Humidity

Dewpoint

Carbon Dioxide

Barometers

Meteorology

Click Here for
CATALOG
TABLE OF CONTENTS

Click Here for
CATALOG
PRODUCT INDEX

Click Here for
TRANSMITTER
SELECTION GUIDE

Click Here for
PRICE LIST
TABLE OF CONTENTS

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Table of Contents

OVERVIEW

Vaisala Sensor Technology 7

Vaisala Product Line 8-11

HUMIDITY, DEWPOINT AND TEMPERATURE INSTRUMENTS

Portables

Desktop data processor and calibrator, HMI 38 13-14

Probes for desktop data processor and calibrator, HMP 35E, HMP 36E & HMP 37E 15-16

Hand held calibrator/indicator with high temperature probe, HMI 41 with HMP 46 17-18

NEW Probes for hand held indicator/calibrator, HMP 41, HMP 42 & HMP 45 19-20

Pocket sized relative humidity and temperature indicator, HM 34 21-22

Concrete humidity measuring system, HM 44 23-24

Industrial Transmitters

NEW Measuring moisture in oil, HMP 228 25-26

Wall-mounting, HMP 231 27-28

Tight spaces and duct mounting, HMP 233 29-30

Pressurized spaces, HMP 234 31-32

Demanding high temperature applications, HMP 235 33-34

NEW Adjustable probe head for ease of installation into pressurized spaces, HMP 238 35-36

General purpose applications, HMP 141, 142 & 143 37-38

Intrinsically Safe Transmitters and Probes

NEW Transmitter featuring probe interchangeability, HMT 360 39-40

NEW Probe for wall-mounting applications, HMP 361 41

NEW Probe for confined spaces and duct mounting, HMP 363 41

NEW Probe for pressurized spaces, HMP 364 42

NEW Probe for demanding high temperature applications, HMP 365 42

NEW Adjustable probe for pressurized spaces, HMP 368 42

FM Approved wall-mounting humidity transmitter, HMP 260 EX 43-44

Next Page To INDEX

Table of Contents - Page 2

HVAC/EMCS Transmitters

Wall and duct-mount transmitters, HMW/D 60/70 Series 45-46

NEMA 4 transmitters, HMW 21/31 Series 47-48

Outdoor transmitters with radiation and precipitation shield, HMD 60/70 O Series 49-50

Calibration-free transmitters, HMD/W 40/50 Series 51-52

OEM and Custom Humidity Instruments

Calibration-free module with interchangeable sensor, HUMITTER® 53-54

Relative humidity modules for custom applications, HMM 22D & HMM 30C 55-56

NEW Humidity, dewpoint and temperature modules for demanding applications, HMM 210 Series 57-58

Calibration Instruments and Accessories

NEW Humidity calibrator, HMK 15 59-60

NEW Sensors, filters, chart recorder, panel meter, adapters, mounting flanges and PsyCalc Psychrometric software 61-62

DEWPOINT TRANSMITTERS FOR EXTREME CONDITIONS

Condensing environments and challenging outdoor applications, HMP 243 63-64

High temperature applications (up to 662^{0}F), DMP 246 65-66

Low dewpoint applications, DMP 248 67-68

Process sampling system, DSS 10 69-70

CO_2 PRODUCTS

Portable Meters, GM 12A and GM 12B 71-72

Indoor air quality instruments for demand control ventilation applications featuring CARBOCAP® Technology, GMD/W 20 Series 73-74

NEW LonWorks® options for GMD/W 20 series CO_2 transmitters, GML 20 and GML 20T 75-76

For industrial applications, GMP 111 & GMP 111E 77-78

OEM modules for HVAC/EMCS applications featuring CARBOCAP® technology, GMM 20W 79-80

OEM modules for custom applications, GMM 11/12 81-82

Next Page

To INDEX

Table of Contents - Page 3

NEW OEM modules with remote interchangeable probes for demanding applications featuring CARBOCAP® technology, GMM 220 Series 83-84

CO_2 Accessories 85

NIST TRACEABLE BAROMETERS

Analog barometers, PTB 100 Series 87-88

Digital barometers, PTB 220 Series 89-90

NEW Digital barometer transfer standard, PTB 220TS 89-90

NEW Combination barometer, humidity, and temperature digital transmitter, PTU 200 91-92

METEOROLOGICAL PRODUCTS

Radiation shield and probe, 2212 HM, HMP 45A and HMP 45D 93-94

NEW Wind measurement systems including sensors and displays 95-96

Mobile Automatic Weather Station, MAWS 101 97-98

CALIBRATION LABORATORY and SERVICE 99

CATALOG PRODUCT INDEX 101

PRICE LIST TABLE OF CONTENTS 102

TRANSMITTER SELECTION GUIDE ..... COVER/INDEX

220/230, 240, 260/360 SERIES SELECTION GUIDE ..... PAGE 2

140, 60/70 SERIES SELECTION GUIDE ..... PAGE 3

21/31, 40/50 SERIES SELECTION GUIDE ..... PAGE 4

BACK to Page 1

Page Blank on Purpose

Humidity Accuracy That Lasts!

