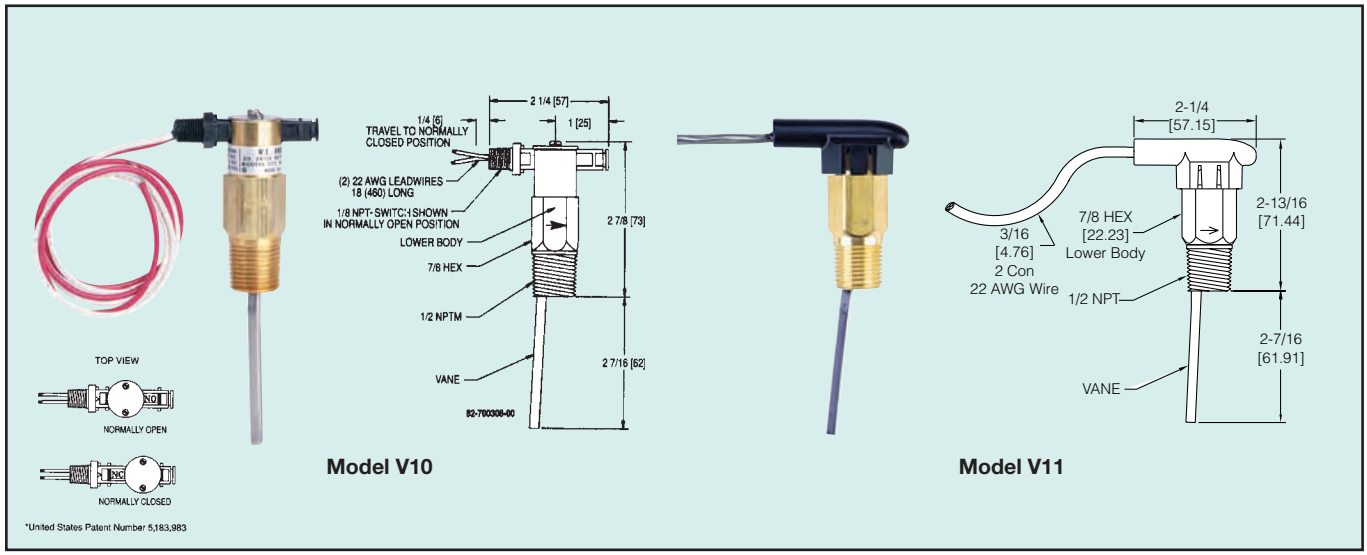
Weatherproof Enclosure. Optional housing is phenylpoliox-ide and provides weatherproof protection for electrical wiring. To order add suffix -WP (Not UL approved). Example: **V8-WP**

Inconel® is a registered trademark of Huntington Alloys corporation.

FLOTECT® Mini-Size Flow Switch

Model V10 & V11

Proof of Flow or No Flow in ½ to 2" Pipe, Low Cost, Leak Proof Body, Weatherproof



Designed to provide an inexpensive, reliable unit to monitor the presence or absence of flow in a system. The V10 and V11 flow switches are used to monitor unattended equipment and protect it from costly damage. The V10 flow switch utilizes a rugged, hermetically sealed reed switch which is encapsulated in a polypropylene switch housing that fits into a standard heavy duty leak proof brass body or optional 303 SS body. The patented switch adjustment* allows the user to change the switch to Normally Open (NO) or Normally Closed (NC) in the field merely by loosening two screws. The switch housing is located outside the process media, making switch change-over or maintenance easy without interruption of process flow.

The V11 Flotect® flow switch takes our very popular V10 design and adds rugged, integral electrical wiring. The one-piece PBT switch housing snaps onto the body and the wiring is epoxy sealed making the switch weatherproof, meeting NEMA 4 standards. The 22 AWG cable used is UV resistant, flame retardant, and comes standard 6 feet in length. This unique design eliminates the need for running conduit between the switch and panel, lowering installation costs.

A full size, trimmable stainless steel vane is provided with a removable laminated template. This template is calibrated for brass or ductile iron reducing tees and forged steel straight tee/bushing combinations. Allows for field installation in pipelines from ½" to 2" diameter. A table with approximate actuation and deactivation values is provided below.

SPECIFICATIONS

Service: Compatible gases or liquids.
Wetted Materials:
Vane: 301 SS.
Body: Brass or 303 SS.
Pin and Spring: 301 SS, 302 SS, and 316 SS.
Magnet: Ceramic 8.
Temperature Limit: V10: 200°F (93°C), V11: 250°F (121°C).
Pressure Limit: Brass body: 1000 psig (69 bar), 303 SS body: 2000 psig (138 bar).
Switch Type: SPST hermetically sealed reed switch. V10: Field adjustable for normally open or normally closed.
Electrical Rating: 1.5A @ 24 VDC resistive, 0.001A @ 200 VDC resistive, 0.5A @ 125 VAC.
Electrical Connections: V10: 22 AWG, 18″ (460 mm) long, V11: 22 AWG, 6' (1.83 m) long. Rated 392°F (200°C). 300V. Flame retardant extruded FEP insulation and overall shield.
Conduit Connection: V10: 1/8″ male NPT.
Process Connection: 1/2″ male NPT standard. Contact factory for other options.
Mounting Orientation: Switch can be installed in any position but the actuation/deactuation flow rates are based on horizontal pipe runs and are nominal values.
Set Point Adjustment: Vane is trimmable.
Weight: V10: 4.5 oz (0.13 kg), V11: 5.8 oz (0.165 kg).
Agency Approvals: V10: CE, UL and CSA; V11: UL.
Switch Enclosure: V10: Polypropylene, V11: Polybutylene terephthalate (PBT).

Cold Water Flow Rates Approximate actuation/deactuation **GPM** upper, **LPM** lower				**Air Flow Rates** Approximate actuation/deactuation **SCFM** upper, **LPM** lower			
Pipe	**Trim**	**N.O.**	**N.C.**	**Pipe**	**Trim**	**N.O.**	**N.C.**
½"	L	2.6/2.3 9.8/8.7	2.6/2.5 9.8/9.5	½"	L	10.3/8.8 291.7/250	10.2/9.2 288/260
¾"	J	3.1/2.7 11.7/10.2	3.1/2.8 11.7/10.6	¾"	J	13/11.6 368.3/328	12.9/11.6 365/328
1"	H	4.8/4.5 18.2/17	4.8/4.4 18.2/16.7	1"	H	19.2/17.6 543.3/498	18.9/17.6 535/498
1¼"	E	6.2/5.6 23.5/21.2	6.1/5.6 23.1/21.2	1¼"	E	24.8/22.2 701.7/628	24.5/22.5 693/637
1½"	C	8.2/7.7 31/29.1	8.2/7.7 31/29.1	1½"	C	33.4/31.2 946.7/883	33/30.6 935/867
2"	Full	9.5/9.1 36/34.4	9.5/9 36/34.1	2"	Full	50.2/48.4 1422/1370	50.2/47.7 1422/1352

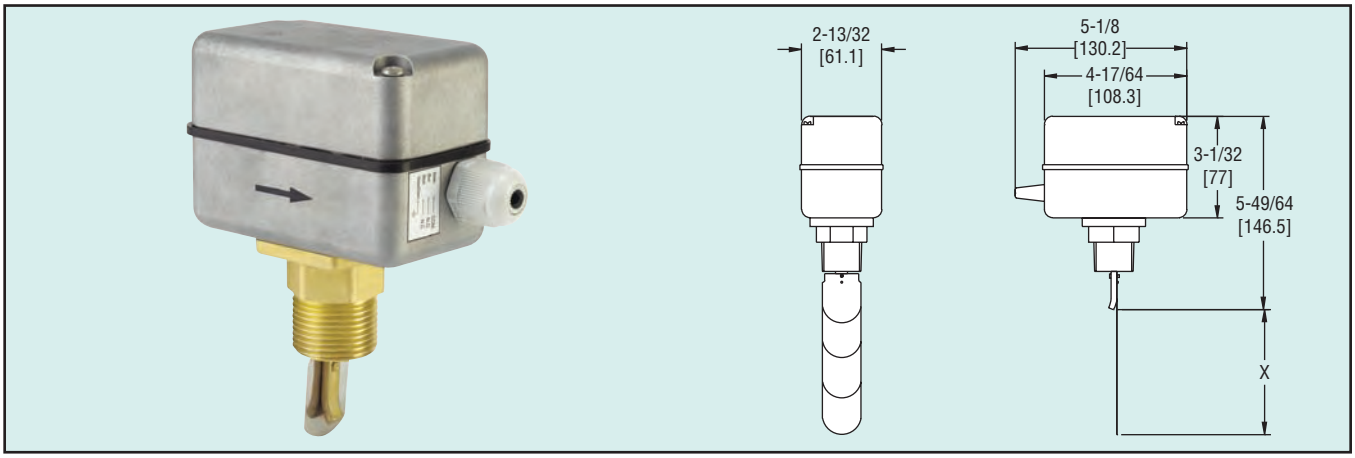
Model V10 (brass lower body)
Model V10SS (303 stainless steel lower body)

Model Number	Body Material	Switch Configuration
V11-BNOA-6	Brass	Normally Open
V11-BNCA-6	Brass	Normally Closed
V11-SNOA-6	303 SS	Normally Open
V11-SNCA-6	303 SS	Normally Closed

Model FS-2

Paddle Flow Switch

Low Cost, Field Adjustable Set Point



The Model FS-2 Paddle Flow Switch offers an economical flow proving solution. Custom set points tailored for the application are enabled by field adjustable vane layers and a set point adjustment screw. The FS-2 features an aluminum weatherproof housing for outdoor installation. Paddles are adjustable to fit 1˝ to 8˝ size pipe. FS-2 is ideal for use in "flow or no flow" applications in cold and hot water systems.

FEATURES

- Field Adjustable Paddle
- Field Adjustable Set Point
- Weatherproof Construction

Model FS-2 Paddle Flow Switch

FLOW RATE CHART

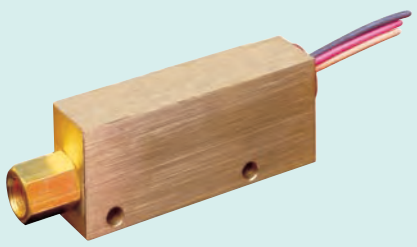
Pipe Diameter (inch)	Blade Length in (mm) Dim. X	Approximate Actuation and Deactuation Flow Rates for Water			
		Minimum Setting GPM (LPM)		Maximum Setting GPM (LPM)	
		Actuate	Deactuate	Actuate	Deactuate
1	1.34 (34)	4.0 (15.0)	1.8 (6.7)	8.8 (33.3)	6.6 (25.0)
1-1/4	1.34 (34)	5.3 (20.0)	2.6 (10.0)	11.4 (43.3)	8.4 (31.7)
1-1/2	2.24 (57)	7.0 (26.7)	4.0 (15.0)	14.5 (55.0)	11.4 (43.3)
2	2.24 (57)	14.1 (53.3)	9.7 (36.7)	31.3 (118.3)	22.5 (85.0)
2-1/2	3.46 (88)	18.5 (70.0)	15.4 (58.3)	35.2 (133.3)	30.8 (116.7)
3	3.46 (88)	27.7 (105.0)	25.1 (95.0)	52.8 (200.0)	46.2 (175.0)
4	3.46 (88)	59.4 (225.0)	52.8 (200.0)	123.3 (466.7)	114.5 (433.3)
5	6.57 (167)	52.8 (200.0)	39.6 (150.0)	132.1 (500.0)	123.3 (466.7)
6	6.57 (167)	75.7 (286.7)	52.8 (200.0)	154.1 (583.3)	140.9 (533.3)
8	6.57 (167)	184.9 (700.0)	158.5 (600.0)	396.3 (1500.0)	374.2 (1416.7)

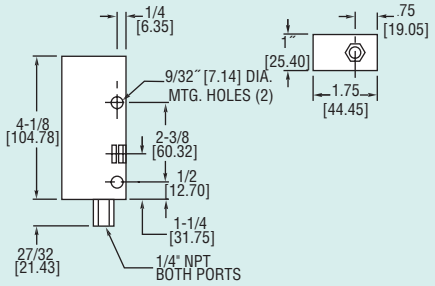
SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials:
Bellow: Tin-bronze.
Vane: Stainless Steel.
Body: Forged brass.
Temperature Limit: 230ºF (110ºC).
Pressure Limit: 145 psig (10 bar).
Enclosure Rating: IP64.
Switch Type: SPDT snap switch.
Electrical Rating: 10A res, 3A ind @ 250 VAC.
Electrical Connection: Cable gland with attached wire leads.
Process Connection: 1˝ male NPT.
Mounting Orientation: Switch must be installed vertically on horizontal pipe runs.
Set Point Adjustment: Four vane combinations and an adjustment screw.
Enclosure: Die-cast aluminum alloy.
Weight: 28.22 oz (0.8 kg).
Agency Approvals: CE.

Series P1 Explosion-Proof Brass Flow Switch

Fixed Setpoints, Flow Rates from 0.10 to 1.5 GPM





The Series P1 Brass Flow Switch utilizes a piston-type design for accurate detection of excessive or insufficient flow rates.The piston magnetically actuates a hermetically sealed SPDT reed switch. The switches have preset actuation points from 0.10 to 1.5 GPM for liquid flow. The Series P1 is ideal for protecting against loss of fluid flow in hydraulic systems or assuring proper coolant flow in semiconductor processing.

MODELS

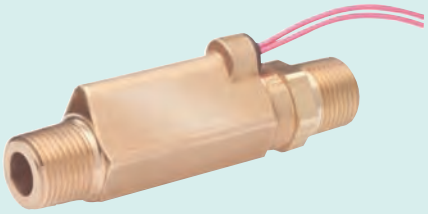
Model Number	Actuation Set Point GPM (LPM)
P1-011	0.10 (.38)
P1-012	0.25 (.95)
P1-013	0.50 (1.89)
P1-014	0.75 (2.84)
P1-015	1.00 (3.79)
P1-016	1.50 (5.68)

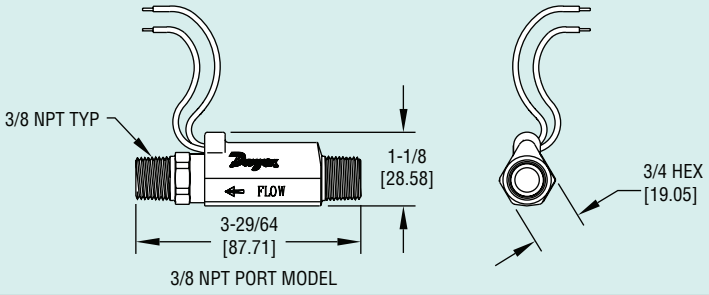
SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Housing: brass; piston: polysulfone; Spring: 316SS; O-Ring: Fluoroelastomer, Other: Epoxy.
Temperature Limits: -20 to 225°F (-29 to 107°C).
Pressure Limits: 1000 psig (68.9 bar).
Enclosure Rating: Explosion-proof, Class I, Groups A, B, C, D, Division 2.
Accuracy: ±10% of set point.
Repeatability: ±1%.
Switch Type: SPDT.
Electrical Rating: .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.
Electrical Connection: 18 AWG, 24˝ (60.96 cm), Polymeric lead wires.
Process Connection: 1/4˝ female NPT.
Mounting Orientation: Any position. Set points shown are based on vertical, inlet down position.
Required Filtration: 50 microns or better.
Weight: 0.66 lb (301 g).

Series P8 High Pressure Brass Flow Switch

Up to 1500 psi, Fixed Setpoint, Up to 2.0 GPM, Rugged Brass Body





High inline pressures are no problem for the Series P8 brass flow switch. The switch integrates a one-piece magnetic PPS composite piston to handle pressure up to 1500 psi. The P8 switches use 100 micron filtration and are less susceptible to clogging than other high inline pressure switches. Setpoints range from 0.25 to 2.0 GPM for liquid flow. Use the Series P8 in industrial cleaning equipment or high pressure lubrication systems.

MODELS

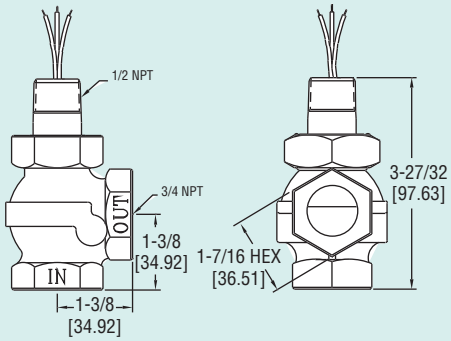
Model Number	Actuation Set Point GPM (LPM)
P8-11	0.25 (.95)
P8-12	0.50 (1.89)
P8-13	1.0 (3.79)
P8-14	1.5 (5.68)
P8-15	2.0 (7.57)

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Housing: Brass; Piston: PPS composite, epoxy Spring: 316SS; O-ring: Flourocarbon.
Temperature Limits: -20 to 275°F (-28 to 135°C).
Pressure Limits: 1500 psi (103.4 bar).
Accuracy: ±20% of set point.
Switch Type: SPST, N.O.
Electrical Rating: .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.
Electrical Connection: No. 22 AWG, 24˝ (61 cm), Polymeric Leads.
Process Connections: 3/8˝ male NPT.
Mounting Orientation: Any position. Set points shown are based on vertical, inlet down position.
Required Filtration: 100 microns or better.
Weight: 6 oz (.17 kg).

Series G9 Globe Flow Switch

Adjustable Set Point, Water or Oil Service, 90° Flow Path



The Series G9 Globe Flow Switch provides accurate flow detection in water and oil with ±1% repeatability. A shuttle by-pass vane inside the housing is controlled externally using an ordinary flat blade screwdriver, allowing flow settings to be changed without disassembly. Each switch is constructed of non-corrosive materials and resists shock and vibration. The Series G9 is suitable for triggering alarms on interlocking shutdown circuitry when flow rate is incorrect and for protecting bearings, gears, and cooling systems.

MODELS

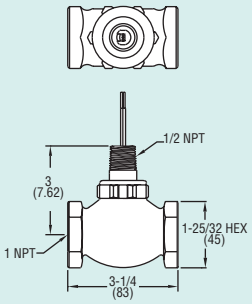
Model Number	Actuation Set Point Range GPM (LPM)
G9-21	0.75 - 4.0 (2.8 - 15.1)
G9-22	2.0 - 8.0 (7.6 - 30.3)
G9-23	7.0 - 14.0 (26.5 - 53.0)

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Housing: Bronze; Shuttle: Acetal; Spring: 316 SS; O-ring: Fluoroelastomer; Other: Ceramic.
Temperature Limits: -20 to 180°F (-29 to 82°C).
Pressure Limits: 400 psi (27 bar) @ 100°F (37.8°C).
Accuracy: ±10% of set point.
Repeatability: ±1% maximum deviation.
Switch Type: SPDT.
Electrical Rating: .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.
Electrical Connections: 18 AWG, 24″ (61 cm), polymeric lead wires.
Process Connection: 3/4″ female NPT.
Mounting Orientation: Any position. Set points shown are based on vertical, lead wires up position.
Required Filtration: 150 microns or better.
Weight: 1 lb 11 oz (0.76 kg).

Series GVS Globe Valve Switch

Adjustable Set Point, Rugged Bronze Construction, Straight Through Flow



The Series GVS offers accurate flow detection with 1% repeatability and external adjustability over a broad range of flow settings. The durable construction delivers long-life reliability in either water or oil. Generous flow paths keep pressure drop low. The GVS are ideal for detection of improper flow rates in high volume lubrication, cooling or process systems.

MODELS

Model Number	Actuation Set Point Range GPM (LPM)
GVS-111	1.0 - 6.0 (3.8 - 22.7)
GVS-112	5.0 - 15.0 (18.9 - 56.8)
GVS-113	2.0 - (7.6 - 30.3)

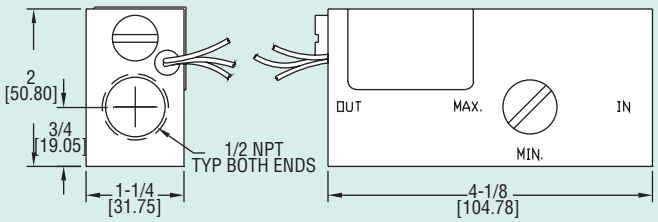
SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Housing: Bronze; Shuttle: TFE; Bonnet: Bronze; Spring: 316SS.; Other: Fluoroelastomer, Ceramic.
Temperature Limits: -20 to 200°F (-29 to 93°C).
Pressure Limits: 400 psig (27 bar) @ 100°F (38°C).
Accuracy: ±10%.
Repeatability: 1% maximum deviation.
Switch Type: SPDT.
Electrical Rating: .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.
Electrical Connections: No. 18 AWG, 24″ (61 cm), polymeric lead wires.
Process Connections: 1″ female NPT.
Mounting Orientation: Any position. Set points shown are based on horizontal, lead wires up positional
Required Filtration: 150 microns or better.
Weight: 2 lb, 8 oz (1.16 kg).

Series AFS

Adjustable Flow Switch

For Oils, Water and Gases, Infinite Adjustments



The Series AFS Adjustable Flow Switch is externally adjustable and is ideal for protecting machine tools from coolant flow failure, protecting bearings from loss of lubricant or assuring proper air flow. The Series AFS offers an infinite number of flow settings from 0.5 to 20 GPM at pressures up to 1000 psig, with low pressure drop and precise repeatability. The AFS is housed in either brass or stainless steel and can be used with water, compatible liquids, oils, and gases.

MODELS

Model	Media	Electrical Connection	Piston	Housing
AFS-131	Oil	Wire Leads	Brass	Brass
AFS-141	Water	Wire Leads	Polysulfone	Brass
AFS-151	Liquids	Wire Leads	316SS	316SS
AFS-231	Gases	Wire Leads	Brass	Brass
AFS-251	Gases	Wire Leads	316SS	316SS
AFS-132	Oil	1/2″ NPT Conduit	Brass	Brass
AFS-142	Water	1/2″ NPT Conduit	Polysulfone	Brass
AFS-152	Liquids	1/2″ NPT Conduit	316SS	316SS
AFS-232	Gases	1/2″ NPT Conduit	Brass	Brass
AFS-252	Gases	1/2″ NPT Conduit	316SS	316SS

SPECIFICATIONS

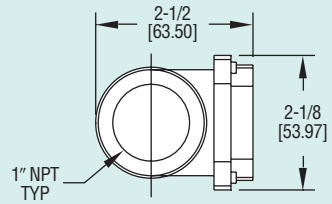
Service: Compatible gases or liquids.
Wetted Materials: See model chart for housing and piston, Spring: 316SS, O-ring: Fluoroelastomer, Other: Epoxy.
Temperature Limits: -20 to 300°F (-29 to 149°C), -20 to 225°F (-29 to 107.2°C) with polysulfone piston.
Pressure Limit: 1000 psi (68 bar).
Accuracy: ±10% of setpoint.
Repeatability: ±1% maximum deviation.
Switch Type: SPDT.
Electrical Rating: .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.
Electrical Connections: 18 AWG, 24″ (61 cm), polymeric lead wires, optional 1/2″ male NPT conduit connection.
Process Connection: 1/2″ female NPT ports.
Mounting Orientation: Any.
Setpoint Adjustment: Liquids: 0.5 to 20 GPM (1.9 to 75.7 LPM),
Gases: 1.0 to 75 SCFM (28 to 2124 LPM) at 5 psig.
Required Filtration: 50 microns or better.
Weight: 2 lb, 11 oz (1.22 kg).

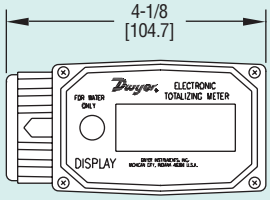
Series TTM

Electronic Totalizing Meter

CE

Batch or Cumulative Totals, Easy-to-Read LCD Display, ±5% Accuracy





Measure batch and cumulative totals in liquid transfer systems with the Series TTM Electronic Totalizing Meter. The meter is designed for any pump, pressure, or gravity feed system with a 3 to 30 GPM (10 to 100 LPM) flow range. View batch and cumulative totals on the large 4-digit LCD display. Batch totals can be reset to measure flow during a single use. The cumulative total will automatically reset to zero when a maximum reading of 9999 is obtained. Models designed for use in water applications are constructed of Nylon and rated to 150 psig (10.3 bar). Aluminum models are calibrated for fuels and rated to 300 psig (20.7 bar).

MODELS

Model No.	Application	Material	Units
TTM10	Water*	Nylon	Gallons
TTM11	Water*	Nylon	Liters
TTM20	Fuels†	Aluminum	Gallons
TTM21	Fuels†	Aluminum	Liters

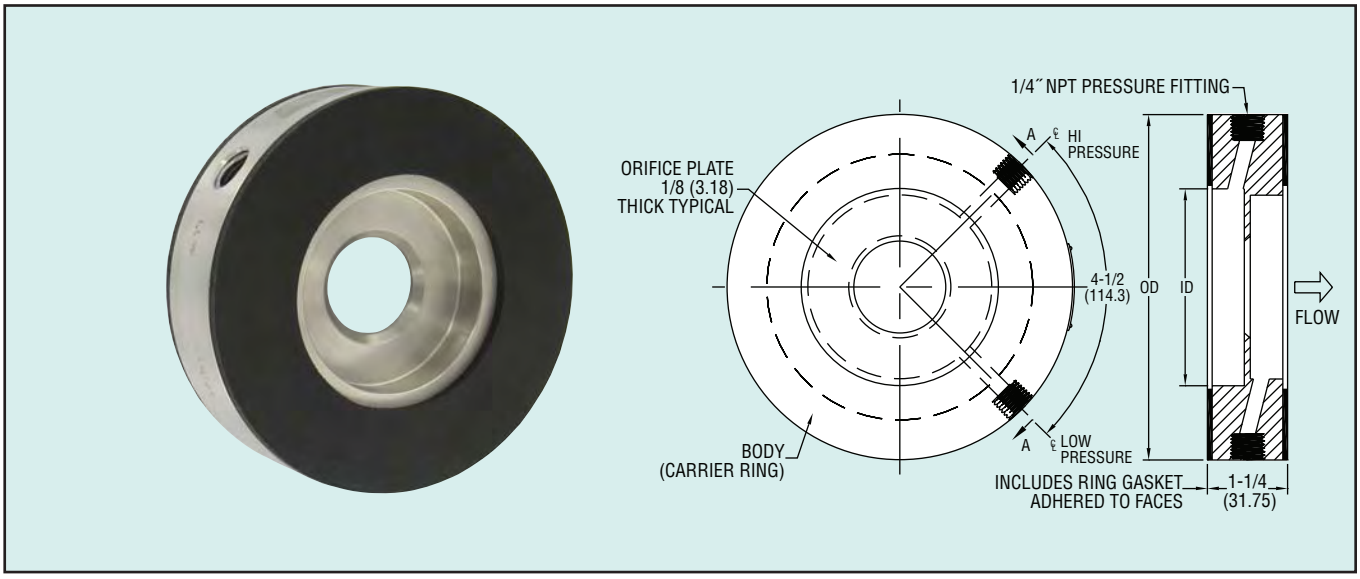
SPECIFICATIONS

Service: Compatible Liquids.
Flow Range: 3 to 30 GPM (10 to 100 LPM).
Wetted Materials: Bearings: Ceramic; Shaft: Tungsten Carbide; Rotor: Nylon 6-6; Rings: 316 SS; Body: TTM20, 21: Ceramic Magnet.
Accuracy: ±5%.
Batch Total Maximum: 9,999.
Cumulative Total Maximum: 9,999.
Temperature Limits: 14 to 130°F (-10 to 54°C).
Pressure Limits: Nylon models: 150 psig (10 bar); Aluminum models: 300 psig (20 bar).
Pressure Drop: 5 psi (0.34 bar) @ maximum flow.
Maximum Particulate Size: 350 microns.
Display: 4-digit LCD, 5/8″ H.
Auto Shut-off: After 1 minute.
Connections: 1″ female NPT.
Power: Two AAA alkaline batteries (included).
Battery Life: Approx. 9,000 hours.
Weight: Nylon models: 0.4 lb (190 g); Aluminum models: 0.7 lb (340 g).
Agency Approvals: CE.

*Calibrated for use with water; †Calibrated for use with gasoline, diesel fuel and kerosene

Series OP Orifice Plate Flow Meter

Stainless Steel for Use with Liquids and Gases



The Series OP Orifice Plate Flow Meter is a complete orifice plate flow metering package. It incorporates a stainless steel orifice plate with a unique holder or carrier ring containing metering taps and integral gaskets. It was designed for use wherever there is an application for a conventional flow orifice plate. It can also be used in place of other primary differential producers for efficiency and cost effectiveness. Installation is accomplished simply by slipping the unit between standard flanges (orifice flanges are not required). The Series OP is available in line sizes from 1/2˝ to 24˝ and can be used with compatible liquids and gases.

FEATURES

- Mounted with Standard Flanges
- Corner Type Metering Taps
- Corrosion Free Material
- Simplified Installation
- Stainless Steel Wetted Parts
- Proven Through a Wide Range of Applications for Energy Efficiency
- Assures Long Term Reliability and Accuracy

SPECIFICATIONS

Service: For metering compatible liquids and gases.
Wetted Material: 304 SS, Buna-N gaskets.
Accuracy: 0.6% of full scale flow. (Beta = .2-.6) ±0.7% for Beta greater than .6.
Temperature: -50 to 200°F (-45 to 93°C).
Pressure: Limited only by pipe and flange rating restrictions.
Head Loss: 1-Beta ratio^2 eg: 1-0.7^2 = 1-0.49 = 51% of the d.p.
Line Sizes: 1/2˝ to 24˝.
Process Connection: 1/4˝ female NPT.
Installation: Standard flange, any rating (orifice flanges not required).
Pipe Requirements: General requirements 10 diameter upstream and 5 diameter downstream of orifice plate.
Weight: Varies with line size. See chart.

Series OP Orifice Plate Flow Meter

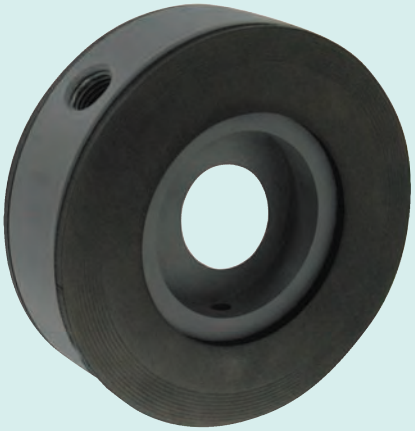
- Material 304/304 L- dual certified- Gaskets Buna "N"
- Based on 70°F, 14.7 psia (Base Conditions)
- Beta Value Based on Std Sch pipe I.D.
- 1.25″ overall thickness
- Orifice plate thickness is 0.125″

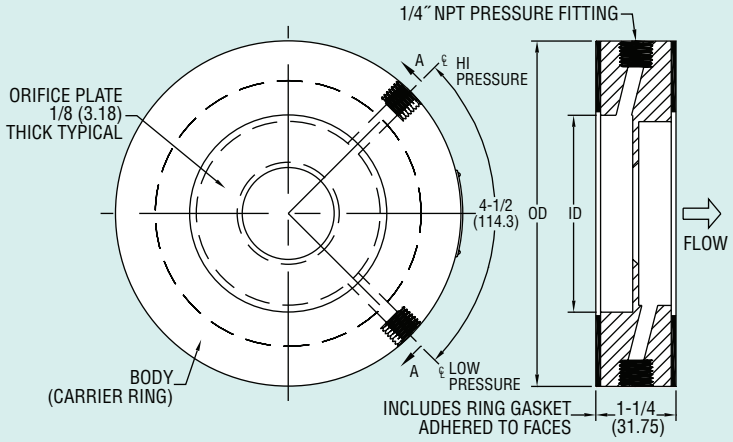
Model Number	Weight (lbs)	Line Size	Bore	Beta	WATER CAPACITY		AIR CAPACITY - Flow in SCFM			
					Inches d.p. W/C	Flow in GPM	Inch d.p. W/C	at 14.7 PSIA (0 PSIG)	at 20 psig	at 100 psig
OP-A-1	1.00	1/2"	0.200"	0.32	20	0.62	20	2.35	3.63	6.61
OP-A-2	1.00	1/2"	0.310"	0.50	100	3.44	100	12.21	19.58	36.37
OP-A-3	1.00	1/2"	0.430"	0.69	320	13.00	200	32.77	56.15	107.47
OP-B-1	1.00	3/4"	0.250"	0.30	20	0.97	20	3.65	5.66	10.3
OP-B-2	1.00	3/4"	0.400"	0.49	100	5.69	100	20.21	32.44	60.26
OP-B-3	1.00	3/4"	0.580"	0.70	320	23.82	200	59.92	102.91	197.2
OP-C-1	2.00	1"	0.300"	0.29	20	1.38	20	5.24	8.11	14.8
OP-C-2	2.00	1"	0.520"	0.49	100	9.63	100	34.2	54.92	102.09
OP-C-3	2.00	1"	0.720"	0.69	320	36.15	200	91.28	156.51	300
OP-D-1	2.00	1.25"	0.400"	0.29	20	2.46	20	9.31	14.41	26.3
OP-D-2	2.00	1.25"	0.700"	0.51	100	17.48	100	62.09	99.75	185.5
OP-D-3	2.00	1.25"	1.00"	0.72	320	71.77	200	180	309.97	595.2
OP-E-1	2.00	1.5"	0.500"	0.31	20	3.85	20	14.57	22.55	41.16
OP-E-2	2.00	1.5"	0.800"	0.50	100	22.73	100	80.82	129.68	241.5
OP-E-3	2.00	1.5"	1.100"	0.68	320	83.95	200	212.18	363.93	697.39
OP-F-1	3.00	2"	0.600"	0.29	20	5.52	20	20.92	32.38	59.13
OP-F-2	3.00	2"	1.000"	0.48	100	35.34	100	125.74	202.03	375.8
OP-F-3	3.00	2"	1.450"	0.70	320	147.74	200	372.09	639.87	1,227.63
OP-G-1	4.00	2.5"	0.750"	0.30	20	8.63	20	32.71	50.64	92.48
OP-G-2	4.00	2.5"	1.250"	0.50	100	55.54	100	197.54	317.58	590.91
OP-G-3	4.00	2.5"	1.750"	0.70	320	216.30	200	543.99	936.56	1,798.86
OP-H-1	5.00	3"	0.920"	0.30	20	12.97	20	49.17	76.13	139.06
OP-H-2	5.00	3"	1.500"	0.49	100	79.94	100	282.9	454.77	846.21
OP-H-3	5.00	3"	2.150"	0.70	320	324.16	200	816.7	1,404.95	2,696.28
OP-J-1	7.00	4"	1.200"	0.30	20	22.03	20	83.58	129.44	236.48
OP-J-2	7.00	4"	2.000"	0.50	100	141.51	100	503.76	810.06	1,507.64
OP-J-3	7.00	4"	2.800"	0.70	320	547.11	200	1,380.03	2,373.02	4,553.68
OP-K-1	8.00	5"	1.500"	0.30	20	34.39	20	130.48	202.11	369.29
OP-K-2	8.00	5"	2.500"	0.50	100	220.80	100	786.23	1,264.42	2,353.51
OP-K-3	8.00	5"	3.500"	0.69	320	853.09	200	2,152.83	3,701.57	7,103.22
OP-L-1	10.00	6"	1.800"	0.30	20	44.40	20	187.86	291	531.75
OP-L-2	10.00	6"	3.000"	0.49	100	317.74	100	1,331.63	1,820.05	3,387.93
OP-L-3	10.00	6"	4.200"	0.69	320	1,226.98	200	3,097.20	5,325.20	10,219.28
OP-M-1	14.00	8"	2.400"	0.30	20	87.95	20	333.87	517.25	945.28
OP-M-2	14.00	8"	4.000"	0.50	100	565.77	100	2,014.95	3,241.45	6,034.85
OP-M-3	14.00	8"	5.600"	0.70	320	2,195.86	200	5,532.00	9,525.43	18,290.00
OP-N-1	20.00	10"	3.000"	0.30	20	137.35	20	521.58	808	1,476.77
OP-N-2	20.00	10"	5.000"	0.50	100	883.04	100	3,145.50	5,060.38	9,421.74
OP-N-3	20.00	10"	7.000"	0.70	320	3,421.26	200	8,626.42	14,846.80	28,506.17
OP-O-1	30.00	12"	3.600"	0.30	20	197.73	20	750.9	1,163.44	2,126.47
OP-O-2	30.00	12"	6.000"	0.50	100	1,271.62	100	4,530	7,288.16	13,570.33
OP-O-3	30.00	12"	8.400"	0.70	320	4,930.86	200	12,430.00	21,397.00	41,089.02
OP-P-1	40.00	14"	4.000"	0.30	20	244.14	20	927.14	1,436.59	2,625.81
OP-P-2	40.00	14"	6.600"	0.50	100	1,537.49	100	6,477.67	8,812.87	16,409.42
OP-P-3	40.00	14"	9.300"	0.70	320	6,052.57	200	15,251.50	28,262.66	50,427.78
OP-Q-1	48.00	16"	4.500"	0.30	20	308.76	20	1,172.63	1,817.05	3,321.32
OP-Q-2	48.00	16"	7.600"	0.50	100	2,038.95	100	7,264.58	11,688.26	21,764.08
OP-Q-3	48.00	16"	10.700"	0.70	320	8,007.74	200	20,179.85	34,749.32	66,737.64
OP-R-1	56.00	18"	5.200"	0.30	20	412.26	20	1,565.79	2,426.34	4,435.12
OP-R-2	56.00	18"	8.600"	0.50	100	2,610.71	100	9,302.08	14,966.93	27,869.85
OP-R-3	56.00	18"	12.000"	0.70	320	10,027.37	200	25,299.92	43,535.32	83,587.01
OP-S-1	64.00	20"	5.780"	0.30	20	509.55	20	1,935.37	2,999.11	5,482.22
OP-S-2	64.00	20"	9.600"	0.50	100	3,252.22	100	11,588.20	18,645.74	34,720.84
OP-S-3	64.00	20"	13.500"	0.70	320	12,742.82	200	32,115.34	55,303.34	106,215.88
OP-T-1	78.00	24"	7.000"	0.30	20	747.18	20	2,838.14	4,398.25	8,038.99
OP-T-2	78.00	24"	11.700"	0.50	100	4,835.93	100	17,229.62	27,726.33	51,633.81
OP-T-3	78.00	24"	16.300"	0.70	320	18,572.50	200	46,810.53	80,610.19	154,823.78

Note: Differential pressure values should be less than 50% of the inlet absolute pressure.

Series PE Orifice Plate Flow Meter

PVC Orifice Plate for Use with Gases





The Series PE Orifice Plate Flow Meter offers one-piece PVC construction incorporating a unique holder or carrier ring containing metering taps and integral gaskets. Unlike a standard orifice plate, the Series PE is a true primary element including the various components for differential pressure measurement. It was designed for use wherever there is an application for a conventional flow orifice plate. It can also be used in place of other primary differential producers for efficiency and cost effectiveness. The Series PE is available in line sizes from 1/2˝ to 24˝ and used for air and most gases. It meets or exceeds ASME, AGA & ISO standards.

FEATURES

- Mounted with Standard Flanges
- Standard “Corner Tap” Configuration
- Corrosion Free Material
- Simplified Installation
- Built in Metering Taps (1/4˝ female NPT STD)
- Proven Through a Wide Range of Applications for Accuracy and Energy Efficiency
- Assures Long Term Reliability and Accuracy

SPECIFICATIONS

Service: Clean air and compatible gases.
Wetted Material: Monolithic (single piece) constructed entirely of gray PVC.
Accuracy: ±0.6% full scale flow. (Beta = .2-.6) ±0.7% for Beta greater than .6.
Temperature: 140°F max (60°C max).
Pressure: 150 psi max.
Head Loss: 1-Beta ratio^2 eg: 1 - 0.7^2 = 1 - 0.49 = 51% of the d.p.
Line Sizes: 1/2˝ to 24˝.
Process Connections: 1/4˝ female NPT.
Installation: Standard flange 125#/150# rating.
Pipe Requirements: General requirements 10 diameter upstream and 5 diameter downstream.
Weight: Varies with line size. See chart.

Series PE Orifice Plate Flow Meter
Air Capacity Structure

- Material PVC- Gaskets Buna "N"
- Based on 70°F, 14.7 psia (Base Conditions)
- Beta Value Based on Std Sch pipe I.D.
- 1.25″ overall thickness
- Orifice plate thickness is 0.125″

Model #	Weight (lbs)	Line Size	Bore	Beta	Inch d/p W/C	AIR CAPACITY - Flow in SCFM		
						at 14.7 PSIA (0 PSIG)	at 20 psig	at 100 psig
PE-A-1	1.00	1/2"	0.200"	0.3	20	2.35	3.63	6.61
PE-A-2	1.00	1/2"	0.310"	0.5	100	12.21	19.58	36.37
PE-A-3	1.00	1/2"	0.430"	0.69	200	32.77	56.15	107.47
PE-B-1	1.00	3/4"	0.250"	0.3	20	3.65	5.66	10.3
PE-B-2	1.00	3/4"	0.400"	0.49	100	20.21	32.44	60.26
PE-B-3	1.00	3/4"	0.580"	0.7	200	59.92	102.91	197.2
PE-C-1	1.00	1"	0.300"	0.29	20	5.24	8.11	14.8
PE-C-2	1.00	1"	0.520"	0.49	100	34.2	54.92	102.09
PE-C-3	1.00	1"	0.720"	0.69	200	91.28	156.51	300
PE-D-1	1.00	1.25"	0.400"	0.29	20	9.31	14.41	26.3
PE-D-2	1.00	1.25"	0.700"	0.51	100	62.09	99.75	185.5
PE-D-3	1.00	1.25"	1.00"	0.72	200	180	309.97	595.2
PE-E-1	2.00	1.5"	0.500"	0.31	20	14.57	22.55	41.16
PE-E-2	2.00	1.5"	0.800"	0.5	100	80.82	129.68	241.5
PE-E-3	2.00	1.5"	1.100"	0.68	200	212.18	363.93	697.39
PE-F-1	2.00	2"	0.600"	0.29	20	20.92	32.38	59.13
PE-F-2	2.00	2"	1.000"	0.48	100	125.74	202.03	375.8
PE-F-3	2.00	2"	1.450"	0.7	200	372.09	639.87	1,227.63
PE-G-1	2.00	2.5"	0.750"	0.3	20	32.71	50.64	92.48
PE-G-2	2.00	2.5"	1.250"	0.5	100	197.54	317.58	590.91
PE-G-3	2.00	2.5"	1.750"	0.7	200	543.99	936.56	1,798.86
PE-H-1	2.00	3"	0.920"	0.3	20	49.17	78.13	139.06
PE-H-2	2.00	3"	1.500"	0.49	100	282.9	454.77	846.21
PE-H-3	2.00	3"	2.150"	0.7	200	816.7	1,404.95	2,696.28
PE-J-1	3.00	4"	1.200"	0.3	20	83.58	129.44	236.48
PE-J-2	3.00	4"	2.000"	0.5	100	503.76	810.06	1,507.64
PE-J-3	3.00	4"	2.800"	0.7	200	1,380.03	2,373.02	4,553.68
PE-K-1	3.00	5"	1.500"	0.3	20	130.48	202.11	369.29
PE-K-2	3.00	5"	2.500"	0.5	100	786.23	1,264.42	2,353.51
PE-K-3	3.00	5"	3.500"	0.69	200	2,152.83	3,701.57	7,103.22
PE-L-1	4.00	6"	1.800"	0.3	20	187.86	291	531.75
PE-L-2	4.00	6"	3.000"	0.49	100	1,331.63	1,820.05	3,387.93
PE-L-3	4.00	6"	4.200"	0.69	200	3,097.20	5,325.20	10,219.28
PE-M-1	5.00	8"	2.400"	0.3	20	333.87	517.25	945.28
PE-M-2	5.00	8"	4.000"	0.5	100	2,014.95	3,241.45	6,034.85
PE-M-3	5.00	8"	5.600"	0.7	200	5,532.00	9,525.43	18,290.00
PE-N-1	6.00	10"	3.000"	0.3	20	521.58	808	1,476.77
PE-N-2	6.00	10"	5.000"	0.5	100	3,145.50	5,060.38	9,421.74
PE-N-3	6.00	10"	7.000"	0.7	200	8,626.42	14,846.80	28,506.17
PE-O-1	7.00	12"	3.600"	0.3	20	750.9	1,163.44	2,126.47
PE-O-2	7.00	12"	6.000"	0.5	100	4,530	7,288.16	13,570.33
PE-O-3	7.00	12"	8.400"	0.7	200	12,430.00	21,397.00	41,089.02
PE-P-1	9.00	14"	4.000"	0.3	20	927.14	1,436.59	2,625.81
PE-P-2	9.00	14"	6.600"	0.5	100	6,477.67	8,812.87	16,409.42
PE-P-3	9.00	14"	9.300"	0.7	200	15,251.50	28,262.66	50,427.78
PE-Q-1	10.00	16"	4.500"	0.3	20	1,172.63	1,817.05	3,321.32
PE-Q-2	10.00	16"	7.600"	0.5	100	7,264.58	11,688.26	21,764.08
PE-Q-3	10.00	16"	10.700"	0.7	200	20,179.85	34,749.32	66,737.64
PE-R-1	12.00	18"	5.200"	0.3	20	1,565.79	2,426.34	4,435.12
PE-R-2	12.00	18"	8.600"	0.5	100	9,302.08	14,966.93	27,869.85
PE-R-3	12.00	18"	12.000"	0.7	200	25,299.92	43,535.32	83,587.01
PE-S-1	14.00	20"	5.780"	0.3	20	1,935.37	2,999.11	5,482.22
PE-S-2	14.00	20"	9.600"	0.5	100	11,588.20	18,645.74	34,720.84
PE-S-3	14.00	20"	13.500"	0.7	200	32,115.34	55,303.34	106,215.88
PE-T-1	16.00	24"	7.000"	0.3	20	2,838.14	4,398.25	8,038.99
PE-T-2	16.00	24"	11.700"	0.5	100	17,229.62	27,726.33	51,633.81
PE-T-3	16.00	24"	16.300"	0.7	200	46,810.53	80,610.19	154,823.78

Note: Differential pressure values should be less than 50% of the inlet absolute pressure.

Introduction to Level Controls

Most of the devices featured in this technical guide use the magnetic attraction or repulsion system of operation. This rugged electro-mechanical design has proven itself for more than 50 years and millions of heavy duty applications. The electro-mechanical system consists of an attractor of magnetic material, usually 430 stainless steel, or a magnet inside the control and a movable magnet outside the device. As the attractor moves in or out of the magnetic field the magnet moves toward or away from the attractor. The magnet is attached to one or more snap action or mercury switches. As the magnet moves it pivots and operates the switch assembly to either make or break one or more electrical contacts. This switch action performs the task of operating equipment, alarms, shutdowns, and/or reports such functions to a computer or central location. Controls featuring this magnet operated system can be used at temperatures up to 800°F (425°C) and pressures up to 1750 psig (121 bar). Liquid level controls are available to handle fluids from water to more aggressive liquids requiring all 316 stainless steel construction. Dry bulk controls can handle materials from carbon black to soybean flour. Electrical contacts of SPST, SPDT, or DPDT configuration are provided to accommodate applications from 12 amperes AC, 10 amperes DC, to milliampere requirements of high technology low current, low voltage intrinsically safe or "dry" circuits. General purpose, weatherproof or explosion-proof enclosures protect the electrical switch assemblies from the environment.

Dwyer Dry Bulk or Liquid Level controls are designed to perform two functions.

A. To maintain a level. This task is usually completed by using a control with a wide deadband, or two fixed deadband controls and a holding relay. Thus when the level of a liquid or dry bulk material reaches a pre-determined high (or low) point a pump is shut off or turned on. This cycle is repeated continuously such as in a sump, tank, lubrication equipment, bin or other pressurized or non-pressured vessel.

B. To monitor a safe level or detect a not-to-exceed level - that is to act as an alarm, or shut down, or both. This can be either high or low functions or both. This is accomplished by using a control with a fixed deadband. There are a great variety of controls suitable for this purpose.

There are basically 8 determining factors when selecting a control for a specific function.

1. Pressure
2. Temperature
3. Specific gravity or bulk density
4. Fixed or adjustable deadband
5. Electrical requirement
6. Enclosure type
    - A. General purpose
    - B. Weatherproof
    - C. Explosion-proof
7. Media compatibility with wetted parts
8. Method of attachment
    - A. External pipe mounted
        1. threaded
        2. socket weld
        3. flanged
    - B. Side mounted
        1. threaded
        2. flanged
    - C. Top mounted
        1. flanged
        2. threaded

If the control is to be externally mounted, can the chamber be a welded type such as for use with clean non-corrosive liquids or should it be flanged so that the unit can be inspected and/or easily maintained? Welded chamber benefits are that they are usually less expensive than flanged controls and can be used with higher pressure and temperature. The disadvantage is that the unit cannot be disassembled for cleaning or inspection. Flanged units can be disassembled but are more expensive and have lower pressure and temperature capability.

Controls for top mounted service are generally capable of performing a greater variety of functions such as operating 1, 2 or 3 pumps, providing high and low alarm or combining functions such as operating a pump and providing both high and low alarms in one unit.

Consult the factory or your nearest sales office if you cannot determine the best control for your application based on the information in the technical guide.

NOMENCLATURE

Process Connection: The part of the level control that is used to mount to the vessel or tank. Usually 1" NPT, 1" socket weld hub, or 1" flanges. Other sizes such as 1-1/2" or 2" are available on special order. For top mounted controls, 4" flanges are normally specified. Other flange sizes, materials and pressure ratings are available.

Chamber or Body: The part of the control that contains the float or displacer.

Enclosure or Housing: The part of the control containing the switch mechanism. It is usually general purpose NEMA-1, weather proof NEMA-4, or explosion proof NEMA-7-9.

Switch Mechanism: The electrical head assembly contained in the enclosure. It may be snap action or mercury switches. It can be (SPST) (SPDT) (DPDT) or (DPST) circuits.

Float or Displacer: The element that follows the liquid level, moving the armature (magnetic attractor) in and out of a magnetic field to activate or de-activate a switch.

Armature (Magnetic attractor, attraction sleeve): The part connected to the end of the float rod opposite the float. It moves in and out of the magnetic field as the liquid rises or falls. Standard material is 430 stainless steel. 316SS sheathed armatures are available on special order.

Armature Tube (enclosing tube): The tube which encloses the internal armature. It also holds the magnetic switch assembly and enclosure externally.

Heat Fins (cooling fins, cooling extension): Optional feature extending the armature tube for heat dissipation purposes. It also has extending fins to promote heat radiation to the atmosphere.

Trim: A general term describing the components inside a chamber or those components exposed to the process media such as; float, float rod, armature, displacers, cable, spring clamps, screws, washers and nuts.

PROPERTIES OF SATURATED STEAM

Pressure or Vacuum	Boiling Temp. °F	Pressure	Boiling Temp. °F	Pressure	Boiling Temp. °F
20" VAC.	161°	2 lb. Pres.	218°	30 lb. Pres.	274°
15" VAC.	178°	3 lb. Pres.	221°	50 lb. Pres.	298°
10" VAC.	192°	4 lb. Pres.	224°	75 lb. Pres.	320°
9" VAC.	194°	5 lb. Pres.	227°	100 lb. Pres.	338°
8" VAC.	196°	6 lb. Pres.	230°	115 lb. Pres.	347°
7" VAC.	199°	7 lb. Pres.	233°	130 lb. Pres.	356°
6" VAC.	201°	8 lb. Pres.	235°	150 lb. Pres.	366°
5" VAC.	203°	10 lb. Pres.	239°	200 lb. Pres.	388°
4" VAC.	205°	12 lb. Pres.	244°	250 lb. Pres.	405°
3" VAC.	208°	14 lb. Pres.	248°	300 lb. Pres.	422°
2" VAC.	209°	16 lb. Pres.	252°	400 lb. Pres.	448°
1" VAC.	211°	18 lb. Pres.	255°	500 lb. Pres.	470°
0	212°	20 lb. Pres.	259°	600 lb. Pres.	489°
8 oz. Pres.	214°	25 lb. Pres.	267°	700 lb. Pres.	505°
1 lb. Pres.	216°	30 lb. Pres.	274°	750 lb. Pres.	513°

CONVERSION TABLES - °C into °F

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-32	-25.6	+2	35.6	45	113	135	275	225	437
-30	-22	4	39.2	50	122	140	284	230	446
-28	-18.4	5	41	55	131	145	293	235	455
-26	-14.8	6	42.8	60	140	150	302	240	464
-24	-11.2	8	46.4	65	149	155	311	245	473
-22	-7.6	10	50	70	158	160	320	250	482
-20	-4	12	53.6	75	167	165	329	255	491
-18	-0.4	14	57.2	80	176	170	338	260	500
-16	+3.2	15	59	85	185	175	347	265	509
-14	6.8	16	60.8	90	194	180	356	270	518
-12	10.4	18	64.4	95	203	185	365	275	527
-10	14	20	68	100	212	190	374	300	572
-8	17.6	22	71.6	105	221	195	383	325	617
-6	21.2	24	75.2	110	230	200	392	350	662
-5	23	25	77	115	239	205	401		
-4	24.8	30	86	120	248	210	410		
-2	28.4	35	95	125	257	215	419		
0	32	40	104	130	266	220	428		

TO CONVERT FEET OF WATER HEAD

Head of feet x 12 = Inches of Water
Head of feet x 0.4335 = psi

TO CONVERT POUNDS PER Sq/In

psi x 2.036 = Inches of Mercury
psi x 51.7 = Millimeters of Mercury
psi x 27.70 = Inches of Water
psi x 0.0703 = Kilograms per Sq/Cm
psi x 6.895 = Kilo Pascal
psi x 0.06895 = bar

TO CONVERT KILOGRAMS PER Sq/Cm

Kilograms per Sq/Cm x 14.233 = psi
Kilograms per Sq/Cm x 28.96= Inches of Mercury

TO CONVERT INCHES OF WATER

Inches of Water x 0.361 = psi
Inches of Water x 0.577 = Ounces per Sq/In
Inches of Water x 0.0736 = Inches of Mercury
Inches of Water x 1.867 = Millimeters of Mercury

TO CONVERT INCHES OF MERCURY

Inches of Mercury x 0.4912 = psi
Inches of Mercury x 13.57 = Inches of Water
Inches of Mercury x 7.87 = Ounces per Sq/In

TO CONVERT BAR

Bar x 14.504 = psig

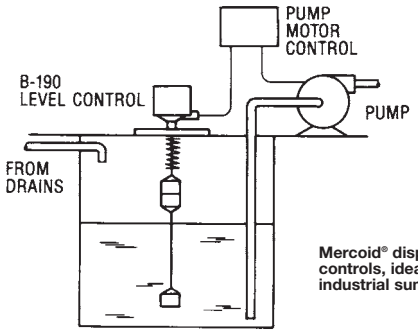
TO CONVERT MILLIMETERS OF MERCURY

Millimeters of Mercury x 0.5357 = Inches of Water
Millimeters of Mercury x .039 = Inches of Mercury
Millimeters of Mercury x 0.0193 = psi

Introduction to Mercoid®, Anderson®, Proximity and Dwyer® Level Controls

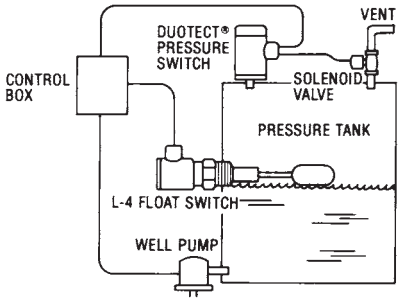
For reliable liquid or dry bulk level monitoring and control

These typical applications may suggest ideas for solving your control problems:
In all systems it is essential that adequate liquid or dry bulk material exists in a pipeline or tank. Mercoid®, W.E. Anderson®, Proximity or Dwyer® switches provide the control and monitor function automatically, reliably and at moderate cost. These controls are widely used in power generating stations, petroleum and chemical processing, pumping stations, air conditioning, heating, hot/cold water supply, liquid or dry bulk transfer, water treatment, sumps and a great variety of industrial applications. The diagrams below suggest but a few of the many applications that protect your motors, pumps, engines and processors.



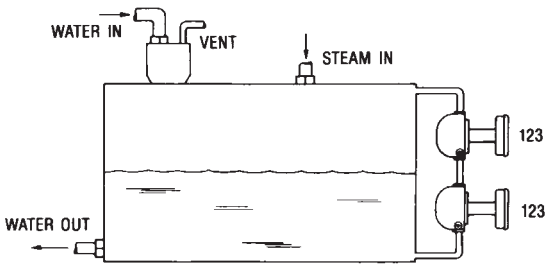
Mercoid® displacer type level controls, ideal for controlling industrial sump pumps.

Industrial sumps and other underground tanks are ideal applications for top mounted Mercoid® displacer type level controls. Easily installed, these controls use porcelain displacers that do not float on the surface of liquids but are suspended on a coil spring and cable. As the liquid in the tank reaches the level of the upper displacers their weight decreases by an amount equal to the liquid displaced allowing the spring to move the cable upward, actuating the switch and the pump is turned on. As the liquid level falls below the upper displacers they move only a small amount, staying within the switch deadband until the liquid level falls to the center of the bottom displacer. At this point the switch is deactivated stopping the pump. The pump will remain deactivated until the water level rises to the upper displacers, repeating the cycle. The displacers are not affected by turbulence, pressure or chemicals and are excellent for tanks with viscous or dirty liquids. The level differential is easily adjusted by repositioning of the displacers on the 316SS cable.



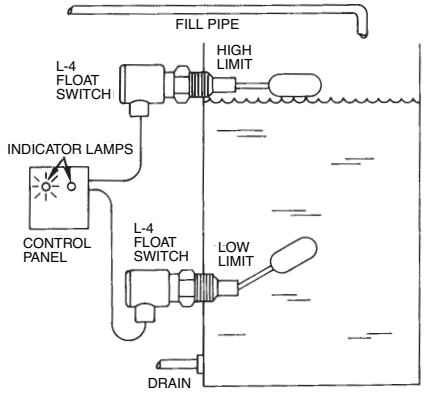
Switches control water level and tank pressure.

A hydro-pneumatic tank with a deep well pump maintains desired pressure in a water system. The pump, however, delivers entrained air along with makeup water, requiring periodic tank venting to prevent excess pressure buildup. As both water level and tank pressure must be maintained, one side of the W.E. Anderson® Duotect pressure switch is interlocked with the W.E. Anderson® L4 float switch via the control box. When tank pressure falls below the preset system pressure due to water drawdown, the Duotect® switch starts the pump and transfers control to the float switch. When the preset water level is reached, the float switch turns the pump off. If entrained air has increased the pressure beyond the limit set in the other side of the Duotect® pressure switch, after a time delay covering several normal cycles, the switch will open the solenoid valve and vent the tank down to proper pressure.

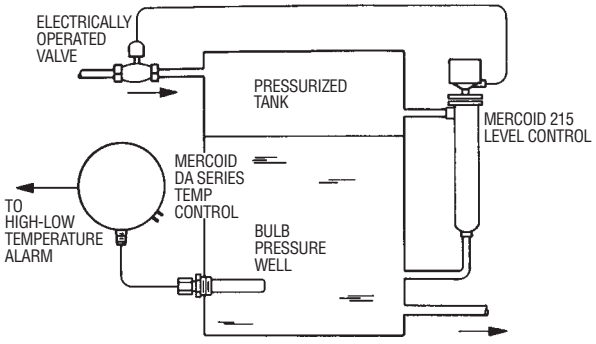


Mercoid® model 123 level controls provide high and low alarm on large deaerator tank.

Liquid level in external piping equals level in the tank. When level rises to high limit, float in upper model 123 is lifted, actuating switch to sound high level alarm. When level drops to low limit, lower model 123 sounds low level alarm.



Reliable float switches monitor and control liquid level.
The W.E. Anderson® L4 float switch provides a simple, reliable means for monitoring and controlling the level of a liquid in a large tank. In this holding tank application, the lower L4 indicates to the operator that a tank fill cycle is required; the L4 can also control the necessary valve or pump to provide an automatic fill cycle. When the level of the liquid reaches the upper L4, the switch activates another indicator lamp or terminates the automatic fill cycle. The L4 float switch in optional stainless steel is recommended for level control of corrosive liquids, while the lower cost standard brass L4 serves well in most water and oil applications.



Mercoid® level and temperature controls find wide application in high pressure and temperature processes.
In the example above, a pressurized holding tank in the process system is replenished with the process media by a supply line and electrically operated valve. The valve is controlled by a Mercoid 215 level control which can operate at system pressure to 300 psi at 500°F and features an adjustable level change from 1½″ to 24″. The temperature of the media in the holding tank is monitored by a Mercoid DA Series bulb and capillary temperature control which has independent, externally adjustable high and low setpoints. The temperature control can actuate an alarm should the media temperature exceed the desired limits. A well in the side of the tank protects the bulb from the system pressure as well as allowing removal of the bulb and control without disrupting the process.

Mercoid® Level Product Guide

MERCOID® LIQUID LEVEL CONTROL

Series	Maximum Pressure	Maximum Temperature	Minimum Specific Gravity	Page
Welded Chamber External Mount				
201	1000 psig 69 bar	750°F 400°C	0.60/0.75	94-95
251	1250 psig 86 bar	750°F 400°C	0.75	96-97
1251	1250 psig 86 bar	500°F 260°C	0.40	98-99
1261	1750 psig 121 bar	500°F 260°C	0.60	100-101
291	350 psig 24 bar	600°F 315°C	0.60	102-103
1265	1500 psig 103 bar	300°F 149°C	0.40	102-103
391	900 psig 62 bar	600°F 315°C	0.70	104-105
Flanged Chamber External Mount				
211	450 psig 31 bar	500°F 260°C	0.60	106-107
221	1000 psig 69 bar	475°F 246°C	0.60	108-109
1211	450 psig 31 bar	500°F 260°C	0.40	110-111
1221	1000 psig 69 bar	475°F 246°C	0.40	112-113
102	400 psig 28 bar	425°F 218°C	0.60	114-115
1102	400 psig 28 bar	425°F 218°C	0.40	114-115
Adjustable Deadband Flanged Chamber				
215	450 psig 28 bar	500°F 260°C	0.60	116-117
Side Mount Threaded or Flanged				
500	400 psig 28 bar	425°F 218°C	0.55	118-119
Top Mount Displacer Type Single Stage				
190	Consult Factory	200°F 93°C	0.50	120-121
Top Mount Displacter Type Two Stage				
195	Consult Factory	200°F 93°C	0.50	120-121
Top Mount Displacter Type Three Stage				
193	Consult Factory	200°F 93°C	0.95	122-123
Top Mount Float Type Fixed Deadband				
301	600 psig 42 bar	500°F 260°C	0.50	124-125

MERCOID® LIQUID LEVEL CONTROL

Series	Maximum Pressure	Maximum Temperature	Minimum Specific Gravity	Page
Top Mount Float Type Adjustable Deadband				
401	300 psig 20.7 bar	500°F 260°C	0.50	126-127
40-49	ATMOS	AMBIENT	0.80	128-129
41	ATMOS	AMBIENT	0.80	128-129
Lever Operated				
46-47	ATMOS	AMBIENT	N/A	128-129
Water Level Packing Gland Design				
123-125	150 psig 10.3 bar	365°F 185°C	0.88	130
Torque Tube Design External Chamber				
75	400 psig 28 bar	500°F 260°C	0.66	131
Anti-Vibration Circuits				132
Special Circuits and Pneumatic Head				133
UL-CSA Approvals				172-173

PROXIMITY LEVEL CONTROL

Radio Frequency Transmitter				
CRF	100 psig 6.9 bar	180°F 82°C	N/A	149
Ultrasonic Transmitter				
UT	100 psig 6.9 bar	160°F 71°C	N/A	148
Ultrasonic Point Level				
GS	1000 psig 69 bar	200°F 93°C	N/A	146
Hydrostatic Level Transmitter				
PLT	Vented Tank	200°F 93°C	N/A	149
Conductivity				
DPL	30 psig 2.1 bar	212°F 100°C	N/A	148

W.E. ANDERSON® LEVEL CONTROL

Side Mount Float				
L4	300 psig 20.7 bar	400°F 205°C	0.70	140
L6	2000 psig 138 bar	400°F 205°C	0.50	141
L8	150 psig 10.3 bar	212°F 100°C	0.60	142
L10	2000 psig 138 bar	200°F 93°C	0.50	143
F7	300 psig 20.7 bar	392°F 200°C	0.60	138-139
Top Mount Float				
L4	300 psig 20.7 bar	400°F 205°C	0.70	140
F7	450 psig 31 bar	300°F 149°C	0.45	138-139
Optical Level				
OLS	200 psig 13.8 bar	200°F 93°C	N/A	145

Mercoid®

Series 201

Welded Construction

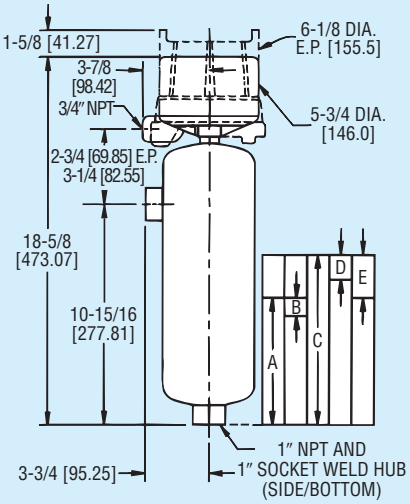
External Mount Pressures to 1000 psi (69 bar) at Temperatures to 750°F (400°C), Optional Explosion-Proof Enclosures, Hermetically Sealed Switches

Series 203 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14″ (356 mm). Other centerlines available.