RH Accuracy and Stability: Both are Important

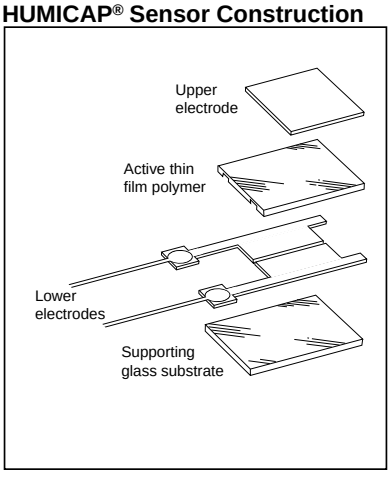
When specifying an RH instrument, be sure to consider both:
• **Accuracy** – how closely the instrument's readings agree with the standard to which it was calibrated
• **Stability** – the instrument's ability to maintain this same level of accuracy over time, i.e., **accuracy that lasts!**
Any manufacturer can "tweak" an instrument to agree with a reference at the time of calibration. It is important that you know how long the instrument can maintain this level of accuracy.

BACK to Table of Contents

Vaisala's patented HUMICAP® thin-film capacitance relative humidity sensors offer accuracy that lasts! That is, they are the most stable RH sensors available today, better than 0.5 %RH/year in normal air conditions. This means that when you select one of Vaisala's ±1%, 2%, or 3% instruments, you can rely on it to maintain this same level of RH accuracy tomorrow, next week, and several months from now without recalibration.

To INDEX

HUMICAP® Sensor Construction



New Transmitter Selection Guide (see back pocket)

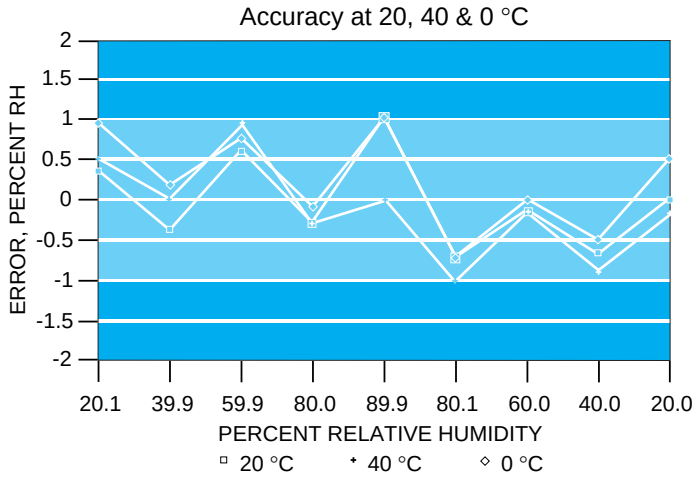
And Vaisala offers the most complete line of RH instruments: from low cost HVAC transmitters with interchangeable calibration-free sensors, to hand-held and desktop instruments, to "smart" high performance humidity/dewpoint transmitters. Seventeen new products are introduced in this catalog along with a comprehensive **Transmitter Selection Guide** to assist you in making the best choice.

ISO 9002 Certified Quality System; NIST Traceable Calibration and Service Laboratory

Vaisala Inc. has earned ISO 9002 certification for its Quality System. Our objective is continuous improvement in the quality of our products and services. The practical benefits that you can see today include:
• Products that perform to our written specifications – *open the box and enjoy years of trouble-free use thereafter.*
• Normal delivery of 1 to 5 unit orders within one week from receipt of order
• Normal delivery of 6 to 10 unit orders within two weeks from receipt of order.
• For large orders we check and inform you of delivery time before we accept the order. ***We then meet this delivery time.***
• NIST-traceable calibration service to accuracy of: ±1%, 2%, and 3%.
• Five day ***guaranteed*** turn around of units sent in for warranty and after warranty service/calibration.
• Priority turnaround service also available for a modest additional charge.

Documented Performance

Vaisala's Calibration Laboratory maintains traceability to NIST by testing our transfer standards at NIST annually. The following NIST data documents the exceptional measurement performance attainable with Vaisala products (including calibration uncertainty, non-repeatability, hysteresis, non-linearity, and temperature dependence) at three temperatures, 20 °C, 40 °C and 0 °C.



NEW - The First Intrinsically Safe RH and Dewpoint Transmitters for Hazardous/Explosive Environments

The HMT 360 Series IS transmitters are the 21st century solution for measuring humidity and dewpoint in hazardous classified areas.

Instead of packaging the transmitter electronics in bulky and expensive enclosures to contain and dissipate explosions when they occur, Vaisala designed the HMT 360 electronics so that an explosion cannot occur.

The end user can realize substantial savings, both in the purchase price and in maintenance, when compared to the older technology.

A variety of probe designs that are all interchangeable with the transmitter electronics allow the user to rotate one probe on the transmitter while a second is being calibrated. In addition, probes can be rotated or exchanged between different transmitters while in the field.

Different HUMICAP® sensors are now available to optimize performance in high hydrogen, toluene, and hydrocarbon environments.

With products designed for wall-mount, confined spaces, high pressure, high temperature and pressurized spaces, the HMT 360 series is the most versatile family of transmitters on the market.

BACK to Table of Contents

To Index

Rugged Industrial Transmitters for RH and Dewpoint

Select from "smart" programmable ± 1% and ± 2% transmitters. All have NEMA 4 enclosures offering protection in wet, condensing environments. Refer to new Transmitter Selection Guide (back pocket) to assist in making the best choice.

The HMP 230 series of "smart" ±1 % RH accuracy transmitters can be customized to meet your needs. Select: output parameters (RH, Td, T, absolute humidity, mixing ratio, wet bulb temperature, enthalpy); temperature range, serial or analog output, type of sensor head, etc.

The new DMP 240 series expands the operating range further to include high temperature and low dewpoint applications without sacrificing accuracy or stability.

The 140 series offers humidity/ temperature measurement, ± 2% RH accuracy, analog outputs, and various mounting configurations.

For high temperature and low dew point applications, choose the new DMP 240.

High Accuracy, and Calibration-Free RH/T Transmitters for HVAC/EMCS

Select from the ± 2% 60/70 series with extended operating temperature range or ± 3% calibration-free 40/50 series with INTERCAP® Interchangeable sensor. Refer to new Transmitter Selection Guide (back pocket) to assist in making the best choice for your HVAC control and building automation needs.

The 60/70 series of ± 2%, 0 to 100% RH and RH/T wall and duct-mount transmitters set the standard in the commercial HVAC industry. Select from a wide range of current loop and voltage output signals. These transmitters feature plug-in HUMICAP® sensors and unique one-point field calibration for both RH and T. Two and three-wire configurations are compatible with virtually all EMCS systems.

A novel feature of the 60/70 series duct units is the ability to remove the electronics without disassembling the unit from the duct.

With the 40/50 series of ± 3%, 0 to 100% RH and RH/T transmitters, calibration expense and inconvenience are eliminated. The INTERCAP® sensors are totally interchangeable, allowing you to replace the sensor without recalibrating the instrument. They are available in wall and duct-mount, two-wire 4-20 mA, and three-wire selectable voltage output configurations.

BACK to Table of Contents

Portable Data Processor, Indicators, Calibrator and Probes for RH and Dewpoint

To INDEX

Vaisala's expanded product offering allows you to perform a wide variety of field and laboratory measurements accurately and conveniently.

With the addition of the new HMP 42 thin probe (ø 4mm), it is now possible to measure relative humidity, dewpoint, and temperature in hard-to-reach spaces. The HMI 41 Digital Indicator offers menu driven software, multiple output options (RH, dewpoint, temperature, wet bulb, mixing ratio, absolute humidity), and 0 to 100% RH. Three other probes (fix mount, extended spiral cable, and high temperature) are also available and provide ±2% RH accuracy. Add a calibration cable and create a portable one-point calibrator.

The HMI 38 Data Processor has more standard features and at a lower price than previous offerings: menu driven software; six output selection (RH, dewpoint, temperature, wet bulb, mixing ratio, and absolute humidity); temperature up to 356 °F, rechargeable battery, analog and serial outputs, data logging, and NIST traceable certificate of calibration to ± 1% accuracy. The HMI 38 is also designed for use as a field calibrator for Vaisala transmitters.

The pocket-sized HM 34 Humidity and Temperature indicator provides 0 to 100% RH measurement. Other features include: built-in extendable probe, automatic shut-off to conserve battery power, and fast response with ± 2% accuracy.

Customized, Modular Relative Humidity Products for OEM Applications

Let Vaisala customize a solution to meet your unique requirements, or select from one of our standard OEM products.

Vaisala's 140 series products have a unique modular structure which permits the mixing and matching of electronics, sensing heads, and enclosures for a cost-effective, customized solution. Our engineering staff is also ready to design a unique proprietary solution, using Vaisala's patented HUMICAP® RH sensor technology, to meet your exact requirements.

Or select from one of our standard OEM products: ***NEW:*** The HMM 210 series modules offer humidity and dewpoint measurements for the most demanding applications.

The HUMITTER® RH and RH/T series offers compact, fully integrated electronics in a NEMA 4 enclosure, and a fully interchangeable INTERCAP® RH sensor which eliminates the need for recalibration.

The HMM 22D, with its small sensing head, and the HMM 30C, featuring a stainless steel sensor probe, offer high performance while meeting the need for low cost solutions.

BACK to Table of Contents

To INDEX

Carbon Dioxide Measurement Instruments

Vaisala's line of CO_2 instruments will meet your Indoor Air Quality (IAQ) and industrial needs. Our new duct/wall-mount transmitters and OEM products feature the new CARBOCAP®, a sensor so stable that these instruments require calibration check only every five years. Vaisala utilizes patented non-dispersive infrared (NDIR) technology for the most accurate, stable, and cost-effective CO_2 measurement solutions available.

NEW: The GMM 220 series modules for demanding OEM applications feature remote hermetically sealed probes with CARBOCAP®® technology.

A cost-effective solution to your ventilation problems, the GMD/W 20 series CO_2 duct and wall mount transmitters, also featuring CARBOCAP® technology, are so stable they require calibration only every five years. This breakthrough self-compensating sensor technology is also utilized in the GMM 20W for OEM applications.

Temperature measurement has been added as an option to Vaisala's GMD/W20 series. Another example of our products being designed to meet our customers' needs.