Series 201 is connected with one horizontal and one vertical 1″ combination NPT and 1″ pipe socket weld connection.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to original position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 204 features two vertical flanged connections (1″ RF forged steel – ANSI specifications). Flange centerline 14 5/8″ (371 mm). Other centerlines available.

Switch Level Change Single Stage Operation | **Switch Level Change Two Stage Operation**

	SP GR	A*	B	A**	B	C	D	E	ORDERING CODE
MIN SP GR 0.6 600 PSI (41 BAR) @ 100°F (38°C) 500 PSI (34 BAR) @ 750°F (400°C)	1.0	6 3/4″ (171 mm)	3/4″ (19 mm)	5 3/4″ (146 mm)	3/4″ (19 mm)	7 3/4″ (197 mm)	1″ (25.4 mm)	2″ (51 mm)	C1-60
	0.6	7 1/2″ (191 mm)	1″ (25.4 mm)	6 1/2″ (165 mm)	1″ (25.4 mm)	9″ (229 mm)	1 3/4″ (44 mm)	2 1/2″ (64 mm)	
MIN SP GR 0.75 1000 PSI (69 BAR) @ 100°F (38°C) 750 PSI (52 BAR) @ 750°F (400°C)	1.0	7 1/4″ (184 mm)	3/4″ (22 mm)	6 1/4″ (159 mm)	3/4″ (19 mm)	8 1/2″ (216 mm)	1 1/4″ (32 mm)	2 1/4″ (57 mm)	C1-75
	0.75	8″ (203 mm)	1″ (25.4 mm)	7″ (178 mm)	1″ (25.4 mm)	9 1/2″ (241 mm)	1 3/4″ (44 mm)	2 1/2″ (64 mm)	

*"A" is adjustable ± 1″.

**"A" is not adjustable.

Long life and reliable operation is inherent in the design of the 201 series. The heavy duty welded carbon steel chamber provides a control to operate up to 1000 psi (69 bar) and process temperature up to 750°F (400°C), 400°F (205°C) at the electrical head assembly. The use of an external magnet reduces the possibility of magnetic particle build up inside the armature tube and subsequent loss of operation as may occur with the internal magnet repulsion design. Choice of construction provides equipment suitable for specific gravity as low as (0.60). Electrical requirements are met by use of hermetically sealed snap action or mercury switches in a variety of actions including SPST, SPDT, DPDT and DPST arrangements. Optional circuits are available for low current/voltage DC; high current DC; or high temperature applications. Check the current chart for the switch best suited for your application. Standard process connections are combination 1″ NPT and 1″ socket weld hubs. Flanged connections are offered as an option.

APPLICATIONS

Refineries, chemical plants, power generating stations, water treatment plants, mixing systems, scrubbers, accumulators, condensate recovery, industrial tanks and vessels.

SPECIFICATIONS

C1-60: Minimum specific gravity 0.60. Process pressure 600 psig (41 bar) at 100°F (38°C). 500 psig (34 bar) at 750°F (400°C).*

C1-75: Minimum specific gravity 0.75. Process pressure 1000 psig (69 bar) at 100°F (38°C), 750 psig (52 bar) at 750°F (400°C).*

*Heat fins (HF) and/or high temperature switches should be considered for process temperatures above 500°F (260°C).

Switch Type: Snap action or mercury. See charts A and B.

Electrical Rating: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure 18″ (460 mm) leads.

Process Connections: Combination 1″ NPT/socket weld hubs or flanges. See chart C.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.

Weight: 201, 27 lb (12.3 kg); 203, 37 lb (17 kg); 204, 44 lb (20 kg).

Suggested Specifications

Liquid level control shall be 201 (203) (204) Series with combination 1″ NPT/socket weld hubs (flanged) process connections. Chamber shall be welded suitable for operation at 1000 psig (69 bar) at 100°F (38°C), 750 psig (52 bar) at 750°F (400°C) at a minimum specific gravity of 0.75; or, 600 psig (41 bar) at 100°F (38°C), 500 psig (34 bar) at 750°F (400°C) at a minimum specific gravity of 0.60. Circuits shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT), (DPDT). Enclosure shall be general purpose (weatherproof) (explosion-proof) (explosion-proof - vapor proof). Switch mechanism shall be gravity return and shall be activated by a stainless steel float.

MODEL CHART – SERIES 201

EXAMPLE	201	WT	7810	10	HF	C1	60		201-WT-7810-C1-60. Liquid level control. Welded carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Side/bottom process connections, combination 1″ NPT/socket weld hubs. Minimum specific gravity 0.60. Operating pressure 600 psig (41 bar) at 100°F (38°C), 500 psi (34 bar) at 350°F (400°C).		
ENCLOSURE		G							General purpose, NEMA-1.	UL	CSA
		WT							Weather proof, NEMA-3R, 4, 4X.	UL	
		E							Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only).	UL	CSA
		EV							Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G (CSA approved Groups C, D, E, F, G only).	UL	CSA
CIRCUITS (For Electrical Circuits see charts A & B below.)			48XX						Single stage. Mercury switch. See Chart A.		
			48XX	XX					Two stage. Mercury switch. See Chart A.		
			78XX						Single stage. Snap switch. See Chart B.		
			78XX	XX					Two stage. Snap switch. See Chart B.		
			78XXHM						Hermetically sealed snap switch. See Chart B.		
			98XX						Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.		
			98XX	XX					Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.		
			10XX						Single stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 201-C1-60 type rated at 500 psi (34 bar): 201-C1-75 type rated at 650 psi (45 bar).		
			10XX	XX					Two stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 201-C1-60 type rated at 500 psi (34 bar); 201-C-75 type rated at 650 psi (45 bar).		
WELDED CHAMBER CONSTRUCTION COMBINATION 1″ NPT/SOCKET WELD HUBS						C1			Refer to Chart C for pressure/temperature ratings. Carbon steel body.		
	201					C1	60		Minimum specific gravity 0.60 side/bottom process connections. Combination 1″ NPT/socket weld hub.	UL	CSA
	201					C1	75		Minimum specific gravity 0.75 side/bottom process connections. Combination 1″ NPT/socket weld hub.	UL	CSA
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS									Refer to Chart C below for pressure/temperature ratings.		
	203					C1	160		1″ 150# flanges side/bottom process connection.	UL	CSA
	203					C1	175		1″ 150# flanges side/bottom process connection.	UL	CSA
	203					C1	360		1″ 300# flanges side/bottom process connection.	UL	CSA
	203					C1	375		1″ 300# flanges side/bottom process connection.	UL	CSA
	203					C1	660		1″ 600# flanges side/bottom process connection.	UL	CSA
	203					C1	675		1″ 600# flanges side/bottom process connection.	UL	CSA
	204					C1	160		1″ 150# flanges side/side process connection.	UL	CSA
	204					C1	175		1″ 150# flanges side/side process connection.	UL	CSA
	204					C1	360		1″ 300# flanges side/side process connection.	UL	CSA
	204					C1	375		1″ 300# flanges side/side process connection.	UL	CSA
	204					C1	660		1″ 600# flanges side/side process connection.	UL	CSA
	204					C1	675		1″ 600# flanges side/side process connection.	UL	CSA
OPTIONS					HF				High temperature fins. Should be considered if ambient temperature exceeds 500°F (260°C) for extended periods.		
								12	Breather and drain for E type explosion proof enclosure. Recommended for high humidity or outdoor service.		

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS					ORDERING CODE				
		AC			DC		SINGLE STAGE	TWO STAGE			
		120V	240V	440V	125V	250V		LOWER	UPPER		
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†	10	5	-4821	-4821	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†	10	5	-4820	-4820	-20	UL	CSA
	SP-DT One switch	4	2	1†	4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†	10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†	10	5	-4813	-4813	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†	10	5	-4814	-4814	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†	4	2	-4806	-4806	-06	UL	CSA
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†	0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†	0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch⁂	5	5				-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches⁂	5	5				-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3		10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3		10‡	3‡	-9810	-9810	-10		
	DP-DT Two SP-DT switches	2	2		0.4**	0.25**	-1006	-1006	-06		
	SP-DT One switch	2	2		0.4**	0.25**	-1010	-1010	-10		

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
**Resistive
⁂ 30VDC = 5 Resistive
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.

CHART C

SERIES	MOUNTING STYLE	MINIMUM SPECIFIC GRAVITY	PRESSURE RATING AT 38°C 100°F	PRESSURE RATING AT 400°C 750°F	FLANGE CLASS (psi)	ORDER CODE
201	1″ NPT	0.6	600 psi 41 bar	500 psi 34 bar	–	C1-60
201	1″ NPT	0.75	1,000 psi 69 bar	750 psi 52 bar	–	C1-75
203 204	FLANGED	0.6	275 psi 19 bar	100 psi 7 bar	150	C1-160
203 204	FLANGED	0.75	275 psi 19 bar	100 psi 7 bar	150	C1-175
203 204	FLANGED	0.6	600 psi 41 bar	425 psi 29 bar	300	C1-360
203 204	FLANGED	0.75	720 psi 50 bar	425 psi 29 bar	300	C1-375
203 204	FLANGED	0.6	600 psi 41 bar	500 psi 34 bar	600	C1-660
203 204	FLANGED	0.75	1,000 psi 69 bar	750 psi 52 bar	600	C1-675

Mercoid®

Series 251

Welded Chamber

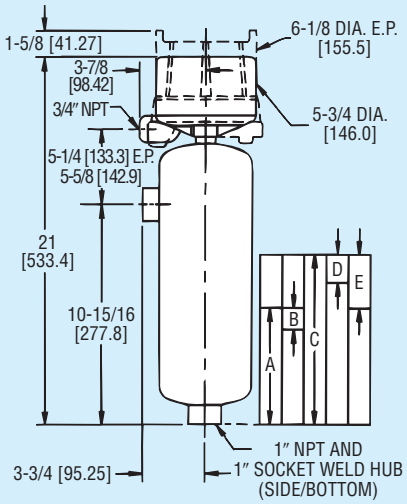
External Mount Pressure to 1250 psig (86 bar), Hermetically Sealed Switches, Temperature to 750°F (400°C), Explosion-Proof Housings

Series 253 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14″ (356 mm). Other centerlines available.

Series 251 is installed with one horizontal and one vertical 1″ socket weld or 1″ NPT combination hub.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 254 features two vertical flanged connections (1″ RF forged steel – ANSI specifications). Flange centerline 14⅝″ (371 mm). Other centerlines available.

Switch Level Change Single Stage Operation | **Switch Level Change Two Stage Operation**

	SP GR	A*	B	A**	B	C	D	E	ORDERING CODE
MIN SP GR 0.75 1250 psi (86 bar) @ 100°F (38°C) to 650°F (345°C) 750 psi (52 bar) @ 750°F (400°C)	1.0	7 1/4″ (184 mm)	3/4″ (19 mm)	6 1/4″ (159 mm)	3/4″ (19 mm)	8 1/2″ (216 mm)	1 1/4″ (32 mm)	2 1/4″ (57 mm)	C1-75
	0.75	8″ (203 mm)	1″ (25.4 mm)	7″ (178 mm)	1″ (25.4 mm)	9 1/2″ (241 mm)	1 3/4″ (44 mm)	2 1/2″ (64 mm)	

*"A" is adjustable ± 1″. **"A" is not adjustable.

Time proven magnetic head leak proof construction combines with a heavy duty welded chamber to provide excellent reliability for control of compatible liquids. Operating pressures of 1250 psig (86 bar) at 650°F (345°C) and 750 psig (52 bar) at 750°F (400°C) are standard. The use of an external magnet reduces the possibility of magnetic particle build up inside the armature tube and subsequent loss of operation as may occur with the internal magnet repulsion design. The controls feature carbon steel bodies and stainless steel internal trim. Process mounting configurations include either side/bottom combination 1″ NPT/socket weld hubs, side/bottom flanges or side/side flanges. A variety of hermetically sealed snap action or mercury switches are available in SPST, SPDT, or DPDT action for single or two stage operation. Mercury or Gold alloy snap action contacts are suitable for low current DC applications. A full range of switch enclosures are offered. Many chamber, enclosure and switch combinations are UL approved.

APPLICATIONS

Refineries, chemical plants, power generating stations, water treatment plants, mixing systems, scrubbers, accumulators, condensate recovery, industrial tanks and vessels.

SPECIFICATIONS

C1-75: Minimum specific gravity 0.75. Process pressure 1250 psig (86 bar) at 100°F (38°C), to 650°F (345°C). 750 psig (52 bar) at 750°F (400°C).*
*Heat fins and/or high temperature switches should be considered for process temperatures above 500°F (260°C).
Switch Types: Snap action or mercury. See charts A and B.
Electrical Rating: See charts A and B.
Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure 18″ (460 mm) leads.
Process Connections: Combination 1″ NPT/socket weld hubs or flanges. See model chart.
Enclosures: G painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum, neoprene.
Wetted Parts: C1 construction, carbon steel, 303SS, 304SS, 316SS, 430SS. (Optional 316SS with 430SS).
Weight: 251, 40 lb (18 kg); 253, 50 lb (22.7 kg); 254, 57 lb (25.8 kg).

Suggested Specifications

Liquid level control shall be 251 (253) (254) Series with combination 1″ NPT/socket weld hubs (flanged) process connections. Chamber shall be welded carbon steel (316SS) suitable for operation at 1250 psig (86 bar) at 100°F (38°C) to 650°F (345°C), 750 psig (52 bar) at 750°F (400°C) at a minimum specific gravity of 0.75. Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT) (DPDT). Enclosure shall be general purpose (weather proof) (explosion-proof) (explosion-proof - vapor proof). Switch mechanism shall be gravity return and shall be activated by a stainless steel float.

MODEL CHART – SERIES 251

EXAMPLE	251	WT	7810	GLD	10	GLD	HF	C1	75		251-WT-7810-C1-75. Liquid level control. Welded carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Operating pressure 1250 psig (86 bar) at 650°F (345°C), 750 psig (52 bar) at 750°F (400°C). Side/bottom process connections, combination 1″ NPT/socket weld hubs., minimum specific gravity 0.75.	
ENCLOSURE		G WT E EV									General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G. Explosion proof, vapor proof, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G.	UL UL UL UL
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX 10XX 10XX		XX XX XX XX						Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Single stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 251-C1-75 type rated at 650 psi (45 bar). Two stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 251-C1-75 type rated at 650 psi (45 bar).	
WELDED CHAMBER CONSTRUCTION COMBINATION 1″ NPT/SOCKET WELD HUBS	251							C1 C1	 75		Carbon steel body. Minimum specific gravity 0.75. Side/bottom process connections. Combination 1″ NPT/socket weld hub. Pressure rating 1250 psig (86 bar) at 100°F (38°C), to 650°F (345°C), 750 psig (52 bar) at 750°F (400°C), V.	UL UL
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	253 253 253 254 254 254							C1 C1 C1 C1 C1 C1	175 375 675 175 375 675		1″ 150# flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 100 psi (7 bar) at 750°F (400°C). Minimum specific gravity 0.75. 1″ 300# flanges side/bottom process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 425 psi (29 bar) at 750°F (400°C). Minimum specific gravity 0.75. 1″ 600# flanges side/bottom process connection. Pressure rating 1250 psi (86 bar) at 100°F (38°C), 750 psi (52 bar) at 750°F (400°C). Minimum specific gravity 0.75. 1″ 150# flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 100 psi (7 bar) at 750°F (400°C). Minimum specific gravity 0.75. 1″ 300# flanges side/side process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 425 psi (29 bar) at 750°F (400°C). Minimum specific gravity 0.75. 1″ 600# flanges side/side process connection. Pressure rating 1250 psi (86 bar) 100°F (38°C), 750 psi (52 bar) at 750°F (400°C). Minimum specific gravity 0.75.	UL UL UL UL UL UL
OPTIONS				GLD		GLD	HF	C216		12	Gold alloy contact for low current service rated at 1 amp resistive, 0.5 amp inductive 28 VDC. Circuit 7810 or 7806 only. High temperature fins should be considered if ambient temperature is extremely high or if process temperature exceeds 500°F (260°C) for extended periods. 316SS chamber and trim. 430SS armature. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE			
		AC			DC			SINGLE STAGE	TWO STAGE		
		120V	240V	440V	30V	125V	250V		LOWER	UPPER	
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821	-4821	-21	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4820	-4820	-20	UL
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813	-4813	-13	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814	-4814	-14	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06	
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10	
	DP-DT Two SP-DT switches	2	2			0.4**	0.25**	-1006	-1006	-06	
	SP-DT One switch	2	2			0.4**	0.25**	-1010	-1010	-10	

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series 1251

Welded Chamber

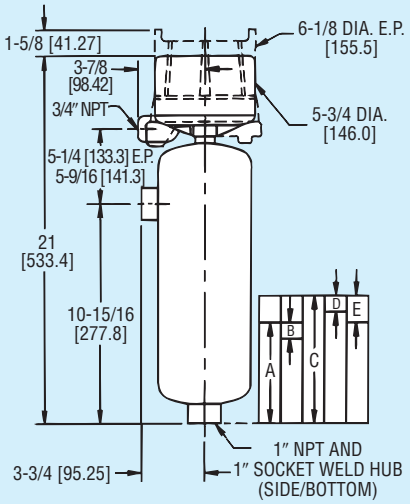
Min. Specific Gravity 0.40, Pressure to 1250 psig (86 bar), and Temperature to 500°F (260°C), Hermetically Sealed Switches

Series 1253 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14″ (356 mm). Other centerlines available.

Series 1251 is installed with one horizontal and one vertical 1″ socket weld or 1″ NPT combination hub.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 1254 has two vertical flanges (1″ RF forged steel – ANSI specifications). Flange centerline 14 5/8″ (371 mm). Other centerlines available.

Switch Level Change Single Stage Operation / **Switch Level Change Two Stage Operation**

	SP GR	A*	B	A*	B	C	D	E	ORDERING CODE
MIN SP GR 0.40 1250 psi (86 bar) @ 100°F (38°C)	1.0	5 3/8″ (137 mm)	1/2″ (13 mm)	5 3/8″ (137 mm)	1/2″ (13 mm)	6 3/8″ (162 mm)	1/2″ (13 mm)	1″ (25 mm)	C1-40
1250 psi (86 bar) @ 500°F (260°C)	0.4	6 5/16″ (160 mm)	5/8″ (16 mm)	6 5/16″ (160 mm)	5/8″ (16 mm)	7 7/16″ (189 mm)	5/8″ (16 mm)	1 1/8″ (29 mm)	

*"A" is not adjustable.

Leak proof all welded heavy duty carbon steel bodies coupled with snap action or mercury switches provide reliable, long term service for compatible liquids. The use of an external magnet reduces the possibility of magnetic particle build-up inside the armature tube and subsequent loss of operation as may occur with the internal magnet repulsion design. A variety of snap action or mercury switches in SPST, SPDT, DPDT or DPST configurations will satisfy most electrical requirements. These switch assemblies are contained in NEMA-1 general purpose, NEMA-4X weatherproof, NEMA-7- 9 groups B, C, D, E, F, G, explosion-proof or explosion-proof – vapor proof enclosures.

APPLICATIONS

Refineries, chemical plants, power generating stations, water treatment plants, mixing systems, scrubbers, accumulators, condensate recovery, industrial tanks and vessels.

SPECIFICATIONS

C1-40: Minimum specific gravity 0.40. Process pressure 1250 psi (86 bar) at 100°F (38°C) to 500°F (260°C).

Switch Type: Snap action or mercury. See charts A and B.

Electrical Rating: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connection: Combination 1″ NPT/socket weld hubs or flanges. See model chart.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.

Wetted Parts: C1 construction. Chamber, carbon steel. Trim, 303SS, 304SS, 316SS and 430SS.

Weight: 1251, 40 lb (18 kg); 1253, 50 lb (22.7 kg); 1254, 57 lb (25.8 kg).

Suggested Specifications

Liquid level control shall be 1251 (1253) (1254) Series with 1″ combination NPT/socket weld hub (flanged) process connections. Chamber shall be welded and suitable for operation at 1250 psig (86 bar) and 500°F (260°C) with a minimum specific gravity of 0.40. Circuit shall be hermetically sealed snap action (mercury) switch (SPST) (SPDT) (DPDT). Enclosure shall be general purpose, (explosion- proof) (explosion-proof – vapor proof). Switch mechanism shall be gravity return and shall be activated by a stainless steel float.

MODEL CHART – SERIES 1251

EXAMPLE	1251	WT	7810	10	C1	40		1251-WT-7810-C1-40. Liquid level control. Welded carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Operating pressure 1250 psig (86 bar) at 100°F (38°C), 1250 psig (86 bar) at 500°F (260°C). Side/bottom process connections, combination 1″ NPT/socket weld hubs. Minimum specific gravity 0.40.	
ENCLOSURE		G WT E EV						General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. Explosion proof, vapor proof. NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G.	UL UL UL UL
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX	 XX XX XX				Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.	
WELDED CHAMBER CONSTRUCTION COMBINATION 1″ NPT/SOCKET WELD HUBS	1251				C1 C1	 40		Carbon steel body. Minimum specific gravity 0.40. Side/bottom process connections. Combination 1″ NPT/socket weld hub. Pressure rating 1250 psig (86 bar) at 100°F (38°C) to 500°F (260°C).	UL UL
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	1253 1253 1253 1254 1254 1254				C1 C1 C1 C1 C1 C1	140 340 640 140 340 640		1″ 150# flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 300# flanges side/bottom process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 625 psi (43 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 600# flanges side/bottom process connection. Pressure rating 1250 psi (86 bar) at 100°F (38°C), 1250 psi (86 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 150# flanges side/side process connection. Pressure rating 275 PSI (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 300# flanges side/side process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 625 psi (43 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 600# flanges side/side process connection. Pressure rating 1250 psi (86 bar) at 100°F (38°C), 1250 psi (86 bar) at 500°F (260°C). Minimum specific gravity 0.40.	UL UL UL UL UL UL
OPTIONS					C216		12	316SS chamber and trim. 430SS armature. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	UL

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE			
		AC			DC			SINGLE STAGE	TWO STAGE		
		120V	240V	440V	30V	125V	250V		LOWER	UPPER	
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-20	UL
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06	
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10	

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 1261

Welded Chamber

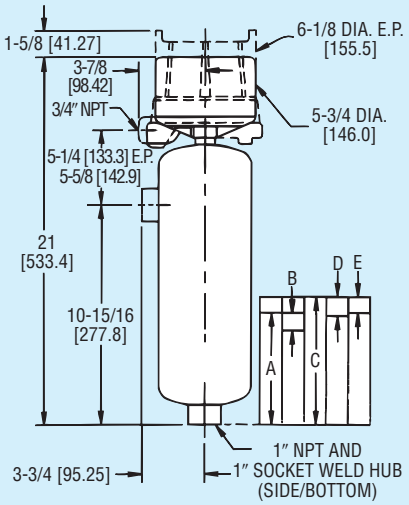
External Mount, Pressure to 1750 psig (121 bar), and Temperature to 500°F (260°C), Hermetically Sealed Switches

Series 1263 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14″ (356 mm). Other centerlines available.

Series 1261 is connected with one vertical and one horizontal 1″ NPT and 1″ socket weld combination connection.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to original position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 1264 has two vertical flanges (1″ RF forged steel – ANSI specifications). Flange centerline 14⅝″ (371 mm). Other centerlines available.

	Switch Level Change Single Stage Operation (Non-Adjustable)			Switch Level Change Two Stage Operation (Non-Adjustable)					
	SP GR	A	B	A	B	C	D	E	ORDERING CODE
MIN SP GR 0.6 1750 psi (121 bar) @ 100°F (38°C)	1.0	5 1/2″ (140 mm)	7/8″ (22 mm)	5 1/2″ (140 mm)	7/8″ (22 mm)	6 1/4″ (159 mm)	7/8″ (22 mm)	3/4″ (19 mm)	C1-60
1650 psi (114 bar) @ 500°F (260°C)	0.6	6″ (152.4 mm)	1 1/8″ (29 mm)	6″ (152.4 mm)	1 1/8″ (29 mm)	6 7/8″ (175 mm)	1 1/8″ (28.6 mm)	7/8″ (22 mm)	

High pressure capability in a heavy duty welded carbon steel chamber provides a rugged heavy duty control to operate up to 1750 psi (121 bar) at 100°F (38°C), and 1650 psi (114 bar) at 500°F (260°C) with a minimum specific gravity of 0.60. Electrical enclosures are suited for general purpose NEMA-1, weatherproof NEMA-4X, explosion-proof or explosion-proof – vapor proof NEMA-7, 9 groups B, C, D, E, F, G, Division I and II requirements. Electrical requirements are met by use of hermetically sealed snap action or mercury switches in a variety of actions including SPST, SPDT, DPDT and DPST arrangements. Optional circuits are available for low current, low DC voltage, high DC current, or high temperature applications. Check the circuit chart for the switch best suited for your application.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

C1-60: Minimum specific gravity 0.60. Process pressure 1750 psig (121 bar) at 100°F (38°C), 1650 psig (114 bar) at 500°F (260°C).

Switch Type: Snap switch or mercury. See charts A and B.

Electrical Rating: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connections: Combination 1″ NPT/socket weld hubs or flanges. See model chart.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum, neoprene.

Wetted Parts: C1 construction is carbon steel, 303SS, 304SS and 430SS.

Weight: 1261, 79 lb (36 kg); 1263, 89 lb (40 kg); 1264, 92 lb (42 kg).

Suggested Specifications

Liquid level control shall be 1261 (1263) (1264) Series with 1″ combination NPT/socket weld hub (flanged) process connections. Chamber shall be welded and suitable for operation at 1650 psi (114 bar) and 500°F (260°C) with a minimum specific gravity of 0.60. Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT) (DPDT). Enclosure shall be general purpose (weatherproof) (explosion-proof) (explosion-proof – vapor proof). Switch mechanism shall be gravity return and shall be activated by a stainless steel float.

MODEL CHART – SERIES 1261

EXAMPLE	1261	WT	7810	10	C1	60		1261-WT-7810-C1-60. Liquid level control. Welded carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Operating pressure 1750 psig (121 bar) at 100°F (38°C), 1650 psig (114 bar) at 500°F (260°C). Side/bottom process connections, combination 1″ NPT/socket weld hubs. Minimum specific gravity 0.60.	
ENCLOSURE		G WT E EV						General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G.	UL UL UL UL
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX	 XX XX XX				Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.	
WELDED CHAMBER CONSTRUCTION COMBINATION 1″ NPT/SOCKET WELD HUBS	1261				C1 C1	 60		Carbon steel body. Minimum specific gravity 0.60. Side/bottom process connections. Combination 1″ NPT/socket weld hub. Pressure rating 1750 psig (121 bar) at 100°F (38°C), 1650 psig (52 bar) at 500°F (260°C).	UL UL
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	1263 1264				C1 C1	660 660		1″ 600# flanges side/bottom process connection. Pressure rating 1450 psi (99 bar) at 100°F (38°C), 1232 psi (84 bar) at 500°F (260°C). Minimum specific gravity 0.60. 1″ 600# flanges side/side process connection. Pressure rating 1450 psi (99 bar) at 100°F (38°C), 1232 psi (84 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL UL
OPTIONS							12	Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE			
		AC			DC			SINGLE STAGE	TWO STAGE		
		120V	240V	440V	30V	125V	250V		LOWER	UPPER	
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-20	UL
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06	
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10	

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC

†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 291/1265

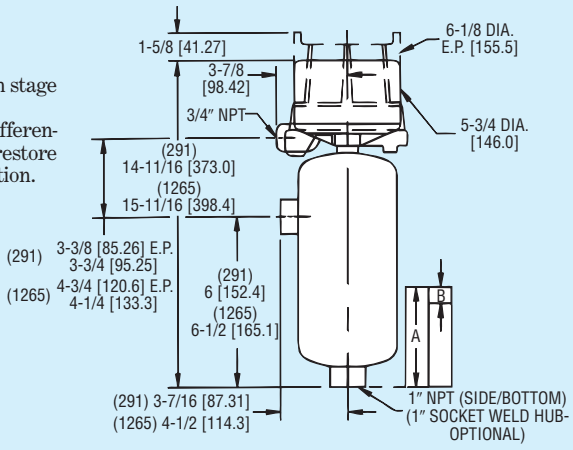
Welded Chamber

Single Stage, Low Cost, Hermetically Sealed Snap Switches, Series 291: Pressure 300 psig (24 bar) to 600°F (315°C), Series 1265: Pressure 1500 psig (103 bar) to 300°F (149°C)

Series 293 and 1267 have one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerlines: 293 - 9¼″ (235 mm); 1267 - 8⅞″ (225.4 mm). Other centerlines available.

Series 291 and 1265 have one vertical and one horizontal 1″ NPT pipe connection. 1″ socket weld optional.

"A" is the level at which stage operates on level rise.
"B" is the operating differential drop in level to restore switch to original position.



Series 294 and 1268 have two vertical flanged connections (1″ RF forged steel – ANSI specifications). Flange centerlines: 294 - 10″ (254 mm); 1268 - 9⅝″ (244.5 mm). Other centerlines available.

Series 291
Switch Level Change
Single Stage-Not Adjustable

CODE	SP GR	A	B
C1-60	1.0	3 1/4″ (82.55 mm)	7/8″ (22 mm)
	0.60	3 5/8″ (92 mm)	1 1/8″ (28.6 mm)

Series 1265
Switch Level Change
Single Stage-Not Adjustable

CODE	SP GR	A	B
C1-40	1.0	4″ (101.6 mm)	5/8″ (16 mm)
	0.40	3 5/16″ (135 mm)	1 3/8″ (35 mm)

Series 291: Inexpensive yet rugged construction in a welded chamber control. The 291 series is specifically designed for single stage operation where pressure does not exceed 350 psig (24 bar) at 100°F (38°C) or 300 psig (21 bar) at 600°F (315°C) available with a variety of hermetically sealed snap switch or mercury switch circuits protected by a general purpose, weatherproof or explosion-proof enclosure and will accommodate specific gravities down to 0.60.

SPECIFICATIONS

C1-60: Minimum specific gravity. Process pressure 350 psig (24 bar) at 100°F (38°C), 300 psig (21 bar) at 600°F (315°C).
Switch Type: Snap action or mercury. See charts A and B.
Electrical Rating: See chart.
Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure 18″ (460 mm) leads.
Process Connection: 1″ NPT (socket weld hubs or flanged optional).
Enclosures: G, painted steel and aluminum; WT, painted steel, aluminum and neoprene; E, aluminum; EV, aluminum and neoprene.
Wetted Parts: C1 construction, carbon steel, 303SS, 304SS, 430SS.
Weight: 291, 10 lb (4.5 kg); 293, 15 lb (6.8 kg); 294, 17 lb (7.7 kg).

Suggested Specifications

Liquid level control shall be 291 (293) (294) series with 1″ NPT (socket weld hubs) (flanged) process connections. Chamber shall be welded carbon steel (316SS) suitable for operation at 350 psig (24 bar) at 100°F (38°C) and 300 psig (21 bar) at 600°F (315°C) with a minimum specific gravity of 0.60. Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT) (DPDT). Switch mechanism shall be gravity return activated by a stainless steel float. Enclosure shall be general purpose, (weatherproof), (explosion-proof), (explosion-proof, vapor proof).

APPLICATIONS

Refineries, chemical plants, power generating stations, water treatment facilities.

Series 1265: High pressure is featured in the 1265 series, with a welded chamber and single stage operation. This control is rated at 1500 psig (103 bar) and 300°F (149°C) with a minimum specific gravity of 0.40. Choice of enclosures include general purpose, weatherproof or explosion-proof. Hermetically sealed snap action or mercury switches are available in a variety of circuits.

SPECIFICATIONS

C1-40: Minimum specific gravity. Process pressure 1500 psig (103 bar) at 300°F (149°C).
Switch Type: Snap action or mercury. See charts A and B.
Electrical Rating: See charts A and B.
Wiring Connections: G, W or E enclosure, terminal block. EV enclosure 18″ (460 mm) leads.
Process Connections: 1″ NPT (socket weld hubs or flanged optional).
Enclosures: G, painted steel and aluminum; WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.
Wetted Parts: C1 construction, carbon steel, 303SS, 304SS, 430SS graphite.
Weight: 1265, 15 lb (6.8 kg); 1267, 20 lb (9 kg); 1268, 22 lb (10 kg).

Suggested Specifications

Liquid level control shall be 1265 (1267) (1268) series with 1″ NPT (socket weld hubs) (flanged) process connections. Chamber shall be welded carbon steel (316SS) suitable for operation at 1500 psig (103 bar) at 300°F (149°C) with a minimum specific gravity of 0.40. Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT) (DPDT). Switch mechanism shall be gravity return activated by a graphite displacer. Enclosure shall be general purpose (weatherproof), (explosion-proof), (explosion-proof, vapor proof).

APPLICATIONS

Refineries, chemical plants, power generating stations, water treatment facilities.

MODEL CHART – SERIES 291

EXAMPLE	291	WT	7810BN	C1	60		291-WT-7810-C1-60. Liquid level control with welded carbon steel chamber. General purpose enclosure. Single pole double throw snap action switch rated at 12 amp 120 VAC; 5 amp 240 VAC. Fixed deadband and automatic reset. Operating pressure 350 psig (24 bar) at 100°F (38°C), 300 psig (21 bar) at 600°F (315°C). Side/bottom process connections 1″ NPT. Minimum specific gravity 0.60.	
ENCLOSURE		G WT E EV					General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G.	UL UL UL UL
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XXBN 78XXBN 98XXBN				Single stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.	
WELDED CHAMBER CONSTRUCTION 1″ NPT PROCESS CONNECTIONS	291			C1 C1	 60		Carbon steel body. Minimum specific gravity 0.60. Side/bottom process connections. 1″ NPT. Pressure rating 350 psig (24 bar) at 100°F (38°C), 300 psig (21 bar) at 600°F (315°C).	UL UL
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	293 293 294 294			C1 C1 C1 C1	160 360 160 360		1″ 150# RF flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). Minimum specific gravity 0.60. 1″ 300# RF flanges side/bottom process connection. Pressure rating 350 psi (24 bar) at 100°F (38°C), 300 psi (21 bar) at 600°F (315°C). Minmum specific gravity 0.60. 1″ 150# RF flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). Minimum specific gravity 0.60. 1″ 300# RF flanges side/side process connection. Pressure rating 350 psi (24 bar) at 100°F (38°C), 300 psi (21 bar) at 600°F (315°C). Minimum specific gravity 0.60.	UL UL UL UL
OPTIONS				C216		H2	316SS chamber and trim. 430SS armature. 1″ socket weld hubs in place of 1″ NPT process connections.	

MODEL CHART – SERIES 1265

EXAMPLE	1265	WT	7810	C1	40			1265-WT-7810-C1-40. Liquid level control with welded carbon steel chamber. Watertight - NEMA-4X. Enclosure. Single pole double throw snap action switch rated at 12 amp 120 VAC, 5 amp 240 VAC. Fixed deadband and automatic reset. Operating pressure 1500 psig (103 bar) at 300°F (149°C). Maximum side/bottom process connections 1″ NPT. Minimum specific gravity 0.40.	
ENCLOSURE		G WT E EV						General purpose, NEMA-1. Weatherproof, NEMA-3R, 4, 4X. Explosion-proof, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G. Explosion-proof, vapor proof, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G.	UL UL
CIRCUITS			48XX 78XX 78XXHM 98XX					Single stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High DC capacity snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.	
WELDED CHAMBER CONSTRUCTION 1″ NPT PROCESS CONNECTIONS	1265			C1 C1	 40			Carbon steel body. Minimum specific gravity 0.40. Side/bottom process connections. 1″ NPT. Pressure rating 1500 psig (103 bar) at 300°F (149°C).	UL UL
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	1267 1267 1267 1267 1268 1268 1268 1268			C1 C1 C1 C1 C1 C1 C1 C1	140 340 640 1540 140 340 640 1540			1″ 150# RF flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 210 psi (14 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 300# RF flanges side/bottom process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 680 psi (47 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 600# RF flanges side/bottom process connection. Pressure rating 1440 psi (99 bar) at 100°F (38°C), 1365 psi (94 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 1500# RF flanges side/bottom process connection. Pressure rating 1500 psi (103 bar) at 100°F (38°C), 1500 psi (103 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 150# RF flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 210 psi (14 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 300# RF flanges side/side process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 680 psi (47 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 600# RF flanges side/side process connection. Pressure rating 1440 psi (99 bar) at 100°F (38°C), 1365 psi (94 bar) at 300°F (149°C). Minimum specific gravity 0.40. 1″ 1500# RF flanges side/side process connection. Pressure rating 1500 psi (103 bar) at 100°F (38°C), 1500 psi (103 bar) at 300°F (149°C). Minimum specific gravity 0.40.	UL UL UL UL UL UL UL UL
OPTIONS						H2	12	1″ socket weld hubs in place of 1″ NPT process connections. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS AC 120V	AC 240V	AC 440V	DC 30V	DC 125V	DC 250V	291 SERIES ORDERING CODE	1265 SERIES ORDERING CODE	
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821 BN	-4821	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4820 BN	-4820	UL
	SP-DT One Switch	4	2	1†		4	2	-4810 BN	-4810	UL
	SP-ST Two switches E.I.*	10	5	3†		10	5	-4815 BN	-4815	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813 BN	-4813	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814 BN	-4814	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806 BN	-4806	UL
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810 BN	-7810	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806 BN	-7806	UL
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806 BN	-9806	
	SP-DT One switch	10	3			10‡	3‡	-9810 BN	-9810	

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 391

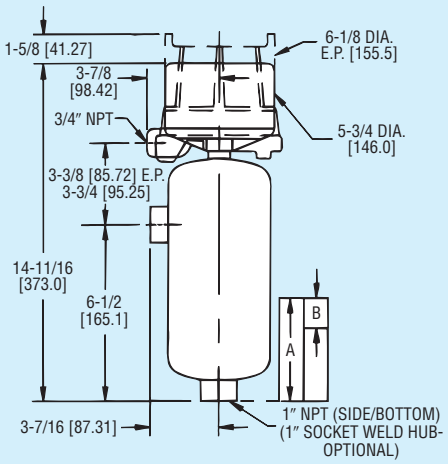
Welded Chamber

Single Stage, Low Cost, Pressure to 775 psi (53 bar), Hermetically Sealed Switches, Temperature to 600°F (315°C), Optional Explosion-Proof

Series 393 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 9-1/4″ (235 mm). Other centerlines available.

Series 391 has one vertical and one horizontal 1″ NPT pipe connection. 1″ socket weld optional.

"A" is the level at which stage operates on level rise.
"B" is the operating differential drop in level to restore switch to original position.



Series 394 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 10″ (254 mm). Other centerlines available.

Switch Level Change
Single Stage-Not Adjustable

CODE	SP GR	A	B
C1-70	1.0	4″ (101.6 mm)	1″ (25.4 mm)
	0.70	4 11/16″ (119 mm)	1 5/16″ (33.34 mm)

Switch Level Change
Single Stage-Not Adjustable

CODE	SP GR	A	B
C1-80	1.0	4 3/8″ (111 mm)	1″ (25.4 mm)
	0.80	4 11/16″ (119 mm)	1 3/16″ (112.3 mm)

Switch Level Change
Single Stage-Not Adjustable

CODE	SP GR	A	B
C1-95	1.0	4 3/4″ (120.7 mm)	7/8″ (22 mm)
	0.95	5″ (127 mm)	1″ (25.4 mm)

Heavy duty, low cost. The perfect description for the 391 control. This series features three individual controls in high quality welded steel chambers to handle a large variety of liquids.

C1-70 type for 0.70 minimum specific gravity liquids to 500 psig (34 bar).
C1-80 type for 0.80 minimum specific gravity liquids to 650 psig (45 bar).
C1-95 type for 0.95 minimum specific gravity liquids to 775 psig (53 bar).

All at a maximum temperature of 600°F (315°C) and SPST, SPDT or DPDT circuits are available in hermetically sealed snap action or mercury switches to handle most electrical applications. A full compliment of enclosures are available including general purpose, weatherproof, explosion-proof, or explosion-proof–vapor proof construction.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

C1-70: Minimum specific gravity 0.70. Process pressure 500 psig (34 bar) at 600°F (315°C).
C1-80: Minimum specific gravity 0.80. Process pressure 650 psig (45 bar) at 600°F (315°C).
C1-95: Minimum specific gravity 0.95. Process pressure 775 psig (53 bar) at 600°F (315°C).
Switch Type: Snap action or mercury. See charts A & B.
Electrical Rating: See charts A & B.
Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.
Process Connections: 1″ NPT (1″ socket weld hub or flanged optional). See Model Chart.
Enclosure: G, painted steel; WT, painted steel and neoprene; E, aluminum; EV, aluminum and neoprene.
Wetted Parts: C1 construction, carbon steel 303SS, 304SS, 316SS, and 430SS.
Weight: 391, 10 lb (4.5 kg); 393, 15 lb (6.8 kg); 394, 17 lb (7.7 kg).

Suggested Specifications:

Liquid level control shall be 391 (393)(394) Series with 1″ NPT (flanged) process connections. Chamber shall be welded carbon steel suitable for operation at 500 psig (34 bar) C1-70, 650 psig (45 bar) C1-80, 775 psig (53 bar) C1-95, at 600°F (315°C). Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST)(SPDT)(DPDT). Switch mechanism shall be gravity return activated by a stainless steel float. Enclosure shall be general purpose, (weatherproof)(explosion-proof)(explosion-proof–vapor proof).

MODEL CHART – SERIES 391

EXAMPLE	391	WT	7810	HF	C1	70			391-WT-7810-C1-70. Liquid level control with welded carbon steel chamber. Watertight - NEMA-4X. Enclosure, single pole double throw snap action switch rated 12 amp 120 VAC, 5 amp 240 VAC. Fixed deadband and automatic reset. Operating pressure 600 psig (41 bar) at 100°F (38°C), 500 psig (34 bar) at 600°F (315°C). Side/bottom process connections 1″ NPT. Minimum specific gravity 0.70.	
ENCLOSURE		G WT E EV							General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G. Explosion proof, vapor proof, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G.	UL UL UL UL
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 78XX 78XXHM 98XX 10XX						Single stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High DC capacity snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Single stage. High temp. snap switch. Continuous rating shall be 800°F (425°C)391-C1-70 type rated at 350 psig (25 bar); 391-C1-80 type rated at 450 psig (32 bar); 391-C1-95 type rated at 525 psig (37 bar).	
WELDED CHAMBER CONSTRUCTION 1″ NPT PROCESS CONNECTIONS	391 391 391				C1 C1 C1	70 80 95			Carbon steel chamber. Minimum specific gravity 0.70. 1″ NPT side/bottom process connections. Pressure rating 600 psig (41 bar) at 100°F (38°C), 500 psig (34 bar) at 600°F (315°C). Carbon steel chamber. Minimum specific gravity 0.80. 1″ NPT side/bottom process connections. Pressure rating 800 psig (55 bar) at 100°F (38°C), 650 psig (45 bar) at 600°F (315°C). Carbon steel chamber. Minimum specific gravity 0.95. 1″ NPT side/bottom process connections. Pressure rating 900 psig (62 bar) at 100°F (38°C), 775 psig (53 bar) at 600°F (315°C).	UL UL UL
WELDED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	393 393 393 393 393 393 393 393 394 394 394 394 394 394 394 394				C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	170 180 195 370 380 395 680 695 170 180 195 370 380 395 680 695			1″ 150# RF flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). Minimum specific gravity 0.70. 1″ 150# RF flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). Minimum specific gravity 0.80. 1″ 150# RF flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). Minimum specific gravity 0.95. 1″ 300# RF flanges side/bottom process connection. Pressure rating 600 psi (41 bar) at 100°F (38°C), 500 psi (34 bar) at 600°F (315°C). Minimum specific gravity 0.70. 1″ 300# RF flanges side/bottom process connection. Pressure rating 720 psi(50 bar) at 100°F (38°C), 555 psi (38 bar) at 600°F (315°C). Minimum specific gravity 0.80. 1″ 300# RF flanges side/bottom process connection. Pressure rating 720 PSI (50 bar) at 100°F (38°C), 555 psi (38 bar) at 600°F (315°C). Minimum specific gravity 0.95. 1″ 600# RF flanges side/bottom process connection. Pressure rating 800 psi (55 bar) at 100°F (38°C), 650 psi (45 bar) at 600°F (315°C). MInimum specific gravity 0.80. 1″ 600# RF flanges side/bottom process connection. Pressure rating 900 psi (62 bar) at 100°F (38°C), 775 psi (53 bar) at 600°F (315°C). MInimum specific gravity 0.95. 1″ 150# RF flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). MInimum specific gravity 0.70. 1″ 150# RF flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 PSI (10 bar) at 600°F (315°C). MInimum specific gravity 0.80. 1″ 150# RF flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 600°F (315°C). MInimum specific gravity 0.95. 1″ 300# RF flanges side/side process connection. Pressure rating 600 psi (41 bar) at 100°F (38°C), 500 psi (34 bar) at 600°F (315°C). Minimum specific gravity 0.70. 1″ 300# RF flanges side/side process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 555 psi (38 bar) at 600°F (315°C). Minimum specific gravity 0.80. 1″ 300# RF flanges side/side process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 555 psi (38 bar) at 600°F (315°C). Minimum specific gravity 0.95. 1″ 600# RF flanges side/side process connection. Pressure rating 800 psi (55 bar) at 100°F (38°C), 650 psi (45 bar) at 600°F (315°C). MInimum specific gravity 0.80. 1″ 600# RF flanges side/side process connection. Pressure rating 900 psi (62 bar) at 100°F (38°C), 775 psi (53 bar) at 600°F (315°C). MInimum specific gravity 0.95.	UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL
OPTIONS				HF			H2 	 12	High temperature fins should be considered if ambient temperature exceeds 500°F (260°C) for extended periods. 1″ socket weld hub instead of 1″ NPT. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS AC 120V	AC 240V	AC 440V	DC 30V	DC 125V	DC 250V	ORDERING CODE SINGLE STAGE	TWO STAGE LOWER	TWO STAGE UPPER	
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821	-4821	-21	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4820	-4820	-20	UL
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813	-4813	-13	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814	-4814	-14	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06	
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10	
	DP-DT Two SP-DT switches	2	2			0.4**	0.25**	-1006	-1006	-06	
	SP-DT One switch	2	2			0.4**	0.25**	-1010	-1010	-10	

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC

†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 211

Flanged Chamber

External Mount, Pressure to 450 psig (31 bar), Hermetically Sealed Switches and Temperature to 500°F (260°C)

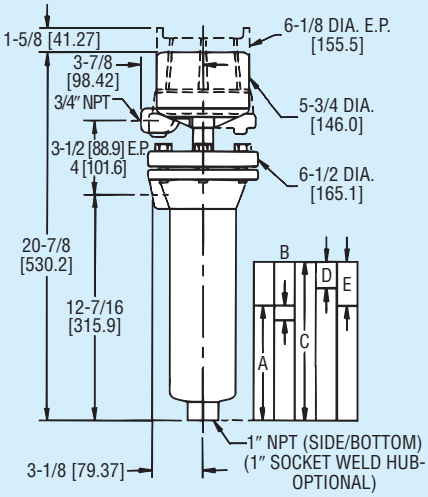
Series 213 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 15¼″ (387 mm). Other centerlines available.

Series 214 has two vertical flanges (1″ RF forged steel – ANSI specifications). Flange centerline 15⅞″ (403 mm). Other centerlines available.

Series 211 has one vertical and one horizontal 1″ NPT pipe connection. 1″ socket weld optional.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Switch Level Change Single Stage Operation | **Switch Level Change Two Stage Operation**

	SP GR	A*	B	A**	B	C	D	E	ORDERING CODE
MIN SP GR 0.6 450 psi (31 bar) @ 100°F (38°C) 300 psi (21 bar) @ 500°F (260°C)	1.0	6 3/4″ (171 mm)	3/4″ (19 mm)	5 3/4″ (146 mm)	3/4″ (19 mm)	8 1/4″ (210 mm)	1 1/4″ (32 mm)	2 1/2″ (64 mm)	C1-60
	0.6	8″ (203 mm)	1 1/4″ (32 mm)	7″ (178 mm)	1 1/4″ (32 mm)	9 3/4″ (248 mm)	2″ (51 mm)	2 3/4″ (70 mm)	

*"A" is adjustable ± 1″. **"A" is not adjustable.

A removable stainless steel float enclosed in a flanged carbon steel chamber is featured in the durable, field proven 211 Series. External side mount series includes 1″ NPT process connections as standard, or with socket weld hubs; or, 1″ flanges as options. Pressure and temperature limits are 450 psi (31 bar) at 100°F (38°C), and 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity for all models is 0.60. The models shown can be ordered with a variety of electrical arrangements including SPST, SPDT, or DPDT circuits in hermetically sealed snap action or mercury contacts. Switches can be ordered open on level rise or fall. Single pole double throw electrically independent circuits are available as well as low current or high DC current applications. A full range of enclosures are offered including general purpose NEMA-1; weatherproof NEMA-4X; (explosion-proof) and (explosion-proof – vapor proof) groups B, C, D, E, F, G, NEMA-7 - 9.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

Minimum Specific Gravity: 0.60

Switch Type: Snap or mercury switch. See charts A and B.

Electrical Rating: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connections: 1″ NPT standard (socket weld hubs or flanges optional). See model chart.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.

Wetted Parts: C1 construction. Chamber, carbon steel. Trim, 303SS, 304SS, and 430SS (316SS and 430SS optional).

Weight: 211, 34 lb (15 kg); 213, 44 lb (20 kg); 214, 51 lb (23 kg).

Suggested Specifications

Liquid level control shall be 211 (213) (214) Series with flanged carbon steel chamber. Process connections shall be 1″ NPT (socket weld hub) (flanged). Unit shall be suitable for operation at 450 psi (31 bar) and 100°F (38°C), 300 psi (21 bar) and 500°F (260°C) with a minimum specific gravity of 0.60. Switch mechanism shall be gravity return and shall be activated by a stainless steel float. Circuit shall be (hermetically sealed) snap action (mercury) switch, (SPST) (SPDT) (DPDT). Enclosure shall be general purpose (weatherproof) (explosion-proof) (explosion- proof – vapor proof).

MODEL CHART – SERIES 211

EXAMPLE	211	WT	7810	10	HF	C1	60			211-WT-7810-CI-60. Liquid level control. Flanged carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Operating pressure 450 psig (31 bar) at 100°F (38°C), 300 psig (21 bar) at 500°F (260°C). Side/bottom process connections, 1″ NPT. Minimum specific gravity 0.60.		
ENCLOSURE		G WT E EV								General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only). Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved groups C, D, E, F, G only).	UL UL UL UL	CSA CSA CSA
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX 10XX 10XX	 XX XX XX XX						Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). No not exceed 450°F (232°C). See Chart B. Single stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 211-C1-60 type rated at 175 psi (12 bar). Two stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 211-C1-60 type rated at 175 psi (12 bar).		
FLANGED CHAMBER CONSTRUCTION 1″ NPT HUBS	211					C1 C1	 60			Carbon steel body. Minimum specific gravity 0.60. Side/bottom process connections. 1″ NPT hubs. Pressure rating 450 psig (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C).	UL UL	CSA CSA
FLANGED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	213 213 213 214 214 214					C1 C1 C1 C1 C1 C1	160 360 660 160 360 660			1″ 150# flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.60. 1″ 300# flanges side/bottom process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60. 1″ 600# flanges side/bottom process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60. 1″ 150# flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.60. 1″ 300# flanges side/side process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60. 1″ 600# flanges side/side process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL UL UL UL UL UL	CSA CSA CSA CSA CSA CSA
OPTIONS					HF	C216		H2	12	High temperature fins should be considered if ambient temperature is extremely high or if process temperature exceeds 500°F (260°C) for extended periods. 316SS chamber and trim. 430SS armature. 1″ socket weld hub instead of 1″ NPT. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	UL	CSA

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE				
		AC			DC			SINGLE STAGE	TWO STAGE			
		120V	240V	440V	30VDC	125V	250V		LOWER	UPPER		
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821	-4821	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†		10	5	-4820	-4820	-20	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813	-4813	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814	-4814	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL	CSA
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10		
	DP-DT Two SP-DT switches	2	2			0.4**	0.25**	-1006	1006	-06		
	SP-DT One switch	2	2			0.4**	0.25**	-1010	-1010	-10		

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC

†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series 221

Flanged Chamber

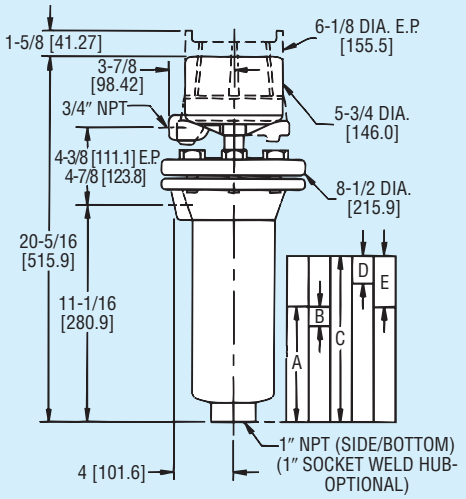
External Mount, Pressure to 1000 psig (69 bar) and Temperature to 475°F (246°C), Hermetically Sealed Switches

Series 223 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14″ (356 mm). Other centerlines available.

Series 221 features one vertical and one horizontal 1″ NPT pipe connection. Optional, 1″ socket weld.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 224 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14⅝″ (371 mm). Other centerlines available.

Switch Level Change Single Stage Operation | **Switch Level Change Two Stage Operation**

	SP GR	A*	B	A**	B	C	D	E	ORDERING CODE
MIN SP GR 0.6 600 PSI (41 BAR) @ 100°F (38°C) 550 PSI (38 BAR) @ 475°F (246°C)	1.0	6 3/4″ (171 mm)	3/4″ (19 mm)	5 3/4″ (146 mm)	3/4″ (19 mm)	7 3/4″ (197 mm)	1″ (25.4 mm)	2″ (51 mm)	C1-60
	0.6	7 1/2″ (191 mm)	1″ (25.4 mm)	6 1/2″ (165 mm)	1″ (25.4 mm)	9″ (229 mm)	1 3/4″ (44 mm)	2 1/2″ (64 mm)	
MIN SP GR 0.75 1000 PSI (69 BAR) @ 100°F (38°C) 850 PSI (59 BAR) @ 475°F (246°C)	1.0	7 1/4″ (184 mm)	3/4″ (19 mm)	6 1/4″ (159 mm)	3/4″ (19 mm)	8 1/2″ (216 mm)	1 1/4″ (32 mm)	2 1/4″ (57 mm)	C1-75
	0.75	8″ (203 mm)	1″ (25.4 mm)	7″ (178 mm)	1″ (25.4 mm)	9 1/2″ (241 mm)	1 3/4″ (44 mm)	2 1/2″ (64 mm)	

*"A" is adjustable ± 1″.

**"A" is not adjustable.

Heavy duty flanged chamber features removable float for ease of inspection and maintenance. The 221 Series also provides 1″ NPT for standard external mounting. Socket weld hubs or flanges are optional. Rugged C1-75 construction is suitable for operation at 1000 psi (69 bar) at 100°F (38°C), and 850 psig (59 bar) at 475°F (246°C) with a minimum specific gravity of 0.75. C1-60 construction is suitable for operation at 600 psig (41 bar) at 100°F (38°C), and 550 psig (38 bar) at 475°F (246°C) with a minimum specific gravity of 0.60. Models featured can be ordered with various circuits including SPST, SPDT, or DPDT with hermetically sealed snap action or mercury contacts. A full range of enclosures are available including general purpose, (weatherproof) (explosion-proof) (explosion-proof - vapor proof).

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

C1-60: Minimum specific gravity 0.60. Process pressure 600 psig (41 bar) at 100°F (38°C), 550 psig (38 bar) at 475°F (246°C).
C1-75: Minimum specific gravity 0.75. Process pressure 1000 psig (69 bar) at 100°F (38°C), 850 psig (59 bar) at 475°F (246°C).
Switch Type: Snap action or mercury switch.
Electrical Rating: See charts A and B.
Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.
Process Connections: 1″ NPT standard (socket weld hubs or flanges optional). See chart C.
Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.
Wetted Parts: Chamber, carbon steel. Trim 316SS, 303SS, 304SS and 430SS.
Weight: 221, 60 lb (27 kg); 223, 70 lb (32 kg); 224, 77 lb (35 kg).

Suggested Specifications:

Liquid level control shall be 221 (223) (224) Series with flanged carbon steel chamber, and removable float. Process connections shall be 1″ NPT (socket weld hubs) (flanged). Control shall be suitable for operation at 600 psig (41 bar) at 100°F (38°C), and 550 psig (38 bar) at 475°F (246°C) with a minimum specific gravity of 0.60 (C1-60); or 1000 psig (69 bar) at 100°F (38°C), and 850 psig (59 bar) at 475°F (246°C) with a minimum specific gravity of 0.75 (C1-75). Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT) (DPDT) with fixed deadband. Switch mechanism shall be gravity return and shall be activated by a stainless steel float. Enclosure shall be general purpose, (weatherproof) (explosion-proof) (explosion-proof - vapor proof).

MODEL CHART – SERIES 221

EXAMPLE	221	WT	7810	10	HF	C1	60			221-WT-7810-C1-60. Liquid level control. Flanged carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Operating pressure 600 psig (41 bar at 100°F (38°C), 550 psig (38 bar) at 475°F (246°C). Side/bottom process connections. 1″ NPT hubs. Minimum specific gravity 0.60.		
ENCLOSURE		G WT E EV								General purpose, NEMA-1. Weatherproof, NEMA-3R, 4, 4X. Explosion-proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only). Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G (CSA approved groups C, D, E, F, G only).	UL UL UL UL	CSA CSA CSA
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX 10XX 10XX	 XX XX XX XX						Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Single stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 221-C1-60 type rated at 350 psig (25 bar); 221-C1-75 type rated at 550 psig (38 bar). Two stage. High temperature snap switch. Continuous rating 800°F (425°C). See Chart B. 221-C1-60 type rated at 350 psig (25 bar); 221-C1-75 type rated at 550 psig (38 bar).		
FLANGED CHAMBER CONSTRUCTION 1″ NPT HUBS	 221 221					C1 C1 C1	 60 75			Refer to Chart C for pressure/temperature ratings. Carbon steel chamber. Minimum specific gravity 0.60. Side/bottom process connections. 1″ NPT hub. Minimum specific gravity 0.75. Side/bottom process connections. 1″ NPT hub.	 UL UL UL	 CSA CSA CSA
FLANGED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	223 223 223 223 223 223 224 224 224 224 224 224					C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	160 360 660 175 375 675 160 360 660 175 375 675			Refer to Chart C for pressure/temperature ratings. 1″ 150# flanges side/bottom process connection. 1″ 300# flanges side/bottom process connection. 1″ 600# flanges side/bottom process connection. 1″ 150# flanges side/bottom process connection. 1″ 300# flanges side/bottom process connection. 1″ 600# flanges side/bottom process connection. 1″ 150# flanges side/side process connection. 1″ 300# flanges side/side process connection. 1″ 600# flanges side/side process connection. 1″ 150# flanges side/side process connection. 1″ 300# flanges side/side process connection. 1″ 600# flanges side/side process connection.	UL UL UL UL UL UL UL UL UL UL UL UL UL	CSA CSA CSA CSA CSA CSA CSA CSA CSA CSA CSA CSA CSA
OPTIONS					HF			H2	12	High temperature fins should be considered if ambient temperature is extremely high or if process temperature exceeds 500°F (260°C) for extended periods. 1″ socket weld hub instead of 1″ NPT. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.		

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS					ORDERING CODE				
		AC			DC		SINGLE STAGE	TWO STAGE			
		120V	240V	440V	125V	250V		LOWER	UPPER		
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†	10	5	-4821	-4821	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†	10	5	-4820	-4820	-20	UL	CSA
	SP-DT One switch	4	2	1†	4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†	10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†	10	5	-4813	-4813	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†	10	5	-4814	-4814	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†	4	2	-4806	-4806	-06	UL	CSA
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†	0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†	0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch⁂	5	5				-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches⁂	5	5				-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3		10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3		10‡	3‡	-9810	-9810	-10		
	DP-DT Two SP-DT switches	2	2		0.4**	0.25**	-1006	-1006	-06		
	SP-DT One switch	2	2		0.4**	0.25**	-1010	-1010	-10		

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
**Resistive ⁂ 30VDC = 5 Resistive
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.

CHART C

SERIES	MOUNTING STYLE	MINIMUM SPECIFIC GRAVITY	PRESSURE RATING AT 38°C 100°F	PRESSURE RATING AT 246°C 475°F	FLANGE CLASS (psi)	ORDER CODE
221	1″ NPT	0.6	600 psi 41 bar	550 psi 38 bar	–	C1-60
221	1″ NPT	0.75	1000 psi 69 bar	850 psi 59 bar	–	C1-75
223 224	Flanged	0.6	275 psi 19 bar	150 psi 10 bar	150	C1-160
223 224	Flanged	0.6	600 psi 41 bar	550 psi 38 bar	300	C1-360
223 224	Flanged	0.6	600 psi 41 bar	550 psi 38 bar	600	C1-660
223 224	Flanged	0.75	275 psi 19 bar	150 psi 10 bar	150	C1-175
223 224	Flanged	0.75	720 psi 50 bar	625 psi 43 bar	300	C1-375
223 224	Flanged	0.75	1000 psi 69 bar	850 psi 59 bar	600	C1-675

Mercoid®

Series 1211

Flanged Chamber

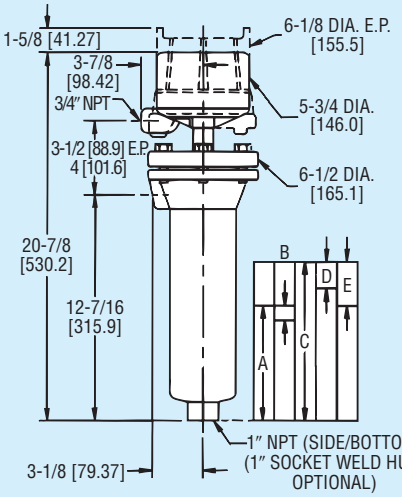
External Mount, Pressure to 450 psig (31 bar) and Temperature to 500°F (260°C), Minimum Specific Gravity 0.40, Hermetically Sealed Switches

Series 1213 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14¼″ (362 mm). Other centerlines available.

Series 1211 is installed with one horizontal and one vertical 1″ NPT combination hub. 1″ socket weld optional.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) – drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage – drop in level to restore switch to position.
"E" – the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 1214 provides two vertical flanged connections (1″ RF forged steel – ANSI specifications). Flange centerline 15⅞″ (403 mm). Other centerlines available.

	Switch Level Change Single Stage Operation			Switch Level Change Two Stage Operation					
	SP GR	A*	B	A*	B	C	D	E	ORDERING CODE
MIN SP GR 0.40 450 psi (31 bar) @ 100°F (38°C) 300 psi (21 bar) @ 500°F (260°C)	0.40	6 1/2″ (165 mm)	5/8″ (16 mm)	6 1/2″ (165 mm)	5/8″ (16 mm)	7 3/4″ (197 mm)	1 1/2″ (38 mm)	1 1/4″ (32 mm)	C1-40

*"A" is not adjustable.

Low minimum specific gravity of 0.40 and rugged flanged chamber for inspection purposes helps insure superior long term performance. Control can be used at maximum process pressure of 450 psig (31 bar) at 100°F (38°C), and 300 psig (21 bar) at 500°F (260°C). Standard 1″ NPT connections are provided for mounting. 1″ socket weld hubs or 1″ flanges are available as options. Hermetically sealed snap switch or mercury switches are provided in a variety of circuit configurations such as (SPST) (SPDT) or (DPDT). High or low DC applications can also be accommodated. General purpose, (weatherproof) (explosion-proof) (explosion-proof – vapor proof) enclosures are provided.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

C1-40: Minimum specific gravity 0.40. Process pressure 450 psig (31 bar) at 100°F (38°C), 300 psig (21 bar) at 500°F (260°C).

Switch Type: Snap action or mercury: See charts A and B.

Electrical Rating: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connections: 1″ NPT or flanges. See model chart. (1″ socket weld-hubs optional).

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum, neoprene.

Wetted Parts: C1 construction. Chamber, carbon steel. Trim 303SS, 304SS, and 430SS (316SS and 430SS optional).

Weight: 1211, 34 lb (15.5 kg); 1213, 44 lb (20 kg); 1214, 47 lb (21.4 kg).

Suggested Specifications

Liquid level control shall be 1211 (1213) (1214) Series with flanged carbon steel chamber. Process connections shall be 1″ NPT (socket weld hub) (flanged). Unit shall be suitable for operation at 450 psi (31 bar) and 100°F (38°C), 300 psi (21 bar) and 500°F (260°C) with a minimum specific gravity of 0.40. Switch mechanism shall be gravity return and shall be activated by a stainless steel float. Circuit shall be (hermetically sealed) snap action (mercury) switch, (SPST) (SPDT) (DPDT). Enclosure shall be general purpose (weatherproof) (explosion-proof) (explosion-proof – vapor proof).

MODEL CHART – SERIES 1211

EXAMPLE	1211	WT	7810	GLD	10	GLD	HF	C1	40			1211-WT-7810-C1-40. Liquid level control. Flanged carbon steel chamber. Weather proof enclosure. SPDT snap action switch, fixed deadband, automatic reset. Operating pressure 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Side/bottom process connections, 1″ NPT, minimum specific gravity 0.40.		
ENCLOSURE		G WT E EV										General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only). Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved groups C, D, E, F, G only).	UL UL UL UL	CSA CSA CSA
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX		XX XX XX							Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.		
FLANGED CHAMBER CONSTRUCTION 1″ NPT/HUBS	1211							C1 C1	 40			Carbon steel body. Minimum specific gravity 0.40. Side/bottom process connections. 1″ NPT hub. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C).	UL UL	CSA CSA
FLANGED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	1213 1213 1213 1214 1214 1214							C1 C1 C1 C1 C1 C1	140 340 640 140 340 640			1″ 150# flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 300# flanges side/bottom process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 600# flanges side/bottom process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 150*# flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 300# flanges side/side process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.40. 1″ 600# flanges side/side process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.40.	UL UL UL UL UL UL	CSA CSA CSA CSA CSA CSA
OPTIONS				GLD		GLD	HF	 C216		H2	12	Gold alloy contact for low current service rated at 1 amp resistive, 0.5 amp inductive 28 VDC. Circuit 7810 or 7806 only. High temperature fins should be considered if temperature exceeds 350°F (177°C) for 98XX circuits. 316SS chamber and trim. 430SS armature. 1″ socket weld hub instead of 1″ NPT. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	UL	CSA

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE				
		AC			DC			SINGLE STAGE	TWO STAGE			
		120V	240V	440V	30V	125V	250V		LOWER	UPPER		
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-20	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL	CSA
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10		

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series 1221

Flanged Chamber

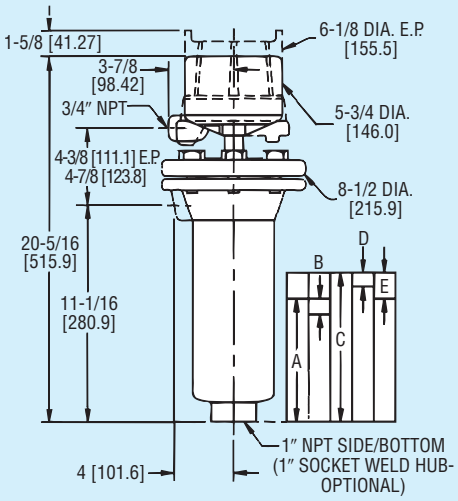
External Mount, Pressure to 1000 psig (69 bar), Hermetically Sealed Switches, Temperature to 475°F (246°C), Minimum Specific Gravity 0.40

Series 1223 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 14″ (356 mm). Other centerlines available.

Series 1221 is installed with one horizontal and one vertical 1″ NPT combination hub. 1″ socket weld optional.

"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) — drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage — drop in level to restore switch to position.
"E" — the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)



Series 1224 has two vertical flanges (1″ RF forged steel – ANSI specifications). Flange centerline 14⅝″ (371 mm) Other centerlines available.

Switch Level Change Single Stage Operation / **Switch Level Change Two Stage Operation**

	SP GR	A*	B	A*	B	C	D	E	ORDERING CODE
MIN SP GR 0.40 1000 psi (69 bar) @ 100°F (38°C) 850 psi (59 bar) @ 475°F (246°C)	0.40	6 7/16″ (164 mm)	5/8″ (16 mm)	6 7/16″ (164 mm)	5/8″ (16 mm)	7 9/16″ (192 mm)	5/8″ (16 mm)	1 1/8″ (29 mm)	C1-40

*"A" is not adjustable.

Low specific gravity and superior long term performance make this Series ideal for applications which require operation at specific gravities as low as 0.40. This Series also provides a heavy duty flanged chamber with removable stainless steel float for easy inspection and maintenance. Chamber is rated for operation of 1000 psig (69 bar) at 100°F (38°C), and 850 psig (59 bar) at 475°F (246°C). 1″ NPT process connections are standard. Socket weld hubs or flanged connections are optional. Various circuits are available in SPST, SPDT or DPDT configurations with hermetically sealed snap action or mercury contacts. Enclosures are general purpose, (weatherproof) (explosion-proof) or (explosion-proof – vapor proof).

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

Minimum Specific Gravity: 0.40. Process pressure 1000 psig (69 bar) at 100°F (38°C); 850 psig (59 bar) at 475°F (246°C).

Switch Type: Snap action or mercury. See charts A and B.

Electrical Rating: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connections: 1″ NPT or flanges. See model chart. (19 socket weld hubs optional).

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum, neoprene. E, aluminum. EV, aluminum, neoprene.

Wetted Parts: C1 construction. Chamber, carbon steel. Trim 303SS, 304SS, 316SS and 430SS.

Weight: 1221, 64 lb (29 kg); 1223, 74 lb (33.6 kg); 1224, 81 lb (36.7 kg).

Suggested Specifications:

Liquid level control shall be 1221 (1223) (1224) Series with flanged carbon steel chamber and removable float. Process connections shall be 1″ NPT (socket weld hubs) (flanged). Control shall be suitable for operation at 1000 psi (69 bar) at 100°F (38°C), and 850 psig (59 bar) at 475°F (246°C) with a minimum specific gravity of 0.40 (C1-40). Circuit shall be (hermetically sealed) snap action (mercury) switch (SPST) (SPDT) (DPDT) with fixed deadband. Switch mechanism shall be gravity return and shall be activated by a stainless steel float. Enclosure shall be general purpose, (weatherproof) (explosion-proof) (explosion-proof – vapor proof).

MODEL CHART – SERIES 1221

EXAMPLE	1221	WT	7810	10	HF	C1	40			1221-WT-7810-C1-40. Liquid level control. Flanged carbon steel chamber. Weather proof enclosure. SPDT snap switch, fixed deadband, automatic reset. Operating pressure 1000 psig (69 bar) at 100°F (38°C), 850 psig (59 bar) at 475°F (246°C). Side/bottom process connections, 1″ NPT hubs. Minimum specific gravity 0.40.		
ENCLOSURE		G WT E EV								General purpose, NEMA-1. Weather proof, NEMA-3R, 4, 4X. Explosion proof, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only). Explosion proof, vapor proof, NEMA-7, 9. Class I Groups B, C, D. Class I Groups E, F, G (CSA approved groups C, D, E, F, G only).	UL UL UL UL	CSA CSA CSA
CIRCUITS **(For Electrical Circuits see charts A & B below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX	 XX XX XX						Single stage. Mercury switch. See Chart A. Two stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart B. Two stage. Snap switch. See Chart B. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.		
FLANGED CHAMBER CONSTRUCTION 1″ NPT HUBS	1221					C1 C1	 40			Carbon steel body. Minimum specific gravity 0.40. Side/bottom process connections. 1″ NPT hub. Pressure rating 1000 psig (69 bar) at 100°F (38°C), 850 psig (59 bar) at 475°F (246°C).	UL UL	CSA CSA
FLANGED CHAMBER CONSTRUCTION WITH FLANGED PROCESS CONNECTIONS	1223 1223 1223 1224 1224 1224					C1 C1 C1 C1 C1 C1	140 340 640 140 340 640			1″ 150# flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 475°F (246°C). Minimum specific gravity 0.40. 1″ 300# flanges side/bottom process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 625 psi (43 bar) at 475°F (246°C). Minimum specific gravity 0.40. 1″ 600# flanges side/bottom process connection. Pressure rating 1000 psi (69 bar) at 100°F (38°C), 850 psi (59 bar) at 475°F (246°C). Minimum specific gravity 0.40. 1″ 150# flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 475°F (246°C). Minimum specific gravity 0.40. 1″ 300# flanges side/side process connection. Pressure rating 720 psi (50 bar) at 100°F (38°C), 625 psi (43 bar) at 475°F (246°C). Minimum specific gravity 0.40. 1″ 600# flanges side/side process connection. Pressure rating 1000 psi (69 bar) at 100°F (38°C), 850 psi (59 bar) at 475°F (246°C). Minimum specific gravity 0.40.	UL UL UL UL UL UL	CSA CSA CSA CSA CSA CSA
OPTIONS					HF			H2	12	High temperature fins should be considered if process temperature exceeds 350°F (177°C) for 98XX circuits. 1″ socket weld hub instead of 1″ NPT. Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.		

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE				
		AC			DC			SINGLE STAGE	TWO STAGE			
		120V	240V	440V	30V	125V	250V		LOWER	UPPER		
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-20	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL	CSA
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10		

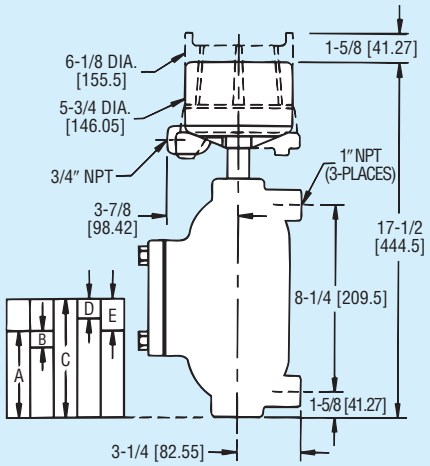
*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 102/1102

Flanged Chamber

Pressure to 400 psig (28 bar), Temperature to 425°F (218°C), Hermetically Sealed Switches, Series 102: Minimum Specific Gravity: 0.60. Series 1102: Minimum Specific Gravity: 0.40

Series 102 is side mounted with two horizontal and one vertical 1″ NPT pipe thread connection.



"A" is the level at which single (or lower stage) operates on level rise.
"B" is the operating differential single (or lower stage) — drop in level to restore switch to original position.
"C" is the level at which the upper stage operates on level rise.
"D" is the operating differential of upper stage — drop in level to restore switch to position.
"E" — the increase in level above "A" to operate upper stage.

Repeatability ± 1/4″ (6.4 mm)

Single Stage

	SP GR	A	B
102 SERIES	1.0	5 1/16″ (129 mm)	3/4″ (19 mm)
	0.6	5 13/16″ (148 mm)	1″ (25.4 mm)
1102 SERIES	0.4	5 1/4″ (133 mm)	1 3/4″ (44 mm)

SERIES 102: "A" is adjustable ± 1″.
SERIES 1102: "A" is not adjustable.

Two-Stage

	SP GR	A	B	C	D	E
SERIES 102	1.0	4 1/8″ (105 mm)	3/4″ (19 mm)	5 5/8″ (143 mm)	1″ (25.4 mm)	1 1/2″ (38 mm)
	0.6	4 7/8″ (124 mm)	1″ (25.4 mm)	6 7/8″ (175 mm)	1 3/4″ (44 mm)	2″ (51 mm)
SERIES 1102	0.4	4 7/8″ (124 mm)	1″ (25.4 mm)	6 1/4″ (159 mm)	7/8″ (22 mm)	1 3/8″ (35 mm)

"A" is not adjustable.

By unique design, you can remove just four bolts from the inspection plate to examine the float and chamber for cleaning or wear without disconnecting the piping or electrical circuitry. The sturdy 102 Series operates at pressures to 400 psi (28 bar) and temperatures to 425°F (218°C). The 102 Series will operate to a minimum specific gravity of 0.60. The 1102 Series will operate to a specific gravity of 0.40 under the same operating pressure and temperature. The 102 and 1102 Series contain a stainless steel float and offer a choice of cast iron, cast steel, or inexpensive cast 316SS float chamber. These series are well suited for applications where ease of accessibility is desired for pressure or vacuum vessels. Electrical circuits using hermetically sealed snap action or mercury contacts are available in a variety of actions including SPST, SPDT, DPDT and DPST combinations. Optional circuits are available for low current, low voltage direct circuits; high direct current or high temperature applications. Electrical enclosures provide general purpose; weather proof, explosion proof or explosion proof - vapor proof capability. The 102 design also features three 1″ NPT process connections for side/side or side/bottom piping. When using the side/side process connection, the bottom 1″ NPT connection can be used as a drain

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

Minimum Specific Gravity: 102 Series S.G. 0.60
1102 Series S.G. 0.40

Switch Type: Snap switch or mercury. See charts A and B (102 Series). See charts C and D (1102 Series).

Electrical Rating: See charts A and B, C and D.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connections: 1″ NPT.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.

Wetted Parts: C construction: cast iron 303SS, 304SS, 316SS, 430SS. C1 construction: cast steel 303SS, 304SS, 316SS, 430SS. C216 construction: cast 316SS, 316SS, 430SS.

Weight: 35 lb (16 kg).

Suggested Specifications

Liquid level control shall be 102 (1102) Series with side, side/bottom 1″ NPT process connections. Chamber shall have inspection plate removable without disconnecting electrical wiring or piping. Control shall be suitable for operation at 400 psi (28 bar) and 425°F (218°C) with a minimum specific gravity of 0.60 (0.40). Electrical switch mechanism shall be gravity return and shall be activated by a stainless steel float.

MODEL CHART – SERIES 102/1102

EXAMPLE	102 1102	WT WT	7810 7810	10 10	C1 C1	60 40	12	102-WT-7810-C1-60. Liquid level control with flanged chamber enclosure. SPDT snap action switch, fixed deadband, automatic reset. Operating pressure 400 psig (28 bar) at 425°F (218°C). Side/bottom, side/side mounting standard with 1″ NPT connections. Minimum specific gravity 0.60. Same as 102 series, except minimum specific gravity is 0.40.	
ENCLOSURES		G WT E EV						General purpose, NEMA-1. Water tight, NEMA-4, 4X. Explosion proof. Class I Groups B, C, D. Class II Groups E, F, G. NEMA-7, 9. Explosion proof, vapor proof. Class I Groups B, C, D. Class II Groups E, F, G. NEMA-7, 9.	UL UL UL UL
CIRCUITS **(For Electrical Circuits see charts below.)**			48XX 48XX 78XX 78XX 78XXHM 98XX 98XX	 XX XX XX				Single stage. Mercury switch. See Chart A or C. Two stage. Mercury switch. See Chart A or C. Single stage. Snap switch. See Chart B or D. Two stage. Snap switch. See Chart B or D. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B or D. Two stage. High capacity DC snap switch. Use heat fins (HF) is process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B or D.	
CHAMBER CONSTRUCTION					C C1 C216	 60 40		Cast iron chamber. Pressure rating 300 psig (22 bar) at 425°F (218°C). Cast steel chamber. Pressure rating 400 psig (28 bar) at 425°F (218°C). Cast 316SS chamber. Float and rod, armature 430SS. Pressure rating 400 psig (28 bar) at 425°F (218°C). Minimum specific gravity 0.60. Minimum specific gravity 0.40	UL UL UL UL
OPTIONS							12	Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS – SERIES 102

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE			
		AC			DC			SINGLE STAGE	TWO STAGE		
		120V	240V	440V	30V	125V	250V		LOWER	UPPER	
CHART A	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821	-4821	-21	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4820	-4820	-20	UL
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL
Mercury Contacts	**SP-DT** Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813	-4813	-13	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814	-4814	-14	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL
CHART B	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL
Snap Action Contacts	**SP-DT** One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06	
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10	

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

CHARTS C & D - ELECTRICAL CIRCUITS AND RATINGS – SERIES 1102

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE		
		AC			DC			SINGLE STAGE	TWO STAGE	
		120V	240V	440V	30V	125V	250V		LOWER	UPPER
CHART C	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-20
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10
Mercury Contacts	**SP-DT** Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06
CHART D	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06
Snap Action Contacts	**SP-DT** One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10

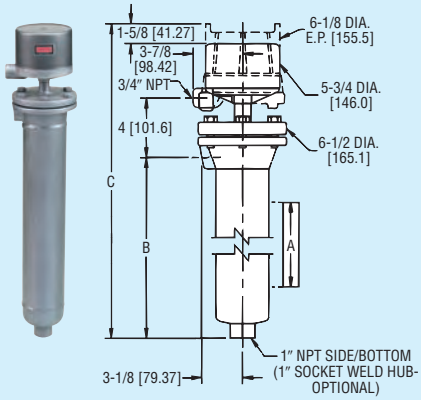
*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 215

Flanged Chamber

Adjustable Deadband 12″ to 24″, Pressure to 450 psig (31 bar), Temperature to 500°F (260°C), Hermetically Sealed Switches

Series 217 has one vertical and one horizontal flanged connection (1″ RF forged steel – ANSI specifications). Flange centerline 27-1/4″ (L12) - 692 mm). Other centerlines available.



Series 215 is connected with one vertical and one horizontal 1″ NPT connection. 1″ socket weld optional.

Operation Section

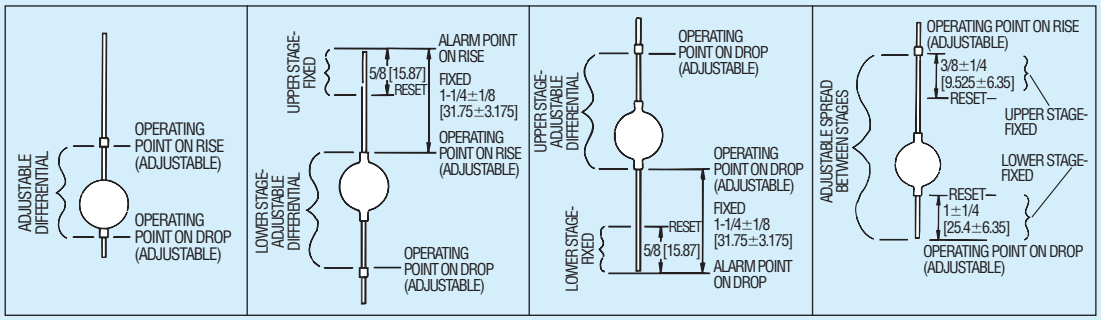
TYPE NO.	*SUFFIX NUMBER	ADJUSTABLE LEVEL CHANGE DIMENSION "A"		CHAMBER DIMENSION "B"	OVERALL CONTROL DIMENSION "C"
215----- G, WT	L12	12″ max (305 mm)	1 1/2″ min. (38 mm)	24 7/16″ (621 mm)	32 7/8″ (835 mm)
	L24	24″ max (610 mm)	1 1/2″ min. (38 mm)	36 7/16″ (926 mm)	44 7/8″ (1140 mm)
215----- E, EV	L12	12″ max (305 mm)	1 1/2″ min. (38 mm)	24 7/16″ (621 mm)	34 9/16″ (878 mm)
	L24	24″ max (610 mm)	1 1/2″ min. (38 mm)	36 7/16″ (926 mm)	46 9/16″ (1184 mm)

* Consult factory for longer lengths. Adjustable 12″ differential is standard.

Minimum differential is a based on a specific gravity of 1.0 and may vary by type of control and specific gravity of liquid used.

Series 218 has two vertical flanges (1″ RF forged steel – ANSI specifications). Flange centerline 27-1/8″ (L12) - 689 mm. Other centerlines available.

Operation Section



Adjustable deadband, flanged chamber and side mount are featured in the heavy duty reliable 215 series. A choice of four operating styles are offered: 1. Single stage adjustable deadband suitable for pump operation; 2. Two stage operation with adjustable lower stage, fixed upper stage for pump and high alarm; 3. Fixed lower stage and adjustable upper stage for pump and low alarm; 4. Fixed upper and lower stage for high and low alarm. Alarm stages can also be used for shutdown. Adjustable level changes are available in increments of 12″, 24″, 36″, or 48″.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

SPECIFICATIONS

Minimum Specific Gravity: 0.60.

Switch Type: Snap action or mercury. See charts A and B.

Electrical Ratings: See charts A and B.

Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.

Process Connections: 1″ NPT standard (1″ socket weld hubs or flanges optional).

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum, neoprene. E, aluminum. EV, aluminum and neoprene.

Wetted Parts: C1 construction. Chamber, carbon steel. Float and trim 303SS, 304SS, 430SS.

Weight: 215, 50 lb (22.7 kg); 217, 60 lb (27 kg); 218, 67 lb (30.4 kg).

Suggested Specifications

Liquid level control shall be 215 (217) (218) Series with adjustable deadband of (12″) (24″) (36″) (48″). Unit shall be external side mount type. Process connections shall be 1″ NPT (socket weld hub) (flanged). Suitable for operation at 450 psig (31 bar) and 100°F (38°C); 300 psig (21 bar) at 500°F (260°C) with a minimum specific gravity of 0.60. Switch mechanism shall be gravity return and shall be activated by a stainless steel float.

MODEL CHART – SERIES 215

EXAMPLE	215-2	WT	7810	10	C1	60		L12	215-2-WT-7810-10-C1-60-L12 Liquid level control, flanged carbon steel chamber. Weather proof enclosure. 2 single pole double throw snap action switches. Lower stage adjustable deadband to operate pump or other devices, upper stage fixed to operate alarm or shutdown. Operating pressure 450 psig (31 bar) at 100°F (38°C) 300 psi (21 bar) at 500°F (260°C). Side/bottom process connection, 1″ NPT. Minimum specific gravity 0.60.		
OPERATION	215-1		XXXX						Single stage operation with an adjustable deadband. Suitable for pump operation.	UL	CSA
	215-2		XXXX	XX					Two stage operation. Lower stage has adjustable deadband. Upper stage has fixed deadband. Suitable for pump and high alarm.	UL	CSA
	215-3		XXXX	XX					Two stage operation. Lower stage fixed deadband. Upper stage has adjustable deadband. Suitable for pump and low alarm.	UL	CSA
	215-4		XXXX	XX					Two stage operation. Both stages have fixed deadband with adjustable spread between stages. Suitable for high and low alarm or shutdown.	UL	CSA
ENCLOSURES		G							General purpose, NEMA-1.	UL	CSA
		WT							Weather proof NEMA-3R, 4, 4X.	UL	CSA
		E							Explosion proof NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only).	UL	CSA
		EV							Explosion proof, vapor proof NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. (CSA approved Groups C, D, E, F, G only).	UL	CSA
CIRCUITS			48XX						Single stage. Mercury switch. See Chart A.		
			48XX	XX					Two stage. Mercury switch. See Chart A.		
(For Electrical Circuits see charts A & B below.)			78XX						Single stage. Snap switch. See Chart B.		
			78XX	XX					Two stage. Snap switch. See Chart B.		
			78XXHM						Hermetically sealed snap switch. See Chart B.		
			98XX						Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B.		
			98XX	XX					Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Not to exceed 450°F (232°C). See Chart B.		
OPTIONS	215				C1	60			Maximum pressure rating 450 psi (31 bar) at 100°F (38°C), and 300 psi (21 bar) at 500°F (260°C).	UL	CSA
								L12	Adjustable level change. 1 1/2″ (38mm) minimum, 12″ (305mm) maximum.	UL	CSA
								L24	Adjustable level change 1 1/2″ (38mm) minimum, 24″ (610mm) maximum. 36″ (91cm) and 48″ (1.22m) available. Consult factory.	UL	CSA
CONSTRUCTION	217				C1	160			1″ 150# flanges side/bottom process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL	CSA
	217				C1	360			1″ 300# flanges side/bottom process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL	CSA
	217				C1	660			1″ 600# flanges side/bottom process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL	CSA
	218				C1	160			1″ 150# flanges side/side process connection. Pressure rating 275 psi (19 bar) at 100°F (38°C), 150 psi (10 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL	CSA
	218				C1	360			1″ 300# flanges side/side process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL	CSA
	218				C1	660			1″ 600# flanges side/side process connection. Pressure rating 450 psi (31 bar) at 100°F (38°C), 300 psi (21 bar) at 500°F (260°C). Minimum specific gravity 0.60.	UL	CSA
							H2		1″ socket weld hub instead of 1″ NPT.		

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE				
		AC			DC			SINGLE STAGE	TWO STAGE			
		120V	240V	440V	30V	125V	250V		LOWER	UPPER		
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-20	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL	CSA
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10		

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Series 500

Side Mount

Threaded or Flange, Pressure to 400 psig (28 bar), Hermetically Sealed Switches, Temperature to 425°F (218°C)

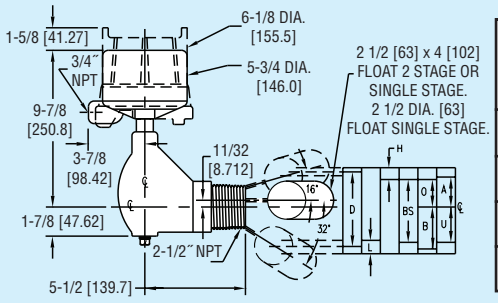
Series 500 F Flanged cast iron type (ANSI 2½″, 125 lb cast iron flange as standard). Steel body furnished (with ANSI 2½″ 150 lb forged steel flange) for direct mounting.

Large flanges available on special order.

Single Stage[1] available with threaded or flanged connection.

FLOAT ROD LENGTH	FLOAT INSERTION 2½″ (64mm) FLOAT	FLOAT INSERTION 2½″×4″ (64×102mm) FLOAT	MINIMUM SPECIFIC GRAVITY 2½″ (64mm) FLOAT	MINIMUM SPECIFIC GRAVITY 2½″×4″ (64×102mm) FLOAT	ADJUSTABLE "D" DIFFERENTIAL	MAX. "A" ABOVE C/L	MAX. "B" BELOW C/L
6″ (153 mm)	6 1/2″ (165 mm)	8″ (203 mm)	.80	.55	[1]MAX. 3″ (76 mm) MIN. 1/2″ (13 mm)	1 7/8″ (48 mm) 1 3/4″ (44 mm)	3 3/8″ (86 mm) 2 3/4″ (70 mm)
12″ (305 mm)	12 1/2″ (318 mm)	14″ (356 mm)	.90	.60	[1]MAX. 5 1/4″ (133 mm) MIN. 1″ (25.4 mm)	3″ (76 mm) 2 7/8″ (73 mm)	6 3/8″ (162 mm) 5 1/4″ (133 mm)
18″ (457 mm)	18 1/2″ (470 mm)	21″ (533 mm)	1.0	.65	[1]MAX. 7 1/2″ (191 mm) MIN. 1 1/2″ (38 mm)	4 1/4″ (108 mm) 4″ (102 mm)	9 1/2″ (241 mm) 7 3/4″ (197 mm)
24″ (610 mm)	24 1/2″ (622 mm)	26″ (660 mm)	1.1	.70	[1]MAX. 10″ (254 mm) MIN. 2″ (51 mm)	5 1/2″ (140 mm) 5 1/8″ (130 mm)	12 1/2″ (318 mm) 10 1/4″ (260 mm)

[1] If control is nozzle mounted, maximum differential will be limited by nozzle length.



Two Stage (2½″×4″ Float Only)[2] available with threaded or flanged connection.

FLOAT ROD LENGTH	INSERTION 2-1/2″×4″ (64×102mm) FLOAT	DIFFERENTIAL NOT ADJUSTABLE BOTTOM STAGE (HIGH LEVEL) H	DIFFERENTIAL NOT ADJUSTABLE TOP STAGE (LOW LEVEL) L	BETWEEN STAGES NOT ADJUSTABLE BS	BETWEEN STAGES NOT ADJUSTABLE OVER C/L "O"	BETWEEN STAGES NOT ADJUSTABLE UNDER C/L "U"	MINIMUM SPECIFIC GRAVITY
6″ (153 mm)	8″ (203 mm)	3/8″ (10 mm)	3/8″ (10 mm)	3 5/8″ (93 mm)	1 1/4″ (32 mm)	2 3/8″ (60 mm)	.70
12″ (305 mm)	14″ (356 mm)	1/2″ (13 mm)	7/8″ (22 mm)	6 5/8″ (168 mm)	2 1/8″ (54 mm)	4 1/2″ (114 mm)	.70
18″ (457 mm)	20″ (508 mm)	7/8″ (22 mm)	1 1/4″ (32 mm)	9 5/8″ (244 mm)	2 7/8″ (73 mm)	6 3/4″ (171 mm)	.75
24″ (610 mm)	26″ (660 mm)	1 1/8″ (29 mm)	1 1/2″ (38 mm)	12 5/8″ (321 mm)	3 5/8″ (93 mm)	9″ (229 mm)	.8

[2] Two stage operation requires 32° float rod movement below horizontal so flange must be bolted directly to tank as shown.

Adjustable deadband combined with direct 2½″ threaded or 2½″ flange mount makes the reliable, heavy duty 500 Series ideal for liquid level control in large or small tanks. Chambers are available in cast iron, cast steel or cast 316 stainless steel to meet the most demanding application. Float rods are available from the standard 6″ (152.4 mm) up to 24″ (610 mm) long providing action down to a specific gravity of 0.55. 2½″ (64 mm) float is suitable for pressure of 400 psig (28 bar), 2½″×4″ (64× 102 mm) float is suitable for 200 psig (14 bar). Maximum operating temperature is 425°F (218°C). A variety of circuits can be ordered including SPST, SPDT or DPDT with hermetically sealed snap action or mercury contacts. Single pole, double throw electrically independent circuits are available as well as contact for high or low DC current applications. A full range of enclosures are available such as general purpose, (weather proof) (explosion proof) (explosion proof - vapor proof).

Suggested Specification

Level switches shall be direct mount type with 2½″ NPT connection. Units shall have weather-proof enclosures. Contacts shall be (hermetically sealed) (mercury wetted) (snap action type). Switching mechanism shall be stainless steel with gravity return action. Stainless steel float shall actuate mechanism by magnetic linkage.

SPECIFICATIONS

Minimum Specific Gravity: Dependent on float size and rod length. See model chart.

Switch Type: Snap action or mercury. See circuit charts A and B.

Electrical Rating: See charts A and B.

Wiring Connection: G, WT or E enclosure, terminal board. EV enclosure 18″(460 mm) leads.

Process Connections: T type 2-1/2″NPT. F type 2-1/2″flange standard.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.

Wetted Parts: See model chart.

Weight: 500 T, 10 lb (4.5 kg); 500 F, 14 lb (6.4 kg).

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, heat transfer systems, sanitary/waste water facilities, drip legs, hydraulic systems, boilers.

MODEL CHART – SERIES 500

EXAMPLE	500T	WT	7810	10	C1	55	12	500T-WT-7810-10-C1-55-12 Liquid level control. NEMA-4X weather proof enclosure. 2½″ NPT cast steel threaded chamber for direct tank mounting. SPDT snap action switch fixed deadband, automatic reset. Operating pressure 200 psi (14 bar) to 425°F (218°C). Minimum specific gravity 0.55 with 6″ (152 mm) float rod and 2½″×4″ (64×102 mm) float.	
CONSTRUCTION	500T 500F							2½″ NPT threaded process connection. Flanged direct mount process connection. 2½″ 125 lb. Cast iron flange furnished for (C) cast iron chamber. 2½″ NPT 150 lb. carbon steel flange furnished for (C1) cast steel chamber. 2½″ NPT 150 lb. 316SS flange furnished for (C216) cast 316SS chamber. Other flange sizes available. Consult factory.	UL UL
ENCLOSURE	500 500 500 500	G WT E EV						General purpose, NEMA-1 enclosure. Watertight enclosure suitable for NEMA-1, 2, 3, 4, 4X. Explosion proof enclosure. NEMA-7, 9, Class I Groups B, C, D; Class II Groups E, F, G, Division I and II. Explosion proof, vapor proof enclosure. NEMA-7, 9, Class I Groups B, C, D; Class II Groups E, F, G, Division I and II.	UL UL UL UL
CIRCUIT: SINGLE STAGE			XXXX 78XXHM					Snap action or mercury switch (see Charts A and B). Hermetically sealed snap switch. See Chart B.	
CHAMBER: SINGLE STAGE					C C C1 C1 C216 C216	55 80 55 80 55 80		Cast iron chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″×4″ (64×102 mm) 316SS float and 316SS trim. Pressure rating 200 psig (14 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.55. Cast iron chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″ (64 mm) 316SS ball float and 316SS trim. Pressure rating 400 psig (28 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.80. Cast steel chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″×4″ (64×102 mm) 316SS float and 316SS trim. Pressure rating 200 psig (14 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.55. Cast steel chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″ (64 mm) 316SS ball float and 316SS trim. Pressure rating 400 psig (28 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.80. Cast 316 stainless steel chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″×4″ (64×102 mm) 316SS float and 316SS trim. Pressure rating 200 psig (14 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.55. Cast 316 stainless steel chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″ (64 mm) 316SS ball float and 316SS trim. Pressure rating 400 psig (28 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.80.	UL UL UL UL UL UL
CIRCUIT: TWO STAGE			XXXX 78XXHM	XX				Snap action or mercury switch (see Charts A and B). Hermetically sealed snap switch. Consult factory.	
CHAMBER: TWO STAGE					C C1 C216	70 70 70		Cast iron chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″×4″ (64×102 mm) 316SS float and 316SS trim. Pressure rating 200 psig (14 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.70. Cast steel chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″×4″ (64×102 mm) 316SS float and 316SS trim. Pressure rating 200 psig (14 bar) to 425°F (218°C) maximum. MInimum specific gravity 0.70. Cast 316 stainless steel chamber. Supplied with 6″ (152 mm) 316SS float rod, 2½″″×4″ (64×102 mm) 316SS float and 316SS trim. Pressure rating 200 psig (14 bar) to 425°F (218°C) maximum. Minimum specific gravity 0.70.	UL UL UL
OPTIONS							12	12″ (305 mm), 18″ (457 mm), or 24″ (610 mm) float rods. Must be specified on order. Minimum specific gravity will increase (see chart). Breather and drain for E type enclosure. Recommended for high humidity or outdoor service.	

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE			
		AC			DC			SINGLE STAGE	TWO STAGE		
		120V	240V	440V	30V	125V	250V		LOWER	UPPER	
CHART A Mercury Contacts	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-20	UL
	SP-ST Open on level RISE	10	5	3†		10	5	-4821	-4821	-21	UL
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-14	UL
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-13	UL
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL
CHART B Snap Action Contacts	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM	
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM	
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06	
	SP-DT One switch	10	3			10‡		3‡	-9810	-9810	-10

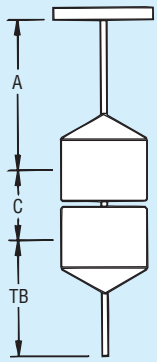
*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series 190/ 195

Top Mount-Displacer Type

Single or Two Stage, Fixed or Adjustable Deadband, Hermetically Sealed Switches, For Pumps or Alarms

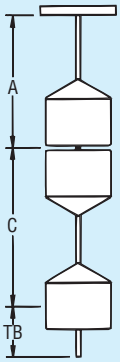


Single stage fixed differential.
AA190 for 3″ flange.
A190 for 4″ flange or larger.

CHART 1

SP GR *	100° F (38°C) A MAX.	100° F (38°C) A MIN.	UPPER # = INCHES LOWER # = METRIC C FIXED	MIN. TB
.5	121 1/2	7 1/2	1 1/2	2 3/4
.5	3.09 M	191 mm	38 mm	7 mm
1.0	123	9	3/4	2
1.0	3.12 M	229 mm	19 mm	51 mm

* Control can be factory set for other specific gravities.



Single stage adjustable differential.
BB190 for 3″ flange.
B190 for 4″ flange or larger.

CHART 2

SP GR *	100° F (38°C) A MAX.	100° F (38°C) A MIN.	UPPER # = INCHES LOWER # = METRIC C MAX.	C MIN.	TB MIN.
.6	116 1/2	6 1/2	114	6 3/4	2 1/2
.6	2.96 M	165 mm	2.90 M	172 mm	64 mm
1.0	119	9	114 1/2	4 5/8	2
1.0	3.02 M	229 mm	2.91 M	117.5 mm	51 mm

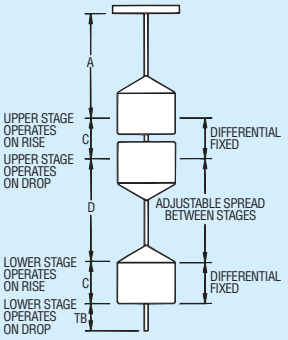
*Control can be factory set for other specific gravities.

A195 - 4 Two Stage
For 3″ Flange. Fixed differentials. Adjustable spread between stages. Specific gravity 0.6 to 1.2.

195-4 Two Stage
For 4″ flange or larger. Fixed Differentials. Adjustable spread between stages. Specific Gravity 0.8 to 1.2.

CHART 3

	MIN.		MAX.	
A	9″	229 mm	119″	30.23 cm
C	3/4″	19 mm	Fixed	Fixed
D	3 1/2″	89 mm	113 1/2″	28.83 cm
TB	1 1/2″	38 mm	———	

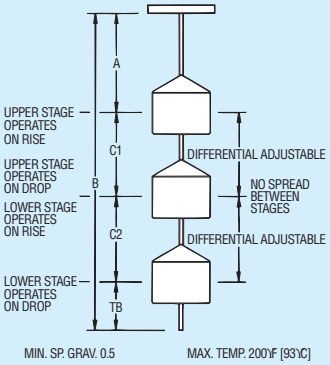


A195 - 6 Two Stage
For 3″ flange. Adjustable differential each stage. Lower stage operates on rise at same point upper stage operates on drop. Specific gravity 0.5 to 1.2.

195-6 Two Stage
For 4″ flange or larger. Adjustable Differential each stage. Lower stage operates on rise at same point upper stage operates on drop. Specific Gravity 0.5 to 1.2.

CHART 4

	MIN.		MAX.	
A	9″	229 mm	118″	29.97 cm
B	15 1/2″	394 mm	125″	31.75 cm
C_1	3 1/2″	89 mm	113″	28.7 cm
C_2	3 1/2″	89 mm	113″	28. 7cm
TB	2″	51 mm	———	



TB = Tank Bottom

The most versatile liquid level controls in our line, displacer controls can be used to trigger alarms, provide shutdown or operate pumps.

Operation: Mercoid® Displacer Controls use displacers that do not float on the surface of liquids, but are suspended on a coil spring. They work on the principle that submerged solids weigh less in liquids, and as the liquid level rises and their weight decreases, the tension on the spring by which they are suspended is decreased. This allows the spring to move the cable and armature upward, actuating the hermetically sealed switches. Because they work on a different principle than float type liquid level controls, displacers are not affected by turbulence, or pressure, and are excellent for applications with viscous or dirty liquids.

Dimensions are based on porcelain displacers with 4″ minimum flange type control. All dimensions are approximate and will vary depending on specific gravity, temperature, displacer material and size. Critical dimensions must be verified with the factory before placing order.

Standard Construction: Porcelain displacers, 10 foot 316SS cable and stops, 4″ 125# CI flange: for operation in specific gravities as low as 0.5 and a maximum temperature of 200°F (93°C). For special conditions, other choices include: 316SS displacers: longer cable: monel or hastalloy cable and stops: other flange sizes, materials or pressure ratings, or 3/4″ NPT top connection in lieu of flange.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, sanitary/waste water facilities, sumps and open or closed tanks and vessels.

SPECIFICATIONS

Temperature Rating: –20°F (–29°C) to 200°F (93°C).
Switch Type: Snap action or mercury.
Electrical Rating: See charts A and B.
Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.
Process Connection: Top mount flange.
Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum, neoprene.
Wetted Parts: Porcelain and 316SS standard. 316SS optional.
Weight: All types with G or WT enclosure and 49 125# CI flange approximately 28 lb (12.7 kg). E and EV enclosure approximately 32 lb (14.5 kg).

Suggested Specification:

Liquid level control shall be top mounted for direct insertion into tank or sump. Operation shall be single stage with fixed (A190), adjustable (B190) deadband, or two stage for high and low alarm (195-4) or for two pumps (195-6). Circuit shall be (SPST) (SPDT) or (DPDT) (hermetically sealed) snap action (mercury) each stage. Control shall include 10 ft. SS cable porcelain (316SS) displacers and 4″ flanges.

Level

MODEL CHART – SERIES 190

EXAMPLE	A190	WT	7810	P	A	1.0	2	A190-WT-7810-P-A-1.0-2 Top mounted single stage, displacer type liquid level control. Watertight. NEMA-4 enclosure. SPDT snap action switch, fixed deadband 3/4″ (19 mm) at 1.0. Specific gravity. Specific gravity from 0.5 to 1.2. Must be specified on order. Maximum operating temperature 200°F (93°C). With 10 ft. SS cable and porcelain displacers, and 4″ 125# cast iron flange.		
DISPLACERS				P S				Porcelain displacers. Not suitable for non-vented steam systems. 316SS displacers.		
CABLE LENGTH					A B C D E			10 ft. 316SS cable and stops (approx. 3 mtrs). 15 ft. 316SS cable and stops (approx. 4.5 mtrs). 20 ft. 316SS cable and stops (approx. 6 mtrs). 25 ft. 316SS cable and stops (approx. 7.5 mtrs). 30 ft. 316SS cable and stops (approx. 9 mtrs). Longer length cable available. Consult factory.		
SPECIFIC GRAVITY						1.0		Specific gravity. Operating specific gravity must be specified on order, from .5 to 1.2		
CONSTRUCTION	A190 AA190							Single stage. Fixed deadband. Normally used for alarm. See Chart 1.	UL	CSA
	B190 BB190							Single stage. Adjustable deadband. Normally used to operate a pump. See Chart 2.	UL	CSA
	195-4 A195-4							Two stage. Fixed deadband each stage. Adjustable spread between stages. Normally used for high and low alarm. See Chart 3.	UL	CSA
	195-6 A195-6							Two stage. Adjustable deadband each stage. No spread between stages. Normally used to operate two pumps one above the other, or, pump and high alarm; or, pump and low alarm. See Chart 4.	UL	CSA
ENCLOSURES		G WT E EV						General purpose NEMA-1. Watertight NEMA-4, 4X. Explosion proof. Class I Groups B, C, D. Class II Groups E, F, G. NEMA-7, 9. (CSA approved Groups C, D, E, F, G only). Explosion-proof, vapor proof, Class I Groups B, C, D. Class II Groups E, F, G. NEMA-7, 9 (CSA approved Groups C, D, E, F, G only).	UL UL UL UL	CSA CSA CSA
CIRCUITS: **SINGLE STAGE** A190–AA190 B190–BB190			48XX 78XX 78XXHM 98XX					See Chart A. See Chart B. Hermetically sealed snap switch. See Chart B. See Chart B.		
TWO STAGE 195–4, 6 A195–4, 6			48XX-XX 78XX-XX 78XXHM 98XX-XX					See Chart A. See Chart B. Hermetically sealed snap switch. See Chart B. See Chart B.		
FLANGE							2 0	Mounting flange. 4″ 125# cast iron. Other flanges available. See Chart 5. No flange, 3/4″ male NPT.		

FLANGE CHART #5

CODE NUMBER	FLANGE DESCRIPTION
1	3″ 125# Cast Iron**
2	4″ 125# Cast Iron
3	5″ 125# Cast Iron
4	6″ 125# Cast Iron
5	8″ 125# Cast Iron
6	3″ 150# R.F. Carbon Steel
7	4″ 150# R.F. Carbon Steel
8	5″ 150# R.F. Carbon Steel
9	6″ 150# R.F. Carbon Steel
10	8″ 150# R.F. Carbon Steel

** For use with AA190, BB190, A195-4, A195-6 only. Stainless steel flanges also available.

EXAMPLE: How to order (see model chart)

A190	WT	7810	P	A	1.0	2
1	2	3	4	5	6	7

1 Construction
2 Enclosure
3 Circuit
4 Displacer Type
5 Cable Length
6 Specific Gravity
7 Flange Size, Material and Rating

CHARTS A & B ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	A190 – B190 AA190 – BB190 ELECTRICAL RATINGS IN AMPS AC 120V	240V	440V	DC 30V	125V	250V	195 – 4, 6 A195 – 4, 6 ORDERING CODE SINGLE STAGE	TWO STAGE LOWER	UPPER		
CHART A	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821	-4820	-21	UL	CSA
	SP-ST Open on level RISE	10	5	3†		10	5	-4820	-4821	-20	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL	CSA
Mercury Contacts	**SP-DT** Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813	-4814	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814	-4813	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL	CSA
CHART B	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL	CSA
	DP-DT Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL	CSA
Snap Action Contacts	**SP-DT** One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10		

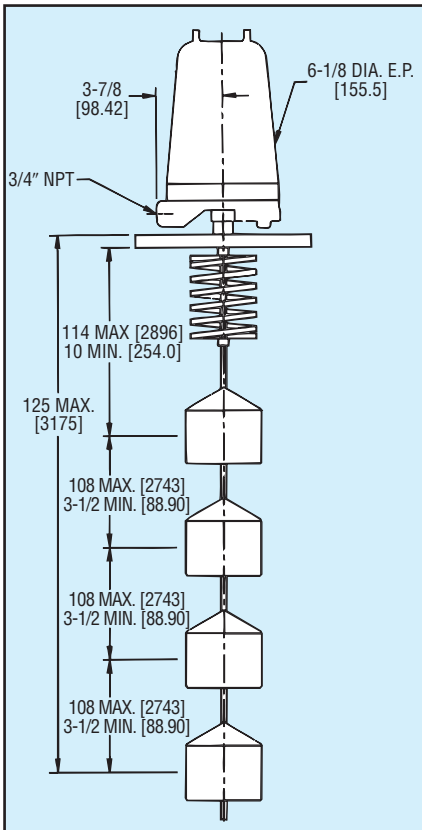
*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series 193

Top Mount-Displacer Type

Three Stage for Pumps or Alarms, Hermetically Sealed Switches



Type 193-1
Can operate one pump (C) to keep tank or sump empty. With high or abnormal filling which one pump (C) could not handle second pump (B) could be activated. Both pumps shut off at bottom. Third stage (A) can be third pump or high alarm.

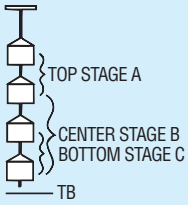


CHART 1

	MIN.		MAX.	
	INCHES	MM.	INCHES	CM.
A	3 1/2	89	108	27.4
B	7	178	111 1/2	28.3
C	3 1/2	89	108	27.4
TB	2 3/4	70	——	——

Type 193-4
Can operate one pump (A) to keep tank full. As demand rises second pump (B) can be activated. For greater demand third pump (C) will operate and shut off with second pump (B) as level rises.

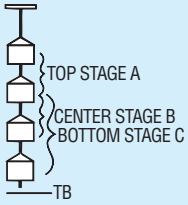


CHART 2

	MIN.		MAX.	
	INCHES	MM.	INCHES	CM.
A	3 1/2	89	108	27.4
B	3 1/2	89	108	27.4
C	7	178	111 1/2	28.3
TB	2 3/4	70	——	——

Type 193-5
For reporting high, middle and low level point. Or high and low alarm plus low shut down; or high and low alarm and high shut down.

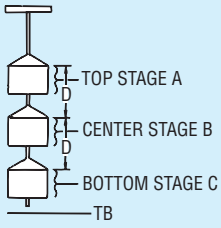


CHART 3

	MIN.		MAX.	
	INCHES	MM.	INCHES	CM.
A	1 1/4	31.8	Fixed	——
B	1 1/4	31.8	Fixed	——
C	1 1/4	31.8	Fixed	——
D	3 1/2	89	108	27.4
TB	2 3/4	70	——	——

Type 193-6
Can be used to operate a pump (B) with high (A) and low (C) alarm; or two pumps (B & C) with high alarm (A) or, two pumps (A & B) with low alarm (C).

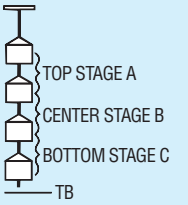


CHART 4

	MIN.		MAX.	
	INCHES	MM.	INCHES	CM.
A	3 1/2	89	108	27.4
B	3 1/2	89	108	27.4
C	3 1/2	89	108	27.4
TB	2 3/4	70	——	——

Three stage versatility for tanks or sumps, the 193 Series can be used to operate as many as 3 pumps or can provide up to 3 alarm/signal points.

Operation: Mercoid® Displacer Controls use displacers that do not float on the surface of liquids, but are suspended on a coil spring. They work on the principle that submerged solids weigh less in liquids, and as the liquid level rises and their weight decreases, the tension on the spring by which they are suspended is decreased. This allows the spring to move the cable and armature upward, actuating the hermetically sealed switches. Because they work on a different principle than float type liquid level controls, displacers are not affected by turbulence, or pressure, and are excellent for applications with viscous or dirty liquids.

Standard Construction: Porcelain displacers, 10 foot 316SS cable and stops, 4″ 125# CI flange: for operation in specific gravities from 0.95 to 1.05 and a maximum temperature of 200°F (93°C). For special conditions, other choices include: 316SS displacers: longer cable: other flange sizes, materials or pressure ratings, or 3/4″ NPT top connection in lieu of flange.

Enclosure types include general purpose NEMA-1, watertight NEMA-4 - 4X, and explosion proof NEMA-7, 9 Class I Groups B, C, D: Class II Groups E, F, G. The EV enclosure is gasketed to help prevent corrosive gases in the atmosphere from damaging the switch mechanism.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, sanitary/waste water facilities, sumps, open or covered tanks and vessels.

Dimensions are approximate and will vary depending on the specific gravity, displacer material and temperature. Critical dimensions must be verified with the factory before placing order.

SPECIFICATIONS

Temperature Rating: –20°F (–29°C) to 200°F (93°C).
Switch Type: Snap action or mercury.
Electrical Rating: See charts A and B.
Wiring Connections: WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.
Process Connection: Top mount flange.
Enclosures: WT, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.
Wetted Parts: Porcelain and 316SS standard. 316SS optional.
Weight: All types with WT, E and EV enclosures and 49 125# CI flange approximately 38 lb (17.3 kg).

Suggested Specifications

Liquid level control shall be three stage top mount displacer type with porcelain (316SS) displacers, ( ) feet SS cable, and ( ) flange. Circuit shall be (hermetically sealed) snap action (mercury) (SPST) (SPDT). Enclosure shall be (watertight) (explosion-proof) (explosion-proof - vapor proof).

MODEL CHART – SERIES 193

EXAMPLE	193-6	WT	7810-10-10	P	A	1.0	2	193-6-WT-7810-10-10-P-A-1.0-2 Top mounted three stage, displacer type liquid level control. Watertight, NEMA-4 enclosure. SPDT snap action switch at 1.0 specific gravity. Maximum operating temperature 200°F (93°C). With 10 ft. SS cable, porcelain displacers, and 4˝ 125# cast iron flange
DISPLACERS				P S				Porcelain displacers. Not suitable for non-vented steam systems. 316SS displacers.
CABLE LENGTH					A B C D E			10 ft. 316SS cable and stops (approx. 3 mtrs). 15 ft. 316SS cable and stops (approx. 4.5 mtrs). 20 ft. 316SS cable and stops (approx. 6 mtrs). 25 ft. 316SS cable and stops (approx. 7.5 mtrs). 30 ft. 316SS cable and stops (approx. 9 mtrs). Longer length cable available. Consult factory.
SPECIFIC GRAVITY						1.0		Specific gravity. Operating specific gravity from 0.95 to 1.05 must be specified on order.
CONSTRUCTION	193-1							Low stage will operate one pump to keep tank or sump empty. With high or abnormal filling which one pump could not handle second pump, center stage, could be activated. Both pumps shut off at bottom. Upper stage (A) can be third pump or high alarm. See Chart 1.
	193-4							Upper stage operates one pump to keep tank full. As demand rises second pump at center stage is activated. With more demand third pump will operate. As level rises, lower and middle stage shut off. See Chart 2.
	193-5							To report high, middle and low level point. Or high and low alarm plus low shut down; or high and low alarm and high shut down. All stages have fixed deadband. See Chart 3.
	193-6							Center stage is used to operate a pump with high and low alarm. Can also be used to operate two pumps with high alarm or, two pumps with low alarm or three pumps. See Chart 4.
ENCLOSURES		WT E EV						Watertight NEMA-4, 4X. Explosion proof. Class I Groups C and D. Class II Groups E, F, G. NEMA-7, 9. Explosion proof, vapor proof. Class I Groups C and D. Class II Groups E, F, G. NEMA-7, 9.
CIRCUITS: THREE STAGE			48XX-XX-XX 78XX-XX-XX 78XXHM 98XX-XX-XX					See Chart A. See Chart B. See Chart B. See Chart B.
FLANGE							0 2 3 4 5	No flange, 3/4˝ male NPT. Mounting flange. 4″ 125# Cast Iron. Mounting flange 5″ 125# Cast Iron Mounting flange 6″ 125# Cast Iron Mounting flange 8″ 125# Cast Iron
							6 7 8 9 10	Mounting flange 3″ 150# R.F. Carbon Steel Mounting flange 4″ 150# R.F. Carbon Steel Mounting flange 5″ 150# R.F. Carbon Steel Mounting flange 6″ 150# R.F. Carbon Steel Mounting flange 8″ 150# R.F. Carbon Steel

CHARTS A & B - ELECTRICAL CIRCUITS AND RATINGS – 193 SERIES

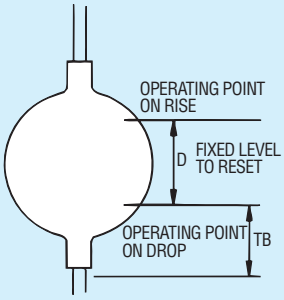
SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS					ORDERING CODE		
		AC		DC					
		120V	240V	30V	125V	250V	LOWER STAGE	MIDDLE STAGE	UPPER STAGE
CHART A									
Mercury Contacts	**SP-DT** One Switch	4	2		4	2	-4810	-10	-10
	SP-DT Two switches E.I.*	10	5		10	5	-4815	-15	-15
CHART B	**SP-DT** One switch	12	5		0.5**	0.25**	-7810	-10	-10
	DP-DT Two SP-DT switches	12	5		0.5**	0.25**	-7806	-06	-06
Snap Action Contacts	**SP-DT** One hermetically sealed switch	5	5	5**			-7810HM	-10HM	-10HM
	DP-DT Two hermetically sealed SP-DT switches	5	5	5**			-7806HM	-06HM	-06HM
	DP-DT Two SP-DT switches	10	3		10‡	3‡	-9806	-06	-06
	SP-DT One switch	10	3		10‡	3‡	-9810	-10	-10

*Electrically Independent **Resistive
‡10 Amp inductive (Polarized) at 125 VDC

Series 301

Top Mount — Float Type

Single Stage for Alarms, Depth to 12 ft. Hermetically Sealed Switches



NOTE

Float travel is limited by the lower extremity of the armature tube, or when provided, by the end of the support extension. Float rods and extensions may be altered to obtain the minimum and maximum operating levels shown in the tables.

If control has been furnished for specified operating levels, the float rod supplied will provide ±2″ adjustment of such levels.

If tank depth is critical a section of float rod below lower clamp (stop) may be cut off.

CHART D
Float Actuation
Switch Level Change — Single Stage Operation

CM = CENTIMETERS MM = MILLIMETERS M = METERS		THE OPERATING DEPTH MUST BE SPECIFIED BETWEEN THESE LIMITS		FIXED LEVEL CHANGE "D" BETWEEN ON AND OFF	MINIMUM TANK DEPTH REQUIRED BELOW LOW OPERATING POINT "TB"
SPECIFIC GRAVITY	FLOAT C = COPPER SS = STAINLESS STEEL	MINIMUM HIGH LEVEL OPERATING POINT (ON RISE) FROM TOP OF FLANGE	MAXIMUM LOW LEVEL OPERATING POINT (ON DROP) FROM TOP OF FLANGE		
1.0	4 1/2″ C	9″ 22.9 cm	96″ 2.44 M	3/4″ 19 mm	5 3/4″ 14.6 cm
	4 1/2″ SS	9 3/8″ 23.8 cm	144″ 3.66 M	3/4″ 19 mm	5 3/4″ 14.6 cm
	7″ SS	10 3/4″ 27.3 cm	144″ 3.66 M	1/2″ 13 mm	6″ 15.2 cm
	3 1/2″ x 6″ SS	9 7/8″ 25 cm	144″ 3.66 M	7/8″ 22 mm	7 5/8″ 19.4 cm
.90	4 1/2″ C	8 3/4″ 22.2 cm	84″ 2.13 M	7/8″ 22 mm	6 1/8″ 15.6 cm
	4 1/2″ SS	9 1/4″ 23.5 cm	144″ 3.66 M	1″ 25 mm	6 1/8″ 15.6 cm
	7″ SS	10 5/8″ 27 cm	144″ 3.66 M	1/2″ 13 mm	6 1/4″ 15.9 cm
	3 1/2″ x 6″ SS	9 3/8″ 23.8 cm	96″ 2.44 M	1 1/8″ 29 mm	7 7/8″ 20.0 cm
.82	4 1/2″ C	8 1/2″ 21.6 cm	72″ 1.83 M	1″ 25 mm	6 1/4″ 15.9 cm
	4 1/2″ SS	8 3/4″ 22.9 cm	108″ 2.74 M	7/8″ 22 mm	6 1/4″ 15.9 cm
	7″ SS	10 1/2″ 26.7 cm	144″ 3.66 M	1/2″ 13 mm	6 3/4″ 17 cm
	3 1/2″ x 6″ SS	9 1/8″ 23.2 cm	72″ 1.83 M	1 1/4″ 32 mm	8″ 20.3 cm
.75	4 1/2″ SS	8 3/8″ 21.3 cm	72″ 1.83 M	1″ 25 mm	6 1/2″ 16.5 cm
	7″ SS	10 3/8″ 26.4 cm	144″ 3.66 M	5/8″ 16 mm	6 7/8″ 17.5 cm
	3 1/2″ x 6″ SS	8 7/8″ 22.5 cm	48″ 1.22 M	1 1/2″ 38 mm	8″ 20.3 cm
.50	7″ SS	9 3/4″ 23.5 cm	144″ 3.66 M	3/4″ 19 mm	6 3/4″ 17 cm

Repeatability ± 1/4″

The reliable 301 Series has proven to be a rugged economical choice for top mounting on tanks where side mounting is not practical, or for use in sumps. These units feature a fixed deadband for high or low alarm or shutdown. This control can be mounted on top of any closed or open tank or sump by use of the 3/4″ NPT connection. Flanges are also available in various sizes, pressure rating and material to meet any installation. Several size floats are available to accommodate liquids to a specific gravity of 0.5 and depths to 12 feet.

Electrical switch actions, SPST (SPDT) (DPDT) or (DPST), can be ordered to satisfy most applications. Two-stage operation available, consult factory. Hermetically sealed snap action or mercury contacts provide for high or low current or voltage requirements. Enclosures include general purpose NEMA-1, weatherproof NEMA-4, explosion-proof NEMA-7, 9. The explosion-proof, vapor proof version combines weatherproof, vapor proof, and explosion-proof NEMA-4, 7, 9 construction in one enclosure. The 301 Series can be used on pressurized vessels.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, sanitary/waste water facilities, sumps, open or closed tanks and vessels.

SPECIFICATIONS

Minimum Specific Gravity: Dependent on float size and rod length. See chart A.

Switch Type: Snap action or mercury. See charts D and E.

Electrical Rating: See charts D and E.

Wiring Connection: G, WT or E enclosure, terminal board. EV enclosure 18″ (460 mm) leads.

Enclosures: G, painted steel and aluminum. WT, painted steel, aluminum and neoprene. E, aluminum. EV, aluminum and neoprene.

Wetted Parts: See model chart.

Approximate Weight: 301G, WT with 4½″ SS float, 8 ft. rod, 5″ 125# cast iron flange. Approximately 35 lb (16 kg) with E, EV enclosure 39 lb (17.7 kg).

Suggested Specification

Liquid level control shall be top mount, float operated with fixed deadband for alarm service, (insertion depth, float and flange type to be specified). Circuit shall be hermetically sealed (SPST) (SPDT) DPDT snap action (mercury) switch. Enclosure shall be general purpose (weatherproof) (explosion-proof) (explosion-proof - vapor proof).