Vaisala's portable CO_2 meter, model GM 12, is available in two measurement ranges (up to 3000 ppm and 3%) and offers a digital display, analog output and adjustable audible alarm. A battery charger and carrying case are included.

The GMP 111 for industrial applications is available with a standard NEMA enclosure, or an optional digital display.

Barometers for Industrial and Meteorological Applications

Vaisa*la's barometers utilize our patented BAROCAP® micromachined silicon capacitive sensor. BAROCAP offers unmatched accuracy and outstanding temperature and long-term stability. Choose from three series, all NIST traceable.*

NEW: The PTU 200 combines barometric pressure, humidity and temperature measurement in a digital transmitter.

NEW: The PTB 220TS Barometric Pressure Transfer Standard offers a total output accuracy of ±0.2 hPa (mbar), and comes in a handsome, solid oak carrying case.

Vaisala barometers offer excellent performance in a variety of applications including: weather stations, data buoys, environmental data logging, and pressure sensitive industrial equipment such as laser interferometers and lithography systems.

The PTB 100 series are analog barometers which offer excellent room temperature characteristics and very low power consumption.

The PTB 220 series, provide serial output and total accuracy of ± 0.2 hPa (mbar) over wide meteorological pressure and temperature ranges. The PTB 220 also offers the ability to incorporate up to three independent BAROCAP sensors for double or triple redundancy.

BACK to Table of Contents

To INDEX

Reliable Meteorological Measurement Instruments and Systems

Vais*ala is the largest worldwide manufacturer of meteorological instruments and systems, all of which are described in other publications available upon request. Here we are featuring a small selection of meteorological RH instruments and wind instruments and systems ideal for industrial applications such as power plants, paper mills, and refineries.*

Our HMP 45D relative humidity probe is designed for use with a solar radiation shield in outdoor conditions of -40 to +140°F (-40 to +60°C). For quick and easy calibration, the probe head containing the sensor and electronics can be removed from the probe body, a replacement installed and the measurement continued while the original sensor head is calibrated in a laboratory.

The HMD60UO/YO probes offer economical solutions for measuring outdoor RH and T as part of HVAC and building automation systems.

Vaisala's wind instruments are approved by the FAA for use in their Automated Surface Weather Observation (AWOS) at airports, and are available in flexible configurations, along with displays, to meet most industrial applications.

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HMI 38 Desktop Humidity Data Processor/Calibrator

FEATURES/BENEFITS

- Portable, versatile and easy to use
- Six user-selectable outputs: relative humidity, temperature, dewpoint, mixing ratio, wet bulb temperature, absolute humidity
- System configuration and parameters can be set by the user
- Data logging, built-in battery and optional carrying case
- Two analog outputs and serial interface
- Optional cables for calibration function
- NIST traceable field calibrator
- Each probe supplied with NIST traceable certificate of calibration

SIX OUTPUT VARIABLES

Up to two probes can be connected to the HMI 38. The probes measure the relative humidity and temperature of ambient air and, from these measurements, the Humidity Data Processor then calculates:

- Dewpoint temperature
- Wet bulb temperature
- Mixing ratio
- Absolute humidity

Both metric and non-metric units are available.

VERSATILE AND EASY TO USE

The HMI 38 Humidity Data Processor is a microprocessor-based instrument, which is ideal for measuring humidity, related variables and temperature in laboratories, storage areas, quality control areas and air-conditioned areas, such as computer rooms and cleanrooms.

The HMI 38 Humidity Data Processor can output six different variables, either through its two analog outputs, or via the RS 232C or RS 485 serial interface. A built-in rechargeable battery provides power for up to 8 hours of continuous use in the field.

The front panel menu guides the user through the operation. The user can configure the measurement system and the parameters controlling the HMI 38's operation, so that the system and its operation can be tailored to fit each application or any specific measurement. The user can connect two probes to each HMI 38 and choose which variables are needed and the order in which they are displayed. The display shows two variables at a time; to see the others, simply scroll the display with the arrow keys of the keypad.

HMI 38 with probes

DATA LOGGING AND DATA TRANSFER

The HMI 38 includes a data logging function. The user can select the delay for starting the data logging and the logging interval, or manually "catch" individual measurements in memory.

The HMI 38 stores the relative humidity and temperature measurements from both probes in memory; from these values it calculates the other variables when they are transferred to a computer or a printer through the serial line. The user can define the output format through the software to meet his application needs.

All measurements are displayed on the LCD front panel of the HMI 38 and output through the analog output channels or to a printer or computer via the RS 232C or RS 485 serial line. Measurement results are output continuously or, upon request, via the serial line. Several HMI 38 units can be connected to one RS 485 serial line; each of them is given an individual address.

USE AS FIELD CALIBRATOR

When used with an optional calibration cable, the HMI 38 also serves as a one-point or two-point calibrator for most Vaisala humidity and temperature transmitters. It also provides an accurate field humidity and temperature reference for other manufacturers' instruments.