MODEL CHART – SERIES 301

CONSTRUCTION	301	WT	7810	XX	AS	24	0.75	2	301-WT-7810-AS-24-0.75-2 Top mounted single stage float operated with fixed deadband. Watertight, NEMA-4X enclosure. SPDT snap action switch rated for 12 amp 120 VAC. 3 1/2″×6″ (89×152mm) 304SS float with galvanized support extension. 24″ (610mm) operating point. Specific gravity 0.75. 4″ 125# cast iron flange.		
ENCLOSURES		G WT E EV							General purpose NEMA-1 enclosure. Water tight enclosure suitable for NEMA-1, 2, 3, 4, 4X. Explosion proof enclosure, NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G. Division I and II. (CSA approved Groups C, D, E, F, G only). Explosion proof enclosure. NEMA-7, 9. Class I Group B, C, D. Class II Group E, F, G. Division I and II. (CSA approved groups C, D, E, F, G only).	UL UL UL UL	CSA CSA CSA
CIRCUITS			48XX 78XX 78XXHM 98XX XXXX	 XX					Single stage. Mercury switch. See Chart A. Single stage. Snap switch. See Chart A. Hermetically sealed snap switch. See Chart B. Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart B. Two stage. Consult factory.		
FLOATS					A AS B CS D DS				3 1/2″×6″ (89×152.4mm) 304SS float, 303SS rod, brass stops, galvanized steel *support extension. 300 psi (21bar) @ 500°F (260°C), 450 psi (31bar) @ 100°F (38°C) (float No. 45-57 SS) 3 1/2″ x 6″ (89x152.4 mm) 304SS float, 316SS stops, 304SS *support extension. 4 1/2″ (114mm) copper float, 303SS rod, brass stops, galvanized steel *support extension. 150 psi (10bar) @ 300°F (149°C) Max., (float No. 45-43-1) 4 1/2″ (114 mm) 304SS, 316SS stops, 304SS *support extension. 300 psi (21bar) @ 500°F (260°C) Max. 600 psi (42bar) @ 100°F (38°C) Max. (float No. 45-30) 7″ (178mm) 304SS float, 303SS rod, brass stops, galvanized steel *support extension. 450 psi (31bar) @ 100°F (38°C) Max. 425 psi (29bar) @ 200°F (93°C) Max. 300 psi (21bar) @ 500°F (260°C) Max. (float No. 45-50) 7″ (178mm) 304SS float , 316SS stops, 304SS *support extension.	UL UL UL UL	CSA CSA CSA CSA
OPERATING POINT						24			Operating point. See Chart D on previous page.	UL	CSA
SPEC. GRAVITY							0.75		Specific gravity at which control will operate. See Chart D on previos page for float selection. Indicates flange size, materials and pressure rating.	UL	CSA
FLANGES **Other materials and pressure ratings available. Consult factory.**								0 2 3 4 5 7 8 9 10	No flange, 3/4″ male NPT 4″ 125# Cast Iron for 3 1/2″ × 6″ (89 × 152.4 mm) float 5″ 125# Cast Iron for 4 1/2″ (114 mm) float 6″ 125# Cast Iron for 4 1/2″ (114 mm) float 8″ 125# Cast Iron for 7″ (178 mm) float 4″ 150# Forged Steel for 3 1/2″ × 6″ (89 × 152.4 mm) float 5″ 150# Forged Steel for 4 1/2″ (114 mm) float 6″ 150# Forged Steel for 4 1/2″ (114 mm) float 8″ 150# Forged Steel for 7″ (178 mm) float	UL	CSA

*Not supplied if insertion depth is less than 15″.

CHARTS A & B ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS AC 120V	AC 240V	AC 440V	DC 30V	DC 125V	DC 250V	ORDERING CODE SINGLE STAGE		
CHART A	**SP-ST** Open on level FALL	10	5	3†		10	5	-4821	UL	CSA
Mercury Contacts	**SP-ST** Open on level RISE	10	5	3†		10	5	-4820	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4813	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4814	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	UL	CSA
CHART B	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	UL	CSA
Snap Action Contacts	**DP-DT** Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	UL	CSA
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806		
	SP-DT One switch	10	3			10‡	3‡	-9810		

*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC

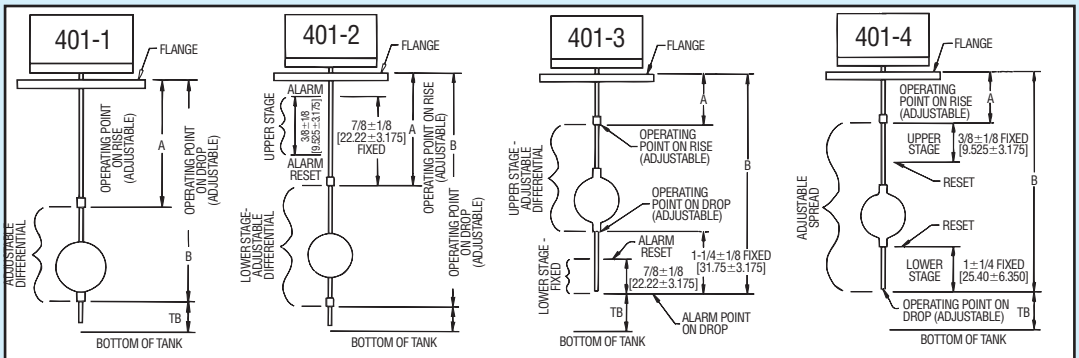
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8
i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series 401

Top Mount — Float Type

Single or Two Stage for Pump or Alarm, Depth to 12 ft., Specific Gravity to 0.50, Hermetically Sealed Switches



TYPE 401-1 SINGLE STAGE
ADJUSTABLE HI AND LO OPERATING LEVELS

TYPE 401-2 TWO STAGE
ADJUSTABLE OPERATING LEVELS PLUS HI LEVEL ALARM OR TRIP. LOWER STAGE IS OPERATING CIRCUIT. UPPER STAGE IS ALARM OR TRIP.

TYPE 401-3 TWO STAGE
ADJUSTABLE OPERATING LEVELS PLUS LO LEVEL OR ALARM OR TRIP. LOWER STAGE IS ALARM OR TRIP CIRCUIT. UPPER STAGE IS OPERATING CIRCUIT.

TYPE 401-4 TWO STAGE
HI AND LO ALARM OR TRIP WITH ADJUSTABLE SPREAD BETWEEN STAGES. LOWER STAGE IS LO LEVEL ALARM OR TRIP CIRCUIT. UPPER STAGE IS HI LEVEL ALARM OR TRIP CIRCUIT.

DIMENSIONS – TYPE 401 - 1, 2, 3, 4 – CHART A

APPROXIMATE MAXIMUM & MINIMUM OPERATING DEPTHS IN INCHES BELOW TOP OF FLANGE FOR STANDARD GUIDE ROD LENGTHS AT VARIOUS SPECIFIC GRAVITIES. FIGURES MAY VARY ± 2″(50 mm) DEPENDING ON FLOAT SIZE.

UPPER FIGURE - INCHES
LOWER FIGURE - METRIC

FLOATS C = COPPER SS = STAINLESS STEEL	MINIMUM "A" SP. GR. 1.0 SLIGHTLY LESS FOR 0.72, 0.62, 0.5	MINIMUM "B"	MAXIMUM FOR "B" — DISTANCE BELOW TOP OF FLANGE FOR OPERATION											
			SP. GR. 1.0 GUIDE RODS			SP. GR. 0.72 GUIDE RODS			SP. GR. 0.62 GUIDE RODS			SP. GR. 0.5 GUIDE RODS		
			4′ 1.22 M	8′ 2.44 M	12′ 3.66 M	4′ 1.22 M	8′ 2.44 M	12′ 3.66 M	4′ 1.22 M	8′ 2.44 M	12′ 3.66 M	4′ 1.22 M	8′ 2.44 M	12′ 3.66 M
3 1/2″× 6″ SS	13	15	46	93	141	*45	*92	*126	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	33cm	38 cm	1.17 M	2.36 M	3.58 M	1.14 M	2.33 M	3.2 M	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
4 1/2″ C	13	15	46	93	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	33 cm	38 cm	1.17 M	2.36 M	3.58 M	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
4 1/2″ SS	13	15	46	93	141	45	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	33 cm	38 cm	1.17 M	2.36 M	3.58 M	1.14 M	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
7″ SS	13	15	46	93	141	45	92	140	44	92	140	44	92	140
	33 cm	38 cm	1.17 M	2.36 M	3.58 M	1.14 M	2.33 M	3.56 M	1.18 M	2.33 M	3.56 M	1.18 M	2.33 M	3.56 M

*Available for Type 401-1 and 3 only.

DIMENSIONS TB & B (see diagrams). Minimum distance below flange required for clearance for following guide rod lengths: 49 1/2″ for 4 ft. rod; 97 1/2″ for 8 ft rod; 145 1/2″ for 12 ft rod. All dimensions are approximate and will vary slightly depending on specific gravity, float material and size. Critical dimensions must be verified with the factory before placing order.

These heavy duty top-mounted liquid level controls operate in pressurized or non-pressurized tanks and sumps with pressures to 600 psi and temperatures to 500°F. They can be ordered to operate at depths to 12 feet with a 12 foot guide rod. Adjustable in single stage and two stage operation to provide action such as operating a pump; pump and high alarm or shutdown; pump and low alarm, or high and low alarm; or high, high alarm; or low, low alarm. Alarm functions can also be used as shutdowns. Series 401 is available in mercury or snap action contact switches. The charts on these pages indicate the range of floats, flange sizes, operating depths, guide rods and electrical circuits offered. Specific gravity applications from 0.5 to 1.0.

APPLICATIONS

Oil refineries, chemical plants, power generating stations, pumping stations, sanitary/waste water facilities, tank and vessels.

SPECIFICATIONS

Minimum Specific Gravity: See chart A.
Temperature Rating: –20°F (–29°C) to 500°F (260°C).
Switch Type: Snap action or mercury.
Electrical Rating: See charts D and E.
Wiring Connections: G, WT or E enclosure, terminal block. EV enclosure, 18″ (460 mm) leads.
Process Connection: Top mount flange.
Enclosures: G, painted steel and aluminum; WT, painted steel, aluminum and neoprene; E, aluminum; EV, aluminum and neoprene.
Wetted Parts: Depends on configuration. Check charts A, B, and C.
Weights: Electrical head and float assembly only: G, WT 10 lb (4.5 kg); E, EV 14 lb (6.3 kg). Flange only: 4″, 17 lb (7.7 kg); 5″, 20 lb (9 kg); 6″, 27 lb (12.3 kg); 8″, 47 lb (21.3 kg). Guide rods assembly: 4 ft (1.2 m), 14 lb (6.4 kg); 8 ft (2.4 m), 28 lb (12.7 kg); 12 ft (3.6 m), 42 lb (19 kg).

Suggested Specifications

Liquid level control shall be top flange mounted, float operated, with (Brass)(Stainless Steel) guide rod assembly for operation to (4)(8)(12) foot depth. Float and flange shall be sized for intended specific gravity. Operation shall be 401-1 (pump), 401-2 (pump and high alarm), 401-3 (pump and low alarm), 401-4 (high and low alarm), Circuit shall be (SPST) (SPDT) (DPDT) hermetically sealed snap action (mercury) switch. Switch mechanism shall be gravity return. Enclosure shall be general purpose (weatherproof) (explosion-proof) (explosion-proof - vapor proof).

MODEL CHART – SERIES 401

EXAMPLE	401	1	WT	7810	XX	A	1.0	48	1	401-1-WT-7810-A-1.0-48-1 Single stage with adjustable deadband. Normally used for pump operation.	UL	CSA
CONSTRUCTION		2								Two stage. Lower stage has adjustable deadband. Upper stage has fixed deadband. Normally used for pump operation and high alarm or shutdown.	UL	CSA
		3								Two stage. Upper stage has adjustable deadband. Lower stage has fixed deadband. Normally used for pump operation and low alarm or shutdown.	UL	CSA
		4								Two stage. Each stage has fixed deadband with adjustable deadband between stages. Normally used for high and low alarm or shutdown.	UL	CSA
ENCLOSURES			G							General purpose NEMA-1 enclosure.	UL	CSA
			WT							Water tight enclosure suitable for NEMA-1, 2, 3, 4,4X.	UL	
			E							Explosion proof enclosure, NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. Division I and II. (CSA approved Groups C, D, E, F, G only).	UL	CSA
			EV							Explosion proof – vapor proof enclosure. NEMA-7, 9. Class I Groups B, C, D. Class II Groups E, F, G. Division I and II.	UL	
CIRCUITS				48XX						Single stage. Mercury switch. See Chart D.		
				48XX	XX					Two stage. Mercury switch. See Chart D.		
				78XX						Single stage. Snap switch. See Chart D.		
				78XX	XX					Two stage. Snap switch. See Chart E.		
				78XXHM						Hermetically sealed snap switch. See Chart E.		
				98XX						Single stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart E.		
				98XX	XX					Two stage. High capacity DC snap switch. Use heat fins (HF) if process temperature exceeds 350°F (177°C). Do not exceed 450°F (232°C). See Chart E.		
						A				Float, float rod and stops. See Chart B.		
							1.0			Specific gravity of process fluid. See Chart A on previous page for operating limits.		
								48		Operating point. See Chart A for operating limits.		
									1	Flange size, material, rating and guide rod assembly. See Chart C		

FLOAT, FLOAT ROD AND STOPS – CHART B

CODE	SIZE	MATERIAL	PRESS/TEMP MAX.	ROD	STOPS
A	3 1/2″ × 6″ (89 × 152.4 mm)	304SS Float	300 PSI (21 BAR) 500°F (260°C)	303SS Rod	Brass Stops
B	3 1/2″ × 6″ (89 × 152.4 mm)	304SS Float	300 PSI (21 BAR) 500°F (260°C)	303SS Rod	316SS Stops
C	4 1/2″ (114 mm)	Copper Float	150 PSI (10 BAR) 300°F (149°C)	303SS Rod	Brass Stops
D	4 1/2″ (114 mm)	316SS Float	300 PSI (21 BAR) 500°F (260°C)	303SS Rod	316SS Stops
E	7″ (178 mm)	304SS Float	300 PSI (21 BAR) 500°F (260°C)	303SS Rod	316SS Stops

FLANGE AND GUIDE ROD ASSEMBLY FOR: 3½ × 6″ (8″ × 152.4 mm) FLOAT – CHART C

CODE	FLANGE SIZE	GUIDE ROD		CODE	FLANGE SIZE	GUIDE ROD	
		LENGTH	MATERIAL			LENGTH	MATERIAL
1	5″ 125# CI	4′ (1.2 M)	Brass	13	6″ 125# CI	4′ (1.2 M)	Brass
2	5″ 125# CI	8′ (2.4 M)	Brass	14	6″ 125# CI	8′ (2.4 M)	Brass
3	5″ 125# CI	12′ (3.6 M)	Brass	15	6″ 125# CI	12′ (3.6 M)	Brass
4	5″ 125# CI	4′ (1.2 M)	303SS	16	6″ 125# CI	4′ (1.2 M)	303SS
5	5″ 125# CI	8′ (3.6 M)	303SS	17	6″ 125# CI	8′ (2.4 M)	303SS
6	5″ 125# CI	12′ (3.6 M)	303SS	18	6″ 125# CI	12′ (3.6 M)	303SS
7	5″ 150# CS	4′ (1.2 M)	Brass	19	6″ 150# CS	4′ (1.2 M)	Brass
8	5″ 150# CS	8′ (2.4 M)	Brass	20	6″ 150# CS	8′ (2.4 M)	Brass
9	5″ 150# CS	12′ (3.6 M)	Brass	21	6″ 150# CS	12′ (3.6 M)	Brass
10	5″ 150# CS	4′ (1.2 M)	303SS	22	6″ 150# CS	4′ (1.2 M)	303SS
11	5″ 150# CS	8′ (2.4 M)	303SS	23	6″ 150# CS	8′ (2.4 M)	303SS
12	5″ 150# CS	12′ (3.6 M)	303SS	24	6″ 150# CS	12′ (3.6 M)	303SS

FLANGE AND GUIDE ROD ASSEMBLY FOR: 4½″ (114 mm) FLOAT – CHART C

CODE	FLANGE SIZE	GUIDE ROD	
		LENGTH	MATERIAL
25	6″ 125# CI	4′ (1.2 M)	Brass
26	6″ 125# CI	8′ (2.4 M)	Brass
27	6″ 125# CI	12′ (3.6 M)	Brass
28	6″ 125# CI	4′ (1.2 M)	303SS
29	6″ 125# CI	8′ (2.4 M)	303SS
30	6″ 125# CI	12′ (3.6 M)	303SS
31	6″ 150# CS	4′ (1.2 M)	Brass
32	6″ 150# CS	8′ (2.4 M)	Brass
33	6″ 150# CS	12′ (3.6 M)	Brass
34	6″ 150# CS	4′ (1.2 M)	303SS
35	6″ 150# CS	8′ (2.4 M)	303SS
36	6″ 150# CS	12′ (3.6 M)	303SS

FLANGE AND GUIDE ROD ASSEMBLY FOR: 7″ (178 mm) FLOAT – CHART C

CODE	FLANGE SIZE	GUIDE ROD	
		LENGTH	MATERIAL
37	8″ 125# CI	4′ (1.2 M)	Brass
38	8″ 125# CI	8′ (2.4 M)	Brass
39	8″ 125# CI	12′ (3.6 M)	Brass
40	8″ 125# CI	4′ (1.2 M)	303SS
41	8″ 125# CI	8′ (2.4 M)	303SS
42	8″ 125# CI	12′ (3.6 M)	303SS
43	8″ 150# CS	4′ (1.2 M)	Brass
44	8″ 150# CS	8′ (2.4 M)	Brass
45	8″ 150# CS	12′ (3.6 M)	Brass
46	8″ 150# CS	4′ (1.2 M)	303SS
47	8″ 150# CS	8′ (2.4 M)	303SS
48	8″ 150# CS	12′ (3.6 M)	303SS

ELECTRICAL CIRCUITS AND RATINGS

SWITCH TYPE	SWITCH ACTION	ELECTRICAL RATINGS IN AMPS						ORDERING CODE				
		AC			DC			SINGLE STAGE	TWO STAGE			
		120V	240V	440V	30V	125V	250V		LOWER	UPPER		
CHART D	**SP-ST** Open on level FALL	10	5	3†		10	5	-4820	-4820	-21	UL	CSA
Mercury Contacts	**SP-ST** Open on level RISE	10	5	3†		10	5	-4821	-4821	-20	UL	CSA
	SP-DT One Switch	4	2	1†		4	2	-4810	-4810	-10	UL	CSA
	SP-DT Two switches E.I.*	10	5	3†		10	5	-4815	-4815	-15	UL	CSA
	DP-ST Two switches E.I.* Open on level FALL	10	5	3†		10	5	-4814	-4814	-13	UL	CSA
	DP-ST Two switches E.I.* Open on level RISE	10	5	3†		10	5	-4813	-4813	-14	UL	CSA
	DP-DT Two SP-DT switches	4	2	1†		4	2	-4806	-4806	-06	UL	CSA
CHART E	**SP-DT** One switch	12	5	3†		0.5**	0.25**	-7810	-7810	-10	UL	CSA
Snap Action Contacts	**DP-DT** Two SP-DT switches	12	5	3†		0.5**	0.25**	-7806	-7806	-06	UL	CSA
	SP-DT One hermetically sealed switch	5	5		5**			-7810HM	-7810HM	-10HM		
	DP-DT Two hermetically sealed SP-DT switches	5	5		5**			-7806HM	-7806HM	-06HM		
	DP-DT Two SP-DT switches	10	3			10‡	3‡	-9806	-9806	-06		
	SP-DT One switch	10	3			10‡	3‡	-9810	-9810	-10		

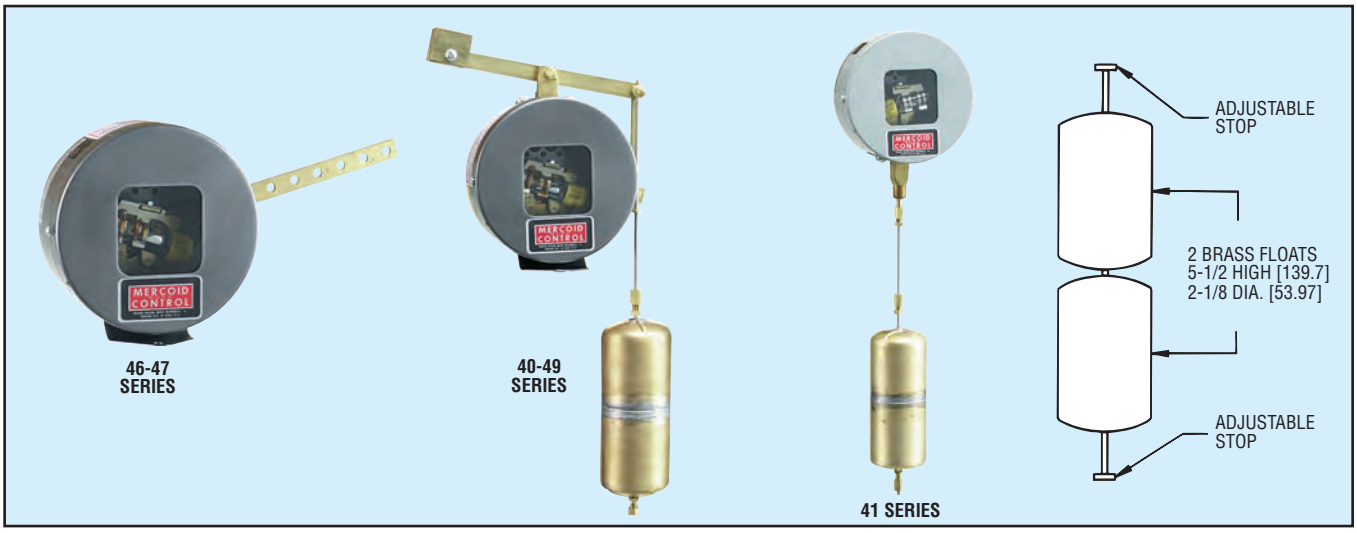
*Electrically Independent
‡10 Amp inductive (Polarized) at 125 VDC

†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8
i.e. -4820 becomes -5820, -7810 becomes -8810, etc.
**Resistive

Mercoid®

Series
40-41
46-47
49

Lever Arm and Float Controls



LEVER OPERATED CONTROLS

To Open/Close Circuits by Mechanical Movement Snap-Action Type 46 (General Purpose NEMA-1)

Used where positive mercury switch action is desired when the operating lever is moved to a particular position (see Chart C for various circuits available). The mercury switch does not move until the operating arm has moved a definite amount at which time it "snaps" to its alternate position.

Direct-Action Type 47 (General Purpose NEMA-1)

Used where greater sensitivity and more over-travel is desired. The mercury switch is mounted on the lever and moves with it. Requires less force and travel than the snap-action type. See Chart C for switch operations.

Direct Action with Spring Return-Type 47SR

For same application as Type 47 except this control is equipped with the spring return feature. The mercury switch is mounted on the lever arm with a spring assembly which returns the arm to the "Center" position when force is removed from the lever arm.

Standard Features

General Purpose-Types 46, 47, 47SR: 4-3/4″ dia. steel case finished gray enamel. Glass fronted cover. Outlet box has 1/2″ knockouts on both sides. Standard with bottom mounting base plate having two 13/64″ holes 3″ apart. 4-1/2″ lever arm extended to right with seven lever holes 1/2″ Centers.

FLOAT CONTROLS
For vessels not under pressure

Type 40-49

For use with rods and floats to open/close mercury switches by a change of liquid levels in vessels not under pressure. Example: to start and stop motor operated pumps, or perform other functions in changes of liquid level.

Type 40 Counter Balanced Snap-Action Movement

For general applications. The float assembly slides up and down the float rod. When the float rises to the top stop, it moves the operating arm up, and when it drops to the bottom stop, it moves the operating arm down. The mercury switch does not move until the operating arm has moved a definite amount, at which time it "snaps" to its alternate position. For minimum liquid level changes, see Chart C. Enclosure is NEMA-1 general purpose.

Type 49 Counter Balanced Direct Action

For use where closer differential in level change is desired between on and off operation. The mercury switch is mounted directly on the operating lever and moves with it. This control requires less operating force than the snap-action type. For minimum liquid level changes, see Chart C. Enclosure is NEMA-1 general purpose.

Type 49SRC Counter Balanced Direct-Action with Spring Return
Similar to Type 49 except spring return assembly added to provide for stage operation. The spring return assembly holds the arm in a neutral position (contacts either open or closed) until the float engages upper or lower stop on rod, and actuates control contacts. Can be used for high or low alarm. Enclosure is NEMA-1 general purpose.

Standard Features

General Purpose-Types 40, 49, 49SRC: 4-3/4″ dia. steel case finished gray enamel. Glass fronted cover. Outlet box has 1/2″ knockouts on both sides. Standard with bottom mounting base plate having two 13/64″ holes 3″ apart. Standard Construction: Furnished with bottom mounting and with lever arm extended to right.

Type 41 Plunger Type Snap-Action

For use on closed tanks (cannot be used on pressurized tanks). Rod and floats same as Type 40 except maximum rod length 4 ft. For minimum liquid level change, see Chart C. Standard Construction: Furnished with 1/4″ NPT Bottom Connection only. Enclosure is NEMA-1 general purpose. For Weather Resistant NEMA-3 Case, specify Type 41W. When ordering, specify Type No. and Circuit. Example: Type 41 - 156. Can be used for pump operation or day tanks.

MODEL CHART – SERIES 40-49 LEVER ARM OPERATED FLOAT CONTROLS

40	2	R6	Example		
40	2	R6	Series Designator. Counter balance lever arm operated control with adjustable deadband. Minimum deadband approximately 2″ (51 mm), maximum deadband 20 ft. (6 M). Operates with **Two** 2-1/8″×5-1/2″ (54×140 mm) diameter brass floats with rod length up to 8 ft; or **Three** 2-1/2″×5 1/2″ (54×140 mm) brass floats for 8 to 20 ft (2.44 to 6M) rod. Float, (Float type, size and rod length must be specified on order). Has mercury switch with "snap action" movement assembly. General purpose case only. Mercury switch circuit. See Chart C. Indicates lever is to the right, and has bottom flange for mounting. **Float and Rod assemblies must be ordered separately. See Chart A. For minimum deadband see Chart B.**	UL	CSA
49	**4821**	**R6**	**Example**		
49	48xx	R6	Similar to Type 40 Series, except mercury switch is mounted directly on operating arm providing closer minimum deadband of 7/8″ (22 mm). Mercury switch circuit. See Chart C. Indicates lever is to the right and has bottom flange for mounting. **Float and Rod assemblies must be ordered separately. See Chart A. For minimum deadband see Chart B.**		CSA
49SRC	**4849**	**R6**	**Example**		
49SRC	48xx	R6	Similar to Type 49 except has spring return to hold lever arm in center (internal) position until the float engages upper or lower stop actuating mercury switch. Circuit 4849 suitable for high and low alarm. Mercury switch circuit. See Chart C. Indicates lever is to the right and has bottom flange for mounting. Other circuits available. Consult factory. **Float and Rod assemblies must be ordered separately. See Chart A. For minimum deadband see Chart B.**		CSA

MODEL CHART – SERIES 41 PLUNGER TYPE FLOAT CONTROLS

41		2	Plunger type liquid level control with mercury switch and "snap action" movement assembly. For use with closed, ventilated tanks (cannot be used with pressurized tanks). Maximum rod length 4 ft. (1.22 M). Operates with **One** 4 1/2″ (114 mm) copper or stainless steel float or **Two** 2 1/8″×5 1/2″ (54×140 mm) cylinder floats. (For liquids less than 0.90 specific gravity use three cylindrical floats). Furnished with 1/4″ NPT bottom connection.	UL	CSA
	W	2	Mercury switch circuit. See Chart C. Weather resistant NEMA - 3 case. **Float and Rod assemblies must be ordered separately. See Chart A. For minimum deadband see Chart B.**		

CHART A – FLOATS AND RODS FOR SERIES 40, 41 AND 49

37 - 29	Consists of 4 ft. (1.22 M) stainless steel float rod, two 2 1/8″×5 1/2″ (54×140 mm) cylindrical brass floats, and brass stops.
37 - 43	Consists of 4 ft. (1.22 M) stainless steel float rod, 4 1/2″ (114 mm) diameter 304SS float and stainless steel stops.
37 - 49	Consists of 4 ft. (1.22 M) stainless steel float rod, 4 1/2″ (114 mm) diametercopper float and brass stops.
	Other rod lengths available. Consult factory.

CHART B – MINIMUM LIQUID LEVEL CHANGES (WATER)

TYPE NO.	MAX. ROD LENGTH	TWO 2-1/8″ (54MM) O.D. BRASS FLOATS	ONE 4-1/2″ (114 MM) O.D. COPPER OR SS FLOAT
40	20 Ft. (6 M)	2″ (51 mm)	1 1/2″ (38 mm)
41	4 Ft. (1.22 M)	4″ (102 mm)	1 1/2″ (38 mm)
49	20 Ft. (6 M)	7/8″ (22 mm)	1/2″ (13 mm)
49SRC	20 Ft. (6 M)	1 1/2″ (38 mm)	3/4″ (19 mm)

MODEL CHART – SERIES 46-47 LEVER ARM OPERATED CONTROLS

46	2	R6			
46	2	R6	Series Designator. Lever arm operated control. Deadband approximately 2″ (51 mm). Has mercury switch with "snap action" movement assembly. General purpose case only. Mercury switch circuit. See Chart C. Indicates lever is to the right, and has bottom flange for mounting.	UL	CSA
47	**4821**	**R6**			
47	48xx	R6	Similar to Type 46 Series, except mercury switch is mounted directly on operating arm providing closer minimum deadband of 7/8″ (22 mm). Mercury switch circuit. See Chart C. Indicates lever is to the right and has bottom flange for mounting.	UL	CSA
47SRC	**4821**	**R6**			
47SRC	48xx	R6	Similar to Type 47 except has spring return to hold lever arm in center (internal) position until the lever actuates engages upper or lower stop actuating mercury switch. Mercury switch circuit. See Chart C. Indicates lever is to the right and has bottom flange for mounting. Other circuits available. Consult factory.	UL	CSA

CHART C

SWITCH ACTION			SNAP-ACTION TYPES 40, 41 OR 46	DIRECT-ACTION TYPES 47, 49, 47, 49SRC		
LEVER DOWN	CENTER	LEVER UP	ADD SUFFIX	ADD SUFFIX		
"A" OFF		ON	-2	-4821	UL	CSA
"A" ON		OFF	-3	-4820	UL	CSA
"A" ON "B" ON		OFF OFF	-103	-4814	UL	CSA
"A" OFF "B" OFF		ON ON	-127	-4813	UL	CSA
"A" OFF "B" ON		ON OFF	-156	-4815	UL	CSA
"A" OFF "B" ON	ON ON	ON OFF		-4823	UL	CSA
"A" OFF "B" ON	OFF OFF	ON OFF		-4849	UL	CSA
"A" OFF "B" ON	ON OFF	ON OFF		-4805	UL	CSA

Other Switches or Combination of Switches are Available, consult factory.

ELECTRICAL RATING — ALL TYPES

Standard type 9-51 switch. Each switch AC or DC 10A. 120V., 5A, 240V., Motor Rating 120/240V 3/4 hp. single phase AC 1/3 hp. DC.

ORDERING INFORMATION:

EXAMPLE: How to order (see model chart)

40 2 R6
1 2 3

1 Series Designation
2 Circuit
3 Float Arm and Flange Location

EXAMPLE: How to order (see model chart)

41 2
1 2

1 Series Designator
2 Circuit

EXAMPLE: How to order (see model chart)

49 4821 R6
1 2 3

1 Series Designator
2 Circuit
3 Float Arm and Flange Location

EXAMPLE: How to order (see model chart)

46 2 R6
1 2 3

1 Series Designator
2 Circuit
3 Lever and Flange Location

EXAMPLE: How to order (see model chart)

49 SRC 4820 R6
1 2 3 4

1 Series Designator
2 Spring Return
3 Circuit
4 Float Arm and Flange Location

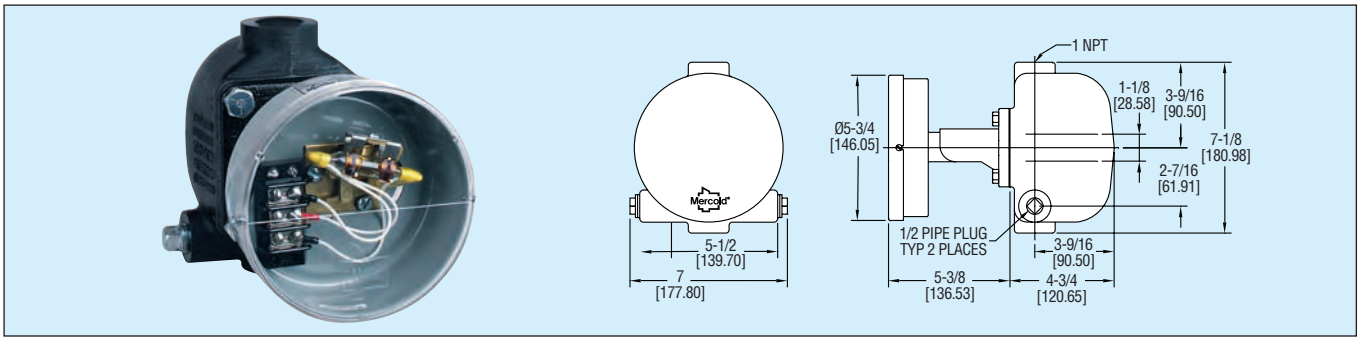
EXAMPLE: How to order (see model chart)

47 4821 R6
1 2 3

1 Series Designator
2 Circuit
3 Lever and Flange Location

Series 123/125 Cast Iron Chamber-Water Level Control

Heavy Duty, Snap Action or Direct Movement



Designed for boiler applications, the model 123 is used primarily for low water cut-off or feed-water control. Other uses include condensate tanks, deaerators, etc. A special snap action mechanism operating a mercury switch eliminates frequent operation due to surging water level. A transparent cover provides convenient visible operation of the electrical switch. The 125 Series offers the same long lasting service with a direct action mercury switch movement that provides a close deadband where needed. Stainless steel trim and manual reset are available if required.

Suggested Specification

Level control shall be side mounted type with cast iron chamber. Float shall operate switching mechanism by direct mechanical linkage. Mechanism shall be snap action type. Deadband shall be approximately 1⅛″ (28.6 mm) for 123 series, 3/8″ (10 mm) for 125 series. Control shall be Mercoid® Level ControlModel No. 123-(125-__).

SPECIFICATIONS

Service: Compatible liquids. Cast iron is not for use with lethal or flammable substances either liquid or gaseous.
Temperature Limit: 365°F (185°C).
Pressure Limit: 150 psig (10 bar).
Min. Specific Gravity: 0.88.
Process Connections: 1″ NPT.
Electrical Rating: See circuits.
Conduit Connection: 1/2″.
Housing: General purpose NEMA-1. Standard (weatherproof optional).
Float Chamber: Cast iron, not for use with lethal or flammable substances, either liquid or gaseous.
Packing Gland: Brass.
Float Material: 304SS.
Deadband: 123 Series approx. 1½″ (38 mm). 125 Series approx. 3/8″ (10 mm).
Weight: 20 lb (9 kg).
Packing: Special non-asbestos, graphite/lead packing.

MODEL CHART – SERIES 123-125

EXAMPLE	123	2		123-2 Liquid level control with SPST mercury switch closing on level increase. Minimum specific gravity 0.88. Cast iron body, general purpose case. Switch rated at 10 amp 120 VAC/DC, 5 amp 24 VAC/DC. Pressure 150 psi (10 bar). Maximum process temperature 365°F (185°C).		
CONSTRUCTION	123			Packing gland construction, cast iron chamber.* General purpose case. Snap acting movement assembly.	UL	CSA
CIRCUIT		2		SPST. Close on level increase. Mercury switch. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC, 1/3 hp 120/240 VDC.		
		3		SPST. Open on level increase. Mercury switch. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC, 1/3 hp 120/240 VDC.		
		153		SPDT. One circuit closes as one circuit opens. Mercury switch. Rated 4 amp 120 VAC/DC, 2 amp 240 VAC/DC. Common ground.		
		156		SPDT. Consisting of two SPST mercury switches. Electrically independent. One circuit closes as one circuit opens. Each switch rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC.		
		804		DPDT. Consisting of two SPDT mercury switches. Each switch has common ground. Two circuits close as two circuits open. Each switch rated 4 amp 120 VAC/DC, 2 amp 240 VAC/DC.		
		7000-153		SPDT snap-action switch. Rated 15 amp 120/240/480 VAC, 1/2 amp 120 VDC res., 1/4 amp 240 VDC res.		
OPTIONAL HOUSING			WP	Weather proof adlet housing.		
EXAMPLE	125	4820		125-4820 Liquid level control with SPST mercury switch closing on level fall. Minimum specific gravity 0.88, cast iron body. General purpose case. Switch rated at 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Pressure rating 150 psi (10 bar). Maximum process temperature 365°F (185°C).		
CONSTRUCTION	125			Packing gland construction, cast iron chamber.* General purpose case. Direct acting movement assembly.	UL	CSA
CIRCUIT		4820		SPST mercury switch close on level fall. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC, 1/3 hp 120/240 VDC.	UL	CSA
		4821		SPST mercury switch open on level fall. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC, 1/3 hp 120/240 VDC.	UL	CSA
		4810		SPDT. One circuit closes as one circuit opens. Mercury switch. Rated 4 amp 120 V AC/DC. Common ground.	UL	CSA
		4815		SPDT. Consisting of two SPST mercury switches. Electrically independent. One circuit closes as one circuit opens. Each switch rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC.	UL	CSA
		4806		DPDT. Consisting of 2 SPDT mercury switches. Each switch has common ground. Two circuits close as two circuits open. Each switch rated 4 amp 120 VAC/DC, 2 amp 240 VAC/DC.	UL	CSA

*Cast iron chamber is not for use with lethal or flammable substances, either liquid or gaseous.

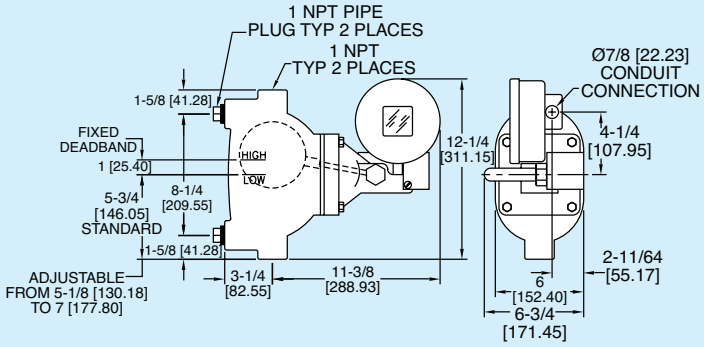
Mercoid®

Series 75

Torque Tube Type Level Control

Direct Action, Mercury Contacts

General purpose



Torque Tube design eliminates O-rings and packing in Model 75 level controls. Float assembly removes easily from chamber for periodic inspection. Four 1″ NPT process connections provide for top/bottom "flow through" or side/side mounting. Enclosures are available in general purpose, NEMA-1. Cast iron chambers are available for pressure to 300 psig (21 bar) at 425°F (218°C). Cast steel and 304 stainless steel chambers are rated for 400 psig (28 bar) at 500°F (260°C). All types will operate to a minimum specific gravity of 0.66.

SPECIFICATIONS

Service: Compatible liquids. Cast iron is not for use with lethal or flammable substances either liquid or gaseous.
Pressure Limit: See chart.
Temperature Limit: See chart.
Minimum Specific Gravity: 0.66.
Process Connection: 1″ female NPT .
Electrical Rating: See circuits.
Conduit Connection: 1/2″.
Level Variation to Actuate Switch: 1″ (25.4 mm).
Housing: NEMA-1, painted steel, transparent cover.
Float: 304 stainless steel.
Weight: 35 lb (16 kg).

Suggested Specification

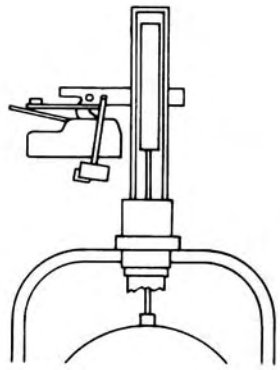
Level control shall be float operated through torque tube seal. Float shall be easily removable from chamber for clean-out and inspection.

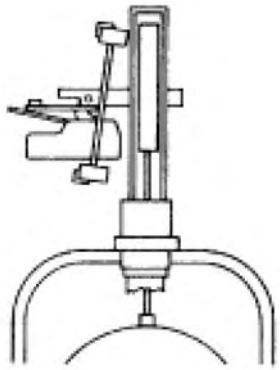
MODEL CHART – SERIES 75

EXAMPLE	75KM	A	4820	75KM-A-4820 Liquid level control with cast iron float chamber,* stainless steel float and brass trim. SPST mercury switch, open on level increase. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC; 1/3 hp 120/240 VDC. General purpose enclosure. Minimum specific gravity 0.66. Maximum pressure 300 psig (21bar). Maximum temperature 425°F (218°C).
HOUSING	75KM 75KXM			General purpose, NEMA-1 enclosure. Construction A, C only. General purpose, NEMA-1 enclosure. Construction A1, A2, C1, C2 only.
CONSTRUCTION		A A1 A2 C C1 C2		Cast iron chamber,* stainless steel float, brass trim. Minimum specific gravity 0.66. Maximum pressure 300 psig (21 bar). Maximum temperature 425°F (218°C). Cast steel chamber, stainless steel float, brass trim. Minimum specific gravity 0.66. Maximum pressure 400 psig (28 bar). Maximum temperature 500°F (260°C). Cast 304SS chamber, stainless steel float, brass trim. Minimum specific gravity 0.66. Maximum pressure 400 psig (28 bar). Maximum temperature 500°F (260°C). Cast iron chamber,* stainless steel float, 304SS trim. Minimum specific gravity 0.66. Maximum pressure 300 psig (21 bar). Maximum temperature 425°F (218°C). Cast steel chamber, stainless steel float, 304SS trim. Minimum specific gravity 0.66. Maximum pressure 400 psig (28 bar). Maximum temperature 500°F (260°C). Cast 304SS chamber, stainless steel float, 304SS trim. Minimum specific gravity 0.66. Maximum pressure 400 psig (28 bar). Maximum temperature 500°F (260°C).
CIRCUIT			4820 4821 4815 4823 4831 4849 4853 4855 4874	SPST mercury switch. Open on level increase. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC, 1/3 hp 120/240 VDC. SPST mercury switch. Close on level increase. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Motor rating 1 hp 120 VAC, 3/4 hp 240 VAC, 1/3 hp 120/240 VDC. SPDT. Consists of two SPST mercury switches, electrically independent. One circuit closes as one circuit opens. Each switch rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. SPDT. Consists of two SPST mercury switches, electrically independent. One switch closed at low and intermediate level, open at high level. One switch closed at high and intermediate level, open at low level. Each switch rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. SPDT. Consists of two SPST mercury switches, electrically independent. One switch closed at low level, open at intermediate and high level. One switch closed at low and intermediate level, open at high level. Each switch rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. SPDT. Consists of two SPST switches, electrically independent. One switch closed at low level, open at intermediate and high level. One switch closed at high level, open at intermediate and low level. Each switch rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Consists of one SPDT and one SPST mercury switch. SPDT switch has one circuit closed at low and intermediate level, open at high level. One circuit closed at high level, open at intermediate and low level. Rated 4 amp 120 VAC/DC, 2 amp 240 VAC/DC, SPST switch closed at high and intermediate level, open at low level. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Consists of one SPDT and one SPST mercury switch. SPDT switch has one circuit closed at low level, open at intermediate and high level. One circuit closed at high and intermediate level, open at low level. Rated 4 amp 120 VAC/DC, 2 amp 240 VAC/DC, SPST switch closed at low and intermediate level, open at high level. Rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC. Consists of three SPST mercury switches. One switch closed at low and intermediate level, open at high level. Two switches closed at high and intermediate level, open at low level. All switches rated 10 amp 120 VAC/DC, 5 amp 240 VAC/DC.

*Cast iron chamber is not for use with lethal or flammable substances, either liquid or gaseous.

Switches — Anti-Vibration





Anti-Vibration Mechanism

The anti-vibration head functions under conditions of extreme vibration - even the rolling or pitching experienced on seagoing vessels. The head consists of two magnets mounted on a pivoted arm, designed so that one magnet is attracted to the armature at all times. The drawing above demonstrates how the mechanism works. The Circuit Arrangement Chart indicates the circuitry available.

Standard Magnetic Mechanism

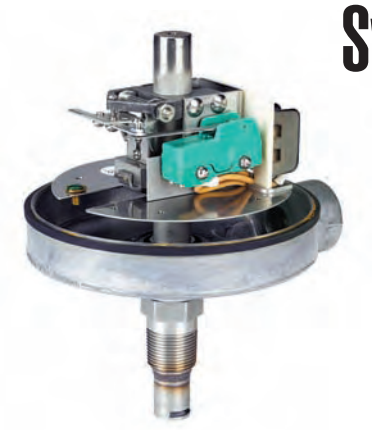
A permanent magnet is attached to a pivoted mercury or snap action switch. As the water level rises, it carries the float upward, raising the magnetic armature. This action attracts the magnet to the non-magnetic tube, tilting the pivot and actuating the mercury or snap action switch. When the liquid level falls, the float and the magnetic armature fall with it. As it moves out of the magnetic field, the attraction ceases, the magnet swings away from the tube and tilts the switch in the reverse position, actuating another series of circuits.

SINGLE STAGE OPERATION ONLY

WITH ENCLOSED METAL SNAP-ACTION CONTACT SWITCHES	
Circuit Arrangement	**Specification No.**
SP-DT (1 Switch)	-7710
SP-DT (2 Switches)	-7706
WITH HERMETICALLY SEALED MERCURY SWITCHES (Not Recommended For Shipboard Installation)	
Circuit Arrangement	**Specification No.**
SP-ST – Closes on DROP	-4720
SP-ST – Closes on RISE	-4721
SP-DT – One CLOSES as other OPENS	-4715
DP-ST – Close on DROP	-4714
DP-ST – Close on RISE	-4713

Other Circuits Available.

Switches — Standard



Snap Action Switches

Snap Action Switches are available on most Mercoid® liquid level controls. From one to four switches can be specified. They are available in single pole, double throw; and double pole, double throw models. The switches can be ordered with two or more switches electrically independent.

Mercury Switches

Mercoid® Mercury Switches are available on all Mercoid® liquid level controls. From one to four switches can be specified. Mercury switches are available in single pole, single throw; single pole, double throw; double pole, single throw; and double pole, double throw models. The switches can be ordered to open on level rise or level fall with two or more switches electrically independent, or single pole, double throw in one switch. Mercoid® designs and builds mercury switches for its liquid level controls to provide added dependability while extending operating life.

Special Circuits
Mercoid Magnetic Head Controls

Mercury Switches

Up to 4 electrically independent SPST switches available on a single level. Mercury contact switches are hermetically sealed for millions of "makes" and "breaks." They also provide visibility of contact elements unaffected by dust, dirt, grease, lint and corrosion. Ample capacity is provided for normal overloading. Note: 440 volts is available on special order, SPST only for two stage.

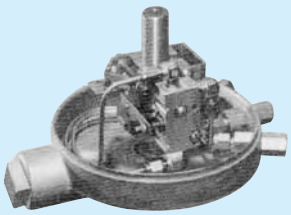
Mercury switches are far superior to other types, such as snap switches, for low energy circuits (4 to 20 milliamps). Mercury switches have stable low resistance and are not subject to atmospheric corrosion or contamination. The problems of contact bounce are minimized and no special circuitry or components are required.

CIRCUIT NUMBER	CIRCUITRY SINGLE OR TWO STAGE	ELECTRICAL RATINGS IN AMPS AC 120	AC 240	AC 440	DC 125	DC 250
4808V	Anti-vibration switch SPST make on low	4	2	1	4	2
4809V	Anti-vibration switch SPST make on high	4	2	1	4	2
4826V	Two anti-vibration switches DPST make on low	4	2	1	4	2
4828V	Two anti-vibration switches SPDT	4	2	1	4	2
4896V	Two anti-vibration switches DPST make on high	4	2	1	4	2
4838V	Two anti-vibration switches make on high. Two make on low. Equivalent to DPDT. Single stage only.	4	2	1	4	2
	SINGLE STAGE ONLY Set point will be inch lower than standard on some units.					
4910	Four switches; 4 pole close on low	10	5	3	10	5
4912	Four switches; (4P) 2 close on low, 2 close on high	10	5	3	10	5
4914	Four switches; (4P) 4 close on high	10	5	3	10	5

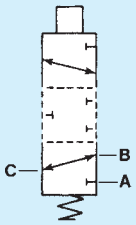
Note: Mercoid order editing may change the circuit number to give the desired switching action for the particular type of control ordered.

Level

Pneumatic Switch Mechanism
For Mercoid Magnetic Head Controls



Flow Diagram



The valve is field adjustable with three ported multi purpose valve functions when connected as indicated. Actuation at high level for 500 Series. All other series at low level.

VALVE FUNCTIONS WHEN CONNECTED AS ILLUSTRATED IN CHART

PORT	2 WAY N.O.	2 WAY N.C.	3 WAY N.O.	3 WAY N.C.	SELECTOR	DIVERTER
A	Plug	Inlet	Exhaust	Inlet	Inlet	Outlet
B	Inlet	Plug	Inlet	Exhaust	Inlet	Outlet
C	Outlet	Outlet	Outlet	Outlet	Outlet	Inlet

Precision built pneumatic switch mechanism is designed for use in a great variety of Mercoid® magnetic head liquid level controls where non-electric switching is required. One heavy duty valve suits all requirements and is available in 2-way or 3-way units. The pneumatic switch features normally open or normally closed control with air pressure from vacuum to 200 psig (13.8 bar). The pneumatic switch operates with up to 200 lbs. W.S.P., or 400°F (205°C) in the chamber. Designed to provide millions of operations under normal conditions the pneumatic mechanisms internal parts are manufactured of hardened stainless steel for long term reliability while the valve body is constructed of rugged solid anodized aluminum.

SPECIFICATIONS

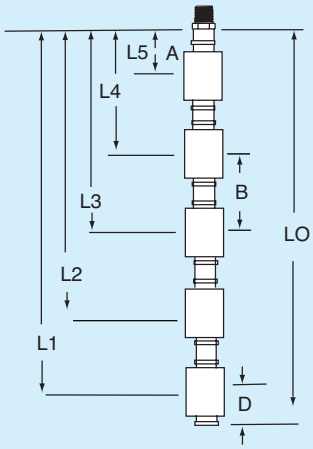
Maximum Switch Air Pressure: 200 psig (13.8 bar).
Maximum Chamber Pressure: 250 lb W.S.P.
Maximum Chamber Temperature: 400°F (205°C).
Pneumatic Process Connections: Three 1/8″ NPT connections 30° apart.
Process Connection Material: Brass and Copper (PC) or 316SS (PSS).
Flow Rate: 24 CFM (680 LPM) air with 100 psig (7 bar) inlet pressure.
Maximum Leak Rate: .45 CFH (12.7LPH) air at 100 psig (7 bar).
Valve Actuation Sequence: See chart above.

MODEL CHART

EXAMPLE	201	G	SK-547PC	C1	60	Example
SERIES DESIGNATOR	XXX					Can be used with most magnetic head level controls. Consult factory. See Specifications for pressure, temperature limits.
ENCLOSURE		G				General purpose, NEMA-1 enclosure.
PNEUMATIC CONNECTIONS			SK-547PC SK-548PSS			Three copper pneumatic fittings; 30 degrees apart 1/8″ NPT connections. Three 316SS pneumatic fittings; 30 degrees apart 1/8″ NPT connections.
				X	X	Denotes chamber materials and minimum specific gravity. Will vary by control type model number.

Series F7-MM Miniature Multi-Station Level Switch

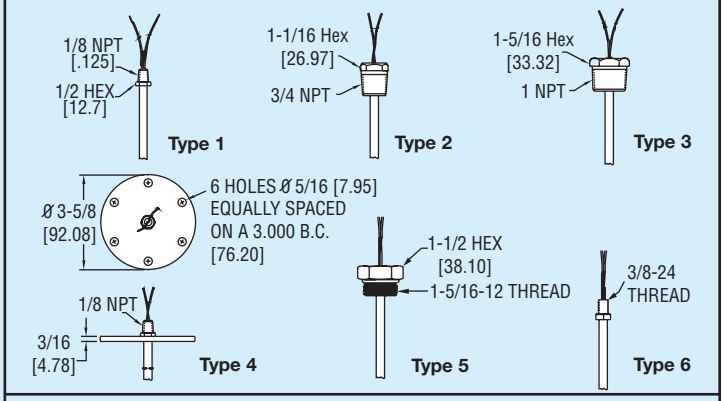
Custom, Lightweight, Low Cost, 316 SS or Buna-N Floats



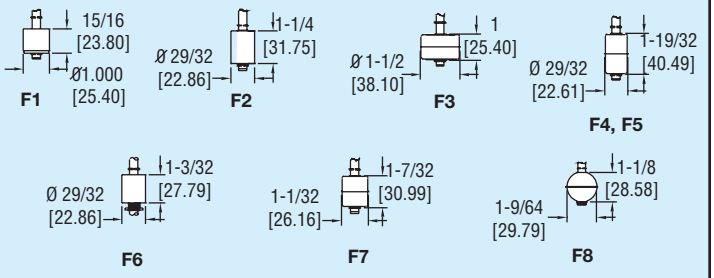
FLOAT TYPE	A in.	B in.	D in.
F1	7/8	1-3/4	3/4
F2	3/4	1-7/8	1-1/16
F3	3/4	1-13/16	15/16
F4	13/16	2-7/16	1-7/16
F5	9/16	2-7/16	1-3/4
F6	15/16	1-7/8	7/8, NO 1-3/16, NC
F7	13/16	2	1-1/8
F8	3/4	1-7/8	1-1/16

Actuation Levels
Each switching point requires one float.
A = Minimum distance from actuation point to bottom of mounting.
B = Minimum distance between actuation levels.
D = Minimum distance from end of unit to lowest actuation point.

MOUNTING DIMENSIONS



FLOAT DIMENSIONS



Miniature custom level switches with a sturdy. lightweight design are ideal for tanks less than four feet (1.2 m) deep. Control up to five different level points across a maximum length of 48″ (121 cm). Stems and mounting fixtures are available in 316 SS or brass.

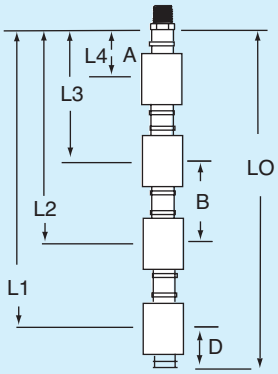
Models are built to your specifications

SPECIFICATIONS
Service: Compatible liquids.
Wetted Materials: Stem, connection, and float.
Temperature Limits: F1 and F2: Water, 180°F (82.2°C); Oil, -40 to 250°F (-40 to 121.1°C). All other floats: -40 to 300°F (-40 to 148.9°C).
Electrical Connection: 24″ (61 cm) free leads #22 AWG, TFE jacketed.
Mounting Orientation: Vertical ±30°.

Example		F7-MM	B	1	5	F1	1			F7-MMB1-5F11-03.00-07.00-11.00-15.00-20.00-25.00
Construction		F7-MM								Multi-station level, 1 to 5 switch points
Stem & Connection Material			B S							Brass with Beryllium copper stops 316SS with SS ARMCO PH-15-7MO stops
Connection Type				1 2 3 4 5 6						1/8″ NPT 3/4″ NPT (Cannot be used with float F1, F3, F7 and F8) 1″ NPT (Cannot be used with float F3) 3-5/8″ Flange [Maximum pressure is 50 psi (3.45 bar)] 1-5/16-12UNF-2A (Cannot be used with float F3) 3/8-24
Switch Points					#					Put 1 to 5 for the number of switch points desired
Float Type						F1 F2 F3 F4 F5 F6 F7 F8				Material / Min. s.g. / Max. Pres. psi (bar) Buna-N / .45 / 300 (20.68) Buna-N / .60 / 250 (17.24) 316SS / .70 / 100 (6.89) 316SS / .85 / 150 (10.34) 316SS / 1.1 / 400 (27.58) PTFE / .65 / 1000 (68.95) 316SS / .85 / 275 (18.96) 316SS / .90 / 600 (41.37)
Switch Type							1 2			SPST, .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC SPST, .8A @ 120 VAC, .4A @ 240 VAC (not UL) NO switch is standard. For NC place an "*" after the corresponding set point distance in the model number.
Set Point Distance	L5 L4 L3 L2 L1							00.00 00.00 00.00 00.00 00.00		In inches referenced from bottom of connection Repeat for each switch point with dashes in between. No numbers needed beyond the number of switches specified. In inches for example 12.25 would be 12.25″ from the bottom of the process connection.
Overall Length Options	L0								00.00	Maximum overall length of 48 inches (121 cm). Minimum length is L1 + D.

Series F7-MQ Quick-Ship Multi-Station Level Switch

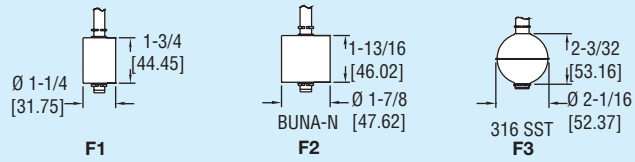
Fast Delivery, Customized, Up to Four Actuation Levels



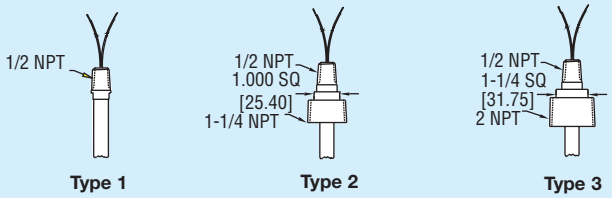
A	B	D
1-1/2″ (38.10 mm)	3″ (76.20 mm)	2″ (50.80 mm)

Actuation Levels
Each switching point requires one float.
A = Minimum distance from actuation point to bottom of mounting.
B = Minimum distance between actuation levels.
D = Minimum distance from end of unit to lowest actuation point.

FLOAT DIMENSIONS



MOUNTING DIMENSIONS



Customize level switches to meet application requirements quickly and affordably. Switches can be configured with up to four different control points and stem lengths up to 72″ (1.82 m). Stems and floats are available in 316 SS or brass.

SPECIFICATIONS

Service: Compatible liquids.
Temperature Limits: F1 and F2 with water: 0 to 180°F (-18 to 82°C); Buna-N floats with oil: -40 to 230°F (-40 to 110°C); F3: -40 to 300°F (-40 to 149°C).
Electrical Connections: 24″ (61 cm) free leads; #22 AWG TFE and #18 AWG Polymeric.
Mounting Orientation: Vertical ±30°.

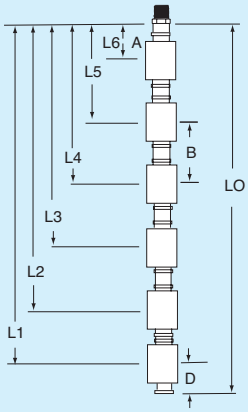
Models are built to your specifications

Example		F7-MQ	B	1	4	F3	3			J	F7-MQB1-4F33-07.00-11.00-15.00-20.00-24.00-J
Construction		F7-MQ									Multi-station level, 1 to 4 switch points
Stem &Connection Material			B S								Brass with Beryllium copper stops 316SS with SS ARMCO PH-15-7MO stops
Connection Type				1 2 3							1/2″ NPT (Float F2, F3 only) 1-1/4″ NPT (Float F1 only) 2″ NPT(Float F2, F3 only)
Switch Points					#						Put 1 to 4 for the number of switch points desired
Float Type						F1 F2 F3					Buna-N, min. s.g. 0.75, 150 psi (10.3 bar) max. pres. Buna-N, min. s.g. 0.55, 150 psi (10.3 bar) max. pres. 316SS, min. s.g. 0.75, 750 psi (51.7 bar) max. pres.
Switch Type							1 3				SPST, .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC SPDT, .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC NO switch is standard. For NC place an "*" after the corresponding set point distance in the model number.
Set Point Distance	L4 L3 L2 L1							00.00 00.00 00.00 00.00			In inches referenced from bottom of connection Repeat for each switch point with dashes in between. No numbers needed beyond the number of switches specified. In inches for example 12.25 would be 12.25″ from the bottom of the process connection.
Overall Length	L0								00.00		Minimum length is L1+D. Maximum length with Connection Length is 72″ (1.82 m)
Options										J	Junction box for wire leads, NEMA 4 (Not available with Connection Type 1)

Series
F7-MS

Multi-Station Level Switch

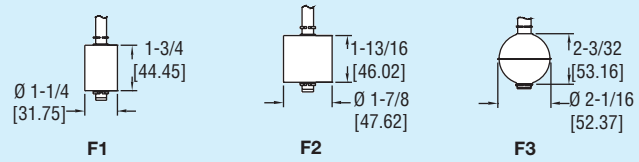
Customize To Fit Application, Up to Six 316 SS or Buna-N Floats



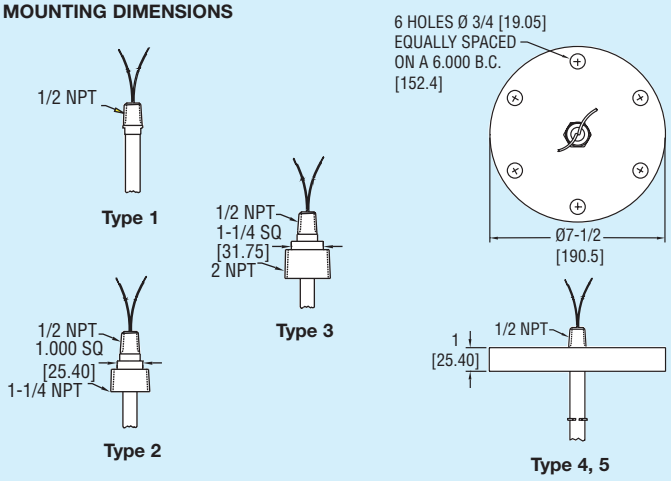
A	B	D
1-1/2″ (38.10 mm)	3″ (76.20 mm)	2″ (50.80 mm)

Actuation Levels
Each switching point requires one float.
A = Minimum distance from actuation point to bottom of mounting.
B = Minimum distance between actuation levels.
D = Minimum distance from end of unit to lowest actuation point.

FLOAT DIMENSIONS



MOUNTING DIMENSIONS



Customize level switches to meet application requirements Switches can be configured with up to six different control points and stem lengths up to 140 inches (3.56 m). Stems and floats are available in 316 SS or brass.

Models are built to your specifications

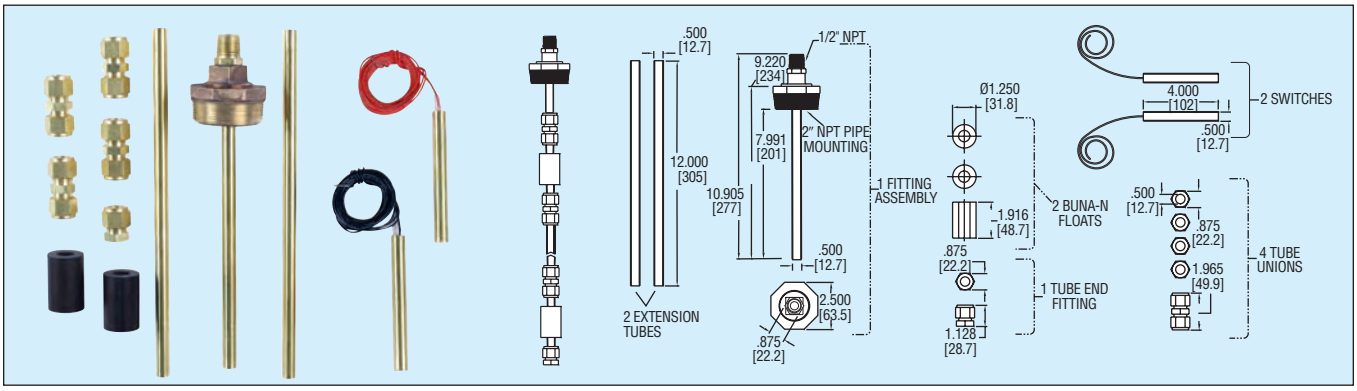
SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Stem, connection, and float.
Temperature Limits: Buna-N floats: 180°F (82.2°C) in water, -40 to 230°F (-40 to 110°C) in oil; SS floats: -40 to 300°F (-40 to 148.9°C).
Wire Leads: 24″ (61 cm) free leads; #22 AWG PTFE jacketed and #18 AWG Polymeric.
Mounting Orientation: Vertical ±30°.

Example		F7-MS	B	1	5	F3	1			J	F7-MSB1-5F31-04.00-07.00-11.00-15.00-20.00-24.00-J
Construction		F7-MS									Multi-station level, 1 to 6 switch points
Stem & Connection Material			B S								Brass with Beryllium copper stops 316SS with SS ARMCO PH-15-7MO stops
Connection Type				1 2 3 4 5							1/2″ NPT (Float F2, F3 only) 1-1/4″ NPT (Float F1 only) 2″ NPT 3″ 150# Flange Carbon Steel (Conn. material S only, float F2, F3 only) [Max. pres. 150 psi (10.3 bar)] 3″ 150# Flange 316SS (Conn. material S only, float F2, F3 only) [Max. pres. 150 psi (10.3 bar)]
Switch Points					#						Put 1 to 6 for the number of switch points desired
Float Type						F1 F2 F3					Buna-N, min. s.g. 0.75, 150 psi (10.3 bar) max. pres. Buna-N, min. s.g. 0.55, 150 psi (10.3 bar) max. pres. 316SS, min. s.g. 0.75, 750 psi (51.7 bar) max. pres.
Switch Type							1 2 3				SPST, .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC SPST, .8A @ 120 VAC, .4A @ 240 VAC (Not UL) SPDT, .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC No switch is standard. For NC place an "*" after the corresponding set point distance in the model number.
Set Point Distance	L6 L5 L4 L3 L2 L1							00.00 00.00 00.00 00.00 00.00 00.00			In inches referenced from bottom of connection Repeat for each switch point with dashes in between. NO numbers needed beyond the number of switches specified. In inches for example 12.25 would be 12.25″ from the bottom of the process connection.
Overall Length									00.00		Minimum length is L1+D. Maximum length with Connection Type 1: 36″ (91.4 cm), Type 2: 60″ (152.4 cm), and Types 3, 4, 5: 140″ (355.6 cm).
Options										J	Junction box for wire leads, NEMA 4 (Not available with Connection Type 1)

Model F7-MLK Multi-Level Switch Kit

One or Two Station Level Switch, Vertically Mount



Customize a level system to suit your application requirements. The F7-MLK Multi-Level Switch Kit contains all the components necessary for the design and fabrication of a 1 or 2 station level switch for pipe plug mounting. User can customize stem length (maximum 36˝), actuation point, distance between floats, and lead wire lengths. The switch kit is ideal for general purpose, low specific gravity, and gas and oil applications. Model F7-MLK includes two level stations (switch, tube, and Buna-N float), two brass extension tubes 12˝ length, four brass tube unions, one end fitting, and one mounting plug.

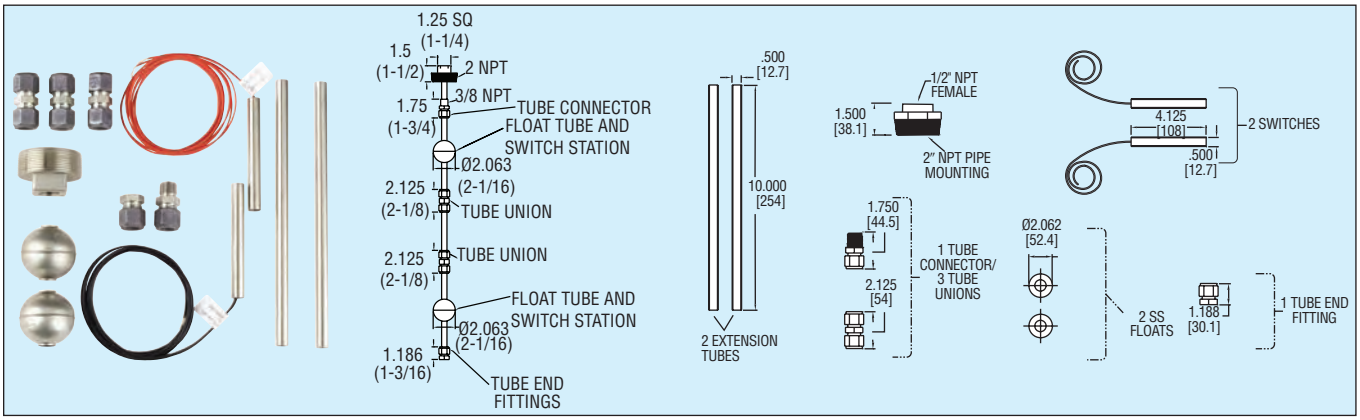
Model F7-MLK Multi-Level Switch Kit

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials (Float/Stem): Buna-N/Brass.
Temperature Limits: 221°F (105°C).
Pressure Limits: 150 psig (10 bar).
Switch Type: SPST, normally open or normally closed.
Electrical Rating: 60 Watts: 0.4A @ 220 VAC, 0.5A @ 110 VAC, 0.2A @ 120 VDC, 0.5A @ 24 VDC.
Electrical Connections: 22 AWG x 72˝ (183 cm) leads.
Process Connection: 2˝ male NPT pipe plug.
Mounting Orientation: Up to 30° angle from vertical.
Stem Length: 36˝ (91 cm) maximum.
Tube/Fitting Size: 1/2˝ O.D.
Minimum Specific Gravity: 0.45.
Weight: 3.5 lb (1.6 kg).

Model F7-MLK2 Multi-Level Switch Kit

316 Stainless Steel, One or Two Station Level Switch, Vertically Mount



The F7-MLK2 Multi-Level Switch Kit contains all the components necessary for the design and fabrication of a 1 or 2 station level switch for pipe plug mounting. The user can customize stem length (maximum 36˝), actuation point, distance between floats, and lead wire lengths. Model F7-MLK2 is constructed of 316 stainless steel—ideal for chemicals, corrosive liquids, oils, or high pressure applications. Model F7-MLK2 includes two level stations with floats (switch, tube, and float), two extension tubes 10˝ (254 mm) length, three tube unions, one tube connector, one end fitting, and one mounting plug.

Model F7-MLK2 Multi-Level Switch Kit

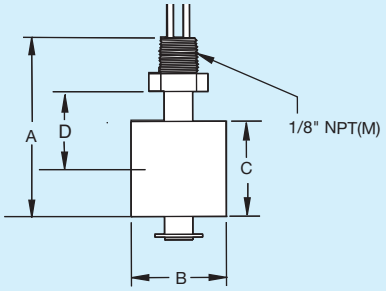
SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials (Float/Stem): 316 SS.
Temperature Limits: -40 to 275°F (-40 to 135°C).
Pressure Limits: 750 psi (52 bar).
Switch Type: SPST, selectable N.O. or N.C.
Electrical Rating: 20 VA: 0.8A @ 240 VAC, 0.17A @ 120 VAC, 0.3A @ 30 VDC.
Electrical Connections: 18 AWG x 60˝ (152 cm) wire leads.
Process Connections: 2˝ male NPT pipe plug.
Mounting Orientation: Up to 30° angle from vertical.
Minimum Specific Gravity: 0.75.
Tube Diameter: 1/2˝ O.D.
Stem Length: 36˝ (91 cm) maximum.
Weight: 3.3 lb (1.6 kg).

Series F7

Level Switches - Vertical

Low Cost, Reliable and Compact, Hermetically Sealed Contacts



Series F7 compact level switches combine low cost and reliability with fast, simple installation. Hermetically sealed reed switches are actuated by magnets permanently bonded inside the float and can be easily adapted to open or close a circuit on rising or falling levels. Vertical mount models are shipped with normally open switch contacts which close as the float rises toward the mounting threads. Reverse switch action by removing the float, rotating it end-for-end and replacing it on the stem. Vertical models mount internally, oriented within 30° of vertical, or select optional fittings for external mounting. Switch ratings are suitable for many solid state control systems and monitors or alarms. Simple relay interfaces can be used for higher current applications.

DIMENSIONS in Inches [mm]

Model	(A) Stem Number	(B) Float Length	(C) Float Diameter	(D) Actuation Height from Hex)
F7-SB	2.75 [70]	1.38 [35]	1.13 [29]	1.2 [31]
F7-SS2	2.06 [52]	1.0 [25]	1.0 [25]	0.73 [19]
F7-MPP	1.63 [41]	0.63 [16]	0.63 [16]	0.47 [12]
F7-PP	2.18 [55]	1.18 [30]	1.0 [25]	0.69 [18]
F7-BT	2.18 [55]	1.18 [30]	1.0 [25]	0.69 [18]
F7-K	2.13 [54]	1.0 [25]	1.0 [25]	0.65 [17]
F7-C11	2.06 [52]	1.0 [25]	1.0 [25]	0.56 [14]
F7-C21	2.06 [24]	1.0 [25]	1.0 [25]	0.56 [14]]
F7-BB	3.19 [81]	1.88 [48]	1.81 [46]	1.19 [30]
F7-PS	3.38 [86]	1.88 [48]	1.88 [48]	1.25 [32]
F7-PVC	3.44 [87]	1.5 [38]	1.81 [46]	0.75 [19]
F7-T1	3.47 [88]	2.13 [54]	1.94 [49]	0.92 [22]
F7-ST713	3.38 [86]	2.06 [52]	2.06 [52]	1.09 [28]
F7-ST714	3.38 [86]	2.06 [52]	2.06 52]	1.09 [28]

STOCKED MODELS

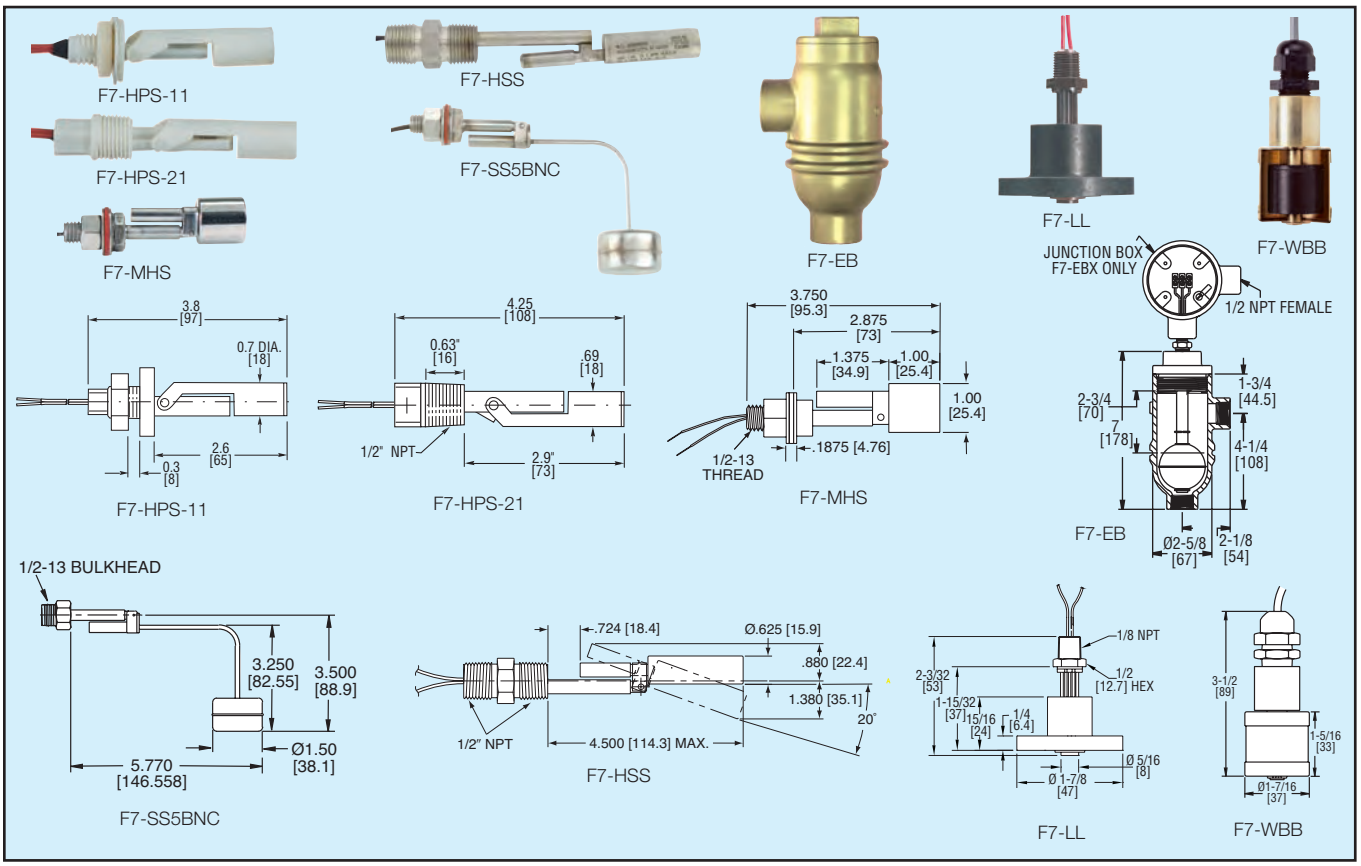
Model Number	Applications	Material Float/Stem	Temp. Limits	Press. Limits	Min. S.G.	Electrical Rating	Wire Leads	Mtg NPT(M)	Weight oz (g)
F7-SB	General purpose	Buna-N & Epoxy/ 316 SS	220°F 105°C	150 psig 10 bar	0.60	25 VA: 1A @ 220VAC	22 AWG 18″ [45 cm]	1/8″	2 (58)
F7-SS2	High temp/pressure, corrosives	316 SS (CYC)/ 316 SS	300°F 149°C	450 psig 31 bar	0.75	25 VA: 1A @ 200VAC	22 AWG, 18″ [45 cm]	1/8″	1.2 (34))
F7-MPP**	Broad chemical compatibility	Polypropylene/ Polypropylene	180°F 82°C	100 psig 6.89 bar	0.90	10 VA: 0.1A @ 100VAC	22 AWG, 24″ [61 cm]	1/8″	0.8 (23)
F7-MPP-NO**	Broad chemical compatibility	Polypropylene/ Polypropylene	176°F 80°C	100 psig 6.89 bar	0.90	50 VA: 0.2A @ 240VAC	22 AWG, 24″ [61 cm]	1/8″	0.8 (23)
F7-PP	Broad chemical compatibility	Polypropylene & Epoxy/Polypropylene	220°F 105°C	100 psig 6.89 bar	0.60	30 VA: 0.14A @ 220VAC	22 AWG, 24″ [61 cm]	1/8″	0.8 (23)
F7-BT	Oils & Fuels	Buna-N & Epoxy/ PBT*	220°F 105°C	150 psig 10 bar	0.45	30 VA: 0.14A @ 220VAC	22 AWG, 24″ [61 cm]	1/8″	0.7 (20)
F7-K	Food/beverage, corrosives	PVDF/ PVDF	180°F 82°C	100 psig 6.89 bar	1.00	50 VA: 0.25A @ 150VAC	22 AWG, 24″ [61 cm]	1/8″	1.5 (43)
F7-C11	General purpose	Buna-N/ Brass	180°F 82°C	150 psig 10 bar	0.45	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/8″	1.5 (43)
F7-C21	Oils & water, general purpose	Buna-N/ 316 SS	180°F 82°C	150 psig 10 bar	0.45	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/8″	1.5 (43)
F7-BB	High viscosity liquids	Buna-N/ Brass	180°F 82°C	150 psig 10 bar	0.55	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/4″	5 (140)
F7-PS	Water-based liquids, complies with FDA	Polysulfone/ Polysulfone†	225°F 107°C	50 psig 3 bar	0.55	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/4″	4 (110)
F7-PVC	Chemical & plating	CPVC/ CPVC	180°F 82°C	15 psig 1 bar	0.85	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/4″	5 (140)
F7-T1	Viscous, sticky or corrosive liquids	PTFE/ PTFE	300°F 149°C	30 psig 2 bar	0.80	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/4″	6 (170)
F7-ST713‡	Oils, water & chemicals	316 SS/ 316 SS	300°F 149°C	750 psig 52 bar	0.80	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/4″	6 (170)

① Distance between hex and liquid (S.G. = 1.0) level at actuation point will vary with specific gravity changes.
*PBT - Polybutylene Terephthalate.
† Incudes 316 SS clip.
‡ Spherical floats.
Note: F7-SB, F7-SS2 not CSA listed.
**F7-MPP is normally closed
F7-MPP-NO is normally open

Optional Fittings — For external mounting of vertical models
A-347, ⅛" x 1¼" NPT carbon steel adapter
A-347-SS, ⅛" x 1¼" NPT 316 SS adapter
A-348, ⅛" x 1½" NPT carbon steel adapter
A-348-SS, ⅛" x 1½" NPT 316 SS adapter

Series F7 Level Switches - Horizontal/Specialty

Low Cost, Hermetically Sealed Contacts



Series F7 Horizontal Mount Level Switches are designed to mount through the walls of tanks and other vessels. Internally mounted models F7-HPS-1, F7-MHS and F7-SS5 are secured to the wall of the tank or vessel from the inside while model F7-HPS-2 is mounted from the outside (externally). Model F7-HSS can be installed internally or externally.

Series F7 Specialty Level Switches are designed for unique applications. Model F7-SS5B/BNC can be used with viscous liquids or liquids with suspended metal particles. Use model F7-LL for low level detection (≥5/8″). The non-intrusive bottle style F7-EB mounts completely outside the tank at the actuation level. Suspend model F7-WBB in stand pipes or sumps for leak detection or drop into wells for ground-water monitoring.

MODELS - Horizontal Mount Switches

Model Number	Applications	Material Float/Stem	Temp. Limits	Press. Limits	Min. S.G.	Electrical Rating	Wire Leads	Mtg	Weight oz (g)
F7-HPS-11	Water, oils, chemicals NSF approved	Polypropylene/ Polypropylene*	225°F 107°C	100 psig 6.89 bar	0.55	20 VA: 0.08A @ 240VAC	22 AWG 24″ [61 cm]	5/8″-11 thread (int)	1.5 (43)
F7-HPS-21	Water, oils, chemicals NSF approved	Polypropylene/ Polypropylene*	225°F 107°C	100 psig 6.89 bar	0.55	20 VA: 0.08A @ 240VAC	22 AWG, 24″ [61 cm]	1/2″ NPT (ext)	2 (58)
F7-MHS	High temperatures, corrosives	316 SS/ 316 SS	392°F 200°C	100 psig 6.89 bar	0.70	30 VA: 0.14A @ 220VAC	22 AWG, 24″ [61 cm]	1/2″-13 bulk-head (int)	2 (58)
F7-HSS†	High temp/pressure,	316 SS	392°F	300 psig	0.80	30 VA: 0.14A @ 220VAC	22 AWG, 24″	1/2″ NPT	3 (94)

MODELS - Specialty Switches

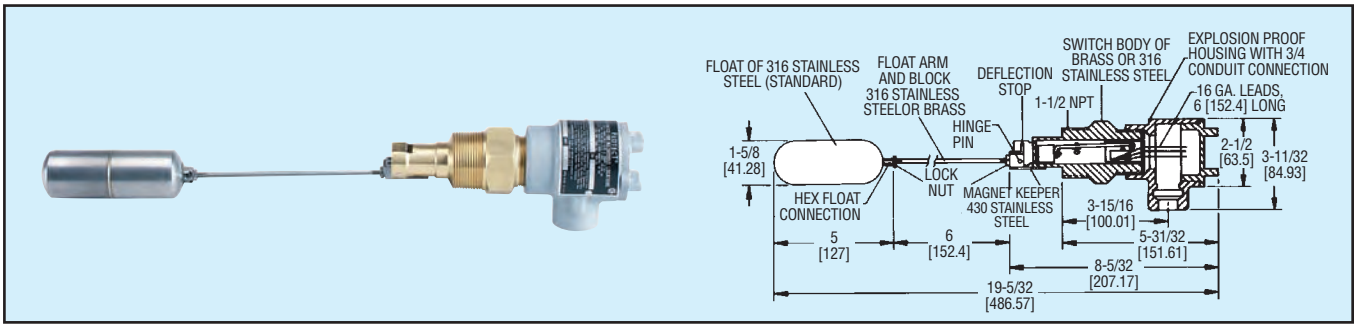
Model Number	Style/ Applications	Material Float/Stem	Temp. Limits	Press. Limits	Min. S.G.	Electrical Rating	Wire Leads	Mtg	Weight oz (g)
F7-SS6	Bent stem/liquids with metal particles	316 SS/ 316SS	300°F 149°C	100 psig 7 bar	0.70	20 VA: 0.08A @ 220VAC N.O. operation	22 AWG, 24″ [61 cm]	1/8″ NPT male	2 (58)
F7-SS6B	Bent stem/liquids with metal particles	316SS/ 316SS	300°F 149°C	100 psig 7 bar	0.70	20 VA: 0.08A @ 220VAC N.C. operation	22 AWG, 24″ [61 cm]	3/8″-24″ male	2 (58)
F7-EB‡	Non-intrusive bottle type/ outside tank mounting	Brass/316 SS (Brass housing)	300°F 149°C	500 psig 34 bar	0.75	20 VA: 0.08A @ 240VAC	18 AWG, 24″ [61 cm]	3/4″ NPT female	5 lb 5 oz (2.4 kg)
F7-LL	Vertical/detect levels as low as 5/8”	Polysulfone/ Buna-N	180°F 82°C	50 psig 3 bar	—	20 VA: 0.08A @ 240VAC	22 AWG, 72″ [182 cm]	1/8″ NPT male	2 (58)
F7-WBB	25 ft. cable, slosh shield/ sumps, stand pipes	Brass/ Buna-N	180°F 82°C	150 psig 10 bar	0.45	20 VA: 0.08A @ 240VAC	22 AWG, 25 ft. [7.6 m]	—	10.8 (310)

* *Contains 20% glass.*
† *F7-HSS is rated explosion-proof for Class I, Groups A, B, C, D; Class II, Groups E, F, G; Class III.*
‡ *Explosion proof model available with DPDT switch. Specify F7-EBX.*

Series L4

FLOTECT® Float Switch

Magnetically Operated Switch, Leak Proof Body, Explosion-Proof



Rugged and reliable the Series L4 Flotect® Level switch operates automatically to indicate tank level. Perfect for starting or stopping pumps, opening or closing valves, or actuate level alarm signals. A unique magnetically actuated switching design gives superior performance. There are no bellows, springs, or seals to fail. Instead, the free-swinging float attracts a magnet within the solid metal switch body, actuating a snap switch by means of a simple lever arm. Float arm hinge design limits the arm angle to prevent vertical hangup.

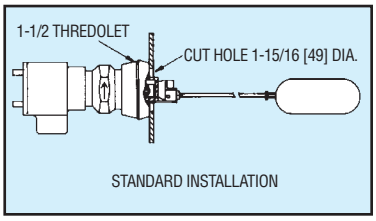
FEATURES

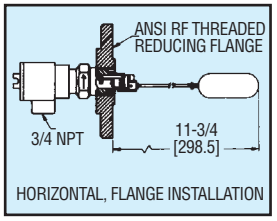
- Leak proof body machined from bar stock
- Choice of floats dependent on maximum pressure and specific gravity
- Weatherproof, designed to meet NEMA 4
- Explosion-proof (listings included in specifications)
- Installs directly and easily into tank with a thredolet or flange (see application drawings)
- Electrical assembly can be easily replaced without removing the unit from the installation so that the process does not have to be shut down.
- Horizontal installation or optional top mount vertical installation

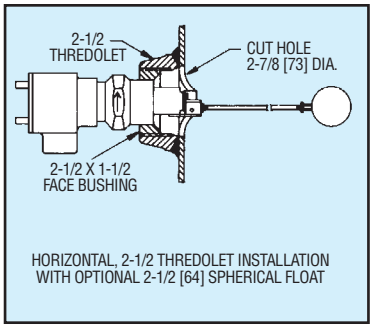
APPLICATIONS

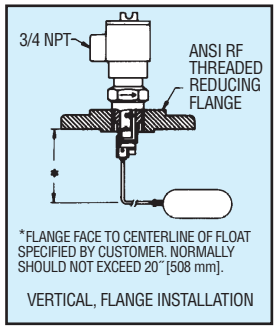
- Direct pump control for maintaining level
- Automatic tank dump operations
- Control levels or provide alarms in sumps, scrubber systems, hydro-pneumatic tanks, low pressure boilers, and various waste water/sewage treatment processes

APPLICATION DRAWINGS FOR FLOTECT® FLOAT SWITCHES









SPECIFICATIONS

Service: Liquids compatible with wetted materials.
Wetted Materials:
Float and Rod: 316 SS.
Body: Brass or 316 SS standard.
Magnet Keeper: 430 SS standard, 316 SS or Nickel optional.
Temperature Limits: 4 to 275°F (-20 to 135°C) standard, MT high temperature option 400°F (205°C) [MT option not UL, CSA, ATEX, or SAA].
Pressure Limit: Brass body 1000 psig (69 bar), 316 SS body 2000 psig (138 bar). Standard float rated 100 psig (6.9 bar). For other floats see options.
Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups C and D; Class II, Groups E, F, and G.
ATEX CE 0344 Ex II 2 G EEx d IIB T6 -20°C≤Tamb≤75°C
EC-Type Certificate No.: KEMA 03 ATEX 2383
SAA: Exd II C T6 (T amb = 60°C). IP66 C1 I, Zone I. Also FM approved.
Switch Type: SPDT snap switch standard, DPDT snap switch optional.
Electrical Rating: UL, FM, ATEX and SAA models: 10A @ 125/250 VAC (V~). CSA models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V⎓). MV option: 1A @ 125 VAC (V~); 1A res., .5A ind. @ 30 VDC (V⎓). MT option: 5A @ 125/250 VAC (V~). [MT and MV option not UL,CSA, FM, ATEX or SAA].
Electrical Connections: UL and CSA models: 16 AWG, 6˝ (152 mm) long. ATEX and SAA unit: terminal block.
Process Connection: 1-1/2˝ male NPT standard, 2-1/2˝ male NPT required for optional floats.
Mounting Orientation: Horizontal installation standard, optional vertical top mount.
Weight: 4 lb 9 oz (2.07 kg).
Dead Band: 3/4˝ (19 mm) for standard float.
Specific Gravity: 0.7 minimum with standard float. For other floats see options.
Agency Approvals: UL, CSA, FM, CE and ATEX.

MODELS

Model No.	Description
L4	Brass body, side wall mounting
L4SS	316SS* body, sidewall mounting

*316SS body and float with 430SS magnet keeper (wetted part).

Options for L4 Switches above — Add suffixes to model numbers
DPDT contacts, add suffix **-D**
Gold Plated Contacts option for dry circuits, add suffix **-MV** (see electrical rating in specifications, no listings or approvals)
High Temperature option rated 400°F (204°C), add suffix **-MT** (see electrical rating in specifications, no listings or approvals)
Time Delay Relay option with 2 SPDT contacts, adjustable from 0-1 to 0-31 minutes. Add suffix **-TRI** (increasing flow) or **-TRD** (decreasing flow) (no listings or approvals)
316 SS Magnet Keeper option to replace standard 430 SS, add suffix **-316**
ATEX approved construction, add suffix **-AT**
SAA approved construction, add suffix **-SAA**
Top Mounted option for vertical flange installation (distance from flange face to centerline of float to be specified, 20˝ (508 mm) maximum), add suffix **-TOP**
Optional Floats (all 2-1/2˝ spherical):
304 SS rated 50 psig (3.5 bar) and 0.5 min. s.g., add suffix **-50**
316 SS rated 150 psig (10.3 bar) and 0.7 min. s.g., add suffix **-150**
304 SS rated 300 psig (20.7 bar) and 0.7 min. s.g., add suffix **-300**

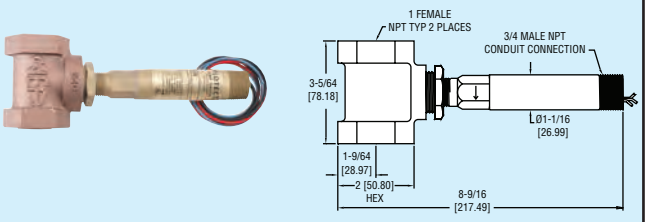
Consult factory for price and availability of fittings for L4 installation. Thredolets, bushings, and flanges are available in a variety of sizes and materials.

Series L6

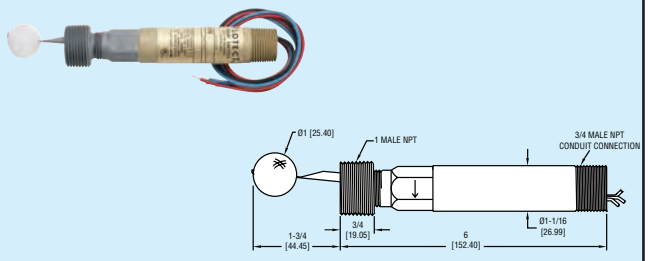
FLOTECT® Liquid Level Switch

Easy In-wall or External Installation, Up to 2000 psig (138 bar)

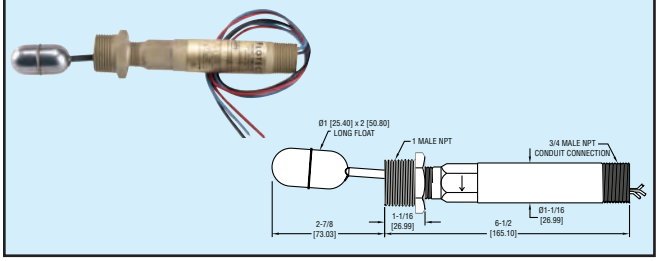
MODEL L6 WITH EXTERNAL FLOAT CHAMBER



MODEL L6 WITH SPHERICAL FLOAT



MODEL L6 WITH CYLINDRICAL FLOAT



SPECIFICATIONS

Service: Liquids compatible with wetted materials.
Wetted Materials:
Float: Solid polypropylene or 304 SS.
Lower Body: Brass or 303 SS.
Magnet: Ceramic.
External Float Chamber (Tee): Matches lower body choice of brass or 303 SS.
Other: Lever Arm, Spring, Pin, etc.: 301 SS.

Temperature Limit: -4 to 220°F (-20 to 105°C) Standard, MT high temperature option 400°F (205°C)(MT not UL, CSA or ATEX). ATEX compliant AT option ambient temperature: -4 to 167°F (-20 to 75°C) process temperature: -4 to 220°F (-20 to 105°C).
Pressure Limits: See chart below.

Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups A, B, C and D; Class II, Groups E, F, and G. (Group A on stainless steel body models only).ATEX CE 0344 Ex II 2 G EEx d IIC T6 Process Temp≤75°C. EC-Type Certificate No.: KEMA 04ATEX2128
Switch Type: SPDT snap switch standard, DPDT snap switch optional.
Electrical Rating: UL models: 5A @ 125/250 VAC (V~). CSA and ATEX models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V⎓). MV option: .1A @ 125 VAC (V~). MT option: 5A @125/250 VAC (V~). [MT option not UL, CSA or ATEX].
Electrical Connections: UL models: 18 AWG, 18″ (460 mm) long. CSA and ATEX models: terminal block.
Upper Body: Brass or 303 SS.
Conduit Connection: 3/4″ male NPT standard, 3/4″ female NPT on junction box models.
Process Connection: 1″ male NPT on models without external float chamber, 1″ female NPT on models with external float chamber.
Mounting Orientation: Horizontal with index arrow pointing down.
Weight: Approximately 1 lb (.5 kg) without external float chamber, 1.75 lb (.8 kg) with external float chamber.
Specific Gravity: See chart below.
Agency Approvals: UL, CSA, CE and ATEX.

MODELS

Model No.	Body	Installation	Float Material	Max. Pressure psig (bar)	Min. Sp. Gr.
L6EPB-B-S-3-O	Brass	Side Wall Mounting	Polypropylene Spherical	1000 (69)	0.9
L6EPB-B-S-3-A	Brass	Side Wall Mounting	304 SS Cylindrical	200 (13.8)	0.5
L6EPB-B-S-3-C	Brass	Side Wall Mounting	304 SS Spherical	350 (24.1)	0.7
L6EPB-B-S-3-B	Brass	Brass External Float Chamber (Tee)	Polypropylene Spherical	250 (17.2)	0.9
L6EPB-B-S-3-H	Brass	Brass External Float Chamber (Tee)	304 SS Spherical	250 (17.2)	0.7
L6EPB-S-S-3-O	303 SS	Side Wall Mounting	Polypropylene Spherical	2000 (138)	0.9
L6EPB-S-S-3-A	303 SS	Side Wall Mounting	304 SS Cylindrical	200 (13.8)	0.5
L6EPB-S-S-3-C	303 SS	Side Wall Mounting	304 SS Spherical	350 (24.1)	0.7
L6EPB-S-S-3-S	303 SS	304 SS External Float Chamber (Tee)	Polypropylene Spherical	2000 (138)	0.9
L6EPB-S-S-3-L	303 SS	304 SS External Float Chamber (Tee)	304 SS Spherical	350 (24.1)	0.7

Surprisingly compact, the Series L6 Flotect® is designed and built for years of trouble-free service in a wide variety of process liquid level applications. Operation is simple and dependable with no mechanical linkage as the level switch is magnetically actuated. The float lever pivoted within the body moves when the process liquid displaces the float. A magnet on the opposite end of the float lever controls a second magnet on the switch actuating lever located in the switch housing.

FEATURES

- Leak proof lower body machined from bar stock
- Choice of models for direct side wall mounting or mounted in a tee to act as an external float chamber
- Weatherproof
- Explosion-proof (listings included in specifications)
- Electrical assembly can be easily replaced without removing the unit from the installation so that the process does not have to be shut down
- Sensitive to level changes of less than 1/2″ (12 mm)

Options:

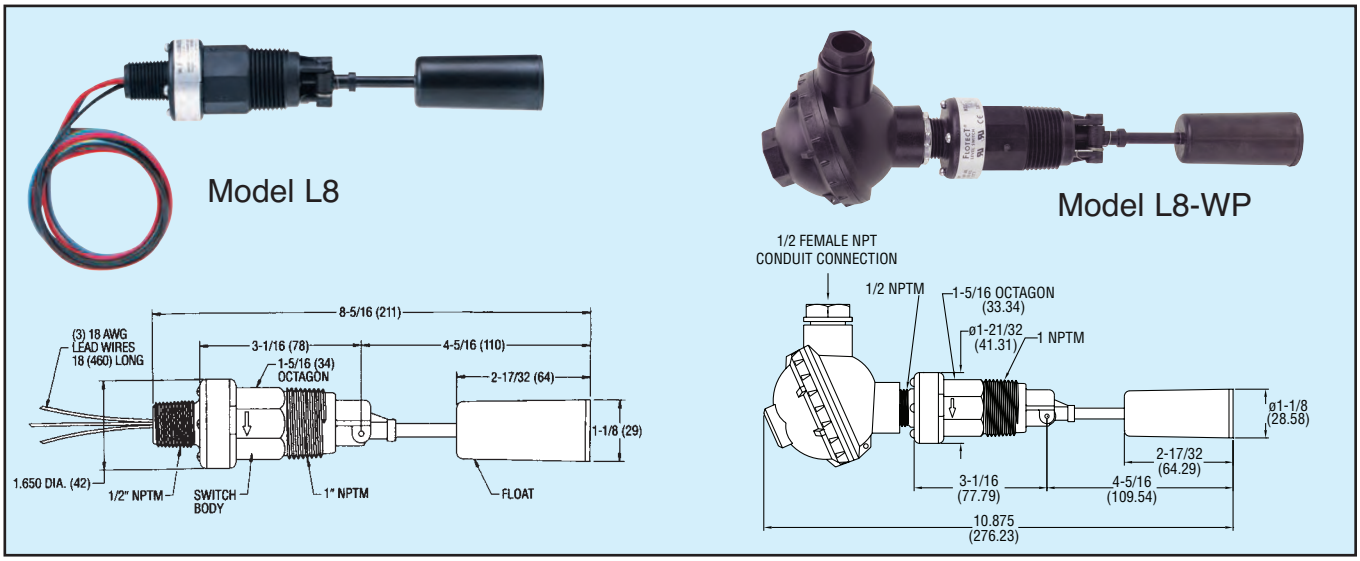
Gold Plated Contacts option for dry circuits,add suffix **-MV** (see electrical rating in specifications)
High Temperature option rated 400°F (204°C), add suffix **-MT** (see electrical rating in specifications, no listings or approvals, only available on models with stainless steel floats)
CSA and UL approved construction, includes weatherproof and explosion-proof junction box, add suffix **-CSA**
ATEX approved construction includes, weatherproof and explosion-proof, junction box add suffix **-AT**
DPDT contacts, change seventh character in model number to “D”. Example: L6EPB-B-D-3-O
303 Stainless Steel Upper Body, change fifth character in model number to “S”. Example: L6EPS-S-S-3-S

Options Not Shown: 1-1/2″ and 2″ male NPT process connection, 2″ female NPT connection tee, and top mount.

Model L8

FLOTECT® Liquid Level Switch

Low Cost, Leak Proof Body
Excellent Chemical Resistance



Model L8 Flotect® Liquid Level Switch features a leak proof body and float constructed from tough, durable polyphenylene sulfide which has excellent chemical resistance. Because the liquid level snap switch is magnetically actuated, there is no direct mechanical linkage to leak or fail, assuring longer life and decreased maintenance costs. This inexpensive unit is ideal for liquid level alarm, indication or control. Installation is quick and easy – simply install in a horizontal position with the index arrow pointing down.

The L8 Flotect®Liquid Level Control is UL recognized as an industrial motor controller per UL standard 508, suitable for mounting in a protected environment. This lightweight switch can be used in numerous chemical process, industrial systems and similar applications where process conditions are compatible with polyphenylene sulfide, ceramic 8 and 316 SS. This liquid level switch provides accurate setpoint control of liquids with specific gravities as low as 0.6. This compact and reliable control is designed to handle temperatures up to 212°F (100°C) and pressures to 150 psig (10 bar).

APPLICATIONS

The Model L8 Flotect® Liquid Level Switch is ideal for predetermined liquid levels in tanks through pump control or solenoid valve control. It provides excellent liquid level alarm or indication when combined with the Series AN14 Indicating Annunciator.

- Environmental control
- Waste water
- Scrubber systems
- Holding tanks
- Cooling towers
- Chemical/Petroleum processing
- Plating and washing tanks
- Sewage treatment
- Car washes
- Remediation systems

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials:
Float and Body: Polyphenylene Sulfide (PPS).
Pin and Spring: 316 SS or Inconel.
Magnet: Ceramic 8.
Temperature Limit: 212°F (100°C).
Pressure Limit: 150 psig (10.34 bar).
Enclosure Rating: General purpose. WP option is weatherproof.
Switch Type: SPDT snap switch. MV option is a SPDT gold contact snap switch.
Electrical Rating: 5A @ 125/250 VAC, 5A resistive, 3A inductive @ 30 VDC. MV option: 1A @ 125 VAC, 1A resistive, 0.5A inductive @ 30 VDC.
Electrical Connections: 18 AWG, 18˝ (460 mm) long.
Conduit Connection: 1/2˝ male NPT.
Process Connection: 1˝ male NPT.
Mounting Orientation: Horizontal with index arrow pointing down.
Weight: 5 oz (0.142 kg).
Agency Approvals: CE, UL 508 for US and Canada.
Specific Gravity: 0.6 minimum.

L8 Level Switch

OPTIONS

Gold Plated Contacts, for dry circuits. Rated 1A @ 125 VAC; 1A resistive, 0.5A inductive @ 30 VDC. To order add suffix -MV. Example: **L8-MV**

Inconel® Alloy Option. Inconel® Alloy replaces standard 316 SS wetted parts. Wetted parts are Inconel® Alloy, ceramic 8, and Polyphenylene Sulfide. To order add suffix -INC. Example: **L8-INC**

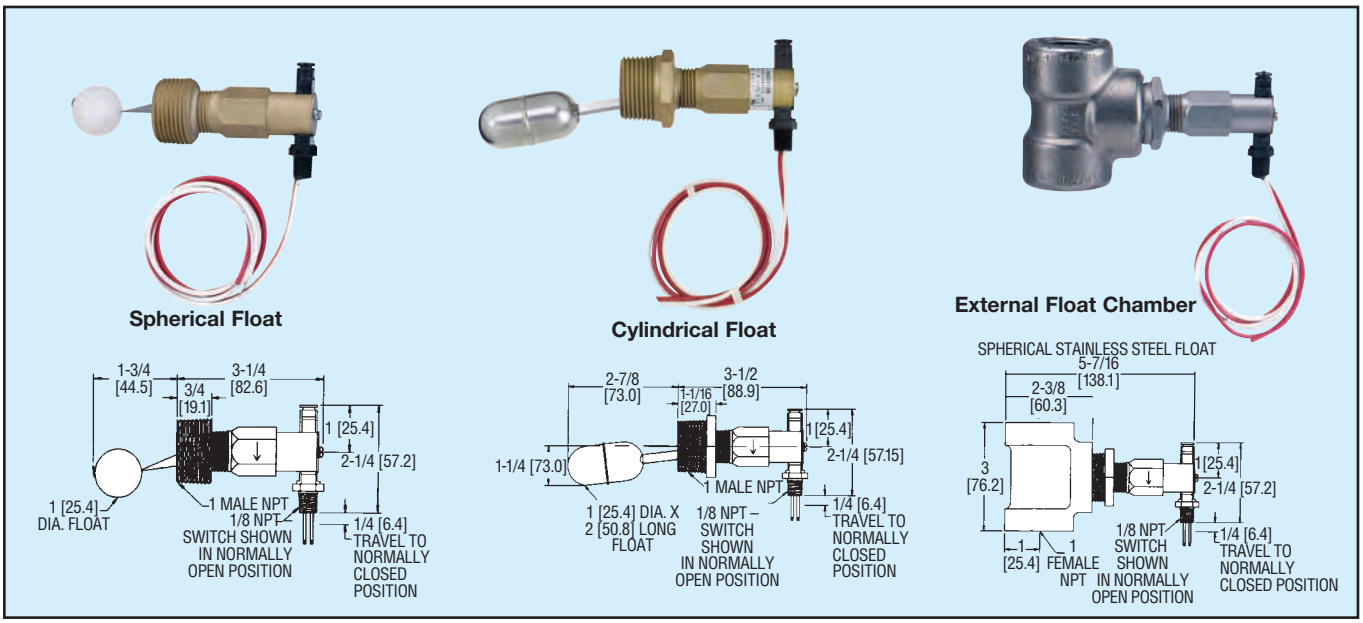
Weatherproof Enclosure. Optional housing is phenylpoliox-ide and provides weatherproof protection for electrical wiring. To order add suffix -WP (Not UL approved). Example: **L8-WP**

Inconel® is a registered trademark of Huntington Alloys Corporation.

Series L10

FLOTECT® Mini-Size Level Switch

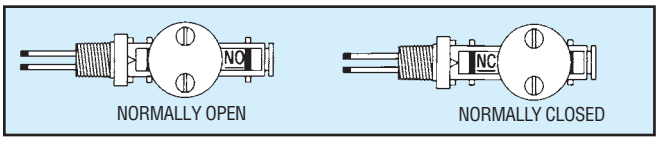
Easy In-wall or External Installation, Specific Gravities as Low as 0.5



The Mini-Size Series L10 Flotect® Level Switches combine low cost with top quality materials and construction for great value and years of reliable liquid level control. Wide media compatibility is assured with a choice of brass or stainless steel bodies and external tees; polypropylene or stainless steel floats. Two basic configurations are offered; with 1" male NPT threads for direct side mounting through a half coupling or with factory installed tee for external mounting.

All Series L10 controls feature a hermetically sealed, magnetically actuated SPST reed switch which is encapsulated in a polypropylene housing. Units are quickly and easily adjusted for your choice of normally open or normally closed operation thanks to a unique patented design. Just loosen two screws and instantly slide the switch assembly to the action required. N.O. and N.C. markings are clearly visible. This feature also speeds switch replacement if damage occurs.

Three types of floats are offered to accommodate liquids with specific gravities as low as 0.5; maximum pressures to 2000 psig (137.8 bar). Wire leads are 22 AWG x 18" (460 mm) and exit the switch assembly through 1/8″ male NPT threads. These controls are UL recognized and CSA listed.



SPECIFICATIONS

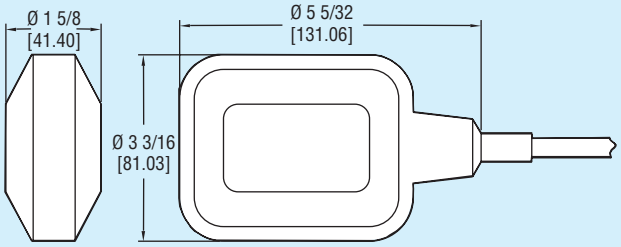
Service: Compatible liquids.
Wetted Materials:
Float: Solid Polypropylene or 304 SS.
Body: Brass or 303 SS.
Magnet: Ceramic.
External Float Chamber (Tee): None, Brass, or 304 SS.
Other: Lever Arm, Pin, Spring, etc.: 301 SS.
Temperature Limit: 200°F (93°C).
Pressure Limit: See chart below.
Switch Type: SPST hermetically sealed reed switch. Field adjustable for normally open or normally closed.
Electrical Rating: 1.5A @ 24 VDC resistive, 0.001A @ 200 VDC resistive, 0.5A @ 125 VAC.
Electrical Connections: 22 AWG, 18″ (460 mm) long.
Conduit Connection: 1/8″ male NPT.
Process Connection: 1″ male NPT standard on models without external float chamber. Change 3 in model number to 4 for 1-1/4″, to 5 for 1-1/2″, or 6 for 2″. 1″ female NPT on models with external float chamber.
Mounting Orientation: Horizontal with index arrow pointing down.
Weight: Approximately 9 oz (0.255 kg) without external float chamber, 2.25 lb (1.02 kg) with external float chamber.
Specific Gravity: See chart below.
Agency Approvals: UL and CSA.
Switch Enclosure: Polypropylene.

MODELS

Model Number	Body Material	Installation/ Mounting	Float Material	Max. Press. psig (bar)	Min. S.G.
L10-B-3-O	Brass	Side Wall Mounting	Polypropylene Spherical	1000 (69)	0.9
L10-B-3-A	Brass	Side Wall Mounting	304 SS Cylindrical	200 (13.8)	0.5
L10-B-3-C	Brass	Side Wall Mounting	304 SS Spherical	350 (24.1)	0.7
L10-B-3-B	Brass	Brass External Float Chamber (Tee)	Polypropylene Spherical	250 (17.2)	0.9
L10-B-3-H	Brass	Brass External Float Chamber (Tee)	304 SS Spherical	250 (17.2)	0.7
L10-S-3-O	303 SS	Side Wall Mounting	Polypropylene Spherical	2000 (137.8)	0.9
L10-S-3-A	303 SS	Side Wall Mounting	304 SS Cylindrical	200 (13.8)	0.5
L10-S-3-C	303 SS	Side Wall Mounting	304 SS Spherical	350 (24.1)	0.7
L10-S-3-S	303 SS	304 SS External Float Chamber (Tee)	Polypropylene Spherical	2000 (137.8)	0.9
L10-S-3-L	303 SS	304 SS External Float Chamber (Tee)	304 SS Spherical	350 (24.1)	0.7

Series CFS Cable Float Switch

No Hazardous Mercury, Adjustable Counterweight, General Purpose



Control the level of liquids in filling or draining reservoirs and tanks with the Series CFS. The mercury-free switch is designed with an inverter microswitch housed in a polypropylene cover. The unit includes a counterweight to adjust the stop and start levels of pump up/pump down application.

MODELS

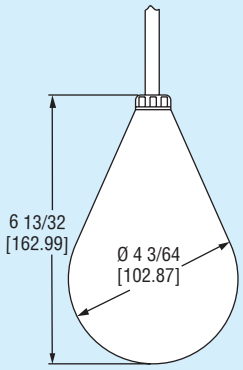
Model Number	Cable Length
CFS-2	6.5 ft (2 m)
CFS-10	32.8 ft (10 m)

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Polypropylene housing, PVC cable.
Temperature Limits: 140°F (60°C).
Pressure Limits: 60 psi (4 bar).
Enclosure Rating: NEMA 4 (IP68).
Switch Type: SPDT.
Electrical Rating: 10 A @ 250 VAC, resistive.
Mounting Orientation: Vertical.
Weight: CFS-2: 1.416 lb (.62 kg).
CFS-10: 3.316 lb (1.48 kg).
Agency Approvals: CE.

Series FSW Free-Floating Level Switch

Designed for Industrial Applications, Mercury-Free



Series FSW Free-Floating Level Switch is a dual level switch designed for filling and draining of tanks, wells, and reservoirs. The shape and interior balance weight ensure impurities and dirt will not adhere to the surface, making it ideal for sewage and waste water applications. The mercury-free switch is designed with an inverter microswitch housed in a polypropylene cover.

MODELS

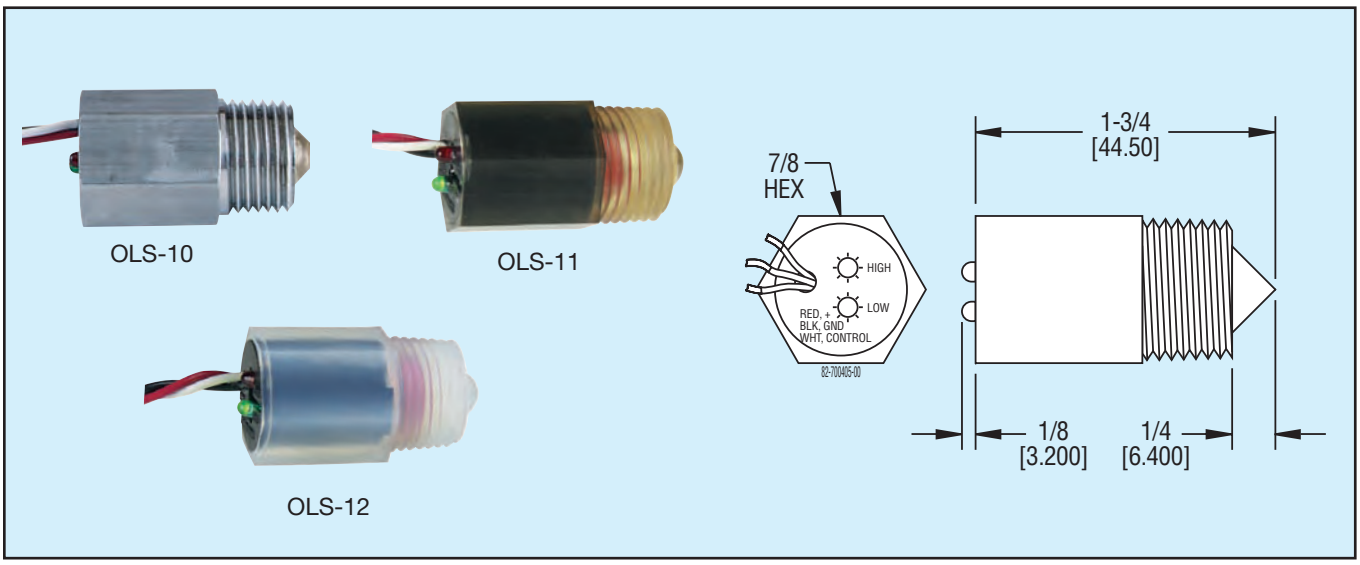
Model Number	Cable Length
FSW-6	19.5 ft (6 m)
FSW-15	49 ft (15 m)
FSW-30	98 ft (30 m)

SPECIFICATIONS

Service: Compatible liquids, slurries.
Wetted Materials: Polypropylene housing, EPDM gland, PVC cable.
Temperature Limits: 140°F (60°C).
Pressure Limits: 60 psi (4 bar).
Enclosure Rating: NEMA 4 (IP68).
Switch Type: SPDT.
Electrical Rating: 10 A @ 250 VAC, resistive.
Mounting Orientation: Vertical.
Weight: FSW-6: 2.6 lb (1.2 kg); FSW-15: 3.85 lb (1.75 kg); FSW-30: 6.8 lb (3.1 kg).
Agency Approvals: CE.

Model OLS Optical Level Switch

Low Cost, Compact, LED Indication



Low cost, rugged optical level switch provides rapid response while employing no moving parts for stable process control. The bright red and green LED's indicate the presence or absence of liquid for true, local indication. Three optional materials, 316 stainless steel, polysulfone and PFA provide application flexibility. Compact switch can be quickly mounted horizontally or vertically for each installation.

PRINCIPLES OF OPERATION

The optical level switch employs an LED, which transmits infrared light. This light is sent through a prism and reflected back to a photo-transistor utilizing two 90° light reflections. With the prism surrounded by a gas, the light source is cast back to the photo transistor. When a translucent liquid is introduced to the prism at or above the point where the light source makes contract with the prism, the light is reflected into the liquid, not allowing the photo-transistor to energize.

FEATURES

- Compact Size
- LED Switch Indication
- No Moving Parts

MODELS

Model No.	Wetted Materials
Model OLS-10	316 SS/Polysulfone
Model OLS-11	Polysulfone
Model OLS-12	PFA

SPECIFICATIONS

Service: Noncoating compatible liquids.
Wetted Materials: See model chart.
Temperature Limit: Process: 200°F (93.3°C), Ambient: 175°F (79.4°C).
Pressure Limit: 200 psig (13.8 bar).
Repeatability: ±0.02″ (0.5 mm).
Switch Type: NPN open collector.
Power Requirements: 10 to 28 VDC.
Output Signal: Vout (max) = 28 VDC, Isink (max) = 100 mA.
Current Consumption: 35 mA maximum.
Electrical Connections: 22 AWG, 18″ (460 mm) long.
Process Connection: 1/2″ male NPT.
Mounting Orientation: Can be mounted in any position.
Weight: 2.5 oz (0.07 kg).
Specific Gravity: No minimum.

Suggested Specifications

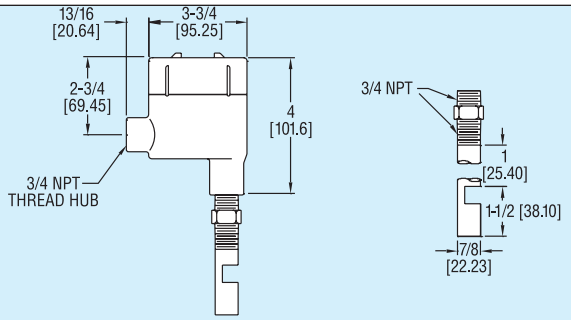
Optical level switch shall be PFA, 316 SS and Polysulfone or Polysulfone construction. Unit shall provide an NPN open collector output signal. Switch shall be capable of mounting in horizontal or vertical position. Switch shall incorporate LED switch status.

APPLICATIONS

- Food and beverage systems
- Hydraulic reservoirs
- Pharmaceutical systems
- Liquid holding tanks
- Sumps
- Air conditioning systems

Series GS Gap Switch

Liquid Level Measurement, 1000:1 Wet/Dry Ratio, 316 SS Wetted Parts



Series GS Gap Switch measures liquid levels at a single point and provides a 10A relay output for high or low level alarm, overflow prevention, and pump protection. The Series GS uses ultrasonic wave propagation between the transducer gap to sense the presence or absence of a liquid. Integral electronics make installation quick and easy. Units can be mounted in either a vertical or horizontal position with no additional calibration required. Gap switch includes a 0.5 second delay and high level failsafe.

MODELS

Model Number	Immersion Depth	Supply Voltage
GS10001	1″ (25.4 mm)	115 VAC
GS20001	1″ (25.4 mm)	230 VAC

SPECIFICATIONS

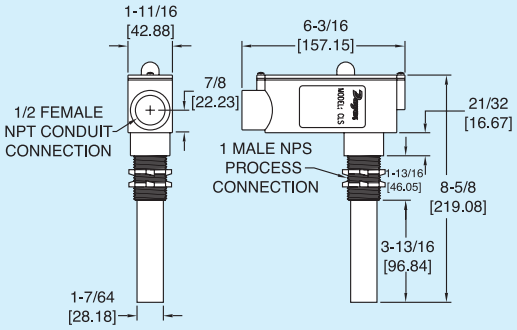
Service: Compatible liquids (1000:1 wet/dry ratio).
Wetted Material: 316 SS.
Temperature Limits: Sensor: –40 to 200°F (–40 to 93°C), Electronics: –20 to 170°F (–4 to 77°C).
Pressure Limits: 1000 psig (68.9 bar).
Enclosure Rating: Epoxy-coated cast aluminum, NEMA 4 & 7.
Repeatability: 2 mm (0.078″) typical.
Switch Type: DPDT.
Electrical Rating: 10A @ 120 VAC resistive.
Power Requirements: 115 VAC, 50/60 Hz (230 VAC optional).
Conduit Connection: 3/4″ female NPT.
Process Connection: 3/4″ male NPT.
Mounting Orientation: Vertical or horizontal.
Delay [On]: 0.5 seconds.
Immersion Depth: 1″ (25.4 mm).
Weight: 1 lb (453 g).
Agency Approval: CE.

APPLICATIONS

Monitor and control levels of water, chemicals, lubricants, acids, creams, lotions, beverages or paints in vessels, storage bins, tanks, sumps, etc.

Model CLS1 Capacitance Level Switch

For Solids, Liquids or Slurries, Fail-Safe Protection, <1 pF Sensitivity



Model CLS1 Capacitance Level Switch provides reliable point level measurement of solids, liquids and slurries in metallic or non-metallic tanks and vessels. Model CLS1 detects the presence or absence of material in contact with the probe by sensing a change in the capacitance. Electronics provide highly sensitive measurement detection (requires less than a 1 picofarad shift from ambient). State of the art technology ignores material build-up on the vessel sidewall or along the probe assembly. One time calibration is simple with a single multi-turn potentiometer. Red LED on housing indicates sensor status. Unit features an adjustable 1-30 second time delay and a 5 amp, SPDT fail-safe relay output. Model CLS1 can be mounted vertically or horizontally.

Model CLS1 Capacitance Level Switch

SPECIFICATIONS

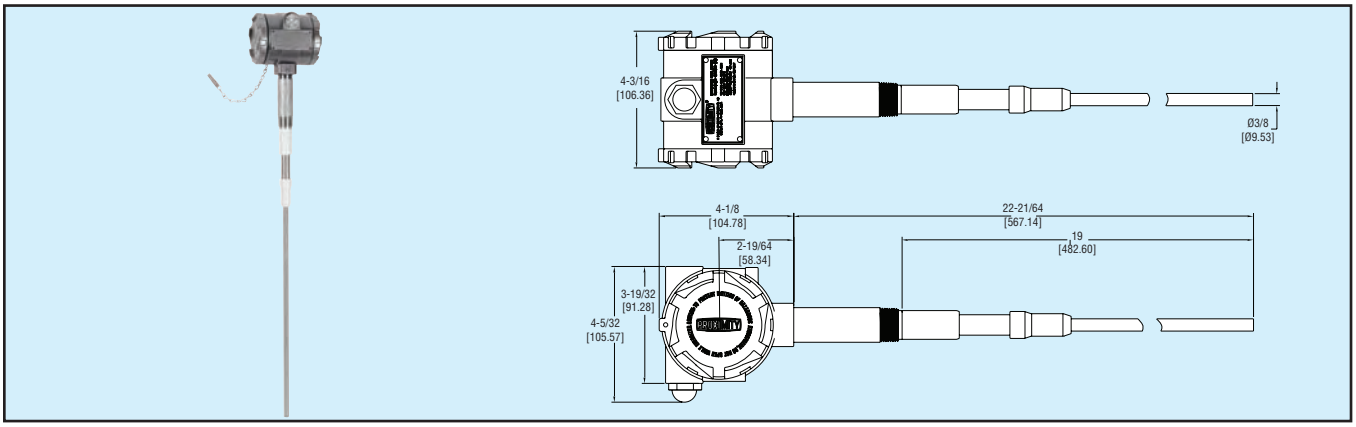
Service: Solids, liquids, or slurries.
Wetted Material: CPVC.
Temperature Limits: Probe: -40 to 240°F (-40 to 116°C), Electronics: -40 to 185°F (-40 to 85°C).
Enclosure Rating: NEMA 4X (IP56), PVC, dust tight, water resistant.
Switch Type: SPDT.
Electrical Rating: 5A @ 250 VAC.
Power Requirements: 120 VAC, 1.5VA.
Conduit Connection: 1/2″ female NPT.
Process Connection: 1″ male NPS.
Mounting Orientation: Vertical or horizontal.
Sensitivity: Adjustable to <1 pF.
Fail-Safe: Switch Selectable, high/Low.
Time Delay: Adjustable 1 to 30 seconds.
Weight: 2.0 lb (0.91 kg).
Agency Approvals: CE.

APPLICATIONS

High or low level detection in bins, silos, tanks, hoppers, chutes and other vessels where liquids, solids or slurries are stored.

Series CLS2 Capacitive Level Switch

Powder, Bulk, or Liquids, Auto-Calibration



The CLS2 is a capacitive technology level switch that does not have any moving parts - no jams, no wear, nothing to break, and no maintenance. State of the art sensing technology in the CLS2, using impulse RF admittance measurement combined with an active guard, provides excellent level measurement and stability while being insensitive to material buildup. This technology also provides immunity to external RF sources like walkie-talkies and cell phones as well as minimal interference with radio communication or other electronic systems.

Capacitive level technology can be used for liquids, powders, and bulk materials and is great for difficult applications such as slurries, coating products, and liquids with solids. The CLS2 is ideal for level indication in silos, receivers, and transporters in pneumatic conveying systems. The CLS2 can also be used for liquid interface applications to detect the level of two immiscible liquids that have different dielectric constants such as oil and water. Wetted materials of PVDF and 316 SS assure great chemical compatibility and meet food grade requirements.

FEATURES

- **Automatic Calibration:** No need to turn calibration pots, just push the calibration button. The CLS2 even has an external magnet to activate the calibration without having to open the enclosure.
- **Universal Power Supply:** One model works from 12 to 240 VAC/DC without any jumpers or settings.
- **Coat Guard:** Unit is not affected by sticky, dusty, or clingy materials that coat or build up on the probe, preventing false alarms.
- **Failsafe Setting:** Output switches can be set for Normally Open or Normally Closed condition on loss of power.
- **Status Indication:** Ultra high brightness external red LED switch status indicator, and internal indicators for power, sensor, and switch status that can be seen externally with window cap option (external LED on weatherproof model only).
- **Time Delay:** Prevent false alarms from material splashing, agitation, etc.
- **Removable Terminals:** Removable terminal block snaps in and out enabling easy wiring outside of the enclosure.

EXAMPLE MODELS
CLS2-W11RK1-019

SPECIFICATIONS

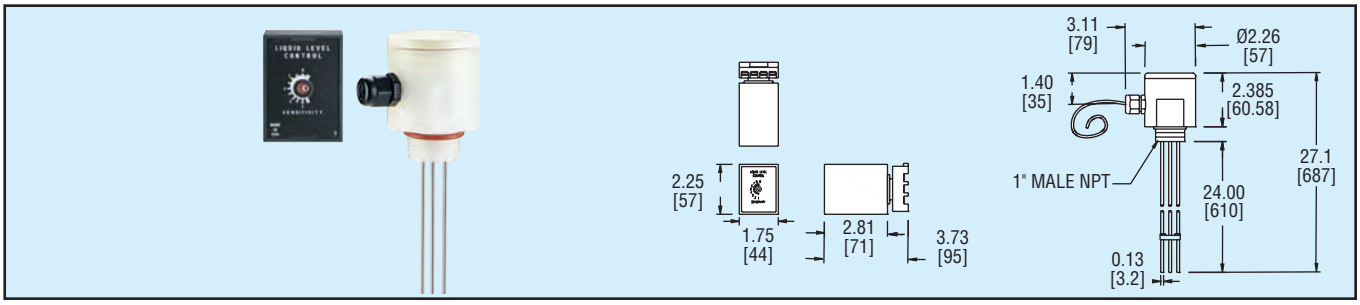
Service: Liquids, powder, and bulk materials compatible with wetted materials.
Wetted Materials: 316 SS and Polyvinylidene flouride (PVDF).
Temperature Limits: Ambient: -40 to 185°F (-40 to 85°C), -4 to 185°F (-20 to 85°C) with under 24 VAC/DC power supply. Process: -40 to 250°F (-40 to 121°C).
Pressure Limit: 365 psi (25 bar).
Enclosure Rating: Weatherproof, NEMA 4X (contact factory for explosion-proof).
Switch Type: DPDT (two form C).
Electrical Rating: 8A @ 120/240 VAC res., 30 VDC. 1/2 hp @ 120 VAC and 1/4 hp @ 240 VAC ind.
Power Requirements: 12 to 240 VAC/DC; 24 to 240 VAC/DC.
Power Consumption: 2.8 Watts max.
Electrical Connection: 1/2˝ NPT conduit opening, screw termination with removable terminal block.
Process Connection: 3/4˝ male NPT. Optional 1-1/4˝ male NPT ; 1˝, 1-1/2˝ BSP. (Contact factory for sanitary connections).
Mounting Orientation: Vertical or horizontal.
Set Point Adjustment: Trips when product touches probe. Cut or extend probe to length of desired trip point. Can be cut as short as 1˝ and can be extended by welding on to probe. (Minimum length will be effected by material being sensed.)
Response Time: 0.2 seconds.
Time Delay: Adjustable, 0 to 60 seconds.
Spark/Static Protection: 10 MEG Ohm dissipation resistance with spark gap. Surge current to 100A max.
Sensitivity: 8 Selectable settings, 1, 2, 4, 6, 8, 10, 14, 20 pF (at 30 pF nominal free capacitance).