Select the right cable:

Instrument	Calibration Cable Part No.
60/70 series	18300
230 series	18200
140 series	18300
20/30 series	18100

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TECHNICAL DATA - HMI 38 Humidity Data Processor

Measured Variables

Relative humidity

Indication range	0...100 %RH
Resolution	0.1 %RH
Typical temperature dependence over the entire operating temperature range	±0.2 %RH

Temperature

Indication range	-40°…+180°F (-40° …+180°C)
(temperature measurement range depends on the probe used)	
Resolution	0.1° F (0.1° C)
Typical temperature dependence of electronics	0.007° F (0.004° C)
Typical additional error caused by the HMI 38 at 68°F (+20°C)	0.11°F (±0.06 ° C)

One and two-point calibration through front panel keypad.

Calculated Variables

Typical ranges (depend on the probe used)

dewpoint temperature	-40...+212 °F (-40...+100 °C)
mixing ratio	0...500 g_{H20}/kg d.a.
absolute humidity	0...600 g_{H20}/m³
wet bulb temperature	32...+212 °F (0...+100 °C)

Data Logging

Storage capacity	
in automatic logging	254 measurements from each probe
in catch logging	127 measurements from each probe
Logging interval	from 10 s to 99 h or catch logging
Measurement speed	
one probe	approx. 1 s
two probes	approx. 2 s

Analog Outputs

Two analog outputs freely selectable and adjustable	0...1 V & 0...5 V
Typical accuracy of analog output at +68°F (+20°C)	±0.05% FS
Typical temperature dependence of analog output	0.003% (0.005 %/°C FS)

Serial Interface

Data interfaces (asynchronous, only one available at a time)	RS 232C, RS 485
Data I/O speed (one chosen)	300, 600, 1200, 2400, 4800, 9600
Communication parameters	
data bits	7 or 8
stop bits	1 or 2
parity	even, odd or none
mode	full or half duplex
Connector	D-type female D9S
Data format	display/printer or computer compatible ASCII characters

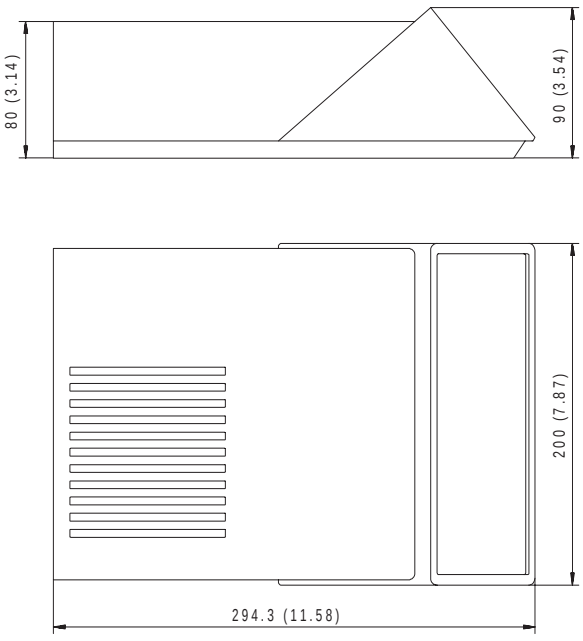
General

Display	2 x 6 character alphanumeric high contrast, wide-view angle LCD
Character height	3.85 mm (0.15")
Keyboard	4 x 4 tactile membrane switches
Number of probes	1...2
Supply voltage	12 VDC (11...16 V), 0.2 A
Rechargeable battery pack	8 NiCd 1.2 V cells, standard 'AA' size
operating time in continuous use	8 hours
operating time in data logging	24 hours
charging time	6 hours
Power consumption during charge	3 W maximum
Recommended external load for 0...1V output	>2 kohm (to ground)
Recommended external load for 0...5 V output	>10 kohm (to ground)
Housing material	ABS plastic
Operating temperature range	32...122 °F (0...+50 °C)
Storage temperature range	-4...+158 °F (-20...+70 °C)
Operating humidity range	95 %RH maximum, noncondensing
Storage humidity range	90 %RH maximum

Note: The HMI 38 can be operated at a higher relative humidity than stored, because the air in a warm instrument has a lower relative humidity than ambient air.
Specifications subject to change without notice.

Dimensions in mm (inches)

HMI 38



BACK to Table of Contents
To Index
HMI 38 Price List

Humidity and Temperature Probes for HMI 38 Humidity Data Processor/Calibrator

FEATURES/BENEFITS

- HUMICAP® sensor
- 0 to 100% RH measurement
- Wide temperature measurement range
  HMP 35E: -40...+140 °F (-40...+60 °C)
  HMP 36E: -40...+176 °F (-40...+80 °C)
  HMP 37E: -40...+248 °F (-40...+120 °C)
- NIST traceable certificate of calibration is supplied

HIGH PERFORMANCE IN ALL ENVIRONMENTS

The HMP 35E, HMP 36E, and HMP 37E probes feature Vaisala's HUMICAP® humidity sensor which is known for its high accuracy, excellent long-term stability, negligible hysteresis, and its resistance to dust and most chemicals. Reliable and rugged, these probes are designed specifically for use with the HMI 38 Humidity Data Processor.