MODEL CHART

Example	CLS2	W	1	1	R	K	1	019	MC	CLS2-W11RK1-019-MC
Series	CLS2									Capacitive Level Switch
Enclosure		W								Weatherproof
Switch			1							DPDT rated 8A @ 12/240 VAC, 30 VDC res.
Power Supply				1						12-240 VAC/DC
Probe Type					R					Standard Rod: 316 SS, .375˝ diameter
					C					Cable: 316 SS with weight
Insulator Material						K				PVDF
Process Connection							1			3/4˝ male NPT
							2			1˝ male NPT
							3			1-1/2˝ male NPT
							4			3/4˝ BSPT
							5			1˝ BSPT
							6			1-1/2˝ BSPT
Probe Length								XXX		Insertion length in inches. Example 019 is 19˝ length. (Minimum length is 6˝, with 3/4˝ sensing tip)
Options									MC	M20 conduit connection with cable gland
									WC	Window Cap
									FG	Food Grade Wetted Materials

PROXIMITY® Model DPL110 Dual Point Level Switch

Tank High/Low Control, Conductivity Technology, Up to 72" Probes



Maintain liquid level high and low limits with the Model DPL Dual Point Level Switch. Units can be used for single or dual point level control in semi-solid liquids, industrial slurries or heavy-bodied liquids like wastewater. Standard 24 inch electrodes can be cut by the end-user to a shorter length or lengthened by adding up to two 24 inch extensions (sold separately) to reach the maximum recommended length of 72 inches. Model DPL contains no moving parts to get stuck or wear out. Controller features adjustable sensitivity and DIN rail-mountable socket mount.

Model DPL110 Dual Point Level Switch

ACCESSORIES

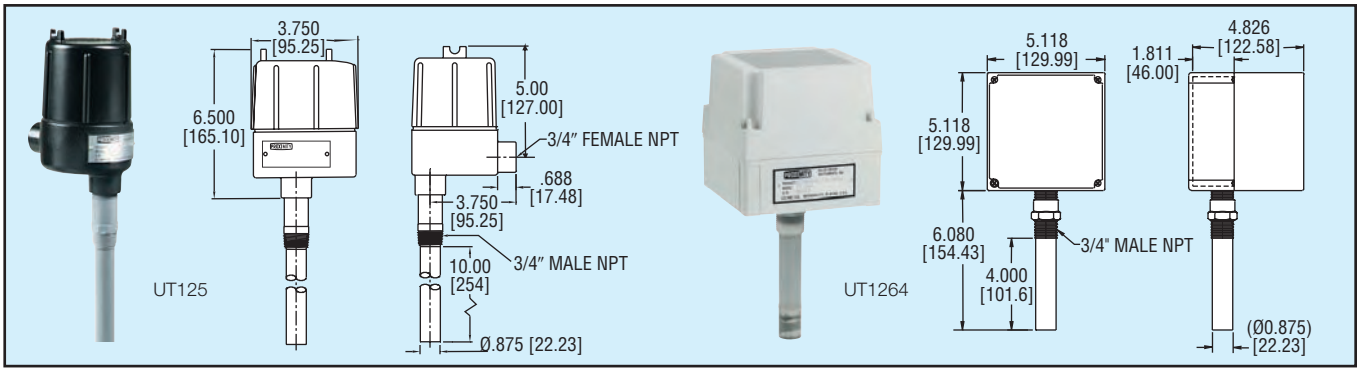
Model DPL5 Electrode Extensions includes two 24" (610 mm) electrode extensions and mounting hardware

SPECIFICATIONS

Electrodes: 1/8" dia, 24" (609.6 mm) length, standard.
Wetted Materials: 316 Stainless Steel, polypropylene.
Mounting, Sensor Head: 1" male NPT.
Pressure Limits: 30 psig (2.06 bar).
Temperature Limits: 212°F (100°C).
Probe Enclosure: NEMA 6 (IP67).
Maximum Probe Length: 72" (1.8 m) with optional extensions.
Connecting Cable, Probe to Controller: 10 ft (3.0 m).
Sensing Voltage: 12 VAC.
Power Supply: 120 VAC 50/60 Hz.
Output: SPDT, 5 Amps @ 240 VAC.
Mounting, Controller: Standard octal socket or 35mm DIN rail.
Weight, Probe Assembly: 1.5 lb (0.68 kg).
Weight, Controller: 1.0 lb (0.45 kg).

PROXIMITY® Series UT Ultrasonic Level Transmitter

Noncontact Measurement, ±0.25% Accuracy, 4-wire



Series UT Ultrasonic Level Transmitters provide reliable, noncontact measurement for liquid level control in tanks and other vessels. Integral electronics generate an ultrasonic pulse which is transmitted through the air space in the tank. The pulse is reflected back to the sensor at the liquid/air interface. From the received echo, the time of flight can be calculated which is directly proportional to the distance of the liquid surface to the sensor. A continuous 4 to 20 mA output signal is generated and updated every half second. Units feature a fully adjustable zero and span, height and distance mode adjustment, lost echo LED indication, and reverse polarity protection.

Model UT125 Ultrasonic Level Transmitter, CPVC
Model UT1264 Ultrasonic Level Transmitter, PVDF

SPECIFICATIONS

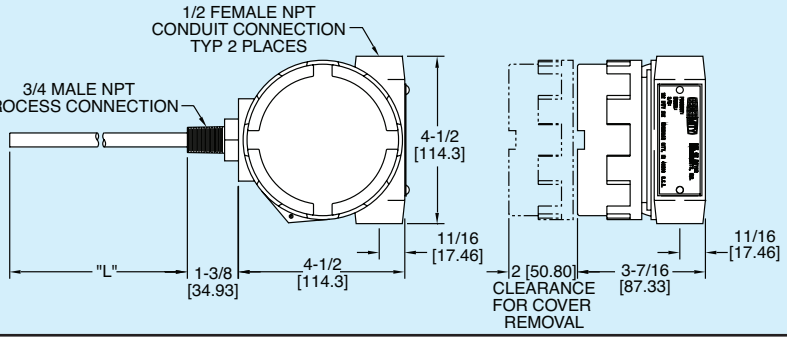
Range: 10 ft (3 m).
Service: Liquids.
Wetted Material: UT125: CPVC; UT1264: PVDF.
Accuracy: ±0.25% full scale.
Repeatability: 1/8" (3.2 mm) typical.
Temperature Limits: Sensor: –20 to 160°F (–29 to 71°C), Electronics: –10 to 170°F (–23 to 77°C) compensated over full range of sensor.
Pressure Limits: 100 psig (6.9 bar).
Blind Zone: 6" (15 cm).
Beam Angle: Conicle 12°.
Power Requirements: 16 to 30 VDC.
Output Signal: 4 to 20 mA DC (isolated), 4-wire.
Zero and Span Adjustments: Zero: 6" to 114" (15 to 290 cm), Span: 1" to 120" (2.5 to 305 cm).
Process Connection: 3/4" male NPT.
Enclosure Rating: UT125: NEMA 7, cast aluminum; UT1264: NEMA 4X (IP67), ABS plastic.
Mounting Orientation: Vertical.
Weight: UT125: 5 lb (2.3 kg); UT1264: 2.0 lb (0.91 kg).

PROXIMITY®

Model CRF

Continuous Level Transmitter

Loop-Powered, 4-20 mA Output, RF Admittance Technology



Continuously monitor the level of liquids and slurries, without worry of false signals as a result of material build-up. Loop powered Series CRF delivers a 4-20 mA isolated output signal proportional to the height of material in a tank or holding vessel. Continuous level transmitter can be field calibrated to fit your specific application. Integral electronics and two-wire design simplify installation. Probes should be mounted vertically and are easily trimmed to shorter lengths where required. When mounting in nonmetallic or horizontal tanks, a separate grounding rod must be used. Consult factory regarding mounting flange, grounding rod assemblies, optional pressure rating, longer lengths and sanitary connection.

APPLICATIONS

Alcohols, wastewater, oils, polymers, acids, caustics, pulp, slurries, wood chips, water-based products in tanks, bins, or other vessels.

MODELS

Model Number	Probe	Length
CRF-TR0-34T-072	FEP coated 316 SS	6 ft (1.83 m)
CRF-TR0-34T-096	FEP coated 316 SS	8 ft (2.44 m)

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials:
Connection: 316 SS.
Probe: FEP.
Accuracy: ± 0.1% of full range repeatability, ± 0.3% of full range linearity.
Temperature Limits: Probe: -40 to 250°F (-40 to 121°C), Electronics: -40 to 180°F (-23 to 82°C).
Pressure Limit: 100 psig (6.89 bar).
Power Requirements: 18 to 30 VDC.
Output Signal: 4 to 20 mA, 2 wire.
Zero and Span Adjustments: Zero: 0 to 500 pF, Span: 25 to 2200 pF.
Loop Resistance: 600 Ohms at 24 VDC.
Current Consumption: 0.6 VA.
Electrical Connections: Screw terminal.
Conduit Connection: 1/2″ female NPT.
Process Connection: 3/4″ male NPT standard. Optional 2, 3, or 4″ 150# flange in 316 SS or PVC, 1-1/2″ or 2" sanitary clamp connection.
Enclosure Rating: Weatherproof. **Mounting Orientation:** Vertically mounted.
Weight: 6 ft probe model is 7.25 lb (2.39 kg).
Probe Length: Rigid Rod: 12″ (304.8 mm) to 144″ (3.66 m). Flexible cable with weight: 24″ (609.6 mm) to 240″ (6.096m).
Options: Flange mount assemblies with reference rod, flexible cable probe, optional connections listed under process connection.

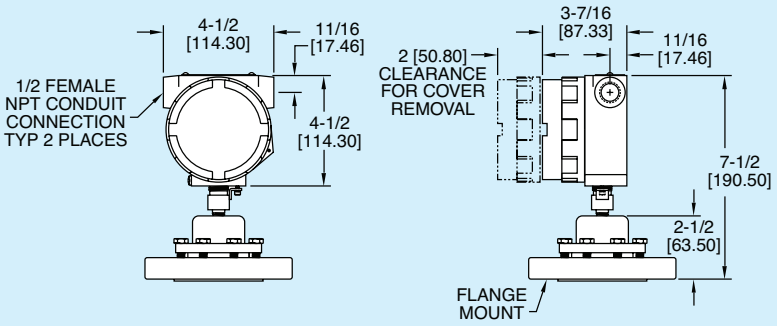
Level

PROXIMITY®

Series PLT

Piezoresistive Level Transmitter

2-wire, Loop-Powered, ±0.25% Accuracy



Series PLT Piezoresistive Level Transmitters provide reliable measurement and control of process levels by sensing the hydrostatic pressure in a tank. The loop-powered level transmitter delivers a 4 to 20 mA output signal proportional to hydrostatic pressure and specific gravity of the fluid for indicating, recording or control purposes. Easily accessible zero and span potentiometers make calibration in the field quick and simple. Units are equipped with EMI and reverse polarity protection.

APPLICATIONS

Monitor and control levels of water, chemicals, lubricants, or paints in vented tanks. Ideal for fluids with suspended solids such as wastewater and slurries.

MODELS

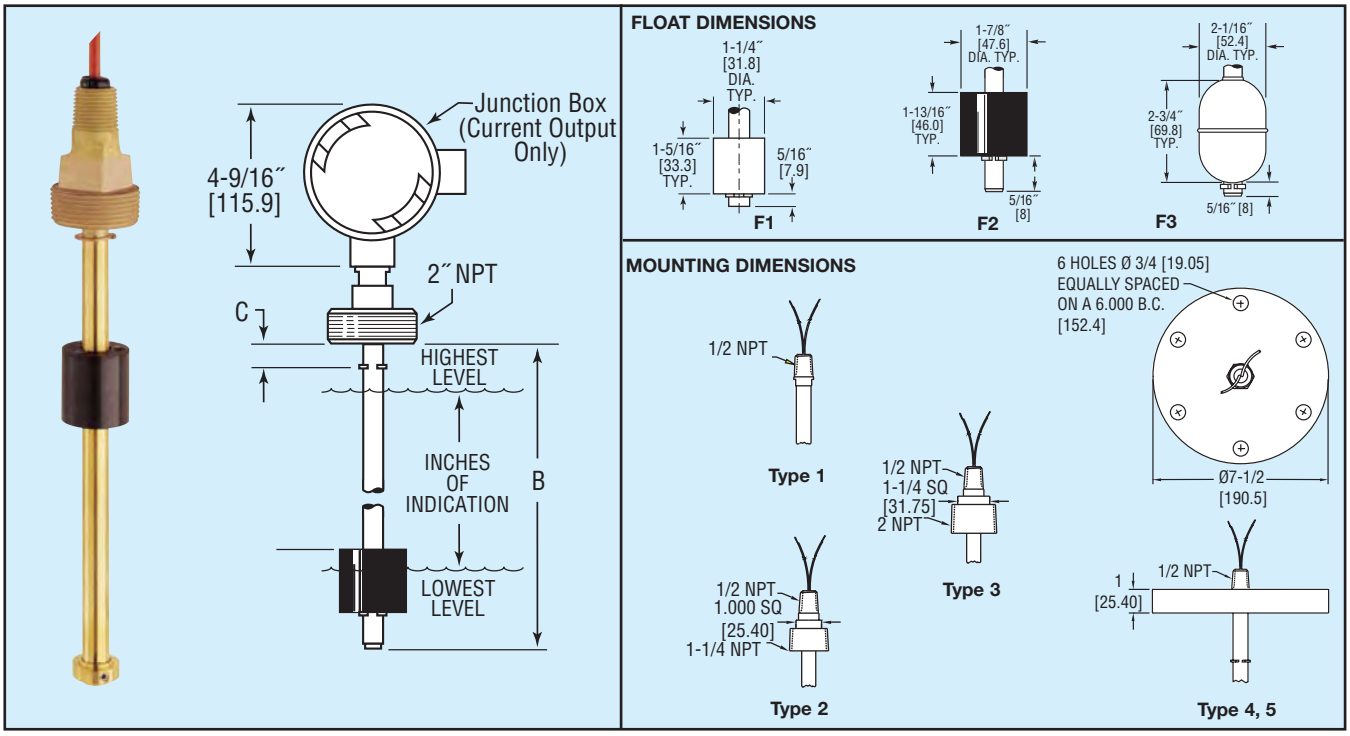
MODEL NUMBER	RANGE		MOUNTING
PLT1040	1 psig (0.07 bar)	2 ft (.61 m)	1" female NPT
PLT1050	1 psig (0.07 bar)	2 ft (.61 m)	2" Flange
PLT2040	5 psig (0.34 bar)	10 ft (3.05 m)	1" female NPT
PLT2050	5 psig (0.34 bar)	10 ft (3.05 m)	2" Flange

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: 316 SS and PTFE.
Accuracy: ± 0.25% of span. Repeatability and hysteresis: ± 0.10% of full range.
Temperature Limits: 0 to 200°F (-18 to 93°C).
Compensated Temperature Range:
0 to 180°F (-18 to 82°C).
Pressure Limit: 3 times the full range.
Power Requirements: 18 to 30 VDC.
Output Signal: 4 to 20 mA, 2 wire.
Zero and Span Adjustments: Zero adjustment for elevation compensation: 25%.
Loop Resistance: 1000 Ohms at 24 VDC.
Electrical Connections: Screw terminal.
Conduit Connection: 1/2″ female NPT.
Process Connection: 2 or 3″ 150# flange, 3″ 300# flange. 1/4″, 1/2″, or 3/4″ female NPT.
Enclosure Rating: Weatherproof.
Mounting Orientation: Any position.
Weight: NPT Connection: 7.95 lb (3.61 kg), 2″ flange connection: 11.85 lb (5.38 kg).
Fill Solution: Silicone oil.
Vibration Limits: ±1 g, 10 to 200 Hz.
Options: See process connection for other connection options. 10 psi (.69 bar) up to 500 psi (34.47 bar) ranges.

Series CLT Continuous Level Transmitter

Customize To Fit Application, 316 SS or Buna-N Floats



Continuous Output Level Transmitters provide up to the minute tank level monitoring. Customize level transmitters to meet application requirements. Transmitters can be configured for 4 to 20 mA or proportional voltage output, stainless steel or Buna-N floats, and lengths up to 72″ (183 cm).

Models are built to your specifications.

SPECIFICATIONS

Service: Compatible liquids.
Resolution: 1/4″.
Temperature Limits: Buna-N floats: 180°F (82°C) in water, -40 to 230°F (-40 to 110°C) in oil; SS stem: -40 to 230°F (-40 to 110°C).
Pressure Limits: Buna-N floats: 150 psig (10 bar); SS floats: 300 psig (21 bar).
Power Requirements: Proportional voltage output models: 10 to 30 VDC; 4-20 mA output models: 10 to 40 VDC.
Loop Resistance: 1.4 kΩ maximum.
Electrical Connections: Proportional voltage output: 24″ (61 cm) free leads #22 AWG, TFE jacketed; 4-20 mA output: Junction box.
Enclosure Rating: 4-20 mA models, NEMA 4 junction box.
Mounting Orientation: Vertical ±20°.

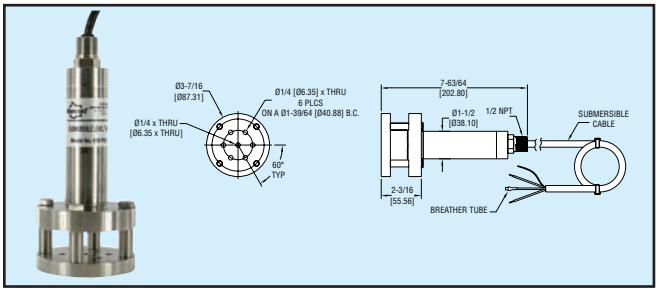
Example	CLT	V	S	5	F3	20.25	02.00	23.50	CLT-VS5F3-20.25-02.00-23.50
Construction	CLT								Continuous Level Transmitter
Output		V C							Voltage, proportional signal of 0 to supply voltage 4-20 mA
Stem and Connection Material			B S						Brass with Beryllium copper stops 316 SS with SS ARMCO PH-15-7MO stops
Connection Type				1 2 3 4 5					1/2″ NPT (Output Type V only) 1-1/4″ NPT (Float F1 only) 2″ NPT 3″ 150# Flange, Carbon Steel (Connection material S only) {Max. pres. 150 psi (10.3 bar)} 3″ 150# Flange, 316 SS (Connection material S only) {Max. pres. 150 psi (10.3 bar)}
Float Type					F1 F2 F3				**Material** / **Min s.g.** / **Max. Pres. psi (bar)** / **Float Factor in (mm)** Buna N / 0.55 / 150 (10.3) / 2.0 (50.8) Buna N / 0.55 / 150 (10.3) / 2.5 (63.5) 316 SS / 0.75 / 300 (20.7) / 3.5 (52.4)
Indication Length						00.00			Length that the unit sends an output for level. Maximum is 68″ (173 cm).
Top Float Stop"C" Dimension							00.00		Distance from bottom of mounting connection to upper float stop. Minimum is 1/4″ (6.4 mm)
Overall Length "B"								00.00	To calculate overall length, add Indication Length, Top Float Stop Dimension "C", and Float Factor. Maximum length is 72″ (1.82 m)

Mercoid®

Series PBLT2

Submersible Level Transmitter

Perfect for Sludge and Slurries, Lightning Protected



The PBLT2 Submersible Level Transmitter is manufactured for years of trouble free service in the harshest applications. The PBLT2 measures the height of liquid above its position in the tank referenced to atmospheric pressure. The transmitter consists of a piezoresistive, sensing element, encased in a 316 SS housing. Perfect for wastewater and slurry applications with features to protect the unit from these demanding applications. Superior lightning and surge protection utilizing dual arrestor technology, grounded to case, eliminating both power supply surges and lightning ground strike transients. Large diameter 316 SS diaphragm seal is non-clogging and damage resistant to floating solids.

Comes equipped with a 270-pound tensile strength, shielded, vented cable. Ventilation tube in the cable automatically compensates for changes in atmospheric pressure above the tank. The vent is protected with a filter eliminating moisture collection in the transducer.

APPLICATIONS

• Wastewater: sludge pits, clarifiers, digesters; Alum tanks; Chemical storage tanks; Oil tanks; Lime slurry; Sumps; Reservoirs

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: 316 SS, 316L SS, Buna-N, cable: ETFE or polyurethane.
Accuracy: ±.25% full scale.
Temperature Limit: 0 to 200ºF (-18 to 93ºC).
Compensated Temperature Range: 0 to 180ºF (-18 to 82ºC).
Thermal Effect: Less than ±.02%/ºF.
Pressure Limit: 2X full scale.
Power Requirement: 13 to 30 VDC.
Output Signal: 4 to 20 mA DC, two wire.
Response Time: 50 msec.
Loop Resistance: 850 ohms at 30 VDC.
Electrical Connection: Wire pigtail.
Mounting Orientation: Suspended in tank below level being measured. Can be placed on the bottom of the tank on its side.
Weight: 4.3 lb (2.0 kg).
Electrical Protection: Lightning and surge protection.

MODELS

Model Number	Range psi (ft wc [m wc])	Cable Length ft (m)	Cable Type
PBLT2-5-40	5 (11.54) [3.52]	40 (12.2)	ETFE
PBLT2-10-40	10 (23.09) [7.04]	40 (12.2)	ETFE
PBLT2-15-60	15 (34.63) [10.56]	60 (18.3)	ETFE
PBLT2-20-60	20 (46.18) [14.08]	60 (18.3)	ETFE
PBLT2-5-40-PU	5 (11.54) [3.52]	40 (12.2)	Polyurethane
PBLT2-10-40-PU	10 (23.09) [7.04]	40 (12.2)	Polyurethane
PBLT2-15-60-PU	15 (34.63) [10.56]	60 (18.3)	Polyurethane
PBLT2-20-60-PU	20 (46.18) [14.08]	60 (18.3)	Ploryurethane

Level

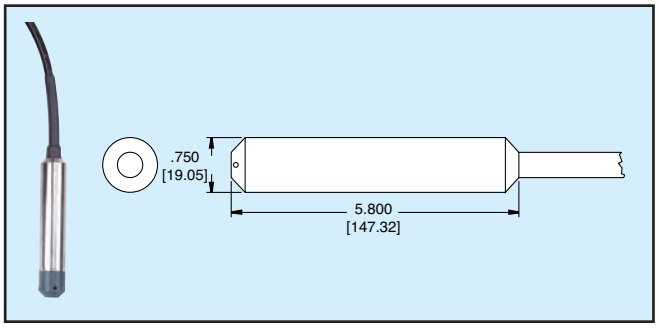
Mercoid®

Series SBLT

Submersible Level Transmitter

Perfect for Ground Water and Wells, Lightning Protected

CE



SBLT Submersible Level Transmitter is manufactured for years of trouble free service. The transmitter consists of a bonded foil, strain gauge, sensing element, encased in 316 SS housing. Superior lightning and surge protection utilizing dual arrestor technology, grounded to case, eliminating both power supply surges and lightning ground strike transients. Bullet nose design protects diaphragm from damage. Comes equipped with a 220-pound tensile strength, shielded, vented, Polyurethane cable. Ventilation tube in the cable automatically compensates for changes in atmospheric pressure above the tank. The vent is protected with a filter eliminating moisture collection in the transducer.

APPLICATIONS

• Well monitoring; Ground water monitoring; Environmental remediation; Surface water monitoring; Down hole; Water Tanks

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials: Body: 316 SS, Cable: Polyurethane. Bullet Nose: PVC.
Accuracy: ±0.20% of full scale.
Temperature Limits: -40 to 150°F (-40 to 65.6°C).
Compensated Temperature Range: 0 to 140°F (-17.8 to 60°C).
Pressure Limit: 1.5X full scale range.
Thermal Effect: Less than ±2.0% of full scale per 100°F.
Power Requirement: 9 to 36 VDC.
Output Signal: 4 to 20 mA DC, 2-wire.
Response Time: < 5 ms.
Loop Resistance: 750 ohms at 24 VDC
Electrical Connections: Wire pigtail.
Mounting Orientation: Suspended in tank below level being measured. Can be placed on the bottom of the tank on its side.
Standard Features: Calibration certificate.
Weight: 3.5 lb (1.59 kg).
Electrical Protection: Dual transient lightning and surge arrestors exceeding FM approved I/S and meet EMA/RFI standards Mil-Std 461/462 and ground to transducer case.

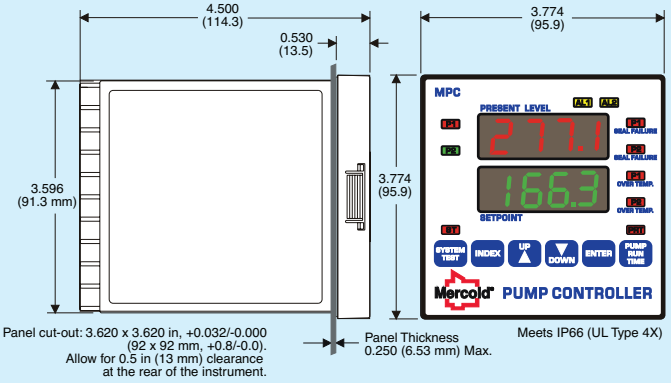
MODELS

Model Number	Pressure Range	Cable Length
SBLT-5-40	5 psi (.35 bar)	40 feet (12.2 m)
SBLT-10-40	10 psi (.69 bar)	40 feet (12.2 m)
SBLT-15-60	15 psi (1.03 bar)	60 feet (18.3 m)
SBLT-20-60	20 psi (1.39 bar)	60 feet (18.3 m)
Extended cable length available contact the factory.		

Series MPC Pump Controller

One or Two Pump Control with Built-In Alternation, Over Temperature Protection and Seal Failure Monitoring

NEW Features!



Level

The Mercoid® MPC Pump Controller provides versatile level control in a standard 1/4 DIN package. Designed for use with almost any style level transmitter the unit displays the present level and main set point value. Incorporated in the MPC is programmable level differential for on/off control of one or two pumps, valves, or other devices through two SPDT relays. Also featured are two additional programmable alarm contacts with front alarm light indication.

The MPC is flexible and incorporates a user-friendly programming menu. The front face meets NEMA 4X for outdoor panel mounting. So many features are combined into the MPC that it eliminates many components in a pump control system.

NEW FEATURES

- Alarms can be programmed for output indication of pump seal failure or over temperature.
- Selectable time delay, for pump two, on power up to pre vent both pumps from starting at the same time. If power is lost, upon regaining power a time delay of up to 60 seconds can be selected to prevent too large of a current draw.

FEATURES

- Selectable pump alternation when used with two pumps to minimize pump wear. With alternation "on" a seal failure or over temperature condition will force the non-failed pump to lead status and stop alternation.
- When used with a submersible pump including a moisture sensor the MPC has alarm light indication of seal failure.
- When used with a pump including a thermostat the MPC has alarm light indication of pump over temperature and removes the pump from service. The Pump can be brought back into service automatically or by manual reset when the pump has cooled down.
- Integral 24 VDC power supply for level transmitter.
- Displays pump run time from a front panel button.
- Test System function that simulates the process input to insure the pumps are operating or to test programming.
- User selectable security lock-out of programming and/or set points.
- Process input retransmission as a current (4 to 20 mA) or voltage (2 to 10 VDC) analog signal*.

* Standard model MPC is set for current retransmission. For voltage retransmission add suffix "-RV".

SPECIFICATIONS

Inputs: 4 (or 0) to 20 mA DC or 2 (or 0) to 10 VDC selectable.
Input Impedance: Current = 10 ohms, Voltage = 100 K ohms.
Output Ratings:
Control Relays: SPDT, rated 10A @ 240 VAC res., 1/4 hp @ 120 VAC, 1/3 hp @ 240 VAC.
Alarm Relays: SPST, 3A @ 240 VAC res., 1/10 hp @ 120 VAC.
Control Type: On/off, reverse (pump out) or direct (pump in) acting.
Power Requirements: 100 to 240 VAC nominal, +10%-15%, 50 to 400 Hz, single phase; 132 to 240 VDC nominal, +10%-15%.
Power Consumption: 7.5 VA maximum.
Accuracy: ±0.25% of span, ±1 least significant digit.
Display: Two 4 digit, 7 segment 0.56˝ high LED's.
Display Resolution: 1 count.
Memory Backup: Nonvolatile memory (no batteries required).
Serial Communications: Optional RS-232 or RS-485 with Modbus® protocol.
Ambient Operating Temperature/RH: 14 to 131°F (-10 to 55°C)/0 to 90% up to 104°F (40°C) non-condensing, 10 to 50% at 131°F (55°C) non-condensing.
Weight: 16 oz (454 g).
Front Panel Rating: Meets UL Type 4X (IP66).
Loop Power Supply (isolated): 24 VDC @ 50 mA, regulated.
Seal Failure (Moisture Sensor):
Power: 2.5 VDC.
Search Current: 3 micro amps.
Resolution: 10K to 500K ohms in 10K ohm steps.
Agency Approvals: UL 508, CE.

ACCESSORIES:

Weatherproof Enclosures, NEMA 4X.

A-901

For compatible level transmitters see Mercoid Series SBLT and PBLT.

Series MPC Pump Controller

OPTIONS

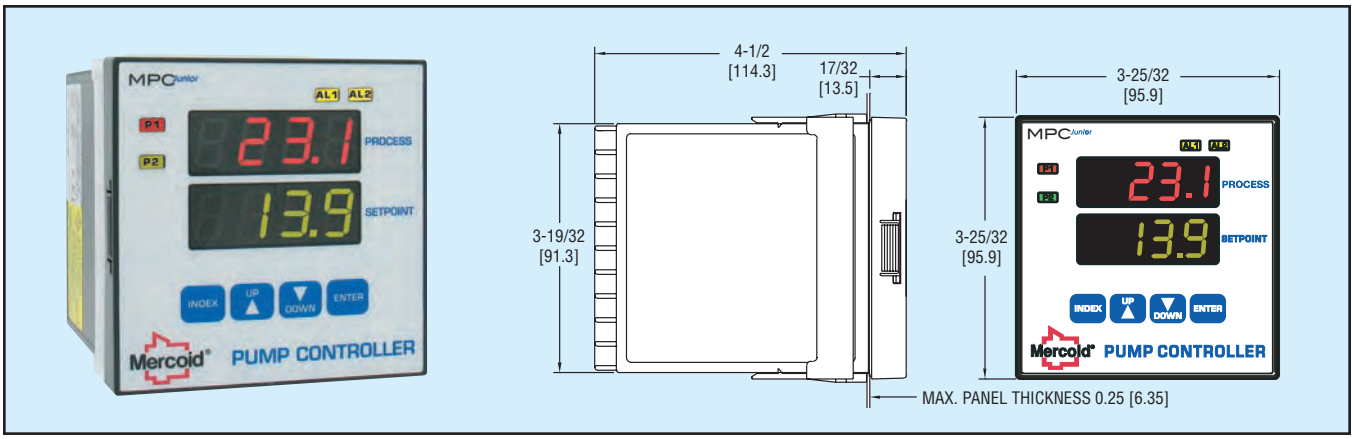
RS-232 Modbus®-RTU Serial Communications.
Add suffix – **232**
RS-485 Modbus®-RTU Serial Communications.
Add suffix – **485**

Modbus® is a registered trademark of Schnieder Automation.

Mercoid® Series MPC Jr.

Pump Controller

One or Two Pump Control with Built-In Alternation



The Mercoid® MPC Junior Pump Controller provides versatile level control in a standard 1/4 DIN package. Designed for use with almost any style level transmitter the unit displays the present level and main set point value. Incorporated in the MPC Jr. is programmable level differential for on/off control of one or two pumps, valves, or other devices through two SPDT relays. Also featured are two additional programmable alarm contacts with front alarm light indication.

The MPC Jr. is flexible and incorporates a user-friendly programming menu. The front face meets NEMA 4X for outdoor panel mounting.

FEATURES

- Selectable pump alternation when used with two pumps to minimize pump wear.
- Integral 24 VDC power supply for transmitter.
- User selectable security lock-out of programming and/or set points.
- Optional process input retransmission as a current (4 to 20 mA) or voltage (2 to 10 VDC) analog signal.
- Analog output of pump "on" condition for activation of separate pump run time meters.

Series MPCJR Pump Controller

OPTIONS

Retransmisssion of input, 4 to 20 mA,
Add suffix – **RC**

Retransmission of input, 0 to 10 VDC,
Add suffix – **RV**

RS-232 Modbus®-RTU Serial Communications
Add suffix – **232**

RS-485 Modbus®-RTU Serial Communications
Add suffix – **485**

Modbus® is a registered trademark of Schnieder Automation.

SPECIFICATIONS

Inputs: 4 (or 0) to 20 mA DC or 2 (or 0) to 10 VDC selectable.
Input Impedance: Current = 10 ohms, Voltage = 5 K ohms.
Output Ratings:
Control Relays: SPDT, rated 10A @ 240 VAC res., 1/4 hp @ 120 VAC, 1/3 hp @ 240 VAC.
Alarm Relays: SPST, 3A @ 240 VAC res., 1/10 hp @ 120 VAC.
Others: 15 VDC @ 20 mA for output one and output two.
Control Type: On/off, reverse (pump out) or direct (pump in) acting.
Power Requirements: 100 to 240 VAC nominal, +10%-15%,
50 to 400 Hz, single phase; 132 to 240 VDC nominal, +10%-15%.
Power Consumption: 7.5 VA maximum.
Accuracy: ±0.25% of span, ±1 least significant digit.
Display: Two 4-digit, 7 segment 0.56˝ high LED's.
Display Resolution: 1 count.
Memory Backup: Nonvolatile memory (no batteries required).
Serial Communications: Optional RS-232 or RS-485 with Modbus® protocol.
Ambient Operating Temperature/RH: 14 to 131°F (-10 to 55°C)/0 to 90% up to 104°F (40°C) non-condensing, 10 to 50% at 131°F (55°C) non-condensing.
Weight: 16 oz (454 g).
Front Panel Rating: Meets UL Type 4X (IP66).
Loop Power Supply (isolated): 24 VDC @ 50 mA, regulated.
Agency Approvals: UL 508, CE.

ACCESSORIES

Weatherproof Enclosures, NEMA 4X.
See Models A-900 and A-901 for details.

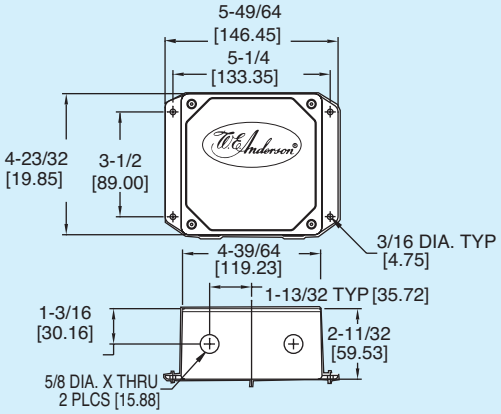

A-901

For compatible level transmitters see Mercoid Series SBLT and PBLT.

Level

Series PCP Relay/Controller/Power Supply

10A SPDT Relay, 24 VDC Power Supply, Latching Circuit for Level Control



Level

APPLICATIONS

- Use with two point level switches for an adjustable differential controlling a pump.
- Use as an external higher current relay for reed or NPN switches.
- Use as a power supply for NPN switches or transmitters.

FEATURES

- Field selectable power requirements of 24 VDC, 24 VAC, 120 VAC, or 240 VAC.
- Compact size with flange for surface mounting.
- Manual reset capability.

The Series PCP level controller is designed to be a power supply, an external relay, and a latching relay for differential level control with two level switches. As a power supply the PCP can step down line voltage to 5 or 24 VDC to power NPN switches such as the OLS and PC level switches or to power a transmitter. The PCP can function as an external relay to increase switching capability by providing up to a 10A SPDT contact for direct control of moderate loads. As a latching relay the PCP can be used with any two normally open level switches and provide level control for pumps. The latching circuit can also be used to hold the relay in an actuated state until manually reset.

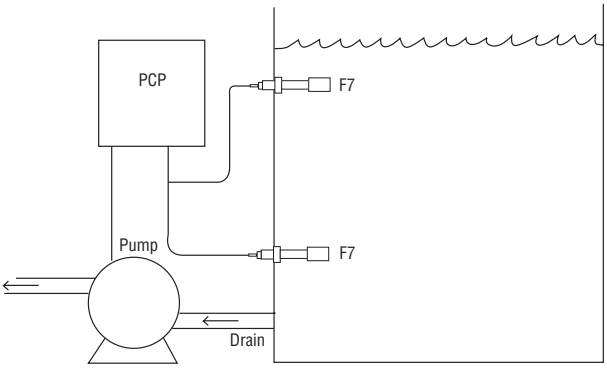
MODELS

Model Number	Electrical Rating of Contact		
	120 VAC	30 VDC	Max. Switching Capacity
PCP-1	0.5A	1A	62.5 VA, 33 W
PCP-5	5A	5A	600 VA, 150 W
PCP-10	10A	5A	1250 VA, 150 W

SPECIFICATIONS

Inputs: One or two normally open switches.
Output Type: SPDT switch.
Output Rating: See model chart.
Control Type: On/off with manual reset capability.
Power Requirements: 24 VDC, 24 VAC, 120 VAC, or 240 VAC.
Power Consumption: DC power: 15 mA maximum, AC power: 55 mA maximum.
Ambient Operating Temperature: 0 to 140°F (-18 to 60°C).
Weight: 1.06 lb (0.48 kg).
Enclosure Rating: General purpose.
Loop Power Supply: 5 or 24 VDC regulated. 200 mA maximum.
Mounting Orientation: Horizontal or vertical.

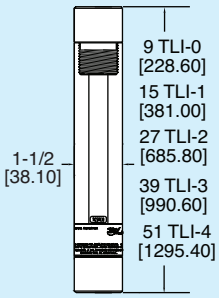
Pump Out Control with F7 Level Switches and PCP Controller



Series TLI

Tank Level Indicator

Double Wall Construction for Ultra-Pure or Corrosive Liquids



The Series TLI Tank Level Indicator provides a visual indication of the height of liquid contained in a tank. The 1/2-foot unit can also be used as a sight flow tube when mounting in a pipeline. The TLI series utilizes a double wall construction to indicate the level of corrosive or ultra-pure liquids and is available with PVC, Polypropylene, or PTFE fittings and 1/2″ or 3/4″ NPT threads. Fluoroelastomer seals are standard. All units are hydrostatically tested to 400 psi (27.6 bar).

MODELS

Model Number	Glass Tube Length
TLI-0-1	6 in. (152.4 mm)
TLI-2-1	24 in. (609.6 mm)
TLI-3-1	36 in. (91.4 cm)
TLI-4-1	48 in. (121.9 cm)

SPECIFICATIONS

Service: Compatible gases and liquids.
Wetted Materials: Tube: Borosilicate glass. End Connections: PVC, Polypropylene, or PTFE. O-ring: Fluoroelastomer.
Temperature Limit: PVC end connections: 140°F (60°C), Polypropylene end connections: 185°F (85°C), PTFE end connections: 210°F (100°C).
Pressure Limit: 100 psig (6.9 bar) at 180°F (82°C).
Connections: 1/2″ female NPT standard. Change 1 in model number to 2 for 3/4″.
Enclosure: Exterior acrylic shield tube to protect glass tube.

OPTIONS

-AT Aluminum Tag
-P Polypropylene Fittings
-T PTFE Fittings
Note: For 3/4″ NPT fittings, change the last digit of the model number to 2.

Level

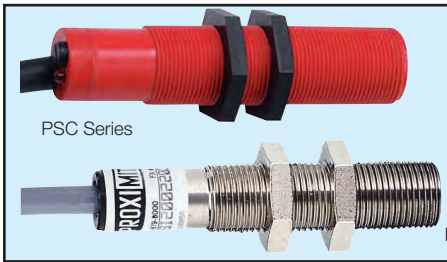
PROXIMITY®

Series PS

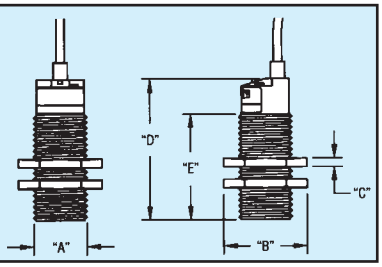
Proximity Sensors

Capacitive or Inductive 3-Wire DC, Threaded Body

CE



Dim.	PSC20103	PSC20203	PSI2002203	PSI2005303
A	M18	M30	M12	M18
B	1.065 (27)	1.614 (41)	0.688 (17)	0.938 (17)
C	0.157 (4)	0.197 (5)	0.125 (3)	0.125 (3)
D	3.156 (80)	3.156 (80)	2.36 (60)	2.87 (73)
E	2.36 (60)	2.36 (60)	1.58 (40)	1.97 (50)



The Series PS Proximity Sensors are noninvasive sensors ideal for level detection, position indicating and counting applications. Capacitive type sensors detect electrically conducting and nonconducting materials, liquids, solids, or powders and include a sensitivity adjustment to differentiate between various materials. Inductive sensors detect ferrous or nonferrous metals only. A bright LED indicates the state of the output switch. Sensors feature short circuit, reverse polarity, and transient protection. Small size and threaded body make installation easy. Inductive sensors are embeddable (can be mounted flush). Capacitive sensors are environmentally protected to IP65 and Inductive sensors are protected to IP68. Units include two fixing, screwdriver, and operating manual.

MODELS

Model Number	Type	Body Size	Switching Frequency	Detecting Dist. in (mm)
PSC20103	Cap.	M18 x 1	400 Hz	.04-3 (1-10)
PSC20203	Cap.	M30 x 1.5	250 Hz	.08-79 (2-20)
PSC30203*	Cap.	M30 x 1.5	250 Hz	.08-79 (2-20)
PSI2002203	Ind.	M12 x 1	800 Hz	.08 (2)
PSI2005303	Ind.	M18 x 1	500 Hz	.19 (5)

* NPN Transister

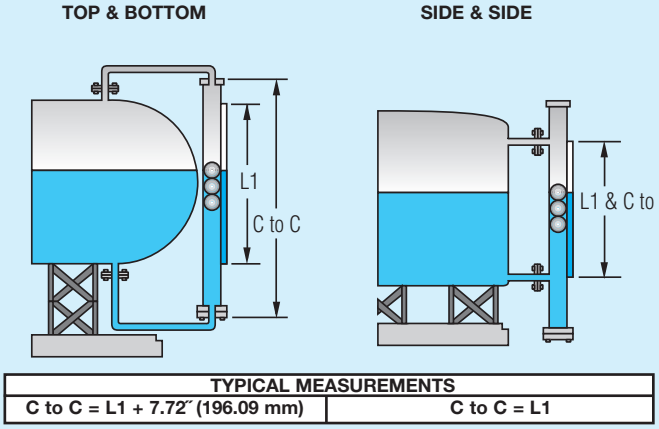
SPECIFICATIONS

Wetted Materials: Glass reinforced plastic (PSC), Stainless Steel (Model PSI2002203), Nickel-plated Brass (Model PSI2005303).
Temperature Limits: -22 to 212°F (-30 to 100°C) capacitive, -13 to 158°F (-25 to 70°C) inductive.
Enclosure Rating: PSC, IP65; PSI, IP68.
Repeatability: ±0.05% (Model PSC20103), ±0.1% (Model PSC20203 ±0.01% (PSI Models).
Power Requirements: 8 to 30 VDC.
Switch Type: Normally open NPN transistor, sinking.
Electrical Rating: 250 mA (PSC), 200 mA (PSI).
Minimum Load Current: 8 mA (PSC), <25 mA (PSI).
Leakage (Off-State) Current: <3 mA (PSC), <0.08 mA (PSI).
Voltage Drop: <3.5V @ 250 mA (PSC).<2.5V @ 200 mA (PSI).
Ripple: 10%.
Electrical Connection: 9.8 ft (3 m) cable.
Deadband: 20% of range (PSC), 15% of range (PSI).
Initializing Time Delay: <10 msec.
Agency Approvals: CE.

Series MVR

Mini View-Rite Level Indicator

Customized, Visual Level Indication, Compact Size



TYPICAL MEASUREMENTS	
C to C = L1 + 7.72″ (196.09 mm)	C to C = L1

Miniature custom level indicators are ideal for high-visibility level indication in tight spaces. All stainless steel housing provides rugged durability with a diameter of only 1-1/4 inches (32 mm). Select the mounting type that will best fit your application and an indication length of up to 96 inches (244 cm). View-Rite level indicators incorporate a pressure tight housing with internal float that magnetically activates external level indication flags, switches, or transmitter.

Models are built to your specifications

SPECIFICATIONS

Service: Clean, low-viscosity liquids.
Pressure Limits: ≤ 300°F, 400 psi (27.6 bar); ≥ 300°F, 373 psi (25.7 bar).
Tube Diameter: 1-1/4″ (32 mm).

SWITCH MODULES

Clamp onto the level indicator. SPST, rated .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.

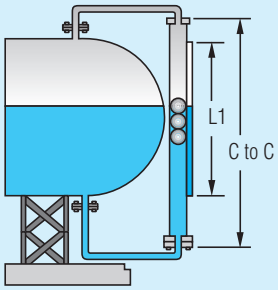
MVR-S1, Maximum temperature is 300°F (148.9°C). Polysulfone with 1/4″ female NPT conduit connection.
MVR-S2, Maximum temperature is 750°F (399°C). 316 SS with 1/2″ male NPT conduit connection.
MVR-S3, Maximum temperature is 750°F (399°C). Explosion-proof terminal box with 1/2″ female NPT conduit connection.

Example	MVR	S	SS	1	TP	D	0.8	150	090	80	P	1	I	MVR-SSS1-TPD-0.8-150-090-80P1-I
Construction	MVR													Mini View-Rite Level Indicator
WETTED Materials		S												304 L SS Housing, 316 L SS Float, Fluoroelastomer O-ring
Configuration			TB SS											Top/Bottom Connections Side/Side Connections
Process Connection				1 3										1/2″ NPT (Female on TB, and Male on SS Configuration) 1/2″ 150# RF Flange
Float Access					TP BM TB									Top Bottom Top and Bottom (Only with SS Configuration)
Drain and Vent						N D V B								None Drain, 1/2″ female NPT (Only with SS Configuration) Vent, 1/2″ female NPT (Only with SS Configuration) Drain and Vent (Only with SS Configuration)
Spec. Gravity							0.0							Specific Gravity of fluid, minimum 0.8
Operating Pressure								000						Operating Pressure, in psi. Maximum is 400 psi (27.6 bar)
Operating Temperature									000					Operating Temperature of the fluid, in °F. Maximum is 400°F (20°C)
Indicating Length, L1										00				Length of level indicator, in whole inches. Maximum of 96″ (2.44 m)
Indicating Flags											P A			Plastic, white and orange [300°F (149°C) maximum] Aluminum, silver and black
Visual Indicating Scale												N 1 2		None Feet and Inches Inches Only
Output Options													I V	4 to 20 mA transmitter of level [300°F (149°C) maximum] 0 to 5 VDC transmitter of level

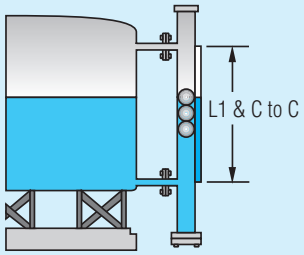
Series VR

View-Rite Level Indicator

Customized to Fit Any Application, Durable, 316 SS Housing and Float



TOP & BOTTOM



SIDE & SIDE

TYPICAL MEASUREMENTS	
C to C = L1 + 10.25″ (260.35 mm)	C to C = L1

Customize level indicators to meet application requirements. Visi-rite level indicators are low maintenance, environmentally friendly, durable, and require no external power. Specify any indication length up to 96 inches (244 cm). View-Rite level indicators incorporate a pressure tight housing with internal float that magnetically activates external level indication flags, switches, or transmitter.

Models are built to your specifications

SPECIFICATIONS

Service: Clean, low-viscosity liquids.
Pressure Limits: 275 psi (18.9 bar), 225 psi (15.5 bar) @ 100°F (37.8°C), 215 psi (14.8 bar) @ 300°F (148.9°C), 195 psi (13.4 bar) @ 400°F (204.4°C).
Tube Diameter: 2-1/2″ (64 mm).

OPTIONAL SWITCH MODULES

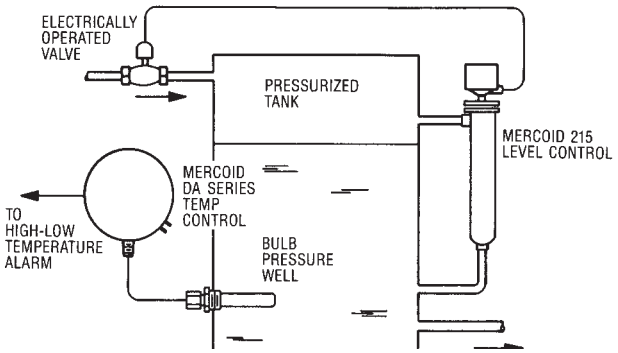
Clamp onto the level indicator. SPST, rated .17A @ 120 VAC, .08A @ 240 VAC, .13A @ 120 VDC, .06A @ 240 VDC.

VR-S1, Maximum temperature is 300°F (148.9°C). Polysulfone with 1/4″ female NPT conduit connection
VR-S2, Maximum temperature is 750°F (399°C). 316 SS with 1/2″ male NPT conduit connection.
VR-S3, Maximum temperature is 750°F (399°C). Explosion-proof terminal box with 1/2″ female NPT conduit connection.

Example	VR	S	SS	1	TP	D	0.8	150	090	80	P	1	I	VR-SSS1-TPD-0.8-150-090-80P1-I
Construction	VR													View-Rite Level Indicator
WETTED Materials		S												316 L SS, Fluoroelastomer O-ring
Configuration			TB SS											Top/Bottom Connections Side/Side Connections
Process Connection				1 2 4 5										1/2″ NPT (Female on TB, and Male on SS Configuration) 1″ NPT (Female on TB, and Male on SS Configuration) 1″ 150# RF Flange 2″ 150# RF Flange
Float Access					TP BM TB									Top Bottom Top and Bottom (Only with SS Configuration)
Drain and Vent						N D V B								None Drain, 1/2″ female NPT (Only with SS Configuration) Vent, 1/2″ female NPT (Only with SS Configuration) Drain and Vent (Only with SS Configuration)
Spec. Gravity							0.0							Specific Gravity of fluid, minimum 0.8
Operating Pressure								000						Operating Pressure, in psi. Maximum is 275 psi (18.9 bar)
Operating Temp.									000					Operating Temperature of the fluid, in °F. Maximum is 400°F (20°C)
Indicating Length, L1										00				Length of level indicator, in whole inches. Maximum of 96″ (2.44 m)
Indicating Flags											P A			Plastic, white and orange [300°F (149°C) maximum] Aluminum, silver and black
Visual Indicating Scale												N 1 2		None Feet and Inches Inches Only
Output Options													I V	4 to 20 mA transmitter of level [300°F (149°) maximum] 0 to 5 VDC transmitter of level

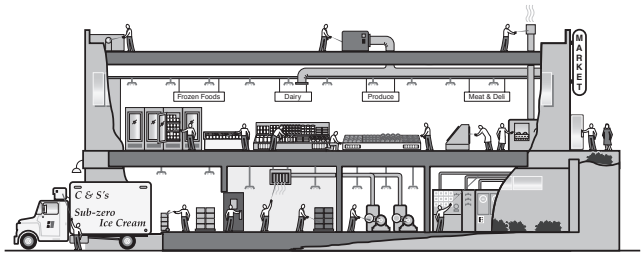
Introduction to Temperature Controls

The temperature of an object is generally described by the relative “Hot” or “Cold” feeling of the item. Several reliable and reproducible methods exist to establish the relative “Hotness” or “Coldness” of an object and provide a quantitative indication of temperature. Our sensors provide a quantitative indication of temperature through a variety of methods including bulb and capillary, infrared, bimetal, thermocouple, thermistor and RTD. These technologies are represented on the following pages.



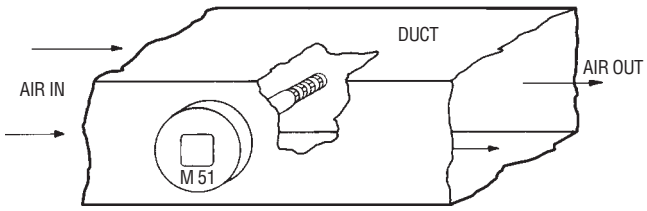
Mercoid® temperature and level controls find wide application in high pressure and high temperature processes.

The application above shows a Mercoid® DA series bulb and capillary temperature control monitoring the temperature of media in a holding tank. This control can actuate an alarm when the media temperature exceeds the desired temperature limit. A well in the side of the tank protects the bulb from the system pressure and it allows removal of the bulb and control without disturbing the process. A Mercoid® Model 215, also shown, can be used to control the level in the tank by turning on or off an electrically operated valve. This level control features an adjustable level setpoint from 1.5 to 24 inches and pressure/temperature ratings of 300 psi/500ºF.



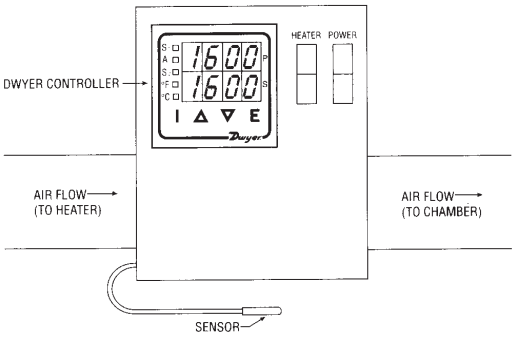
Noncontact temperature measurement using infrared thermometers.

Use Infrared Thermometers for noncontact, non-contaminating temperature measurement of food items. Quickly verify uniform heating or cooling in food display and food storage areas to eliminate spoilage and product waste. Monitor the temperature of ovens, ranges, deep fryers, and heated serving areas while maintaining a safe distance from the heat source. Check refrigeration and heating lines, compressors, motors, HVAC units, electrical connections, and circuit breakers to verify proper operation and determine trouble spots early.



Mercoid® M-51R duct temperature switch provides high temperature cut-off on textile drying unit.

Hot air from dryer flows past model M-51. If temperature reaches setpoint, bimetal element rotates, actuating switch to shut down dryer. Unit will not restart until M-51 manual reset is actuated. M-51 is mounted in a special well to prevent fouling by textile particles.

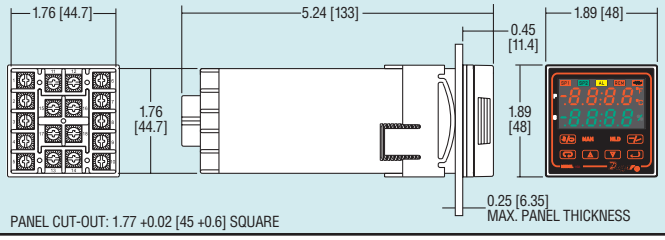


Dwyer® controllers used within heater controllers.

In bioscience laboratories, the preferred methods of temperature control for experiments are heated water baths. There are experiments where water cannot be used, so the next feasible option is to send temperature controlled air to the experiment site. In order to use temperature controlled air, an air heater is needed. Within this product, a Dwyer® temperature controller is used for accurate and responsive temperature control. The Dwyer® controller can adapt to a different environment through different operating modes such as SELF-TUNE or manual PID adjustments, or preset PID responses.

Series 16A Temperature Controller/Process

1/16 DIN, Universal Input, Fuzzy Logic, Self-Tune PID



Latest microprocessor based technology affords full programmability with complete array of features in compact ultralow cost unit. 16A Series Temperature/Process Controller features universal input, Self-Tune PID, Fuzzy Logic, and dual four-digit LED displays for process and set point value. Selectable inputs can be thermocouple, RTD, current or voltage. Available outputs are solid-state relay, relay, pulsed voltage, or proportional current. Programmable alarm (optional) can be reset automatically or manually. Front panel is waterproof and corrosion resistant (UL type 4-X), making it ideal for sanitary applications. Replace electronics without wiring changes (via removable front panel). Self diagnostics, nonvolatile memory and selectable control modes are all designed for greater productivity. Four security levels are password protected. On-off, P, PI or PID manual tune control functions can be selected or the controller will Self-Tune automatically for best PID control.

The 16A2 offers the best value in Standard Features in a Process and Temperature control. In addition to the features listed above, the 16A2 offers Peak/Valley indication, Percent Output indication, Digital Input Filter, and a host of others.

MODELS

MODEL NO.	ALARM	OUTPUT A	OUTPUT B
16A2111	Yes	SSR	SSR
16A2030	No	Relay	None
16A2133	Yes	Relay	Relay
16A2130	Yes	Relay	None
16A2020	No	15 VDC	None
16A2110	Yes	SSR	None
16A2050	No	Current	None

Modbus® is a registered trademark of Schnieder Automation.

SPECIFICATIONS

Selectable Inputs: Thermocouple, RTD, DC Voltage, or DC Current (See Input Ranges).
Display: Two four-digit LED displays, 0.3 in (7.62 mm) high. **Display Resolution:** 1 degree or 0.1 degree (sensor dependent), or 1 count.
Accuracy: ±0.25% of span ±1 least significant digit.
Supply Voltage: 100 to 240 VAC nominal, +10% -15%, 50 to 400 Hz single phase; 132 to 240 VDC +10% -20%.
Operating Temperature: 14 to 131°F (-10 to 55°C).
Power Consumption: 5 VA maximum.
Control Output Ratings:
SSR: 2.0 A at 240 VAC resistive at 77°F (25°C). De-rates to 1.0 A at 130°F (55°C). Minimum load of 100 mA. **DC SSR:** 1.75 A at 32 VDC maximum. **Relay:** SPST, 3A at 240 VAC resistive, 1.5 A @ 240 VAC inductive. Pilot Duty rating: 250 VA, 2 A @ 120 VAC, 1 A @ 240 VAC. **Alarm Relay:** SPST, 3 A @ 240 VAC resistive; 1.5 A @ 240 VAC inductive. Pilot Duty Rating: 240 VA, 2 A @ 120 VAC or 1 A @ 240 VAC. **Switched Voltage:** 15 VDC at 20 mA.
Proportional Current: 0 to 20 mADC, scalable, into 600 ohms maximum.
Weight: 8 oz (227 g).
Agency Approvals: UL E83725, CE.
Front Panel Rating: Type 4X (IP66).
Serial Communications (Optional): RS-232 or RS-485 with either LoveLink™ Software or Modbus® RTU protocol.

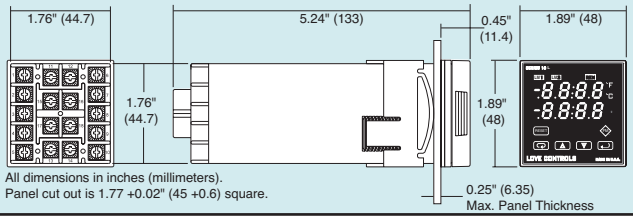
OPTIONS

934,** Process Signal Output, PV or SV. Isolated 0 to 20 mADC
936,** Process Signal Output, PV or SV. Isolated 0 to 10 VDC
992,** RS 485 Computer Compatible Control Lovelink™ Software
993,** RS 232 Computer Compatible Lovelink™ Software
9502, 12-24 VDC/VAC power input

** These options may not be combined with each other.

Series 16L Limit Controls

FM Approved, Large, Dual Display, Universal Input



The 16L Series Temperature/Process FM Approved Limit Controls set a new standard in 1/16 DIN Limit controls. The 16L offers universal input (10 thermocouple types, 4 RTD types, voltage, and current), single set point or dual set point. Standard features include Remote Reset capability, Peak/Valley indication, open sensor protection, input rate of change protection, and much more.

Unit offers 1500 VAC resolution, selectable high or low input, programmable sensor break protection and adjustable differential.

Outputs include normally open (form A) and normally closed (form B) relays. Form A and form B relays can be setup one for each set point output and logically linked to emulate a form C output.

Designed and built in the USA, the 16L family of controls offers the highest levels of features, function, and quality available today.

MODELS

MODEL NO.	OUTPUT A	OUTPUT B
16L2030	N.O. Relay	None
16L2034	N.O. Relay	N.C. Relays

SPECIFICATIONS

Selectable Inputs: 10 Thermocouple, 4 RTD, DC Voltage, or DC Current selectable.
Display: Two 4 digit, 7 segment 0.3˝ (7.62 mm) high LEDs.
Accuracy: ±0.25% of span, ±1 least significant digit.
Supply Voltage: 100 to 240 VAC, nominal, +10 -15%, 50 to 400 Hz. single phase; 132 to 240 VDC, nominal, +10 -20%.
Power Consumption: 5 VA maximum.
Operating Temperature: 14 to 131°F (-10 to 55°C).
Memory Backup: Nonvolatile memory. No batteries required.
Control Output Ratings: Relay: SPST, 3A @ 240 VAC resistive; 1.5A @ 240 VAC inductive.
Weight: 8 oz (227 g).
Agency Approvals: UL, FM.

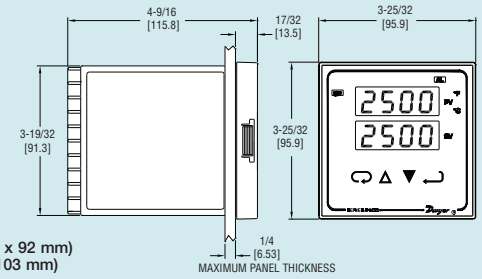
OPTION

934, Process Signal Output, PV or SV. Isolated 0 to 20 mADC

Series 2500

Temperature/Controller

1/4 DIN Fully Programmable, Self-Tune PID



Panel Cutout: 3.622" x 3.622" (92 mm x 92 mm)
Depth Behind Mounting Surface: 4" (103 mm)

The Love Series 2500 Temperature Control provides an impressive array of features in an economical 1/4 DIN package. Features include on-off, time proportioning, proportional, PI, PD, or full PID control, programmable from the front panel, or use Self-Tune PID. Input types are selectable from a variety of thermocouple types (J, K, T, E, N or L) or DIN, NIST or Ni RTD's. Outputs include solid state relay, mechanical relay, 5 VDC (ideal for driving an external SSR) or isolated 4-20 mA proportional current. Programmable alarm can act as high or low or high/low guardband alarm

A water and corrosion resistant front panel (NEMA 4X; IP 65), input fault timer, digital input filter, Self-Tune ramp to setpoint, four password protected security levels and °F or °C display selection are all standard. Entire electronics package is field replaceable without wiring changes thanks to removable front panel.