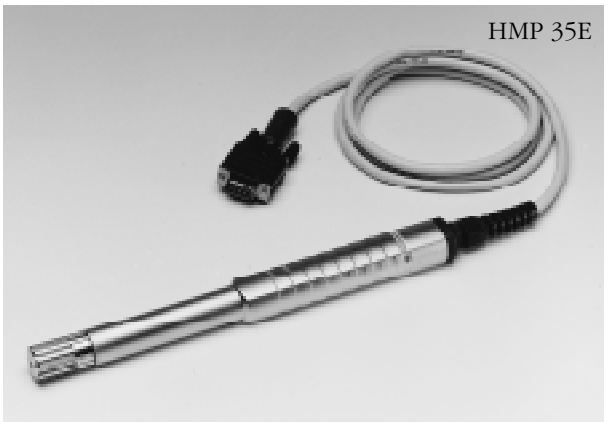
The HMP 35E is for general purpose measurements where the temperature normally stays below 140 °F (60 °C) and never exceeds 176 °F (80 °C).

The rugged HMP 36E is designed for continuous use in temperatures up to 176 °F (+80°C), but can withstand temperatures up to 320 °F (160 °C) for a short while. Its long stainless steel shaft works well in difficult-to-reach areas, and can also be used as a piercing probe.

The versatile HMP 37E is designed for temperatures up to 248 °F (120 °C), but it can be used in short-term measurements in temperatures as high as 356 °F (180 °C). The HMP 37E is ideally suited for use in tight and difficult-to-reach areas.

EASY AND QUICK CALIBRATION

The HMP 35E, HMP 36E and HMP 37E probes are easy to calibrate either at one point against an accurate reference instrument, or at two points in controlled laboratory conditions. Temperature calibration can be done with the software commands alone, while humidity calibration requires potentiometer adjustment at the probes.


HMP 35E


HMP 36E


HMP 37E

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TECHNICAL DATA - HMP 35E, HMP 36E, HMP 37E PROBES

Relative Humidity

Measurement range	0...100 %RH
Output signal range	0.002...1 VDC (equals 0.2...100 %RH)
Accuracy at +68°F (+20°C) including nonlinearity and hysteresis	
against field references	±2 %RH (0...90 %RH)
(ASTM E104-85)	±3 %RH (90...100 %RH)
against factory references	±1 %RH (0...90 %RH)
	±2% (90...100 %RH)
Temperature dependence of electronics	±0.02%RH/°F (±0.04 %RH/°C)
Typical long-term stability	better than 1 %RH per year
Response time at +68°F (+20°C)	
90 % response	5 s with grid
	15 s with membrane filter
Sensor	HUMICAP® K

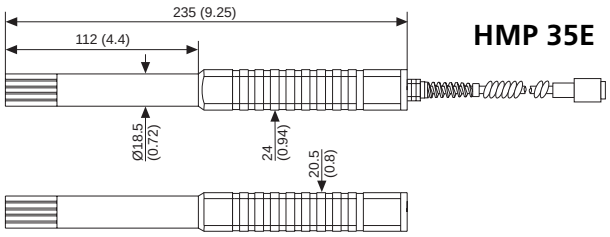
Temperature

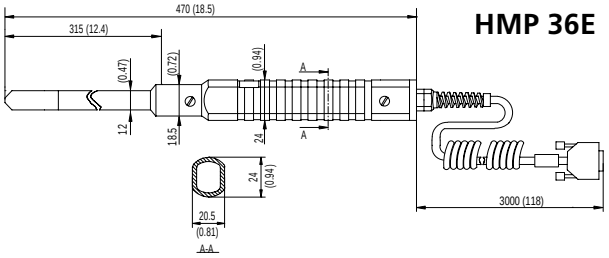
Measurement range-HMP 35E	
continuous measurement	-40...+140 °F (-40...+60 °C)
short-term measurement	-40...+176 °F (-40...+80 °C)
Measurement range-HMP 36E	
continuous measurement	-40...+176 °F (-40...+80 °C)
short-term measurement	-40...+320 °F (-40...+160 °C)
Measurement range-HMP 37E	
continuous measurement	-40...+248 °F (-40...+120 °C)
short-term measurement	-40...+356 °F (-40...+180 °C)
Temperature sensor	PT 100 IEC 751 1/3 Class B 4-wire

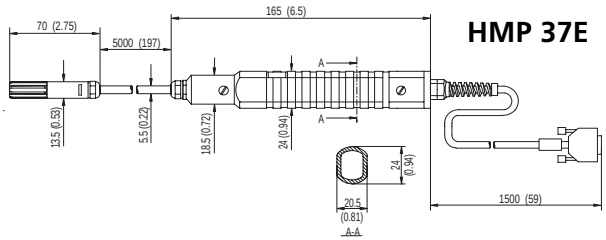
General

Supply voltage from HMI 38	7...16 VDC
Current consumption	±4 mA
Operating temperature range	
sensor head	
HMP 35E	-40...+140 °F (-40...+60 °C)
HMP 36E	-40...+176 °F (-40...+80 °C)
HMP 37E	-40...+248 °F (-40...+120 °C)
electronics	-40...+140 °F (-40...+60 °C)
Sensor protection - standard	
HMP 35E	chromium-plated membrane filter, part no. 16126HM
HMP 36E	bronze sintered filter, part no. 0195
HMP 37E	PPS grid with stainless steel netting, part no. 16720
Sensor protection - optional	
HMP 35E	chromium-plated plastic grid, part no. 15795
	bronze sintered filter 37 µm, part no. 6685
	bronze sintered filter 216 µm, part no. 6686
HMP 36E	membrane filter, part no. 10159HM
HMP 37E	PPS grid, part no. 16562
Protection class	NEMA 3S (IP 55)
Housing material	ABS plastic
Connector	D-type male D9P
Cable length	
HMP 35E	1500 mm
HMP 36E	1150/3000 mm spiral cable
HMP 37E	5 m between sensor head and electronics, 1.5 m cable between electronics and connector
Weight	
HMP 35E	180 g
HMP 36E	400 g
HMP 37E	500 g

Specifications subject to change without notice.