MODELS

MODEL NO.	ALARM	INPUT	OUTPUT
25111	Yes	Thermocouple	SSR
25112	Yes	Thermocouple	5 VDC
25113	Yes	Thermocouple	Relay
25115	Yes	Thermocouple	4-20mA
25125	Yes	RTD	4-20 mA

SPECIFICATIONS

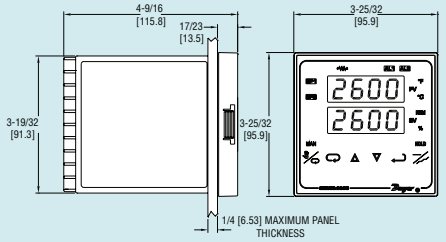
Inputs: Thermocouple or RTD.
Input Impedance: Thermocouple = 3 megohms minimum, RTD current = 200 µA maximum.
Display: Two-4 digit, 7 segment, 0.56" high LED. Resolution: 1 degree or 0.1 degree.
Accuracy: ±0.25% of span, ±1 degree.
Supply Voltage: 100-240 VAC nominal, ±10%, 50-400 Hz, single phase; 132-240 VDC nominal, ±10%.
Power Consumption: 5 VA maximum.
Operating Temperature: 14 to 131°F (-10 to 55°C).
Memory Backup: Non-volatile memory. No batteries required.
Control Output Ratings:
SSR: 2.5A @ 240 VAC resistive at 77°F (25°C). De-rates to 1.25A @ 130°F (55°C).
Relay: SPDT, 10 A @ 240 VAC resistive.
Switched Voltage (non-isolated): 5 VDC @ 20 mA.
Proportional Isolated Current: 0-20 mA, selectable, into 600 Ohms maximum.
Control Action: Selectable for reverse (usually heating) or direct (usually cooling).
Ramp: One ramp time adjustable from 0-100 hours.
Isolation: Relay and SSR outputs; 1500 VAC. 0-20 mA output; 500 VAC. 5 VDC output is not isolated.
Weight: 13 oz (369 g).
Front Panel Rating: NEMA 4X (IP65).

*When ordering a control to operate contactor or solenoid loads greater than 100 mA, select the SSR output instead of the Relay. If the Relay is selected, also order P/N A-600, R/C Snubber.

Series 2600

Temperature/Process Controller

1/4 DIN Self-Tune PID, Fuzzy Logic Software



Series 2600 Temperature/Process Controllers set a new standard for quality, versatility, ease-of-use and value. While they include a high level of standard features, many function setup items appear in the control menu only when the function is selected, so you don't have to wade through unnecessary items. Units feature a universal input for thermocouple types J,K,E,T,L,N,B,C,S & R; RTDs 100Ω Plt. NIST, 100Ω Plt. DIN, 120Ω Ni Industrial, 1000Ω Plt. DIN; differential input (-10 to +10 mV DC) and process input (0 to 20 mA DC, 0 to 10 VDC). A standard 24 Volt isolated, regulated power supply is included to operate most standard 4-20 mA transmitters.

Standard features include Self-Tune, Fuzzy Logic, fully adjustable PID, Auto/Manual control with bumpless transfer and front panel activation key, percent output indication, peak and valley indication, loop break protection and indication. For process inputs, the display is fully programmable from -1999 to +9999 with selectable decimal point location. Most thermocouple and RTD inputs can show whole or tenth degree displays. The Series 2600 is available with single or dual setpoint outputs and can be programmed for on-off, PID or heat/cool or latching alarm. All outputs are isolated from the inputs. Outputs include 10 Amp relay, and 0-20 mA DC (scalable).

MODELS

Model No.	Alarm	Output A	Output B
26130	Yes	Relay	None
26150	Yes	Current	None
26133	Yes	Relay	Relay

SPECIFICATIONS

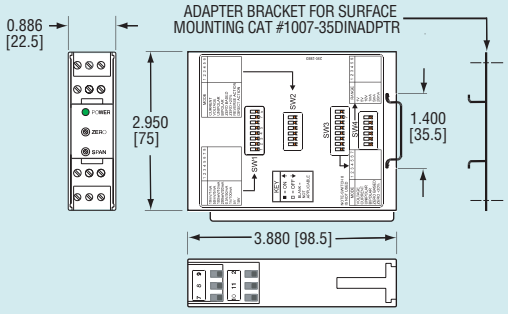
Selectable Inputs: Thermocouple, RTD, DC voltage or DC current.
Input Impedance:
Thermocouple — 3 Megohms minimum.
Voltage — 5000 ohms.
Current — 10 ohms.
RTD Current — 200 µA maximum.
Display: Two 4 digit, 7 segment, 0.56˝ (14.2 mm) high LED.
Accuracy: ±0.25% of span, ±1 least significant digit.
Supply Voltage: 100 to 240 VAC nominal, +10%-15%, 50 to 400 Hz, single phase; 132 to 240 VDC +10% -20%.
Operating Temperature Range: 14 to 131°F (-10 to 55°C).
Control Output Ratings:
Relay: SPDT,10A @ 240 VAC resistive, 1/2 hp @ 120 VAC, 1/3 hp @ 240 VAC.
Alarm Relay: SPST, 3A @ 240 VAC resistive.
Proportional Current: 0-20 mA DC, scalable into 600 ohms maximum.
Weight: 13 oz (369 g).
Front Panel Rating: NEMA 4X (IP65).

OPTIONS

934, Process Signal Output, PV or SV. Isolated 0 to 20 mADC.

Series SC4130 SC4151 SC4380 Iso Verter® II Signal Conditioning Modules

Accepts Virtually All Standard Process Signals



Linearized and isolated RTD and Thermocouple transmitters are part of the Series SC4000 Iso Verter® II Signal Conditioning Modules. These modules completely isolate the input from the output and from ground. Compatible with industry standard 35 mm DIN Rail mount transmitters and isolators, these modules are easily applied in new or existing installations.

The **SC4380 Process Signal Converter/Isolator** accepts virtually all standard process signals as an input, and isolates and retransmits the signal in either the same units or virtually any other standard process signal. The SC4380 can be field programmed for reverse or direct action and can receive and transmit single sided or bipolar* signals. Low Voltage units (SCL) are also available.

The **SC4151 RTD Transmitters** each offer a fixed scale range input (selected when ordered) and a linearized, isolated, field selectable 4 to 20 mA or 0 to 10 VDC output. Output is selected by simple switch settings. Low Voltage units (SCL) are also available.

The **SC4130 Thermocouple Transmitter** offers a fixed scale range input (selected when ordered) and a linearized, isolated, field selectable 4 to 20 mA or 0 to 10 VDC output. Output is selected by simple switch settings.

Low Voltage units (SCL) are also available.

*Note: The term "bipolar" refers to an input or output that crosses zero volts. Certain devices have ranges that run from minus to plus voltages (eg. -1 to +5 VDC, -10 to +10 VDC, etc.). The SC4380 Iso Verter® II can be set up to accept a bipolar signal input or provide a bipolar output.

To order use range code as suffix.

MODELS
SC4130 & SCL4130

Model SC4130 Range Codes	Model SCL4130 Range Codes
A = J, -100 to 200°C	A = J, -100 to 200°C
C = J, 0 to 100°C	C = J, 0 to 100°C
D = J, 0 to 500°F	D = J, 0 to 500°F
E = J, 0 to 250°C	E = J, 0 to 250°C
F = J, 0 to 750°C	F = J, 0 to 750°C
G = J, 0 to 1000°F	G = J, 0 to 1000°F
H = K, -150 to 350°F	H = K, -150 to 350°F
J = K, -100 to 200°C	J = K, -100 to 200°C
K = K, 0 to 500°F	K = K, 0 to 500°F
L = K, 0 to 250°C	L = K, 0 to 250°C
M = K, 0 to 1000°F	M = K, 0 to 1000°F
N = K, 0 to 500°C	N = K, 0 to 500°C
P = K, 0 to 2000°F	P = K, 0 to 2000°F
R = K, 0 to 1000°C	R = K, 0 to 1000°C
S = T, -300 to 250°F	S = T, -300 to 250°F
T = T, -200 to 200°C	T = T, -200 to 200°C

SPECIFICATIONS

Isolation: 1500 VAC RMS. **Linearity:** 0.1% of full scale.
Drift: ±0.02%/ °C typical, ±0.05%/ °C maximum.
Power Supply: SC: 85 to 265 VDC/VAC 50 to 400 Hz;
SCL: 12 to 24 VDC/VAC 50 to 400 Hz.
Output Loads: Current: 600 ohms maximum Voltage: 500 ohms minimum (20 mA maximum).
Input Characteristics: SC4380: Voltage: 1 megohms impedance, Current: 10 ohms; SC4151: RTD Search current < 500 µA; SC4130: 3 megohms impedance.
Case Size: 0.866″ W (22.5 mm) × 2.950″ H (75.0 mm) × 3.880″ D (98.5 mm).
Mounting: Mounts on industry standard 35mm DIN Rail (DIN EN50022-35).

MODELS
SC4151 & SCL4151

Model SC4151 Range Codes	Model SCL4151 Range Codes
A = DIN, -100 to 200°C	A = DIN, -100 to 200°C
B = DIN, 0 to 100°C	B = DIN, 0 to 100°C
C = DIN, 0 to 150°C	C = DIN, 0 to 150°C
D = DIN, 0 to 200°F	D = DIN, 0 to 200°F
E = DIN, 0 to 200°C	E = DIN, 0 to 200°C
F = DIN, 0 to 400°F	F = DIN, 0 to 400°F
G = DIN, 0 to 250°C	G = DIN, 0 to 250°C
H = DIN, 0 to 500°F	H = DIN, 0 to 500°F
J = DIN, 0 to 500°C	J = DIN, 0 to 500°C
K = DIN, 0 to 1000°F	K = DIN, 0 to 1000°F

MODELS
SC4380 & SCL4380 OPERATING RANGES

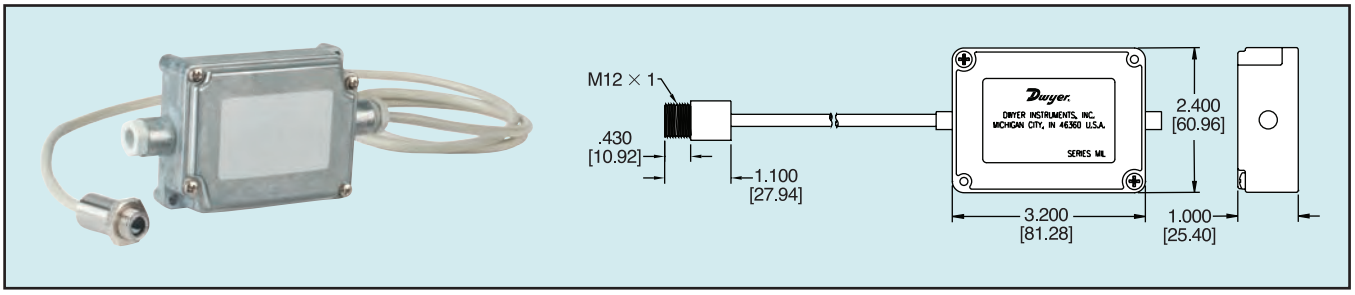
Inputs		Outputs	
Current	**Voltage**	**Current**	**Voltage**
0 to 5 mA	0 to 100 mV	0 to 1 mA	0 to 1 V
0 to 10 mA	0 to 200 mV	0 to 5 mA	0 to 5 V
0 to 10 mA	0 to 500 mV	0 to 20 mA	0 to 10 V
0 to 20 mA	0 to 1 V	1 to 5 mA	1 to 5 V
0 to 50 mA	0 to 5 V	4 to 20 mA	2 to 10 V
0 to 100 mA	0 to 10 V		
1 to 5 mA	1 to 5 V		
4 to 20 mA	2 to 10 V		
10 to 50 mA			

SC4130 & SCL4130* Thermocouple Transmitters
SC4151 & SCL4151* RTD Transmitters
SC4380 & SCL4380 Iso Verter® II Process Signal Converter/Isolators

*SCL models are low voltage units.

Series MIL Mini In-Line IR Sensor

Temperature Measurement System, Adjustable Emissivity, Field Selectable Outputs



Series MIL Mini In-Line IR Sensor is a complete temperature measurement system. The unit includes a miniature sensing head and remote electronics for easy installation. The remote electronics include selectable output, LCD display, head temperature signal, adjustable emissivity, and peak/valley/averaging. The sensor is housed in a rugged NEMA 4 (IP65) stainless steel enclosure and is connected to the electronics via a 9.8 ft (3 m) cable. Includes 1 mounting nut.

MODELS

Model Number	Distance-to-Target Size Ratio
MIL2C	2:1
MIL5C	10:1

ACCESSORIES

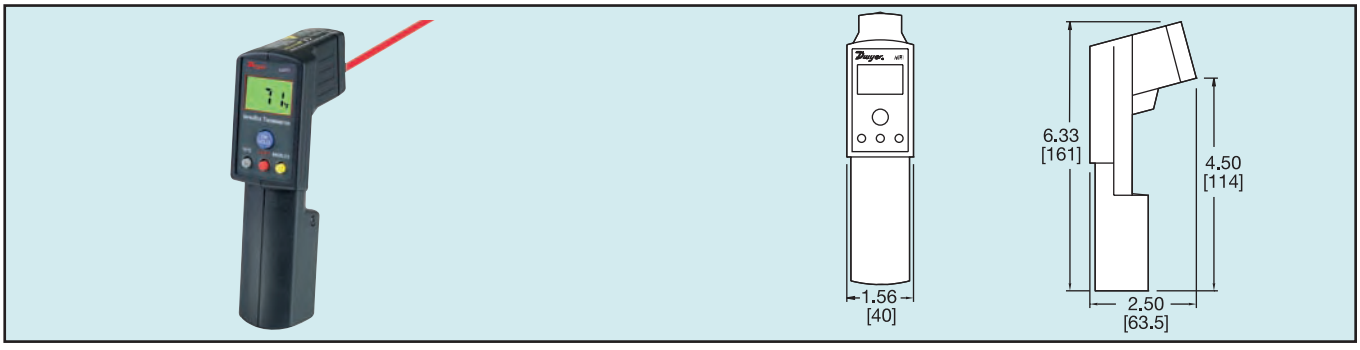
Model **XXXMIACMN** Replacement Mounting nuts (2 pieces)
Model **XXXMIACFB** Fixed Mounting Bracket
Model **XXXMIACAB** Adjustable Mounting Bracket

SPECIFICATIONS

Temperature Range: -40 to 1112°F (-40 to 600°C) for mA, V or K thermocouple output: -13 to 1112°F (-25 to 600°C) for J thermocouple output.
Accuracy: mA or V output: ±1% of reading or ±1°C whichever is greater. T/C output: ±1% or ±2.5°C whichever is greater.
Emissivity: 0.100 to 1.100 digitally adjustable increments of .001.
Distance-to-Target Size Ratio: 2:1 or 10:1.
Resolution: 0.5°F (0.3°C).
Response Time: 150 ms (95%).
Ambient Operating Temp: Sensing head: 32 to 185°F (0 to 85°C); Electronics: 32 to 150°F (0 to 65°C).
Power Requirement: 11-26 VDC.
Repeatability: ±0.5% of reading or ±1°F (±0.5°C) whichever is greater.
Storage Temperature: 0 to 185°F (-18 to 85°C).
Outputs: Scalable 4-20 mA, 0-20 mA, 0-5 V, J or K thermocouple.
Cable Length: 9.8 ft (3 m).
Spectral Response: 8 to 14 µm.
Housing: NEMA 4 (IP65), Sensing head: stainless steel; Electronics: Die-cast zinc.
Weight: Sensing head: 1.75 oz (50 g); Electronics: 9.5 oz (270 g).
Agency Approvals: CE.

Model MIR1 Mini Infrared Thermometer

Laser Sighting, Measure Temperatures Up To 600°F (315°C)



Low cost, noncontact Model MIR1 Mini Infrared Thermometer is ideal for measuring the temperature of an object at a safe distance. Use the MIR1 to detect heat problems in equipment, machinery, or processes. Equipped with laser sighting to accurately pinpoint targets. The MIR1 features a 6:1 distance-to-target ratio, fixed emissivity, selectable °F or °C, display hold, and an LCD backlight.

Model MIR1 Mini Infrared Thermometer

ACCESSORIES

Model IR8SC Soft case with wrist strap

SPECIFICATIONS

Temperature Range: 0 to 600°F (-20 to 315°C).
Accuracy: ±2% of reading or ±4°F (±2°C) whichever is greater.
Emissivity: Fixed at 0.95.
Distance-to-Target Size Ratio: 6:1, nominal.
Laser Classification: Single Point.
Display: 3-Digit, 3/8″ height.
Resolution: 1°C/°F.
Response Time: 0.5 seconds.
Ambient Operating Temperature: 32 to 122°F (0 to 50°C), 80% RH max.
Power Requirements: One 9V alkaline (included).
Power Current: 12 mA DC, approximate.
Sample Rate: 1 second, approximate.
Weight: 6.4 oz (200 g).
Agency Approvals: CE.

Mercoid®

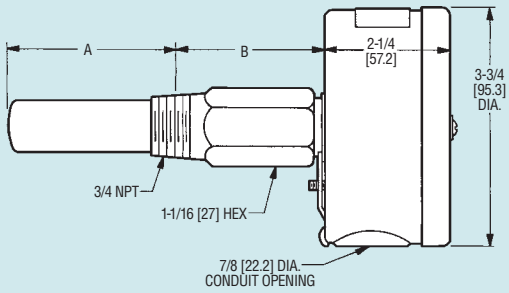
Series FM

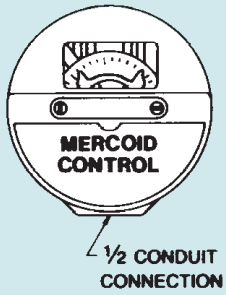
Immersion Temperature Control

Visible Setpoint Adjustment, Adjustable Deadband, Monitor Liquids to 300°F (149°C)

UL CSA FM APPROVED

General purpose





Compact and low cost, Model FM-437 employs a bimetal element inside an immersion well. Instrument is detachable from the well, allowing maintenance without draining system. Visible calibrated dial reduces "start up" time and speeds setpoint changing. Contacts are hermetically sealed and mercury wetted. High current (up to 17A) capacity switches available on special order.

SPECIFICATIONS

Service: Compatible liquids or gases.
Wetted Materials: Well: Copper or 304 SS.
Temperature Limit: Process: 375° F (190°C), Ambient: 180°F (82°C).
Pressure Limit: Copper well: 200 psi (13.8 bar) @ 300°F (149°C), 304 SS well: 900 psi (62 bar) @ 300°F (149°C).
Enclosure Rating: General purpose.
Switch Type: SPDT mercury switch. Optional SPST.
Electrical Rating: 4A @ 120 VAC/DC, 2A @ 240 VAC/DC. 1/8 HP @ 120/240 VAC single phase.
Electrical Connections: Screw terminal.
Conduit Connection: 7/8″ (22.23 mm) hole for 1/2″ (12.7 mm) conduit hub.
Process Connection: 3/4″ NPT male.
Mounting Orientation: Horizontal and level.
Set Point Adjustment: Internal moveable pointers for set point and reset point.
Weight: 2 lb (0.9 kg).
Deadband: Adjustable, see model chart.
Options: SPST mercury switches with higher current ratings.
Set Point Scale: Indication in °F standard. °C optional.
Agency Approvals: UL, FM and CSA.

MODEL CHART – SERIES FM

EXAMPLE	FM	437_ _	_ _2	3510	FM-437-2-3510 Immersion Temperature Control, copper well, adjustable deadband, automatic reset, SPST mercury switch, adjustable range 80 – 240°F (27 – 115°C)						
CONSTRUCTION	FM				General purpose enclosure, NEMA-1 (standard)				UL	FM	CSA
WELL MATERIALS		437			Copper well, maximum pressure 200 psig (14 bar), 300°F (149°C) (standard).				UL	FM	CSA
		437SS			Type 304 stainless steel well, maximum pressure 900 psig (62 bar), at 300°F (149°C)				UL	FM	CSA
CIRCUIT (SWITCHING) OPTIONS			2		SPST mercury switch – opens on temperature increase. Electrical rating below.				UL	FM	CSA
			3		SPST mercury switch – closes on temperature increase. Electrical rating below.				UL	FM	CSA
			26		SPST mercury switch – closes on temperature increase. Electrical rating below.					FM	
			36		SPST mercury switch – opens on temperature increase. Electrical rating below					FM	CSA
			153		SPDT mercury switch. Electrical rating below				UL	FM	CSA
			( )		Other circuits available, consult factory						
								DEADBAND			
						A	B	MIN.	MAX.		
ADJUSTABLE TEMPERATURE RANGES & INSERTION LENGTHS				3515	Adjustable range 40-200°F (5-93°C)	2⅛″ insertion length (73 mm).	2⅜″ (60 mm)	15°F (8.4°C)	160°F (89°C)	UL	FM	CSA
				3516	Adjustable range 40-200°F (5-93°C)	4½″ insertion length (114 mm).	¾″ (19 mm)	15°F (8.4°C)	160°F (89°C)	UL	FM	CSA
				3510	Adjustable range 80-240°F (27-115°C)	2⅛″ insertion length (73 mm).	2⅜″ (60 mm)	15°F (8.4°C)	160°F (89°C)	UL	FM	CSA
				3511	Adjustable range 80-240°F (27-115°C)	4½″ insertion length (114 mm).	¾″ (19 mm)	15°F (8.4°C)	160°F (89°C)	UL	FM	CSA
				3528	Adjustable range 160-300°F (71-149°C)	2⅛″ insertion length (73 mm).	2⅜″ (60 mm)	18°F (10°C)	140°F (78°C)	UL	FM	CSA
				3528	Adjustable range 160-300°F (71-149°C)	4½″ insertion length (114 mm).	¾″ (19 mm)	18°F (10°C)	140°F (78°C)	UL	FM	CSA

ELECTRICAL RATINGS

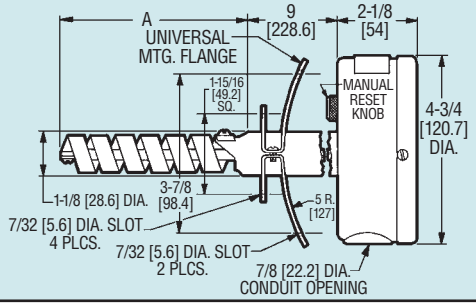
CIRCUIT SUFFIX NO.	AC CAPACITY			DC CAPACITY		HORSEPOWER	
	120V	240V	440V	120V	240V	AC	DC
–2	10A	5A	3A	10A	5A	3/4	1/3
–3	10A	5A	3A	10A	5A	3/4	1/3
–36 –26	17A @ 120/240/277V AC, resistive. Other ratings same as above.						
–153	4A	2A	NA	4A	2A	1/8	NA

Series M-51

Bi-Metal Air Temperature Switches

Double Adjustable, Heavy Duty, Universal Mounting, Automatic or Manual Reset

General purpose



SPECIFICATIONS

Service: Compatible gases.
Temperature Limit: Process: range maximum, Ambient: 180°F (82°C).
Enclosure Rating: General purpose.
Switch Type: SPST mercury switch. Optional SPDT.
Electrical Rating: 10A @ 120 VAC/DC, 5A @ 240 VAC/DC. 3/4 HP @ 120/240 VAC single phase, 1/3 HP @ 120/240 VDC.
Electrical Connections: Screw terminal.
Conduit Connection: 7/8″ (22.23 mm) hole for 1/2″ (12.7 mm) conduit hub.
Process Connection: Mounting flange. Reversible for flat or curved surfaces.
Mounting Orientation: Horizontal and level.
Set Point Adjustment: Internal moveable pointers for set point and reset point.
Weight: 5 lb (2.27 kg).
Deadband: Adjustable from minimum in model chart to full range.
Set Point Scale: Indication in °F standard. °C optional.
Options: SPDT and DPST switches. Switch that closes on temperature increase.
Agency Approvals: UL and CSA. FM only on models M-51R-74 and MX-51R-75.

Ordering Example

MX51-156-75

Designed for use as a limit switch, fan control, or alarm switch, Model M-51 is used on all types of air conditioning ducts, furnaces, ovens, dryers, etc. Unit may also be used with damper control system to prevent spread of fire through ducts. Adjustments for both set and reset points. Visible dial shows duct temperature and switch setpoints.

MODELS

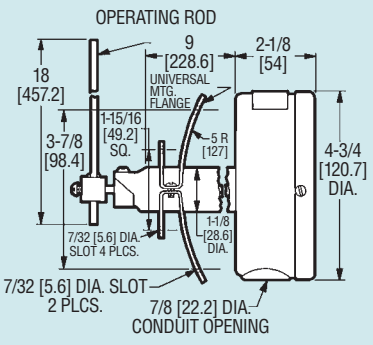
MODEL NUMBER†	ADJUSTABLE RANGE, °F	°C	MIN. DEAD-BAND, °F	°C	SWITCH ACTION ON TEMP. RISE	RESET	DIMENSION A IN	DIMENSION A MM			
M-51-71	25-125	–4+52	12	7	Opens	Automatic	5⅜″	136	UL		CSA
M-51R-71	25-125	–4+52	12	7	Opens	Manual	5⅜″	136	UL		CSA
M-53-74*	50-500	+10+260	20	11	Closes	Automatic	4⅜″	111	UL		CSA
M-51-74	50-500	+10+260	20	11	Opens	Automatic	4⅜″	111	UL		CSA
M-51R-74	50-500	+10+260	20	11	Opens	Manual	4⅜″	111	UL	FM	CSA
M-53R-74	50-500	+10+260	20	11	Closes	Manual	4⅜″	111	UL		CSA
MX-51-75	50-650	+10+340	20	11	Opens	Automatic	4⅜″	111	UL		CSA
MX-53-75*	50-650	+10+340	20	11	Closes	Automatic	4⅜″	111	UL		CSA
MX-51R-75	50-650	+10+340	20	11	Opens	Manual	4⅜″	111	UL	FM	CSA
MX-53R-75	50-650	+10+340	20	11	Closes	Manual	4⅜″	111	UL		CSA

*M-53, MX-53 CONTAINS SUMMER SWITCH TO PERMIT FAN OPERATION FOR VENTILATION PURPOSES. AUTOMATICALLY RESETS WHEN TEMPERATURE RISES.
†MODEL M-51, MX-51, M-51R ALSO AVAILABLE WITH THE FOLLOWING CIRCUITS:
103 DPST: 2 each SPST Mercury switches. Closes on temperature increase. Rated 10A at 120V, 5A at 240V AC/DC.
127 DPST: 2 each SPST Mercury switches. Opens on temperature increase. Rated 10A at 120V, 5A at 240V AC/DC.
153 SPDT Mercury switch. Rated 4A at 120V, 2A at 240V AC/DC.
156 SPDT: 2 SPST Mercury switches. 1 opens as 1 closes on temperature increase. Rated 10A at 120V, 5A at 240 V AC/DC.
127, 153, 156 circuits FM approved with type M51R-range 74 and MX51R-range 75.

Series ML-51-153

Damper Position Switch

Separate Low-High Setting, Universal Mounting, Spring Return



Simplicity of design and quality construction assure reliable control of fan systems which employ adjustable dampers. The Model ML-51-153 Damper Position switch is installed on the side of duct near adjustable dampers. A 5/32″ × 18″ stainless steel rod links the two, so that damper motion causes switch arm rotation which makes or breaks hermetically sealed mercury switch contacts. Common uses are to prevent fan operation until damper position is correct or to actuate a warning light or audible alarm when an abnormal condition exists. High/low settings are individually adjustable and their locations are clearly visible through the glass window. Dual purpose mounting bracket reverses to fit both round and rectangular duct.

SPECIFICATIONS

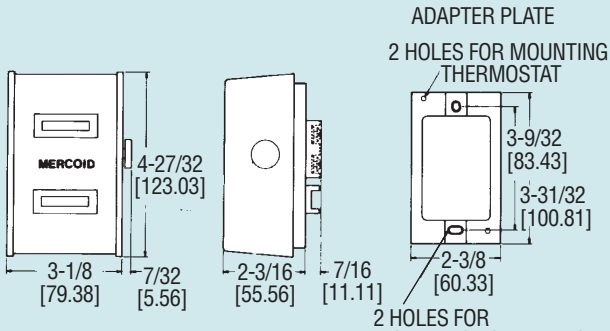
Maximum Temperature: 180°F (82°C).
Switch Type: SPDT tilting mercury. Three screw-type terminals.
Electrical Rating: 4A at 115 VAC/DC, 230 VAC/DC, 1A 440 VAC/DC.
Conduit Openings: 7/8″ hole for 1/2″ conduit.
Housing: Painted steel with glass front window: Reversible flange flat or curved surfaces.
Weight: 2 lb, 10 oz (1.2 kg).

Model ML-51-153 Damper Position Switch

Series 860

Line Voltage Thermostats

Built-in Thermometer, Heavy Duty Construction



Heavy duty and reliable, Model 860 Line Voltage thermostat is designed for direct control of motors operating HVAC equipment in industrial environments. Hermetically sealed mercury switch resists dust, dirt, grease and moisture. Cadmium plated steel and brass mechanism resist corrosion. Setpoint is easily adjustable via knurled knob located on the side of the unit. Knob may be removed to prevent tampering. Contacts rated up to 17A available on special order.

Suggested Specification

Thermostats shall have heavy duty controls suitable for 120/240 V operation. Contacts shall be hermetically sealed and mercury wetted. Units shall include integral thermometer. Enclosures shall be (indoor) (explosion-proof) type. Units shall be bellows actuated and shall have removable setpoint adjust knob.

ELECTRICAL RATINGS

CIRCUIT OPTION	RATING
-2 (except 2MS),	10A @ 120 VAC/DC 5A @ 240 VAC/DC – 3/4 HP single
-3	phase 120/240 VAC: 1/4 HP 120/240 VDC.
-2MS	10A @ 120 VAC/DC 5A @ 240 VAC/DC – 1/2 HP single 0phase 120/240 VAC 1/4 HP 120/240 VDC.
-26, -36	Same as first ratings above plus non-inductive 17A @ 120 VAC (2040 Watts), 17A @ 240 VAC (4080 Watts).
-153	4A @ 120 VAC/DC 2A @ 240 VAC/DC, 1/8 HP, single phase 120/240 VAC.

SPECIFICATIONS

Service: Compatible gases.
Temperature Limits: -10 to 140°F (-23 to 60°C).
Enclosure Rating: General purpose or explosion-proof rated NEMA 7 & 9, Class I, Groups C and D; Class II, Groups E, F, and G. CSA approval does not include Group C.
Switch Type: SPDT or SPST mercury switch. SPST models shown open on temperature increase. Replace "-2" with "-3" in the model number for close on increase.
Electrical Rating: SPDT: 4A @ 120 VAC/DC, 2A @ 240 VAC/DC. 1/8 HP @ 120/240 VAC single phase. SPST: 10A @ 120 VAC/DC, 5A @ 240 VAC/DC. 3/4 HP @ 120/240 VAC single phase, 1/4 HP @ 120/240 VDC.
Electrical Connections: General purpose: screw terminal, Explosion-proof: pigtail leads.
Conduit Connection: General purpose: none, Explosion-proof: 1/2″ female NPT.
Mounting Orientation: Vertical and level. General purpose unit includes adapter plate for mounting into a standard wall switch box.
Set Point Adjustment: External knob. Can be removed to prevent tampering.
Weight: General purpose: 1.5 lb (0.7 kg), Explosion-proof: 4.5 lb (2.0 kg).
Deadband: Fixed. Range 65: approx. 4°F (2°C), Other ranges: approx. 2°F (1°C).
Options: SPST mercury switches with higher current ratings. Manual selector switch for off, auto, and on. Metal thermostat guard.
Set Point Scale: Indication in °F standard. °C optional.
Agency Approvals: UL and CSA.

MODEL CHART – SERIES 860

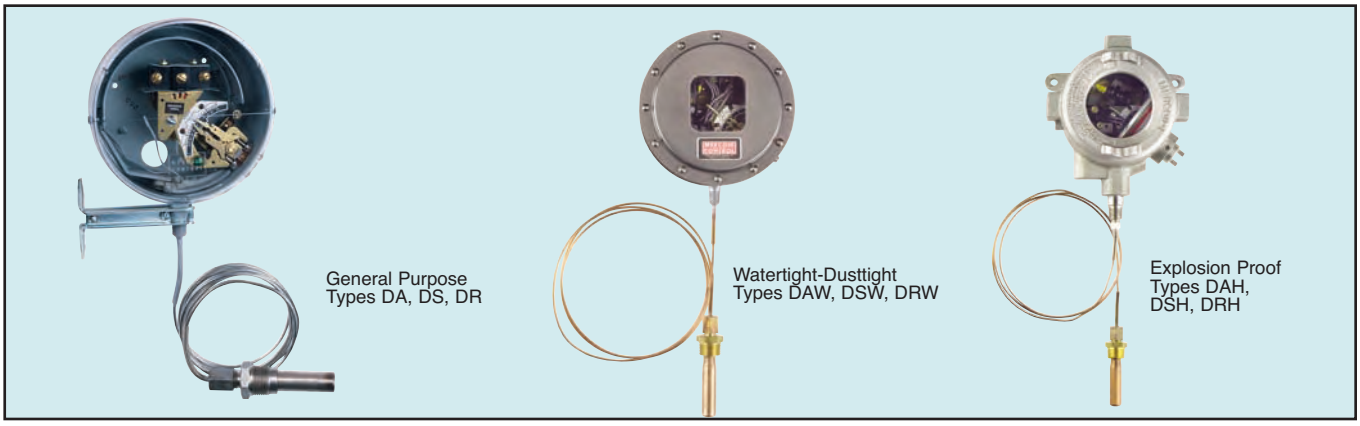
EXAMPLE	860		61	860-2-61 Line Voltage thermostat, fixed deadband, automatic, reset, adjustable range 25-60°F (–4+15°C).			
CONSTRUCTION	860			General purpose enclosure (standard)		UL	CSA
CIRCUIT (SWITCHING)		2		SPST mercury switch – opens on temperature rise.		UL	CSA
		2MS		SPST mercury switch – opens on temperature rise, 3 position manual selector – off, auto on. Available with circuit –2 only, reduced electrical rating.		UL	CSA
		3		SPST mercury switch – closes on temperature rise		UL	CSA
		26		SPST mercury switch – closes on temperature rise		UL	CSA
		36		SPST mercury switch – opens on temperature rise			CSA
OPTIONS		153		SPDT mercury switch		UL	CSA
					Approximate Deadband of °F (°C)		
ADJUSTABLE TEMPERATURE RANGES			61	Adjustable range 25-60°F (–4-15°C)	2° (1)	UL	CSA
			62	Adjustable range 38-70°F (4-21°C)	2° (1)	UL	CSA
			63	Adjustable range 56-80°F (14-27°C)	2° (1)	UL	CSA
			64	Adjustable range 65-90°F (18-33°C)	2° (1)	UL	CSA
			65	Adjustable range 80-110°F (27-43°C)	4° (2)	UL	CSA

Manual Selector: Type 860-2MS provided with three-position manual selector marked for no heat, automatic fan settings. Fan settings maintains continuously closed circuit for operation of ventilating equipment.
Thermostat Guard: Metal guard with steel case. Order No. 12-85 for exposed wiring, No. 12-82 for concealed wiring.
NOTE: Types 860-26 & 860-36 are for electric heating and are not furnished with thermometers as standard. Thermometers available at no extra charge on request.

Mercoid®

Series D

Remote Bulb Temperature Controls



To Order: Specify Type, Circuit Suffix No., Range Number, Bulb Type and Capillary Length desired. See page 167.

SPECIFICATIONS

Maximum Ambient Temperature: 180°F.
Maximum Bulb Temperature: See chart.
Bulb Connection: 3/4″ male NPT.
Electrical Ratings: See chart.

Housing: Pressed steel with transparent cover or aluminum (H)
Dial: Calibrated in °F/°C.
Maximum Bulb Pressure: 300 psi for bulb No. 2. Bulb No. 1 for open tank use or other non-pressurized applications only.
Capillary Length: 6' standard.
Weight: 5 lb.

POPULAR MODELS – OPERATING RANGES/SERIES D
WITH SNAP ACTION CONTACTS Types DA-7035, DS-7235-153, & DS-7235-804

ADJUSTABLE OPERATING RANGE	RANGE NO.	MAX. PROCESS TEMP. NOT TO EXCEED	ADJUSTABLE DEADBAND DA-7035-153 MINIMUM DEADBAND	FIXED DEADBAND DS-7235-153 FIXED DEADBAND	FIXED DEADBAND DS-7235-804 (2) SPDT FIXED DEADBAND	BULB FURNISHED WITH 6' CAPILLARY UNLESS OTHERWISE SPECIFIED (1) BULB NO./ CAP. MAT'L.	BULB MIN. INSERTION DEPTH (2)
–60 to +30°F (–50 to 0°C)	1N	150°F (65°C)	23°F (13°C)	5°F (3°C)	5°F (3°C)	No. 2 S.S./Copper	2⅛" (73 mm)
0 to 100°F (–18 to 40°C)	3N	240°F (115°C)	25°F (14°C)	5°F (3°C)	5°F (3°C)	No. 2 S.S./Copper	2⅛" (73 mm)
50 to 150°F (10 to 65°C)	4N	250°F (120°C)	25°F (14°C)	5°F (3°C)	5°F (3°C)	No. 2 S.S./Copper	2⅛" (73 mm)
100 to 200°F (40 to 95°C)	5N	300°F (150°C)	25°F (14°C)	5°F (3°C)	5°F (3°C)	No. 2 S.S./Copper	2⅛" (73 mm)
140 to 300°F (60 to 150°C)	7N	500°F (260°C)	41°F (23°C)	8°F (4.5°C)	8°F (4.5°C)	No. 2 S.S./Copper	2⅛" (73 mm)
250 to 415°F (120 to 215°C)	8N	550°F (290°C)	42°F (23°C)	9°F (5°C)	9°F (5°C)	No. 2 S.S./S.S.	2⅛" (73 mm)
350 to 550°F (175 to 290°C)	9N	600°F (315°C)	50°F (28°C)	10°F (6°C)	10°F (6°C)	No. 2 S.S./S.S.	4⅞" (124 mm)
100 to 300°F (40 to 150°C)	10N	500°F (260°C)	50°F (28°C)	10°F (6°C)	10°F (6°C)	No. 2 S.S./Copper	2⅛" (73 mm)
100 to 500°F (40 to 260°C)	11N	600°F (315°C)	100°F (56°C)	20°F (12°C)	20°F (12°C)	No. 2 S.S./S.S.	2⅛" (73 mm)
ELECTRICAL RATINGS			See Code D	See Code E	See Code G		

WITH MERCURY SWITCH CONTACTS Types D-35, D-535, D-235

ADJUSTABLE OPERATING RANGE	RANGE NO.	MAX. PROCESS TEMP. NOT TO EXCEED	ADJUSTABLE DEADBAND DA-35 DAW-38 DAH-35 MINIMUM DEADBAND	ADJUSTABLE DEADBAND DA-535 DAW-538 DAH-535 MINIMUM DEADBAND	FIXED DEADBAND DS-235 DSW-235 DSH-235 FIXED DEADBAND	BULB FURNISHED WITH 6' CAPILLARY UNLESS OTHERWISE SPECIFIED (1) BULB NO./ CAP. MAT'L.	BULB MIN. INSERTION DEPTH (2)
–60 to +30°F (–50 to 0°C)	1N	150°F (65°C)	7°F (3.5°C)	3°F (2°C)	1.5°F (1°C)	No. 2 S.S./Copper	2⅛" (73 mm)
0 to 100°F (–18 to 40°C)	3N	240°F (115°C)	7°F (4°C)	3°F (2°C)	1.5°F (1°C)	No. 2 S.S./Copper	2⅛" (73 mm)
50 to 150°F (10 to 65°C)	4N	250°F (120°C)	7°F (4°C)	3°F (2°C)	1.5°F (1°C)	No. 2 S.S./Copper	2⅛" (73 mm)
100 to 200°F (40 to 95°C)	5N	300°F (150°C)	7°F (4°C)	3°F (2°C)	1.5°F (1°C)	No. 2 S.S./Copper	2⅛" (73 mm)
140 to 300°F (60 to 150°C)	7N	500°F (260°C)	12°F (7°C)	5°F (3°C)	2.5°F (1.5°C)	No. 2 S.S./Copper	2⅛" (73 mm)
250 to 415°F (120 to 215°C)	8N	550°F (290°C)	12°F (7°C)	5°F (3°C)	2.5°F (1.5°C)	No. 2 S.S./S.S.	2⅛" (73 mm)
350 to 550°F (175 to 290°C)	9N	600°F (315°C)	14°F (8°C)	6°F (3.5°C)	3°F (2°C)	No. 2 S.S./S.S.	4⅞" (124 mm)
100 to 300°F (40 to 150°C)	10N	500°F (260°C)	14°F (8°C)	6°F (3.5°C)	3°F (2°C)	No. 2 S.S./Copper	2⅛" (73 mm)
100 to 500°F (40 to 260°C)	11N	600°F (315°C)	28°F (16°C)	12°F (7°C)	6°F (4°C)	No. 2 S.S./S.S.	2⅛" (73 mm)
ELECTRICAL RATINGS			See Code A/B	See Code H	See Code I		

(1) All bulbs, including those with a copper capillary, are made of Type 304 Stainless Steel. (2) Insertion depth may be increased through use of bulb supports or wells – see page 167 or consult factory.

DA SERIES SWITCH ACTIONS

For Mercury Switch Contacts

CIRCUIT SUFFIX NO.	SWITCH ACTION
-2	SPST, OPENS on increase
-3	SPST, CLOSES on increase
-153	SPDT, one circuit OPENS as other CLOSES
-156*	SPDT, consists of two SPST switches, one CLOSES as one OPENS. Electrically independent.
-804*	(2) SPDT, Two circuits OPEN as two CLOSE.

*Deadband approximately double

For Snap-Action Contacts

CIRCUIT SUFFIX NO.	SWITCH ACTION
-153	SPDT one circuit OPENS as other CLOSES
-804	Two SPDT operate simultaneously in one direction upon increase (or decrease when specified)

DA SERIES ELECTRICAL RATINGS

For Mercury Switch Contacts

CODE	CIRCUIT SUFFIX NO.	AC CAPACITY 120V	AC CAPACITY 240V	AC CAPACITY 440V	DC RESISTIVE 120V	DC RESISTIVE 240V	HORSEPOWER AC	HORSEPOWER DC
A	-2, -3, -156	10A	5A	3A	10A	5A	3/4	1/3
B	-153, -804	4A	2A	①	4A	2A	1/8	NA
H	-2, -3	5A	2A	NA	2-1/2A	1A	1/8	1/10
I②	-2, -3	0.3A	0.15A	NA	0.15A	0.07A	NA	NA

①-153 circuit available 1A, 440V AC on special order.
② Also rated 0.9 Amps at 24V AC.

For Snap-Action Contacts

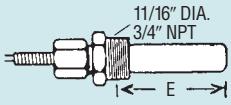
CODE	CIRCUIT SUFFIX NO.	AC CAPACITY 120V	AC CAPACITY 240V	AC CAPACITY 440V	DC RESISTIVE 120V	DC RESISTIVE 240V	HORSEPOWER AC	HORSEPOWER DC
D	-153	15A	15A	15@ 480V	1/2A	1/4A	1/8	NA
E	-153	15A	15A	NA			③	NA
G	-804	5A	5A	NA	④	④	NA	NA

③ 1/4 HP at 120V AC, 1/2 HP at 240V AC
④ 5A, 30V DC resistive.

Series D Temperature Controls — Bulb Selection

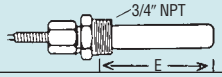
RANGE TABLE – NO. 2 BULB

Standard 11/16″ Diameter Series D Bulb & 3/4″ NPT Connection — Optional 11/16″ Bulb & 1/2″ NPT Connection

See Note for "E" & "B" Dims.	Bulb (1)/ 6 ft. Cap. Tubing	RANGE NUMBERS 1N, 3N, 4N, 5N, 7N, 10N	8N, 11N	9N		RANGE NUMBERS 1N, 3N, 4N, 5N, 7N, 10N	8N, 11N	9N
STANDARD 3/4″ NPT PROCESS CONNECTION 	S.S. Bulb/ Copper Capillary	E = 2⅞″ B = 2⅞″ Standard	N.A.	N.A.	OPTIONAL 11/16″ BULB WITH 1/2″ NPT PROCESS CONN.	E = 3½″ B = 2⅞″	N.A.	N.A.
	S.S. Bulb/ S.S. Cap.	E = 2⅞″ B = 2⅞″ Option	E = 2⅞″ B = 2⅞″ Standard	E = 4⅞″ B = 4⅞″ Standard		E = 3½″ B = 2⅞″	E = 3½″ B = 2⅞″	E = 5½″ B = 4⅞″

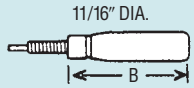
RANGE TABLE – NO. 2 BULB

Standard 1/2″ & 3/8″ Diameter Bulbs with 3/4″ NPT Connection — Optional 1/2″ & 3/8″ Bulbs with 1/2″ NPT Connection

	Bulb (1)/ 6 ft. Cap. Tubing	RANGE NUMBERS 1N, 3N, 4N, 5N, 7N, 10N	8N, 11N	9N		RANGE NUMBERS 1N, 3N, 4N, 5N, 7N, 10N	8N, 11N	9N
OPTIONAL 1/2″ DIAMETER BULB WITH 3/4″ NPT PROCESS CONNECTION	S.S. Bulb/ Copper	E = 5¾″ B = 5¾″	N.A.	N.A.	OPTIONAL 1/2″ BULB WITH 1/2″ NPT	E = 6⅜″ B = 5¾″	N.A.	N.A.
	S.S. Bulb/ S.S. Cap.	E = 5¾″ B = 5¾″	E = 5¾″ B = 5¾″	E = 10″ B = 10″		E = 6⅜″ B = 5¾″	E = 6⅜″ B = 5¾″	E = 10⅝″ B = 10″
OPTIONAL 3/8″ DIAMETER BULB WITH 3/4″ NPT PROCESS CONNECTION	S.S. Bulb/ Copper	E = 11⅜″ B = 11⅜″	N.A.	N.A.	OPTIONAL 3/8″ BULB WITH 1/2″ NPT	E = 11⅜″ B = 11⅜″	N.A.	N.A.
	S.S. Bulb/ S.S. Cap.	E = 11⅜″ B = 11⅜″	E = 11⅜″ B = 11⅜″	E = 19⅞″ B = 19⅞″		E = 11⅜″ B = 11⅜″	E = 11⅜″ B = 11⅜″	E = 19⅞″ B = 19⅞″

RANGE TABLE – NO. 1 BULB

11/16″ Diameter Series D Bulb for Open Tank Use

See Note for "B" Dims. (No process connection.) 	Bulb (1)/ 6 ft. Cap. Tubing	RANGE NUMBERS 1N, 3N, 4N, 5N, 7N, 10N	8N, 11N	9N
	S.S. Bulb/ Copper	B = 2⅞″ Standard	N.A.	N.A.
	S.S. Bulb/ S.S. Cap.	B = 2⅞″ Option	B = 2⅞″ Standard	B = 4⅞″ Standard

(1) All bulbs, including those with a copper capillary, are made of Type 304 Stainless Steel.

NOTES:

Dim. "E" = MINIMUM INSERTION DEPTH. Minimum clearance distance for bulb insertion: measured from the top outside surface of female NPT.

Dim. "B" = ACTIVE BULB LENGTH. Length of bulb that responds to temperature change: measured from the free end. Process fluid must have good contact with the bulb over this length.

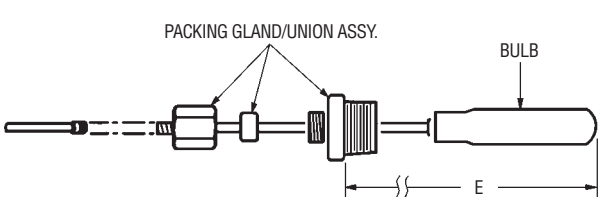
PROTECTIVE WELL & SLEEVE ASSEMBLIES FOR SERIES D. NO. 2 BULB.

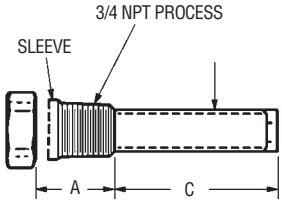
(Standard 11/16″ Diameter)

RANGE	BULB ASS'Y WELL DIM. E (MIN.)	C	WELL ASS'Y # BRASS	S.S.
1N, 3N, 4N, 5N, 7N, 10N	2⅞″ 73 mm	3¼″ 83 mm	49-543	49-251SS-1
8N, 11N	2⅞″ 73 mm	3¼″ 83 mm	N/A	49-251SS-1
9N	4⅞″ 124 mm	5¼″ 134 mm	N/A	49-253SS-1

WELL PRESSURE RATINGS

TEMP.	BRASS	S.S.
70°F (21°C)	1000 psi 68.9 bar	2400 psi 165.5 bar
200°F (95°C)	900 psi 62.1 bar	2250 psi 155.1 bar
300°F (150°C)	500 psi 34.5 bar	2150 psi 148.2 bar
400°F (205°C)	160 psi 11.0 bar	– –
550°F (285°C)	Do Not Use	2000 psi 137.9 bar





For non-standard well assemblies, contact factory and provide dimensions - A & C desired. NOTE - dimension C normally must be greater than bulb dimension E (from chart above).

Well assemblies shown are the shortest available for the particular bulb. Longer wells may abe used where greater insertion depth is required. Extended sleeves are available for insulated pipe applications. Std. sleeve length, dimension A is 1⅛″.

GENERAL INFORMATION

The bulbs of Series D temperature controls must be completely immersed in the media being monitored. All bulbs are made of 304 stainless steel: capillary material is either copper or 316 stainless steel, as shown in the range table. The maximum pressure of bulbs with a process connection is 300 psi. Other bulbs are for non-pressurized (e.g., open tank) use only. Consult the factory for higher pressure applications. Unlike vapor pressure systems, the new Series D gas actuation system does not exhibit any cross ambient effect. Also, since there are no liquids in the capillary line there are no limitations on height differential between the bulb and control, even with capillaries as long as 100 feet. The use of protective wells is recommended to protect the bulb from physical damage by solid materials in the media, to permit removal of the bulb without shutting down the process or draining the system and to allow monitoring the temperature of media at pressures above 300 psi. A well will increase the lag of the temperature control unit because the temperature changes in the systems media must pass through the well before contacting the bulb. *Be sure that the well dimension "C" is equal to or greater than bulb length dimension "E" to insure that all of the sensing bulb is within the system media.*

Bulb supports are available and recommended where fluid velocities are greater than 15 feet per second or where it is desired to insert the bulb at a depth within a vessel or tank. For insulated surfaces, an extension sleeve is also available. Consult the factory for details.

Mercoid® Series DA-7435-0 Two-Stage Temperature Controls

Series DA-7435-0
(Model shown is with weatherproof enclosure.)

NOTE: Std. bulb and capillary same as for Type D-35 – see chart pg 166. Select special bulbs from chart on page 167. To order: Specify model #, range, and bulb.

MODELS – OPERATING RANGES/SERIES DA-7435-0
With Snap-Action Contacts

RANGE NO.	SCALE RANGE	MINIMUM SPREAD BETWEEN SWITCHES	FIXED DEADBAND EACH SWITCH
1N	–60 to +30°F (–50 to 0°C)	18°F (10°C)	4°F (2°C)
3N	0 to 100°F (–18 to 40°C)	20°F (11°C)	4°F (2°C)
4N	50 to 150°F (10 to 65°C)	20°F (11°C)	4°F (2°C)
5N	100 to 200°F (40 to 95°C)	20°F (11°C)	4°F (2°C)
7N	140 to 300°F (60 to 150°C)	32°F (18°C)	7°F (4°C)
8N	250 to 415°F (120 to 215°C)	33°F (19°C)	7°F (4°C)
9N	350 to 550°F (175 to 290°C)	40°F (23°C)	8°F (5°C)
10N	100 to 300°F (40 to 150°C)	40°F (23°C)	8°F (5°C)
11N	100 to 500°F (40 to 260°C)	80°F (45°C)	16°F (9°C)

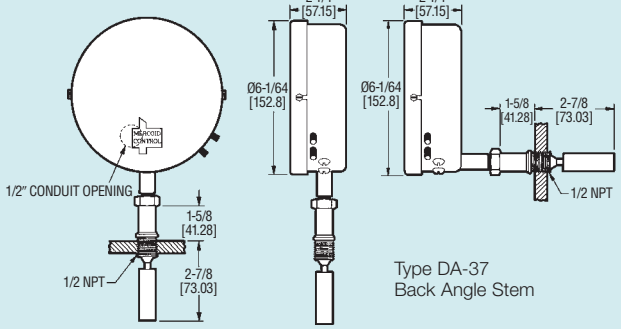
ELECTRICAL RATING
AC capacities: 5A @ 120V, 5A @ 240V.
(Not available for 440 V.)
DC capacity: 5A, 30 V resistive.

FEATURES
Two-stage capability • Temperature ranges to 550°F. • Incorporating two SPDT snap-action switches • Switches activated by a single gas actuated Bourdon tube • External adjustment, with visible calibrated dial and visible on-off • Dials calibrated in °F. and °C.

APPLICATION
(1) To close one alarm circuit at high temperature and another at low temperature. (Both circuits normally "open"). (2) As an electrical interlock to open one circuit as temperature rises above the operating range, and open another circuit as temperature drops below the operating range. (3) To provide two-stage control by opening or closing one circuit upon a rise in temperature, and a second circuit on a further rise.

Mercoid® Series DA-36/DA-37 Liquid Temperature Controls

Type DA-36
Straight Stem



Type DA-37
Back Angle Stem

FEATURES
Dual external adjustments • Mercury or snap switch operation • 304 SS immersion bulb • Gas-actuated Bourdon tube • Visible calibrated dial • Maximum temperatures to 380°F • Straight stem (DA-36) or back angle stem (DA-37) mounting.

304 SS Immersion Bulb –
For use in liquid media not injurious to Type 304 SS. Recommended for heavy oil preheaters. 3″ immersion bulb with 1/2″ NPT connection. • 1/2 NPT connection & 303 SS.

APPLICATION
For use as a high limit control on hot water boilers, hot water storage tanks, heavy oil preheaters, and various industrial applications. The immersion bulb is inserted directly into the medium being controlled. When the liquid temperature exceeds the predetermined setpoints, a switch contact is tripped.

To Order:
Specify Type, Circuit Suffix No., Range No., and optional construction, if desired.
Example – DA-36-2-5NS

MODELS – OPERATING RANGES/ DIFFERENTIALS

RANGE NO.	OPERATING RANGE	MAXIMUM DEADBAND	MAXIMUM TEMPERATURE
5NS	100 to 200°F (40 to 95°C)	100°F (55°C)	300°F (149°C)
6NS	140 to 250°F (60 to 120°C)	100°F (55°C)	380°F (190°C)

With Mercury Switch

RANGE NO.	SUFFIX NO. (1)	MINIMUM DEADBAND
5NS	-2, -3, -153	7°F (4°C)
6NS	-2, -3, -153	8°F (5°C)

With Snap Switch DA-7000

MODEL NO.	MIN. DEADBAND	STEM TYPE
DA-7036-153-5NS	25°F (14°C)	BOTTOM
DA-7037-153-5NS	25°F (14°C)	BACK ANGLE
DA-7036-153-6NS	28°F (16°C)	BOTTOM
DA-7037-153-6NS	28°F (16°C)	BACK ANGLE

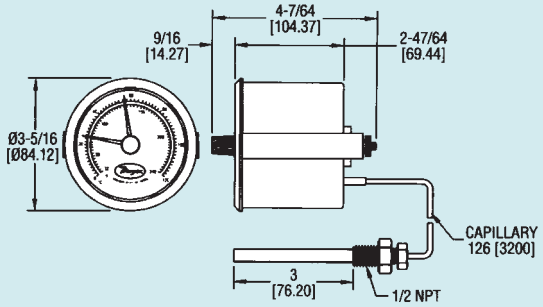
With Fixed Differential DS-7200

MODEL NO.	MIN. DEADBAND	STEM TYPE
DA-7231-153-5NS	5°F (3°C)	BOTTOM
DA-7237-153-5NS	5°F (3°C)	BACK ANGLE
DA-7236-153-6NS	6°F (3°C)	BOTTOM
DA-7237-153-6NS	6°F (3°C)	BACK ANGLE

Model RRT

Remote Reading Thermometer with Switch

3¼" Dial, Liquid Actuated Bulb and Capillary Type



Remotely monitor and control temperature with this economical, reliable liquid actuated thermometer with integral 5 amp rated snap switch. The switch setpoint is fully adjustable across the entire temperature range. Dual scale reads in both °F and °C. Unit is housed in a corrosion protected, plated steel case with scratch resistant glass window. A bi-metallic element compensates for temperature effects on the capillary for maximum accuracy. Thermometer includes U-clamp bracket for fast, easy panel mounting. Mount bulb in any position at any height without affecting temperature reading.

MODELS

Model Number	Range, °F	Range, °C
RRT2120U	-40 to 120	-40 to 50
RRT2250U	32 to 248	0 to 120
RRT2300U	0 to 300	-18 to 149

SPECIFICATIONS

Wetted Materials: Brass.
Accuracy: ±2% of full scale.
Temperature Limits: -4 to 158°F (-20 to 70°C).
Thermal Effect (Includes Span and Zero): ±1.5% of span per 100°F (55.6°C) nominal.
Switch Type, Rating: SPDT, 5A @ 250 VAC, non-inductive.
Electrical Connections: (3) male quick connects.
Process Connection: 1/2˝ male NPT.
Dial Size: 3-1/4˝ (80 mm).
Capillary Length: 10.5 ft (3.2 meters).
Bulb Length: 3.0 in (76 mm).
Weight: 1 lb, 4.4 oz.
Agency Approvals: CE.

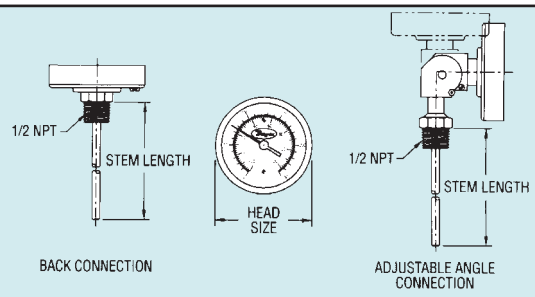
Suggested Specifications

Remote reading thermometer shall be liquid actuated bulb and capillary type with dual scale and ±2% of full scale accuracy. Thermometer control mechanism shall be a 5A, SPDT snap action switch. Capillary shall be copper, 10-1/2 feet in length. Thermometer shall be Dwyer® Remote Reading Thermometer Model No. RRT2250U.

Series BT

Bimetal Thermometers

2", 3" or 5" Dial, Dual Scale, ±1% FS Accuracy, External Reset



Series BT Bimetal Thermometers offer accurate, reliable service even in the toughest environments. These corrosion resistant units are constructed from stainless steel and are hermetically sealed to prevent crystal fogging. The bimetal element directly drives pointer, eliminating gears and linkage. An external reset screw allows field calibration and easy-to-read aluminum dial minimizes parallax error. Choose back connection, lower connection or adjustable angle for easy viewing and installation. Adjustable models can be rotated a full 360° and tilted over a 180° arc. NOTE: When using in pressurized applications, use a suitable thermowell.

SPECIFICATIONS

Wetted Materials: 304 SS.
Accuracy: ±1% full scale.
Response Time: ≤ 40 seconds.
Temperature Limits: Head: 200°F (93°C). Stem: Not to exceed 50% over-range or 1000°F (538°C) or 800°F (427°C) continuously.
Process Connection: 1/4˝ NPT on 2˝ dial size; 1/2˝ NPT on 3˝ or 5˝ dial size.
Materials of Construction: 304 SS stem, glass crystal, anodized aluminum dial, Series 300 SS head, bezel, and mounting bushing.
Stem Diameter: 1/4˝ O.D.
Immersion Depth: Minimum 2˝ in liquids, 4˝ in gas.

MODELS

	Dial Size, Stem Length	Temperature Range, °F(°C)	Degree Div., °F(°C)
Back Connection			
BTB22551*	2", 2-½"	0/250	2
BTB2405D	2", 4"	0/250 (-20/120)	2 (2)
BTB2409D	2", 4"	200/1000 (100/550)	10 (5)
BTB32510D	3", 2½"	0/200 (-20/100)	2 (2)
BTB3255D	3", 2½"	0/250 (20/120)	2 (2)
BTB3257D	3", 2½"	50/550 (10/290)	5 (5)
BTB34010D	3", 4"	0/200 (-20/100)	2 (2)
BTB3405D	3", 4"	0/250 (-20/120)	2 (2)
BTB3407D	3", 4"	50/550 (10/290)	5 (5)
BTB3605D	3", 6"	0/250 (-20/120)	2 (2)

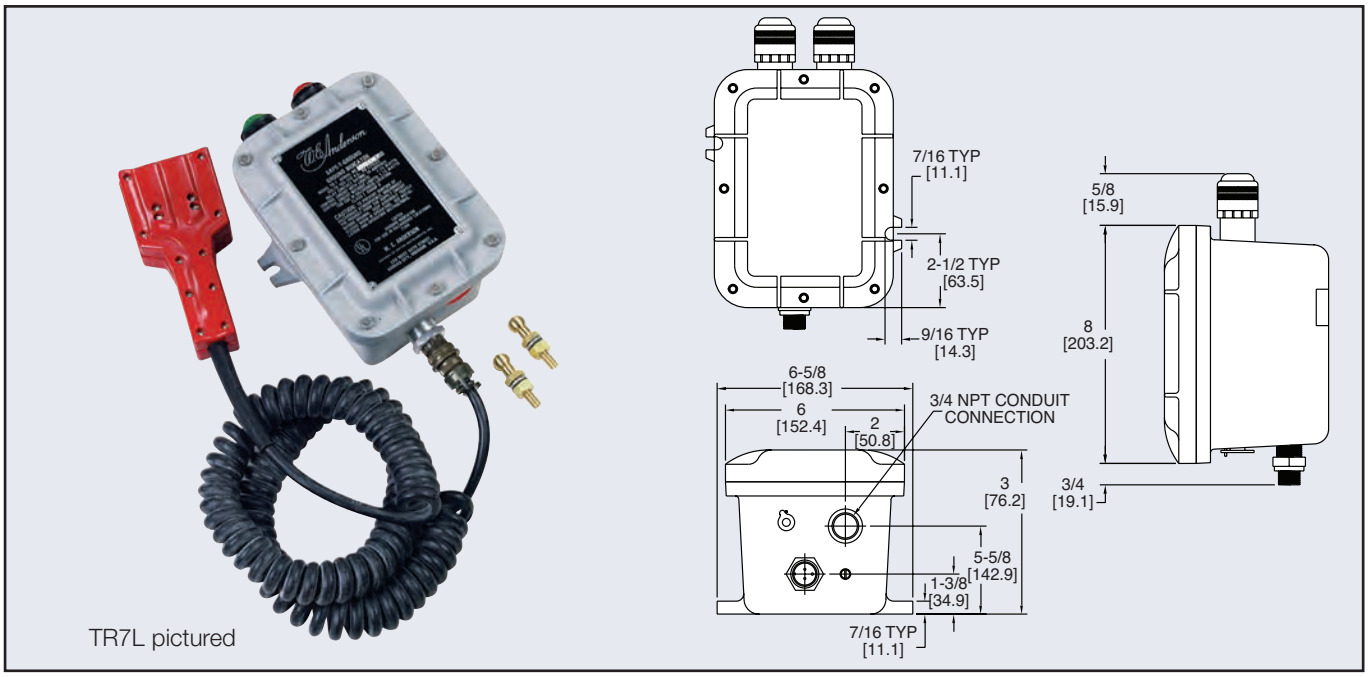
Model Number	Dial Size, Stem Length	Temperature Range, °F(°C)	Degree Div., °F(°C)
Adjustable Angle Connection			
BTA54010D	5", 4"	0/200 (-20/100)	2 (2)
BTA5405D	5", 4"	0/250 (-20/120)	2 (2)
BTA5407D	5", 4"	50/550 (10/290)	5 (5)
BTA56010D	5", 6"	0/200 (-20/100)	2 (2)
BTA5605D	5", 6"	0/250 (-20/120)	2 (2)
BTA5607D	5", 6"	50/550 (10/290)	5 (5)
Lower Connection			
BTC3255D	3", 2.5"	0/250 (-20/120)	2 (2)

*Model offered in Fahrenheit scale only.