Dimensions in mm (inches)

BACK to Table of Contents
To INDEX
HMP 35's Price List

HMI 41/HMP 46 Hand Held Humidity/ Dewpoint Indicator and Field Calibrator with High Temperature Probe

FEATURES

- ±1% RH accuracy (0...90%)
- ±2% (90...100%)
- -40...+212 °F (up to 356 °F for short periods)
- Serves as an easy-to-use field calibrator when used with HMP 46 probe and calibration cables
- Versatile and easy to use
- Measures humidity and temperature
- Calculates dewpoint, wet bulb temperature, absolute humidity and mixing ratio
- Full 0 to 100 %RH measurement
- Excellent stability
- Optional carrying case
- Optional calibration cables
- Available as complete calibration kit (HMK 41)

CALIBRATION KIT HMK41

HMK 41 includes HMI 41, HMP 46, NIST traceable certificate of calibration, carrying case, and choice of one of the following calibration cables:

Cable Part #	for Calibrating
19116	HM60/70's, HM 140's, HMM 22D
19164	HMP230's, HMM 210
19165	HM20/30's, HMP 130's, HMM 30C

HIGH TEMPERATURE PROBE

The HMP 46 humidity and temperature probe is designed for measurements in ducts or chambers in humidities of 0...100%RH and at temperatures from -40 to +212 °F (-40 to +100 °C). For short periods of time the probe can even be used in temperatures of up to +356 °F (+180 °C).

The HMP 46 probe's structure is solid and rugged; its stainless steel probe head is made to withstand rough handling in mechanically demanding applications. The probe's long shaft can also reach otherwise unreachable places, and can be used as a piercing probe.

VERSATILE AND EASY TO USE

In addition to displaying the humidity and temperature readings, the HMI 41 can calculate dewpoint and wet bulb temperature, absolute humidity and mixing ratio - no more awkward conversion tables and complex calculation.

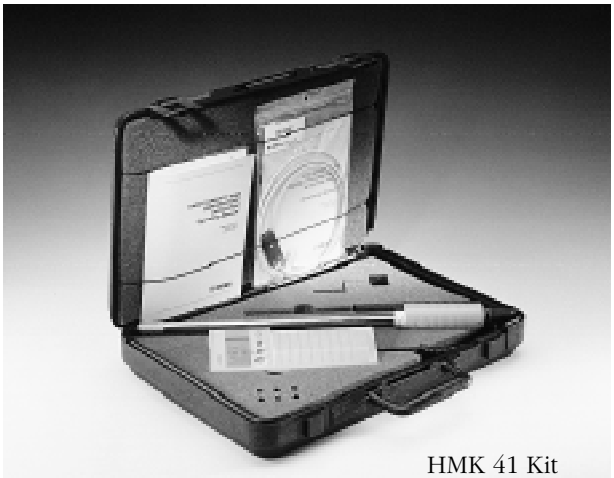
The indicator has an easy-to-read two line liquid crystal display. The display unit (metric or non-metric) are easily selected.

These features, plus fast response time, high measurement accuracy and excellent stability, as well as the wide temperature range of the probe, make the HMI 41/HMP 46 combination an ideal choice for the most demanding applications.

HMI 41 with HMP 46

HIGH PERFORMANCE SENSOR

The probes incorporate Vaisala's latest HUMICAP® sensor. This sensor has high accuracy, excellent long-term stability and negligible hysteresis. Insensitive to dust, particulate dirt and most chemicals, the HUMICAP® is also used in Vaisala's industrial humidity transmitters.



HMK 41 Kit

VAISALA
100 Commerce Way, Woburn, MA 01801
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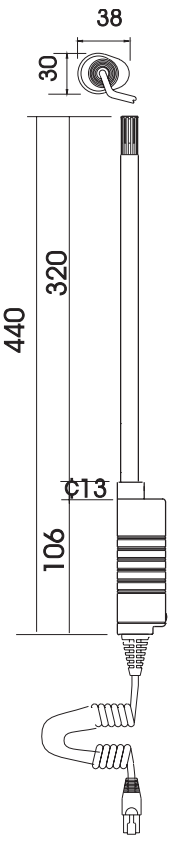
TECHNICAL DATA - HMI 41 & HMP 46 CALIBRATOR/INDICATOR AND PROBE