Model TR-7

SAFE-T-GROUND

Explosion-proof, Intrinsically Safe, Ground and Continuity Control



Model TR-7 Safe-T-Ground provides continuous monitoring of a truck's ground connection throughout loading operations. Static electricity is often brought in by tank trucks entering the loading area. The Safe-T-Ground Model TR-7 instantly stops loading operations if a tank truck loses its ground. The simple but rugged Model TR-7 circuit continuously measures resistance through the truck by applying a small voltage to one terminal of the truck grounding contactor. The other terminal is connected to the loading rack ground. If the Safe-T-Ground detects a resistance of more than a few ohms across the contactor terminals, the relay opens, breaking the control circuit. The relay will not close until the grounding contactor is properly connected.

To safeguard loading operations, the Safe-T-Ground circuit can be wired into your pump control – and to an audible alarm or signal light.

The double wire TR-7 system provides an extra safeguard against explosion, compared to single wire grounding, which cannot measure the quality of the electrical ground connection during loading. The transistorized TR-7 circuit generates little heat – an added safety feature.

The Model TR-7 Safe-T-Ground is simple and easy to install. Removal of the cover on the explosion-proof aluminum housing reveals the easily accessible terminal strip for relay and ground control wiring, and a complete schematic wiring diagram appears on a label next to the terminal strip for easy wiring. Coiled grounding cable/contactor-handle assembly is easily replaced via mil-spec connector on housing.

FEATURES

- Interlocks with the loading dock pump control system.
- Prevents operation unless truck is properly grounded.
- Instantly stops operation if ground is lost while loading.

SPECIFICATIONS

Housing: 356-T6 Cast aluminum alloy (copper-free), explosion-proof – Class I, Group D.
Size: 6-5/8″ wide x 10-3/8″ high x 5-5/8″ deep.
Electrical: 105-125 VAC, 60 Hz. 7.75 watts – with light, 1.75 watts – without lights.
Electrical Rating, Relay: DPDT, 10 amps, 125 VAC, 60 Hz. contact rating. Optional 220-240 VAC, 50/60 HZ - call factory.
Wiring Hookup: On terminal strip.
Conduit Connection: 3/4″ NPT
Installation: 7/16″ mounting lugs, integrally cast.
Contactor: (Grounding clamp) molded polyethylene with beryllium copper contact clips. 16-2 type SO coiled cable; retracts to 3', extends to 16'.
Grounding Studs: 2 supplied. Order a pair for each truck.
Shipping Weight: 20 lb with contactor and cord.
Options: Integral pilot lights; 30' coiled cable; temporary contactor assemblies.

MODEL CHART

Example	TR-7	A	B		L	TR-7-ABL, Ground and continuity control, 220 VAC power supply, SAA approved, 36″ coiled cable, with indicating lights
Construction	TR-7					Explosion-proof and intrinsically safe
Power Supply Option		- A U				120 VAC (Standard) 220/240 VAC SAA 220/240 VAC UL
Cable Connection			- B			Stud (Standard) Battery (Alligator) Clamp
Cable Length				- X		36″ Coiled, extends to 16' (Standard) 72″ Coiled, extends to 32'
Options					L	Red and Green Indicating Lights

Test Equipment

Technical Reference Books

Plant Engineer's Handbook Edited by R. Keith Mobley, 2001

- Produced in association with Plant Engineering Magazine and created by leading authors and editor
- International perspective with dual units and regulations

Offers comprehensive coverage of an enormous range of subjects, which are of vital interest to the plant engineer and anyone connected with industrial operations or maintenance. Includes plant site selection, basic facilities, lubrication, corrosion, energy conservation, maintenance, insurance matters, materials handling, financial concerns, and environmental considerations.

Order Number: BK-0003

ISBN: 0750673281, Pages: 2400, Hardback

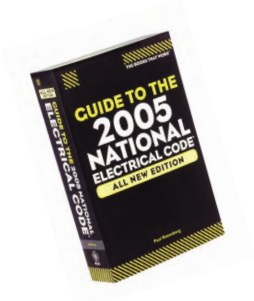
Instrumentation Reference Book Third Edition, Edited by Walt Boyes, 2002

- Great reference for anyone in the process, control and instrumentation fields where measurements are essential

This reference book is a comprehensive and authoritative collection of technical information, which is of direct value to instrumentation and control engineers as well as instrumentation technicians and users. Covers topics such as measurement of flow, viscosity, length, strain, level, volume, vibration, force, density, pressure, radiation, particle size, temperature, noise, optical, and chemical composition. Also includes instrumentation systems and technical references.

Order Number: BK-0002

ISBN: 0750671238, Pages: 1062, Hardback



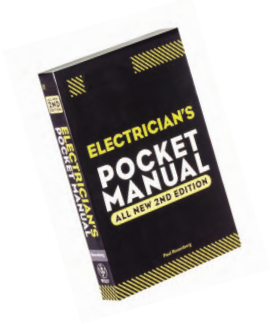
Guide to the 2005 National Electrical Code By Paul Rosenberg, 2004

- Understand the terms and rules for installation set forth in the NEC
- Review each section of the NEC that applies to electrical installation
- Learn about the significant changes in bonding and grounding requirements
- Explore the expanded section covering communications equipment

This guide extracts the necessary information for installers and arranges it for easy access, highlighting the changes so you can quickly spot what's new. If you're a novice or even a veteran, you'll want this book with you on every job.

Order Number: BK-0012

ISBN: 0764578022, Pages: 816, Paperback



Electrician's Pocket Manual Second Edition, By Paul Rosenberg, 2003

- Explains updated maintenance and construction standards
- Provides details on motors, controllers, and circuits
- Examines electronic components and communications wiring
- Offers guidelines for dealing with hazardous location wiring
- Covers generators, mechanical power transmission, and electrical power distribution

The Electrician's Pocket Manual is packed with charts, conversions, photographs, diagrams, code standards, and other information you need on the job. It even includes a chapter on tools and safety. This on-the-job reference will help you find answers quickly and easily.

Order Number: BK-0011

ISBN: 0764541994, Pages: 358, Paperback

Pumps & Hydraulics Sixth Edition, By Rex Miller & Mark Richard Miller, 2004

- Learn to install and service pumps for nearly any application
- Service and maintain individual pumping devices that use smaller motors
- See how pumps are used in robotics, taking advantage of hydraulics to lift larger, heavier loads
- Know the appropriate servicing schedule for different types of pumping equipment

This handbook is widely known as a highly useful and definitive reference for HVAC engineers and technicians alike, and those who work on domestic hot and cold-water services, gas supply, and steam services. Newly updated on natural ventilation, ventilation rates, free cooling and nighttime cooling.

Order Number: BK-0009

ISBN: 0764571168, Pages: 556, Paperback

Agency Approvals

Index of Guide Numbers Underwriters' Laboratories, Inc. Listed Mercoid Controls

The following listings are from official records of Underwriters' Laboratories, Inc., under the various categories shown. Reprints of this bulletin are made semi-annually to maintain a current list and are available by writing Dwyer Instruments, Inc. Information regarding listings may also be obtained by writing Underwriters' Laboratories, Inc.

Float-operated switches:
Enclosed,
Types 40, 41, or 46 followed by -2, -3, -4, -9, -25, -26, -36, -52, -54, -102, -103, -106, -112, -113, -116, -117, -118, -126, -127, 130, -136, -137, -140, -141, -142, -151, -152, -153, -156, -160, -162, -166, -170, or -172, followed by B, L, R, or T, followed by 3, 6, 9, or 12; Type 47 followed by 4808-18 incl., 4820-29 incl., -31, -32, -45, -49, -57, -68, -73, -88, -89, -93, -96, or -97, followed by B, L, R, or T, followed by 3, 6, 9, or 12; Types 72, 75; 122, 123, 125; Types 175G, 185G, 301G, 401-1G, -2G, -3G, -4G, followed by 48 or 58, followed by 13, 14, 15, 20, 21, 13-20, -21, 14-20, -21, 15-20, -21, 20-13, -14, -15, -20, -21, 21-13, -14, -15, -20, -21; Types 175G, 185G, 301G, 401-1G, -2G, -3G, , -4G, followed by 78 or 88, followed by 06, 10, or 10-10; Series Types 102G, 201G, 203G, 204G, 205G, 207G, 208G, 211G, 213G, 214G, 215G, 217G, 218G, 221G, 223G, 224G, 225G, 227G, 228G, 230G, 233G, 234G, 251G, 254G, 500G, 1211G, 1213G, 1214G, 1221G, 1223G, 1224G, 1251G, 1253G, 1254G, 1261G, 1263G, 1264G, 1271G, 1273G, 1274G, 1281G, 1283G, 1284G, followed by suffixes; rain-tight Types 175W, 185W, 301W, 401-1W, -2W, -3W, -4W, followed by 48 or 58, followed by 13, 14, 15, 20, 21, 13-20, -21, 14-20, -21, 15-20, -21, 20-13, -14, -15, -20, -21, 21-13, -14, -15, -20, -21; Types 175W, 185W, 301W, 401-1W, -2W, -3W, -4W, followed by 78 or 88, followed by 06, 10 or 10-10; Types 102W, 201W, 203W, 204W, 205W, 207W, 208W, 211W, 213W, 214W, 215W, 217W, 218W, 221W, 223W, 224W, 225W, 227W, 228W, 230W, 233W, 234W, 251W, 253W, 254W, 500W, 500FW, 1211W, 1213W, 1214W, 1221W, 1223W, 1224W, 1251W, 1253W, 1254W, 1261W, 1263W, 1264W, 1271W, 1273W, 1274W, 1281W, 1283W, 1284W, followed by suffixes.

Pressure-operated switches:
Enclosed,
Type AP with or without D or R with or without 41 followed by -2, -3, -4, -26, -36, -54, -153 with or without L, U; Type AP followed by 70, 80 followed by 21, 41 followed by 153; Types DA-21 to -24 incl., -41 to -44 incl., DAF-21 to -24 incl., -41 to -44 incl., DAW-23, -43, DR-21† to -24 † incl., -41 † to 44† incl., DRF-21 † to -24† incl., -41† to -44† incl., DRW-23†, -43†, DS-21 to -24 incl., -41 to -44 incl., DSF-21 to -24 incl., -41 to -44 incl., DSW-23, -43, with one of the following suffix numbers -2 to -5 incl., -9, -25, -26, -36, -52, -54, -55, -102, -103, -106, -112, -113, -116, -117, -118, -126, -127, -130, -136, -137, -140, -141, -142, -151, to -156 incl., -160, -162, -166, -170, -172, -701, -702, -704, -705, -707, -708, -710, -711, -713, -714, -716, -717, -719, -720, -722, -723, -725, -726, -728, -729, -731, -732, -734, -735, -737, -738, -740, -741, -743, -744, -746, -747, -751, -754, -755, -761, -765, -804, -815, 816, with or without suffix B; DA-31 to -34 incl., DR-31 to -34 incl., DS-31 to -34 incl., with one of the following suffix numbers; -2 to -5 incl., -9, -25, -26, -52, -54, -55, -102, -103, -106, -112, -113, -116, -117, -118, -126, -127, -130, -136, -137, -140, -141, -142, -151, to -156 incl., -160, -162, -166, -170, -172, -701, -702, -704, -705, -707, -708, -710, -711, -713, -714, -716, -717, -719, -720, -722, -723, -725, -726, -728, -729, -731, -732, -734, -735, -737, -738, -740, -741, -743, -744, -746, -747, -751, -755; DA, DAF, DR, DRF, DS, DSF, followed by -7021 to -7024 incl., -7031 to -7034 incl., -7041 to -7044 incl., followed by -153 or -804, with or without suffix B, DS, DSF followed by -7221 to -7224 incl., -7231 to -7234 incl., -7241 to -7244 incl., followed by -153 or -804, with or without suffix B; DSW followed by -7223, -7233, -7243, followed by -153, with or without suffix B; PQ, PQ-3; -4122, -4123, -129, -4132; PPQ, PPQ-4122, -4123, -4123, -4129, -4132 with or without suffix B; raintight, Types N3-DAW-23, -43, N3-DRW-23†, -43†, N3-DSW-23, -43 with one of the following suffix numbers: -2 to -5 incl., -9, -25, -26 -36, -52, -54, -55, -102, -103, -106, -112, -113, -116, -117, -118, -126, -127, -130, -136, -137, -140, -141, -142, -151, to -156 incl., -160, -162, -166, -170, -172, -701, -702, -704, -705, -707, -708, -710, -711, -713, -714, -716, -717, -719, -720, -722, -723, -725, -726, -728, -729, -731, -732, -734, -735, -737, -738, -740, -741, -743, -744, -746, -747, -751, -754, -755, -761, -765, -804, -815, -816 with or without suffix B; N3DAW, N3DRW, N3DSW, followed by -7023, -7033, -7043, followed by -153, -804, with or without suffix B; N3DSW followed by -7223, -7233, -7243, followed by -153, with or without suffix B.
†Suffix number followed by letter U or L.

Pressure-operated switches: Open,
Type AP with or without D, followed by S, with or without 41 followed by -2, -3, -4, -26, -36, -54, -153; Type APS followed by 70, 80 followed by 21, 41, followed by 153.

Combined float and pressure-operated switches: Enclosed,
Types DA-71, -120, -121, -131; DR-71, -120, -121, DS-71, -120, -121 with one of the following suffix numbers: -2 to -5 incl., -9, -25, -26, -52, -54, -55, -102, -103, -106, -112, -113, -116, -117, -118, -126, -127, -130, -136, -137, -140, -141, -142, -151 to 156 incl., -160, -162, -166, -170, -172, -701, -702, -704, -705, -707, -708, -710, -711, -713, -714, -716, -717, -719, -720, -722, -723, -725, -726, -728, -729, -731, -732, -734, -735, -737, -738, -740, -741, -743, -744, -746, -747, -751, -755.

Card No. E6169 Temperature-Indicating & Regulating Equipment UL Control No. 723G:
Room thermostat, for direct control of fixed electric space heating. Type 860-36.
Room thermostats, Type 860 followed by -2, -3, -26; 860MS followed by -2, -3, Temperature controllers. Types FM437-2, 437-3, -153, DA35-39 incl., DAW-38, DR35-39 incl., DRW-38, DS35-39 incl., DSW-38, M51, M51R, M53; raintight, Types N3-DAW-38, N3-DRW-38, N3DSW-38.

Card No. MP991 Gas and Oil Equipment Controls, Limit UL Control No. 728G:
Group A-Types DA31-34 incl., DA7031 incl., DAF31-34 incl., DAW33, N3-DAW33, DS31-34 incl., DS7234 incl., DSF31-34 incl., DSW33, N3-DSW33. Group AM1-Types DR31L incl., DR31U-34U incl.,* DRF31-34L incl., DRF31U-34U incl.,* DRW33L, -33U,* N3-DRW33L, -33U.* Group B-Types DA35-39 incl., -36SS, -37SS, DAW38, N3-DAW38, DS35-39 incl., -36SS, -37SS, DSW38, N3-DSW38, FM437-2, -3,* -152, -153, FM437SS-2, -3,* -152, -153. Group BM1-Types DR35L-39L incl., -36SSL, -37SSL, DR35U-39U incl.,* -36SSU,* -37SSU,* DRW38L, -38U,* N3-DRW38L, 38U.* Group C-Types DA35-39 incl., -36SS, -37SS, DAW38, N3DAW38, DS35-39, incl., -36SS, -37SS, DSW38, N3-DSW38, M41, M51. Group CM1-Types DR35L-39L incl., -36SSL, -37SSL, DRW38L, N3DRW38L. Group D-Types M43, M53. Group EM2-Type M51R.
** Closes circuit on temperature or pressure rise. Designation may have numerical suffix.*

Card No. MH7298 Switches UL Control No. 725G:
Pressure-or-vacuum-operated switches. Type PG* with or without suffix -2, -2P, -3, -3P, -4, -54, -103, -105, -127, -129, -152, -153, -156, -158, or -161 for air, natural gas or LP-gas; Type PR* with or without suffix -2, -2P, -3, -4, -54, -129, -152, or -158 for air, natural gas or LP-gas; Type PRL* with or without suffix -2, -3, -3P, -4, -54, -105, -152, -153, or -161 for air, natural gas or LP-gas; Type PK with or without suffux -2, -2P, -3, -3P, -4, -54, -103, -105, -127, -129, -152, -153, -156, -158, or -161 for air; Type PKR with or without suffix -2, -2P, -3, -4, -54, -129, -152, -153, or -158 for air, Type PKRL with or without suffix -2, -3, -3P, -4, -54, -105, -152, -153, or -161 for air. Pressure-operated switches, Types AG, AGR,** AK, AKR** with suffix -2, -3, -4, -54, or -153, APF with suffix -2, -3, or -153, for air. Type APF 7021-153 for air. Types DA-81 to -84 incl., DAF-81 to -84 incl., DAW-83, N3DAW83, DR-81L to -84L incl., DR-81U to -84U incl., DRF-81L to -84L incl., DRF-81U to -84U incl., DRW-83L, DRW-83U, N3-DRW-83L, N3-DRW-83U, DS-81 to -84 incl., DSF-81 to -84 incl., DSW-83, N3-DSW-83 followed by -2, -3, -4, -5, -9, -25, -26, -36, -52, -54, -55, -102, -102, -106, -112, -113, -116, -117, -118, -126, -127, -130, -136, -137, -140, -141, -142, -151, -152, -153, -154, -155, -156, -160, -162, -166, -170, -172, -701, -702, -704, -705, -707, -708, -710, -711, -713, -714, -716, -717, -719, -720, -722, -723, -725, -726, -728, -729, -731, -732, -734, -735, -737, -738, -740, -741, -743, -744, -746, -747, -751, -754, -755, -761, -765, -804, -815, or 816 with or without suffix -B, DA-7081 to -7084 incl., with suffix -153, DS-7281 to -7284 include. with suffix -153 or -153-SL, for air and No. 6 oil and lighter. Temperature-operated oil pre-heat switches. Types FM437SS, DA-36SS, -37SS with suffix, -2, -3, -26, -36, -152, or -153.
**When used as a differential pressure switch, for air only.*
*** Suffix number if followed by letter L or U.*

Card No. SA709 Electrical Appliance and Utilization Equipment List-Refrigeration Accessories-Controllers UL Control No. 726G:
Temperature or pressure actuated operating controllers or pressure-limiting devices for use with electrically operated refrigerating machines. Types DA-21-24 incl., DA-31-34 incl., DA-35, -38, -39, DR-21;* DR-31,* DR-35,* -38, -39, with or without suffix number -2, -3, -4, -54, -103, -127, -156, -160.
** DR devices have suffix L or U.*
Pressure-operated switches: Types CD, CS, or CSS followed by -10, -30, -150. Types CDDO, SCDO, CSSO, CDDD, CDDS, CDSS, CSDD, CSSD, or CSSS followed by -10, -30, -150.

Card No. E14785 Hazardous Location Equipment List Motor Controllers-Float & Pressure Operated. UL Control No. 722G:
Pressure-operated switches. Class I, Groups C and D; Class II, Groups E, F, and G. Types DAE, DLE, DRE, DSE, DAH, DAHF, DLH, DRH, DSH-7221, -7222, -7232, -7241, -7242 followed by -153 or -804.
Pressure-operated switches, mercury-tube type. Class I, Groups C and D; Class II, Groups E, F, and G. Types APH-7021, -7041, -8021, -8041, APH, -2, -3, -4, -26, -36, -54, -153 with or without suffix letter or letters. Types DAE-21, -31, -41, DAH-21, -31, -41, DRE-21, -31, -41, DRH-21,* -31,* -41, DSE-21, -31, -41, DSH-21, -31, -41 with suffix number or numbers. Float-operated switches, mercury-tube type. Class I, Groups C and D; Class II, Groups E, F and G. Types 175E, -EV, 185E, -EV, 301E, -EV, 401-1E, -1EV, -2E, -2EV, -3E, -3EV, -4E, -4EV with suffix numbers. The types with suffix "V" are provided with factory seals of conductors entering the switch enclosure.
**May also have suffix letter.*

Card No. E14785 Refrigeration Controllers UL Control No. 727G:
Class I, Groups C and D; Class II, Groups E, F and G. Temperature or pressure actuated operating controllers or pressure-limiting devices for use with electrically operated refrigerating machines. Types DAE-35, DAH-35, DRH-35,* DSE-35, DSH-35 with suffix number or numbers.
**May also have suffix letter.*
Types DAH-21, DAH-31, DAH-35, DRE-21,* -31, -35, with suffix number or nos.

Card No. E14785 Temperature & Regulating Equipment UL Control No. 724G:
Thermostats externally adjustable (Class Groups C and D; Class II, Groups E, F and G). Types DAE-35, DAH-35, DRE-35, DRH-35* with suffix No. or Nos. Types 860EH with suffix -2, -3, -4, -26, -36, -52, -54 or -153. Types 860EHMS with suffix -2, -3, -4, -54,
**May also have suffix letter.*

NOTE: For additional agency approvals please call the factory.

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Reference Tables

AREA OF CIRCLES IN FT²			
Diam. in Inches	AREA Square Feet	Diam. in Inches	AREA Square Feet
1	.0054	30	4.909
1½	.0123	31	5.241
2	.0218	32	5.585
2½	.0341	33	5.940
3	.0491	34	6.305
3½	.0668	35	6.611
4	.0873	36	7.069
4½	.1105	37	7.467
5	.1364	38	7.876
5½	.1650	39	8.296
6	.1964	40	8.727
6½	.2305	41	9.168
7	.2673	42	9.621
7½	.3068	43	10.08
8	.3491	44	10.56
8½	.3940	45	11.04
9	.4418	46	11.54
9½	.4923	47	12.05
10	.5454	48	12.57
11	.6600	49	13.10
12	.7854	50	13.64
13	.9218	51	14.19
14	1.069	52	14.75
15	1.227	53	15.32
16	1.396	54	15.90
17	1.576	56	17.10
18	1.767	58	18.35
19	1.969	60	19.63
20	2.182	62	20.97
21	2.405	64	22.34
22	2.640	66	23.76
23	2.885	68	25.22
24	3.142	70	26.73
25	3.409	72	28.27
26	3.687	74	29.87
27	3.976	76	31.50
28	4.276	78	33.18
29	4.587	80	34.91

VOLUME EQUIVALENTS	
1 CU. FT. =	1728 Cu. In.
	7.481 Gal. (U.S.)
	28.317 Liters
	28.317 Cu. Cm.
1 GAL. (U.S.) =	231 Cu. In.
	.1337 Cu. Ft.
	3.785 Liters
	3785 Cu. Cm.
1 LITER =	.0353 Cu. Ft.
	.2642 Gal. (U.S.)
	1000 Cu. Cm.

ALTITUDE PRESSURE TABLE		
Mercury at 0°C (32°F)		
Altitude in feet	Inches of Mercury	In Millimeters of Mercury
-1,000	31.02	787.9
0	29.921	760.0
1,000	28.86	732.9
2,000	27.82	706.6
3,000	26.81	681.1
4,000	25.84	656.3
5,000	24.89	632.3
6,000	23.98	609.0
7,000	23.09	586.4
8,000	22.22	564.4
9,000	21.38	543.2
10,000	20.58	522.6
15,000	16.88	428.8
20,000	13.75	349.1
25,000	11.10	281.9
30,000	8.88	225.6
35,000	7.04	178.7
40,000	5.54	140.7
45,000	4.36	110.8
50,000	3.436	87.30

SPECIFIC GRAVITIES OF GASES		
(BASED ON 68°F AND 14.7 LBS. ABS.)		
ACETYLENE	C_2H_2	.897
AIR	.....	1.000
AMMONIA	NH_3	.587
ARGON	A	1.378
BUTANE-N	C_4H_{40}	2.390
BUTANE-ISO	$(CH)_3)_2CH\ CH_3$	1.990
CARBON DIOXIDE	CO_2	1.517
CARBON MONOXIDE	CO	.966
CHLORINE	CL_2	2.452
ETHANE	C_2H_6	1.035
HELIUM	He	.138
HYDROGEN	H_2	.070
METHANE	CH_4	.553
NATURAL GAS	.....	.665
		(Approx. Avg.)
NITRIC OXIDE	NO	1.035
NITROGEN	N_2	.966
NITROUS OXIDE	N_20	1.518
OXYGEN	0_2	1.103
PROPANE	C_3H_8	1.550
SULPHUR DIOXIDE	SO_2	2.209

FLOW EQUIVALENTS							
1 Cu. Ft./Hr.		1 Cu. Ft./Min.		1 CC/Min.		1 CC/Hr.	
.0166	Cu. Ft./Min.	60	Cu. Ft./Hr.	60	CC/Hr.	.0167	CC/Min.
.4719	LPM	28.316	LPM	.000035	Cu. Ft./Min.	.0000005	Cu. Ft./Min.
28.316	LPH	1699	LPH	.0021	Cu. Ft./Hr.	.00003	Cu. Ft./Hr.
471.947	CC/Min.	28317	CC/Min.	.001	LPM	.000017	LPM
28317	CC/Hr.	1,699,011	CC/Hr.	.06	LPH	.001	LPH
.1247	Gal/Min.	7.481	Gal/Min.	.00026	Gal/Min.	.000004	Gal/Min.
7.481	Gal/Hr.	448.831	Gal/Hr.	.0159	Gal/Hr.	.00026	Gal/Hr.
1 LPM		**1 LPH**		**1 Gal/Min.**		**1 Gal/Hr.**	
60	LPH	.0166	LPM	60	Gal/Hr.	.0167	Gal/Min.
.035	Cu. Ft./Min.	.00059	Cu. Ft./Min.	.1337	Cu. Ft./Min.	.002	Cu. Ft./Min.
2.1189	Cu. Ft./Hr.	.035	Cu. Ft./Hr.	8.021	Cu. Ft./Hr.	.1337	Cu. Ft./Hr.
1000	CC/Min.	16.667	CC/Min.	3.785	LPM	.063	LPM
60,002	CC/Hr.	1000	CC/Hr.	227.118	LPH	3.785	LPH
.264	Gal/Min.	.004	Gal/Min.	3,785.412	CC/Min.	63.069	CC/Min.
15.851	Gal/Hr.	.264	Gal/Hr.	227,125	CC/Hr.	3785	CC/Hr.

Reference Tables

Equivalent Temperature Readings for Fahrenheit and Celsius Scales

°F = 9/5 °C + 32 °C = 5/9 (°F -32)

	°Celsius	°Fahrenheit	°Celsius	°Fahrenheit	°Celsius	°Fahrenheit	°Celsius
-76.	-60.	10.	-12.2	62.	16.7	114.	45.6
-67.	-55.	10.4	-12.	62.6	17.	114.8	46.
-58.	-50.	11.	-11.7	63.	17.2	115.	46.1
-49.	-45.	12.	-11.1	64.	17.8	116.	46.7
-40.	-40.	12.2	-11.	64.4	18.	116.6	47.
-39.	-39.4	13.	-10.6	65.	18.3	117.	47.2
-38.2	-39.	14.	-10.	66.	18.9	118.	47.8
-38.	-38.9	15.	-9.4	66.2	19.	118.4	48.
-37.	-38.3	15.8	-9.	67.	19.4	119.	48.3
-36.4	-38.	16.	-8.9	68.	20.	120.	48.9
-36.	-37.8	17.	-8.3	69.	20.6	120.2	49.
-35.	-37.2	17.6	-8.	69.8	21.	121.	49.4
-34.6	-37.	18.	-7.8	70.	21.1	122.	50.
-34.	-36.7	19.	-7.2	71.	21.7	123.	50.6
-33.	-36.1	19.4	-7.	71.6	22.	123.8	51.
-32.8	-36.	20.	-6.7	72.	22.2	124.	51.1
-32.	-35.6	21.	-6.1	73.	22.8	125.	51.7
-31.	-35.	21.2	-6.	73.4	23.	125.6	52.
-30.	-34.4	22.	-5.6	74.	23.3	126.	52.2
-29.2	-34.	23.	-5.	75.	23.9	127.	52.8
-29.	-33.9	24.	-4.4	75.2	24.	127.4	53.
-28.	-33.3	24.8	-4.	76.	24.4	128.	53.3
-27.4	-33.	25.	-3.9	77.	25.	129.	53.9
-27.	-32.8	26.	-3.3	78.	25.6	129.2	54.
-26.	-32.2	26.6	-3.	78.8	26.	130.	54.4
-25.6	-32.	27.	-2.8	79.	26.1	131.	55.
-25	-32.9	28.	-2.2	80.	26.7	132.	55.6
-24.	-31.7	28.4	-2.	80.6	27.	132.8	56.
-23.8	-31.1	29.	-1.7	81.	27.2	133.	56.1
-23.	-30.5	30.	-1.1	82.	27.8	134.	56.7
-22.	-30.	30.2	-1.	82.4	28.	134.6	57.0
-21.	-29.4	31.	-0.6	83.	28.3	135.	57.2
-20.2	-29.	32.	0.	84.	28.9	136.	57.8
-20.	-28.9	33.	+0.6	84.2	29.	136.4	58.
-19.	-28.3	33.8	1.	85.	29.4	137.	58.3
-18.4	-28.	34.	1.1	86.	30.	138.	58.9
-18.	-27.8	35.	1.7	87.	30.6	138.2	59.0
-17.	-27.2	35.6	2.	87.8	31.	139.	59.4
-16.6	-27.	36.	2.2	88.0	31.1	140.	60.
-16.	-26.7	37.	2.8	89.	31.7	141.	60.6
-15.	-26.1	37.4	3.	89.6	32.	141.8	61.
-14.8	-26.	38.	3.3	90.	32.2	142.	61.1
-14.	-25.6	39.	3.9	91.	32.8	143.	61.7
-13.	-25.	39.2	4.	91.4	33.	143.6	62.
-12.0	-24.4	40.	4.4	92.	33.3	144.	62.2
-11.2	-24.	41.	5.	93.	33.9	145.	62.8
-11.	-23.9	42.	5.6	93.2	34.	145.4	63.
-10.0	-23.3	42.8	6.	94.	34.4	146.	63.3
-9.4	-23.	43.	6.1	95.	35.	147.	63.9
-9.	-22.8	44.	6.7	96.	35.6	147.2	64.
-8.	-22.2	44.6	7.	96.8	36.	148.	64.4
-7.6	-22.	45.	7.2	97.	36.1	149.	65.
-7.	-21.7	46.	7.8	98.	36.7	150.	65.6
-6.	-21.1	46.4	8.	98.6	37.	150.8	66.
-5.8	-21.	47.	8.3	99.	37.2	151.	66.1
-5.	-20.6	48.	8.9	100.	37.8	152.	66.7
-4.	-20.	48.2	9.	100.4	38.	152.6	67.
-3.	-19.4	49.	9.4	101.	38.3	153.	67.2
-2.2	-19.	50.	10.0	102.	38.9	154.	67.8
-2.	-18.9	51.	10.6	102.2	39.	154.4	68.
-1.	-18.3	51.8	11.	103.	39.4	155.	68.3
-0.4	-18.	52.	11.1	104.	40.	156.	68.9
0.	-17.8	53.	11.7	105.	40.6	156.2	69.
+1.	-17.2	53.6	12.	105.8	41.	157.	69.4
1.4	17.	54.	12.2	106.	41.1	158.	70.
2.	-16.7	55.	12.8	107.	41.7	159.	70.6
3.	-16.1	55.4	13.	107.6	42.	159.	71.
3.2	-16.	56.	13.3	108.	42.2	160.	71.1
4.	-15.6	57.	13.9	109.	42.8	161.	71.7
5.	-15.	57.2	14.	109.4	43.	161.6	72.
6.	-14.4	58.	14.4	110.	43.3	162.	72.2
6.8	-14.	59.	15.	111.	43.9	163.	72.8
7.	-13.9	60.	15.6	111.2	44.	163.4	73.
8.	-13.3	60.8	16.	112.	44.4	164.	73.3
8.6	-13.	61.	16.1	113.	45.	165.	73.9
9.	-12.8						

Reference Tables

Equivalent Temperature Readings for Fahrenheit and Celsius Scales (Continued)

°F = 9/5 °C + 32

°C = 5/9 (°F -32)

°Fahrenheit	°Celsius	°Fahrenheit	°Celsius	°Fahrenheit	°Celsius	°Fahrenheit	°Celsius
165.2	74.	218.	103.3	270.	132.2	322.	161.1
166.	74.4	219.	103.9	271.	132.8	323.	161.7
167.	75.	219.2	104.	271.4	133.	323.6	162.
168.	75.6	220.	104.4	272.	133.3	324.	162.2
168.8	76.	221.	105.	273.	133.9	325.	162.8
169.	76.1	222.	105.6	273.2	134.	325.4	163.
170.	76.7	222.8	106.	274.	134.4	326.	163.3
170.6	77.	223.	106.1	275.	135.	327.	163.9
171.	77.2	224.	106.7	276.	135.6	327.2	164.
172.	77.8	224.6	107.	276.8	136.	328.	164.4
172.4	78.	225.	107.2	277.	136.1	329.	165.
173.	78.3	226.	107.8	278.	136.7	330.	165.6
174.	78.9	226.4	108.	278.6	137.	330.8	166.
174.2	79.	227.	108.3	279.	137.2	331.	166.1
175.	79.4	228.	108.9	280.	137.8	332.	166.7
176.	80.	228.2	109.	280.4	138.	332.6	167.
177.	80.6	229.	109.4	281.	138.3	333.	167.2
177.8	81.	230.	110.	282.	138.9	334.	167.8
178.	81.1	231.	110.6	282.2	139.	334.4	168.
179.	81.7	231.8	111.	283.	139.4	335.	168.3
179.6	82.	232.	111.1	284.	140.	336.	168.9
180.	82.2	233.	111.7	285.	140.6	336.2	169.
181.	82.8	233.6	112.	285.8	141.	337.	169.4
181.4	83.	234.	112.3	286.	141.1	338.	170.
182.	83.3	235.	112.8	287.	141.7	339.	170.6
183.	83.9	235.4	113.	287.6	142.	339.8	171.
183.2	84.	236.	113.3	288.	142.2	340.	171.1
184.	84.4	237.	113.9	289.	142.8	341.	171.7
185.	85.	237.2	114.	289.4	143.	341.6	172.
186.	85.6	238.	114.4	290.	143.3	342.	172.2
186.8	86.	239.	115.	291.	143.9	343.	172.8
187.	86.1	240.	115.6	291.2	144.	343.4	173.
188.	86.7	240.8	116.	292.	144.4	344.	173.3
188.6	87.	241.	116.1	293.	145.	345.	173.9
189.	87.2	242.	116.7	294.	145.6	345.2	174.
190.	87.8	242.6	117	294.8	146.	346.	174.4
190.4	88.	243.	117.2	295.	146.1	347.	175.
191.	88.3	244.	117.8	296.	146.7	348.	175.6
192.	88.9	244.4	118.	296.6	147.	348.8	176.
192.2	89.	245.	118.3	297.	147.2	349.	176.1
193.	89.4	246.	118.9	298.	147.8	350.	176.7
194.	90.	246.2	119.	298.4	148.	350.6	177.
195.	90.6	247.	119.4	299.	148.3	351.	177.2
195.8	91.	248.	120.	300.	148.9	352.	177.8
196.	91.1	249.	120.6	300.2	149.	352.4	178.
197.	91.7	249.8	121.	301.	149.4	353.	178.3
197.6	92.	250.	121.1	302.	150.	354.	178.9
198.	92.2	251.	121.7	303.	150.6	354.2	179.
199.	92.8	251.6	122.	303.8	151.	355.	179.4
199.4	93.	252.	122.4	304.	151.1	356.	180.
200.	93.3	253.	122.8	305.	151.7	357.	180.6
201.	93.9	253.4	123.	305.6	152.	357.8	181.
201.2	94.	254.	123.3	306.	152.2	358.	181.1
202.	94.4	255.	123.9	307.	152.8	359.	181.6
203.	95.	255.2	124.	307.4	153.	359.6	182.
204.	95.6	256.	124.4	308.	153.3	360.	182.2
204.8	96.	257.	125.	309.	153.9	361.	182.8
205.	96.1	258.	125.5	309.2	154.	361.4	183.
206.	96.7	258.8	126.	310.	154.4	362.	183.3
206.6	97.	259.	126.1	311.	155.	363.	183.9
207.	97.2	260.	126.7	312.	155.6	363.2	184.
208.	97.8	260.6	127.	312.8	156.	364.	184.4
208.4	98.	261.	127.2	313.	156.1	365.	185.
209.	98.3	262.	127.8	314.	156.7	366.	185.6
210.	98.9	262.4	128.	314.6	157.	366.8	186.
210.2	99.	263.	128.3	315.	157.2	367.	186.1
211.	99.4	264.	128.9	316.	157.8	368.	186.7
212.	100.	264.2	129.	316.4	158.	368.6	187.
213.	100.6	265.	129.4	317.	153.3	369.	187.2
213.8	101.	266.	130.	318.	158.9	370.	187.8
214.	101.1	267.	130.6	318.2	159.	370.4	188.
215.	101.7	267.8	131.	319.	159.4	371.	188.3
215.6	102.	268.	131.3	320.	160.	372.	188.9
216.	102.2	269.	131.7	321.	160.6	372.2	189.
217.	102.8	269.6	132.	321.8	161.	373.	189.4
217.4	103.					374.	190.

Specific Gravity of Liquid

Liquid	Specific Gravity
Acetone	0.792
Alcohol, ethyl	0.791
Alcohol, methyl	0.810
Ammonia, saturated	0.655
Benzene	0.9
Brine (10% Na Cl)	1.08
Carbolic acid	0.950 to 0.965
Carbon disulfide	1.293
Carbon tetrachloride	1.595
Chloroform	1.489
Ether	0.736
Fuel Oils	
1	0.82 to 0.95
2	0.82 to 0.95
3	0.82 to 0.95
5A	0.82 to 0.95
5B	0.82 to 0.95
6	0.82 to 0.95
Gas oils	0.89
Gasolines	
a	0.74
b	0.72
c	0.68
Glycerine	1.260
Heptane-n	0.688
Hexane	0.664
Kerosene	0.820
Mercury	13.600
Methyl acetate	0.93
Methyl iodide	2.28
Milk	1.028 to 1.035
Naptha, petroleum ether	0.665
Naptha, wood	0.848 to 0.810
Oils	
Castor	0.969
Coconut	0.925
Cotton seed	0.926
Creosote	1.040 to 1.200
Linseed, boiled	0.924
Olive	0.918
Palm	0.924
Peanut	0.92
Sesame Seed	0.923
Soy Bean	0.924 to .928
Pentane	.623
Propylene glycol	1.038
SAE 30 Lube Oil	0.9
Sea Water	1.025
Sodium chloride	
5%	1.037
25%	1.196
	1.19
Sodium hydroxide (caustic soda)	
20%	1.22
30%	1.33
40%	1.43
Turpentine (spirits)	0.870
Water	1.000

Agency Approval Chart

Products with this symbol conform to certain standards and are eligible to be placed on the market in the European Community.

Products with this symbol are listed by Underwriters Laboratories, Inc. Samples of these products have been evaluated by UL and meet the applicable UL standards for safety.

Products with this symbol bear the UL Listing Mark for Canada.

Products with this symbol are recognized Component Program of Underwriters Laboratories, Inc.

This symbol assures you that the product meets certain safety standards and/or performance criteria as set by the Canadian Standards Association.

Products with this mark meet certain requirements as reported by Factory Mutual Research.

Products with this symbol conform to certain ATEX requirements as set by the European Union.

Hazardous Locations Listings

Class I (-4)	Flammable gases or vapors are or may be present in sufficient quantities to produce explosive or ignitable mixtures.
Division I (-4A)	Gases or vapors are or may be in the atmosphere in normal operations.
Group A (-2)	Containing acetylene.
Group B (-2)	Containing hydrogen, ethylene oxide & propylene oxide or gases or vapors of equivalent hazard.
Group C (-2)	Containing ethyl-ether vapor, ethylene or cyclopropane.
Group D (-2)	Containing gasoline, hexane, naptha, benzine, butane, propane, alcohol, acetone, lacquer solvent or natural gas.
Division II (-4B)	Gases or vapors are not normally present. They may be present due to leakage, accidents or maintenance. It is possible for one atmosphere to contain the same items as listed for Groups of Division I of this class.
Class II (-5)	Combustible dust may be present in sufficient quantities to produce an explosive atmosphere.
Division I (-5A)	Dust in suspension. Dust is or may be present in the atmosphere due to normal operating conditions.
Group E (-2)	Containing metal dust, including aluminum, magnesiums and their commercial alloys, and other metals of similar hazardous characteristics.
Group F (-2)	Containing carbon black, coal or coke dust.
Group G (-2)	Containing flour, starch or grain dust.
Division II (-5D)	Dust not normally in suspension. Possibly containing the same items as listed for Groups of Division I of this class.
Class III (-6)	Ignitable fibers are present, but not necessarily present in air in quantities sufficient to produce ignitable mixtures.
Division I (-6A)	Easily ignitable fibers or materials producing combustible flyings are handled, manufactured or used.
Division II (-6B)	Easily ignitable fibers are stored or handled.

NEMA Standards for Industrial Enclosures

Type 1	General purpose - indoor.
Type 2	Drip-proof - indoor. Protects against limited amounts of falling liquids and dirt.
Type 3	Dust-tight, raintight and sleet resistant - outdoor. Protects against windblown dust, rain sleet and external ice formation.
Type 3R	Same as Type 3, except not dust-tight.
Type 3S	Same as Type 3, but provides for operation of external mechanism when ice-laden.
Type 4	Watertight and dust-tight - indoor and outdoor. Protects against windblown dust and rain, splashing water and hose-directed water.
Type 4X	Same as Type 4 except also corrosion resistant.
Type 5	Dust-tight - indoor. Protects against dust and falling dirt.
Type 6	Submersible, watertight and dust-tight - indoor and outdoor. Protects against water entry during occasional temporary submersion to a limited depth.
Type 6P	Same as Type 6 except for prolonged submersion.
Type 7	Class I indoor hazardous locations. Explosion proof, may be A, B, C or D.
Type 8	Class I indoor or outdoor hazardous locations - oil immersed equipment, may be A, B, C or D.
Type 9	Class II indoor hazardous locations. Explosion proof, may be E, F or G.
Type 10	Mining Enforcement Safety Administration. Explosion proof in methane or natural gas.
Type 11	Corrosion resistant and drip-proof - oil-immersed - indoor .
Type 12	Dust-tight and drip-tight - indoor, non-corrosive dripping liquids.
Type 12K	Same as Type 12 except enclosures have knockouts.
Type 13	Oil-tight and dust-tight - indoors, non-corrosive spray of water, oil and coolant.

Pressure Conversion Chart

in/H_2O	P.S.I.	in/Hg	mm/H_2O	mm/Hg	kg/cm²	bar	mbar	Pa	kPa
.1	.0036	.0073	2.534	.1863	.0002	.0002	.2482	24.82	.0248
.2	.0072	.0146	5.067	.3726	.0005	.0005	.4964	49.64	.0496
.4	.0144	.0293	10.13	.7452	.0010	.0010	.9928	99.28	.0993
.6	.0216	.0440	15.20	1.118	.0015	.0015	1.489	148.9	.1489
.8	.0289	.0588	20.34	1.496	.0020	.0020	1.992	199.2	.1992
1.0	.0361	.0735	25.41	1.868	.0025	.0025	2.489	248.9	.2489
2	.0722	.1470	50.81	3.736	.0051	.0050	4.978	497.8	.4978
3	.1083	.2205	76.22	5.604	.0076	.0075	7.467	746.7	.7476
4	.1444	.2940	101.62	7.472	.0102	.0099	9.956	995.6	.9956
5	.1804	.3673	127.0	9.335	.0127	.0124	12.44	1244	1.244
6	.2165	.4408	152.4	11.203	.0152	.0149	14.93	1493	1.493
7	.2526	.5143	177.8	13.072	.0178	.0174	17.42	1742	1.742
8	.2887	.5878	203.2	14.940	.0203	.0199	19.90	1990	1.990
9	.3248	.6613	228.6	16.808	.0228	.0224	22.39	2239	2.239
10	.3609	.7348	254.0	18.676	.0254	.0249	24.88	2488	2.488
11	.3970	.8083	279.4	20.544	.0279	.0274	27.37	2737	2.737
12	.4331	.8818	304.8	22.412	.0304	.0299	29.86	2986	2.986
13	.4692	.9553	330.2	24.280	.0330	.0324	32.35	3235	3.235
14	.5053	1.029	355.6	26.148	.0355	.0348	34.84	3484	3.484
15	.5414	1.102	381.0	28.016	.0381	.0373	37.33	3733	3.733
16	.5774	1.176	406.4	29.879	.0406	.0398	39.81	3981	3.981
17	.6136	1.249	431.8	31.752	.0431	.0423	42.31	4231	4.231
18	.6496	1.322	457.2	33.616	.0457	.0448	44.79	4479	4.479
19	.6857	1.396	482.6	35.484	.0482	.0473	47.28	4728	4.728
20	.7218	1.470	508.0	37.352	.0507	.0498	49.77	4977	4.977
21	.7579	1.543	533.4	39.22	.0533	.0523	52.26	5226	5.226
22	.7940	1.616	558.8	41.09	.0558	.0547	54.74	5474	5.474
23	.8301	1.690	584.2	42.96	.0584	.0572	57.23	5723	5.723
24	.8662	1.764	609.6	44.82	.0609	.0597	59.72	5972	5.972
25	.9023	1.837	635.0	46.69	.0634	.0622	62.21	6221	6.221
26	.9384	1.910	660.4	48.56	.0660	.0647	64.70	6470	6.470
27	.9745	1.984	685.8	50.43	.0685	.0672	67.19	6719	6.719
28	1.010	2.056	710.8	52.26	.0710	.0696	69.64	6964	6.964
29	1.047	2.132	736.8	54.18	.0736	.0722	72.19	7219	7.219
30	1.083	2.205	762.2	56.04	.0761	.0747	74.67	7467	7.467
31	1.119	2.278	787.5	57.91	.0787	.0772	77.15	7715	7.715
32	1.155	2.352	812.8	59.77	.0812	.0796	79.63	7963	7.963
33	1.191	2.425	836.2	61.63	.0837	.0821	82.12	8212	8.212
34	1.227	2.498	863.5	63.49	.0862	.0846	84.60	8460	8.460
35	1.263	2.571	888.9	65.36	.0888	.0871	87.08	8708	8.708
36	1.299	2.645	914.2	67.22	.0913	.0896	89.56	8956	8.956
37	1.335	2.718	939.5	69.08	.0938	.0920	92.04	9204	9.204
38	1.371	2.791	964.9	70.95	.0964	.0945	94.53	9453	9.453
39	1.408	2.876	990.9	72.86	.0990	.0971	97.08	9708	9.708
40	1.444	2.940	1016	74.72	.1015	.0996	99.56	9956	9.956
41	1.480	3.013	1042	76.59	.1040	.1020	102.0	10204	10.20
42	1.516	3.086	1067	78.45	.1066	.1045	104.5	10452	10.45
43	1.552	3.160	1092	80.31	.1091	.1070	107.0	10701	10.70
44	1.588	3.233	1118	82.18	.1116	.1095	109.5	10949	10.95
45	1.624	3.306	1143	84.04	.1142	.1120	112.0	11197	11.20
46	1.660	3.378	1168	85.90	.1167	.1144	114.5	11445	11.44
47	1.696	3.453	1194	87.76	.1192	.1169	116.9	11694	11.69
48	1.732	3.526	1219	89.63	.1218	.1194	119.4	11942	11.94
49	1.768	3.600	1244	91.49	.1243	.1219	121.9	12190	12.19
50	1.804	3.673	1270	93.35	.1268	.1244	124.4	12438	12.44
51	1.841	3.748	1296	95.27	.1294	.1269	126.9	12693	12.69
52	1.877	3.822	1321	97.13	.1320	.1294	129.4	12941	12.94
53	1.913	3.895	1346	98.99	.1345	.1319	131.9	13190	13.19
54	1.949	3.968	1372	100.8	.1370	.1344	134.4	13438	13.44
55	1.985	4.041	1397	102.7	.1395	.1369	136.9	13686	13.69
56	2.021	4.115	1422	104.6	.1421	.1393	139.3	13934	13.93
57	2.057	4.188	1448	106.4	.1146	.1418	141.8	14182	14.18
58	2.093	4.261	1473	108.3	.1471	.1443	144.3	14431	14.43
59	2.129	4.335	1498	110.2	.1497	.1468	146.8	14679	14.68
60	2.165	4.408	1524	112.0	.1522	.1493	149.3	14927	14.93
61	2.202	4.483	1550	113.9	.1548	.1518	151.8	15182	15.18
62	2.238	4.556	1575	115.8	.1573	.1543	154.3	15430	15.43
63	2.274	4.630	1600	117.7	.1599	.1568	156.8	15679	15.68
64	2.310	4.703	1626	119.5	.1624	.1593	159.3	15927	15.93
65	2.346	4.776	1651	121.4	.1649	.1618	161.8	16175	16.18
66	2.382	4.850	1676	123.3	.1674	.1642	164.2	16423	16.42
67	2.418	4.923	1702	125.1	.1700	.1667	166.7	16672	16.67
68	2.454	4.996	1727	127.0	.1725	.1692	169.2	16920	16.92
69	2.490	5.070	1752	128.8	.1750	.1717	171.7	17168	17.17
70	2.526	5.143	1778	130.7	.1776	.1742	174.2	17416	17.42
71	2.562	5.216	1803	132.6	.1801	.1766	176.6	17664	17.66
72	2.598	5.290	1828	134.4	.1826	.1791	179.1	17912	17.91
73	2.635	5.365	1854	136.4	.1852	.1817	181.7	18168	18.17
74	2.671	5.438	1880	138.2	.1878	.1842	184.2	18416	18.42
75	2.707	5.511	1905	140.1	.1903	.1866	186.6	18664	18.66
76	2.743	5.585	1930	141.9	.1928	.1891	189.1	18912	18.91
77	2.779	5.658	1956	143.8	.1954	.1916	191.6	19160	19.16
78	2.815	5.731	1981	145.7	.1979	.1941	194.1	19409	19.41
79	2.851	5.805	2006	147.5	.2004	.1966	196.6	19657	19.66
80	2.887	5.878	2032	149.4	.2030	.1991	199.1	19905	19.90
81	2.923	5.951	2057	151.2	.2055	.2015	201.5	20153	20.15
82	2.959	6.024	2082	153.1	.2080	.2040	204.0	20402	20.40
83	2.996	6.100	2108	155.0	.2106	.2066	206.6	20657	20.66
84	3.032	6.173	2134	156.9	.2131	.2091	209.1	20905	20.90
85	3.068	6.246	2159	158.8	.2157	.2115	211.5	21153	21.15
86	3.104	6.320	2184	160.6	.2182	.2140	214.0	21401	21.40
87	3.140	6.393	2210	162.5	.2207	.2165	216.5	21650	21.65
88	3.176	6.466	2265	164.4	.2233	.2190	219.0	21898	21.90
89	3.212	6.450	2260	166.2	.2258	.2215	221.5	22146	22.15
90	3.248	6.613	2286	168.1	.2283	.2239	223.9	22394	22.39
91	3.284	6.686	2311	169.9	.2309	.2264	226.4	22642	22.64
92	3.320	6.760	2336	171.8	.2334	.2289	228.9	22890	22.89
93	3.356	6.833	2362	173.7	.2359	.2314	231.4	23139	23.14
94	3.392	6.906	2387	175.5	.2384	.2339	233.9	23387	23.39
95	3.429	6.981	2413	177.4	.2410	.2364	236.4	23642	23.64
96	3.456	7.055	2438	179.3	.2436	.2389	238.9	23890	23.89
97	3.501	7.128	2464	181.2	.2461	.2414	241.4	24138	24.14
98	3.537	7.201	2489	183.0	.2486	.2439	243.9	24387	24.39
99	3.573	7.275	2514	184.9	.2512	.2464	246.4	24635	24.64
100	3.609	7.348	2540	186.8	.2537	.2488	248.8	24883	24.88

P.S.I.	in/H_2O	in/Hg	mm/H_2O	mm/Hg	kg/cm²	bar	mbar	Pa	kPa
1.0	27.71	2.036	703.1	51.75	.0703	.0689	68.95	6895	6.895
1.1	30.45	2.240	773.4	56.89	.0773	.0758	75.84	7584	7.584
1.2	33.22	2.443	843.7	62.06	.0844	.0827	82.74	8274	8.274
1.3	35.98	2.647	914.0	67.23	.0914	.0896	89.63	8963	8.963
1.4	38.75	2.850	984.3	72.40	.0984	.0965	96.52	9652	9.652
1.5	41.52	3.054	1055	77.57	.1055	.1034	103.4	10340	10.34
1.6	44.29	3.258	1125	82.74	.1125	.1103	110.3	11030	11.03
1.7	47.06	3.461	1195	87.92	.1195	.1172	117.2	11720	11.72
1.8	49.82	3.665	1266	93.09	.1266	.1241	124.1	12410	12.41
1.9	52.59	3.686	1336	98.26	.1336	.1310	131.0	13100	13.10
2.0	55.36	4.072	1406	103.4	.1406	.1379	137.9	13790	13.79
2.1	58.13	4.276	1476	108.6	.1476	.1448	144.8	14480	14.48
2.2	60.90	4.479	1547	113.8	.1547	.1517	151.7	15170	15.17
2.3	63.67	4.683	1617	118.9	.1617	.1586	158.6	15860	15.86
2.4	66.43	4.886	1687	124.1	.1687	.1655	165.5	16550	16.55
2.5	69.20	5.090	1758	129.3	.1758	.1724	172.4	17240	17.24
2.6	71.97	5.294	1828	134.5	.1828	.1793	179.3	17930	17.93
2.7	74.74	5.497	1898	139.6	.1898	.1862	186.2	18620	18.62
2.8	77.51	5.701	1969	144.8	.1968	.1930	193.0	19300	19.30
2.9	80.27	5.904	2039	150.0	.2039	.1999	199.9	19990	19.99
3.0	83.04	6.108	2109	155.1	.2109	.2068	206.8	20680	20.68
3.1	85.81	6.312	2180	160.3	.2180	.2137	213.7	21370	21.37
3.2	88.58	6.515	2250	165.5	.2250	.2206	220.6	22060	22.06
3.3	91.35	6.719	2320	170.7	.2320	.2275	227.5	22750	22.75
3.4	94.11	6.922	2390	175.8	.2390	.2344	234.4	23440	23.44
3.5	96.88	7.126	2461	181.0	.2461	.2413	241.3	24130	24.13
3.6	99.65	7.330	2531	186.2	.2531	.2482	248.2	24820	24.82
3.7	102.4	7.535	2601	191.3	.2601	.2551	255.1	25510	25.51
3.8	105.2	7.737	2672	196.5	.2672	.2620	262.0	26200	26.20
3.9	108.0	7.940	2742	201.7	.2742	.2689	268.9	26890	26.89
4.0	110.7	8.144	2812	206.9	.2812	.2758	275.8	27580	27.58
4.1	113.5	8.348	2883	212.0	.2883	.2827	282.7	28270	28.27
4.2	116.3	8.551	2953	217.2	.2953	.2896	289.6	28960	28.96
4.3	119.0	8.775	3023	222.4	.3023	.2965	296.5	29650	29.65
4.4	121.8	8.958	3094	227.5	.3094	.3034	303.4	30338	30.34
4.5	124.6	9.162	2164	232.7	.3164	.3103	310.3	31030	31.03
4.6	127.3	9.366	3234	237.9	.3234	.3172	317.2	31720	31.72
4.7	130.1	9.569	3304	243.1	.3304	.3240	324.0	32400	32.40
4.8	132.9	9.773	3375	248.2	.3375	.3310	331.0	33100	33.10
4.9	135.6	9.976	3445	253.4	.3445	.3378	337.8	33780	33.78
5.0	138.4	10.18	3515	258.6	.3515	.3447	344.7	34470	34.47
5.1	141.2	10.38	3586	263.7	.3586	.3516	351.6	35160	35.16
5.2	143.9	10.59	3656	268.9	.3656	.3585	358.5	35850	35.85
5.3	146.7	10.79	3726	274.1	.3726	.3654	365.4	36540	36.54
5.4	149.5	10.99	3797	279.3	.3797	.3723	372.3	37230	37.23
5.5	152.2	11.20	3876	284.4	.3867	.3792	379.2	37920	37.92
5.6	155.0	11.40	3973	289.6	.3937	.3861	386.1	38610	38.61
5.7	157.8	11.60	4008	294.8	.4007	.3930	393.0	39300	39.30
5.8	160.5	11.81	4078	299.9	.4078	.3999	399.9	39990	39.99
5.9	163.3	12.01	4148	305.1	.4148	.4068	406.8	40680	40.68
6.0	166.1	12.22	4218	310.3	.4218	.4137	413.7	41370	41.37
6.1	168.8	12.42	4289	315.5	.4289	.4206	420.6	42060	42.06
6.2	171.6	12.62	4359	320.6	.4359	.4275	427.5	42750	42.75
6.3	174.4	12.83	4429	325.8	.4429	.4344	434.4	43440	43.44
6.4	177.2	13.03	4500	331.0	.4500	.4413	441.3	44130	44.13
6.5	179.9	13.23	4570	336.1	.4570	.4482	448.2	44820	44.82
6.6	182.7	13.44	4640	341.3	.4640	.4550	455.0	45500	45.50
6.7	185.5	13.64	4711	346.5	.4710	.4619	461.9	46190	46.19
6.8	188.2	13.84	4781	351.7	.4781	.4688	468.8	46880	46.88
6.9	191.0	14.05	4851	356.8	.4851	.4757	475.7	47570	47.57
7.0	193.8	14.25	4922	362.0	.4921	.4826	482.6	48260	48.26
7.1	196.5	14.46	4992	367.2	.4992	.4895	489.5	48950	48.95
7.2	199.3	14.66	5062	372.3	.5062	.4964	496.4	49640	49.64
7.3	202.1	14.86	5132	377.5	.5132	.5033	503.3	50330	50.33
7.4	204.8	15.07	5203	382.7	.5203	.5102	510.2	51020	51.02
7.5	207.6	15.27	5273	387.9	.5273	.5171	517.1	51710	51.71
7.6	210.4	15.47	5343	393.0	.5343	.5240	524.0	52400	52.40
7.8	215.9	15.88	5484	403.4	.5484	.5378	537.8	53780	53.78
8.0	221.4	16.29	5625	413.7	.5625	.5516	551.6	55160	55.16
8.2	227.0	16.70	5765	424.1	.5765	.5654	565.4	56540	56.54
8.4	232.5	17.10	5906	434.4	.5906	.5792	579.2	57920	57.92
8.6	238.0	17.51	6047	444.7	.6046	.5929	592.9	59290	59.29
8.8	243.6	17.92	6187	455.1	.6187	.6067	606.7	60670	60.67
9.0	249.1	18.32	6328	465.4	.6328	.6205	620.5	62050	62.05
9.2	254.7	18.73	6468	475.8	.6468	.6343	634.3	63430	63.43
9.4	260.2	19.14	6609	486.1	.6609	.6481	648.1	64810	64.81
9.6	265.7	19.54	6750	496.5	.6749	.6619	661.9	66190	66.19
9.8	271.3	19.95	6890	506.8	.6890	.6757	675.7	67570	67.57
10.0	276.8	20.36	7031	517.1	.7031	.6895	689.5	68950	68.95
11.0	304.5	22.40	7734	568.9	.7734	.7584	758.4	75840	75.84
12.0	332.2	24.43	8437	620.6	.8437	.8274	827.4	82740	82.74
13.0	359.8	26.47	9140	672.3	.9140	.8963	896.3	98630	89.63
14.0	387.5	28.50	9843	724.0	.9843	.9652	965.2	96520	96.52
14.7	406.9	29.93	10340	760.2	1.033	1.014	1014	101400	101.4
15.0	415.2	30.54	10550	775.7	1.055	1.034	1034	103400	103.4
16.0	442.9	32.58	11250	827.4	1.125	1.103	1103	110300	110.3
17.0	470.6	34.61	11950	879.1	1.195	1.172	1172	117200	117.2
18.0	498.2	36.65	12660	930.9	1.265	1.241	1241	124100	124.1
19.0	525.9	36.68	13360	982.6	1.336	1.310	1310	131000	131.0
20.0	553.6	40.72	14060	1034	1.406	1.379	1379	137900	137.9
21.0	581.3	42.76	14770	1086	1.476	1.448	1448	144800	144.8
22.0	609.0	44.79	15470	1138	1.547	1.517	1517	151700	151.7
23.0	636.7	46.83	16170	1189	1.617	1.586	1586	158600	158.6
24.0	664.3	48.86	16870	1241	1.687	1.655	1655	165500	165.5
25.0	692.0	50.90	17580	1293	1.758	1.724	1724	172400	172.4

CONVERSION FACTORS

NOTE:
CONVERSION FACTORS ROUNDED

P.S.I. x 27.71 = in. H_2O
P.S.I. x 2.036 = in. Hg
P.S.I. x 703.1 = mm/H_2O
P.S.I. x 51.75 = mm/Hg
P.S.I. x .0703 = kg/cm²
P.S.I. x .0689 = bar
P.S.I. x 68.95 = mbar
P.S.I. x 6895 = Pa
P.S.I. x 6.895 = kPa

Discount Schedule and Conditions of Sale

NOTE:

Each item (model, range, part number, etc.) is discounted independently. In an order for more than one item, different items cannot be combined to earn a greater discount.

Most items are subject to STANDARD schedule at right. Prices followed by the symbol Ⓑ are subject to discounts per schedule B.

Certain items such as repairs, repair parts, EXPL and WP housings, special scale and tag charges are priced at net and earn no discount.

INDUSTRIAL DISCOUNT SCHEDULE

QUANTITY OF EACH ITEM	DISCOUNTS	
	STANDARD	SCHEDULE B
1-24	Net	Net
25-99	5%	Net
100-249	10%	5%
250-499	15%	10%
500-Up	20%	15%

Terms and Conditions of Sale

1. Prices and Specifications are subject to change without notice.

2. Shipping dates are approximate. They are dependent upon credit approval and subject to delays beyond our control.

3. Terms: Net 30 days to companies with established credit rating. In the event Buyer fails to fulfill previous terms of payment, or in case Seller shall have any doubt at any time as to Buyer's financial responsibility, Seller may decline to make further deliveries except upon receipt of cash in advance or other special arrangements.

4. Liability Point and Title: All material is sold F.O.B. Factory (Domestic) / FCA Free Carrier (International). Title to all material sold shall pass to buyer upon delivery by Seller to carrier at shipping point.

5. State and Local Taxes: Any taxes which the Seller may be required to pay or collect upon or with respect to the sale, purchase, delivery, use or consumption of any of the material covered hereby shall be for the account of the Buyer and shall be added to the purchase price.

6. Special tooling, dies, silk screens and molds acquired specially to produce goods for Buyer remain the property of Dwyer Instruments, Inc., and may not be removed. They will be maintained in good condition for a minimum period of three years from the date of the original purchase order.

7. Export Orders: Terms, discounts and conditions of sale for purchase orders originating or for shipment to final destinations outside the U.S.A. will be furnished upon request.

8. Limited Warranty: The Seller warrants all Dwyer instruments and equipment to be free from defects in workmanship or material under normal use and service for a period of one year from date of shipment. Liability under this warranty is limited to repair or replacement F.O.B. Factory (Domestic) / FCA Free Carrier (International) of any parts which prove to be defective within that time or repayment of the purchase price at the Seller's option provided the instruments have been returned, transportation prepaid, within one year from date of purchase. All technical advice, recommendations and services are based on technical data and information which the Seller believes to be reliable and are intended for use by persons having skill and knowledge of the business, at their own discretion. In no case is Seller liable beyond replacement of equipment F.O.B. Factory (Domestic) / FCA Free Carrier (International) or the full purchase price. This warranty does not apply if the maximum ratings label is removed or if the instrument or equipment is abused, altered, used at ratings above the maximum specified, or otherwise misused in any way.

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