HMI 41 Indicator

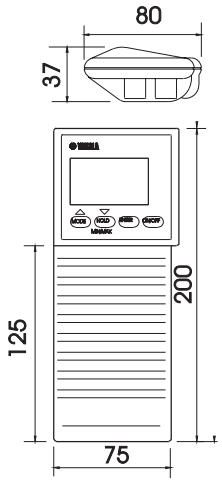
Calculated variables	dewpoint temperature, absolute humidity, wet bulb temperature, mixing ratio
Resolution	0.1 %RH; 0.1 °F
Power supply	4 batteries, type AA (LR 6)
Battery operation time (alkaline batteries)	72 h continuous use
Auto-off function	
Operating temperature	-4...+140 °F (-20...+60 °C)
Operating storage	non-condensing
Storage temperature	-40...+158 °F (-40...+70 °C)
Display	two line LCD
Housing material	ABS plastic
Housing classification	IP 53 (with connectors blocked)
Weight (incl. batteries)	300 g
Options	
calibrator function	see front page for cable part no.
carrying case for HMI41 & HMP46	part no. 85-21797
serial communication cable	part no. 19446
Maximum measurement error of indicator at +68°F (+20 °C)	
humidity	±0.1 %RH
temperature	±0.18°F (±0.1 °C)

Dimensions in mm

HMP 46



HMI 41



BACK to Table of Contents

To INDEX

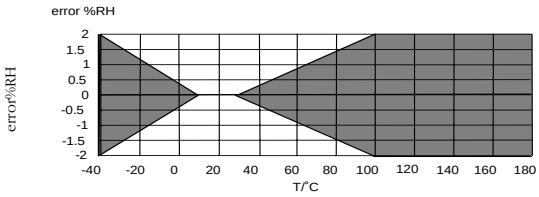
HMI 41 & 46 Price List

HMP 46 Probe

Humidity

Measurement range	0...100 %RH non condensing
Maximum achievable accuracy when calibrated against high quality, certified humidity standards	
0…90 %RH	±1 %RH
90…100 %RH	±2 %RH
when calibrated against salt solutions (ASTM E104-85)	
0…90 %RH	±2 %RH
90…100 %RH	±3 %RH

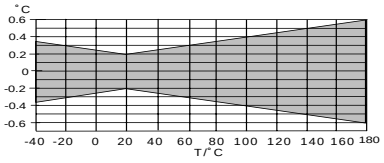
Temperature Dependence



Typical long-term stability	better than 1 %RH per year
Response time (90%)	
at +20°C in still air w/sintered filter	15 s
Humidity sensor	HUMICAP® 180

Temperature

Continuous measurement	-40…+212 °F (-40…+100°C)
Short-term measurement	-40…+356 °F (-40…+180°C)
Accuracy at 68°F (+20°C)	±0.36°F (±0.2 °C)
Accuracy over the measurement range	



Temperature sensor	Pt 100 IEC 751 1/3 class B

General

Typical ranges of calculated variables	
dewpoint temperature	-40…+212 °F (-40...+100°C)
absolute humidity	0...600 g/m³
wet bulb temperature	32…+212 °F (0...100°C)
mixing ratio	0...600 g/Kg d.a.
Cable length	1500 mm; extended spiral cable
Operating temperature range for electronics	-4...+140 °F (-20...+60 °C)
Electronics housing	ABS plastic
Probe head	stainless steel
Housing classification electronics	NEMA 4 (IP 65)
Sensor protection	sintered filter, part no. 0195
option	membrane filter, part no. 10159HM
	plastic grid, part no. 6221
Weight	450 g
Meets EMS standards EN50081-1 and EN50082-2	

Humidity and Temperature Probes for the HMI 41 Indicator

VERSATILE AND EASY TO USE

Vaisala's HMI 41 hand-held indicator can be used with any one of the four probes to quickly and easily measure humidity and temperature, and to make other measurement calculations such as dewpoint, wet bulb temperature, absolute humidity, and mixing ratio.

The HMI 41 has an easy-to-read LCD display. Temperature readout is available in either degrees Centigrade or Fahrenheit. Calculated variables are available in metric and non-metric.

The HMI 41 with probes is ideal for use in a variety of spot checking applications such as plant maintenance; air-conditioning system installation and inspection: freezers; and storage and production areas.

HIGH PERFORMANCE SENSOR

Vaisala probes incorporate the HUMICAP® humidity sensor, known for its high accuracy, reliability, and long-term stability. For more than twenty-five years, this rugged sensor has proven itself time and time again to be resistant to dust and most chemicals.

HMP 41: This humidity and temperature probe is fix-mounted directly on the HMI 41 indicator. It can be upgraded to an HMP 45 by purchasing the HMH 45 handle and cable option.

HMP 45: This humidity and temperature probe features an extended spiral cable.

NEW **HMP 42:** The HMP 42 humidity and temperature probe can be used for spot checking humidity and temperature in applications which require an extremely thin probe, such as:

- for monitoring the drying of structures during construction or after water damage
- in tight places
- in ducts or chambers
- under a linoleum floor

The probe diameter is only 0.16 inch. (4 mm), allowing access into very small tight, and hard-to-reach spaces.

HMP 46: See preceding data sheet.

HMI 41 with HMP 41

HMI 41 with HMP 45

HMI 41 with HMP 42

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TECHNICAL DATA - HMP 41, HMP 42 AND HMP 45 PROBES

HMP 41, HMP 42, and HMP 45 Probes

Humidity

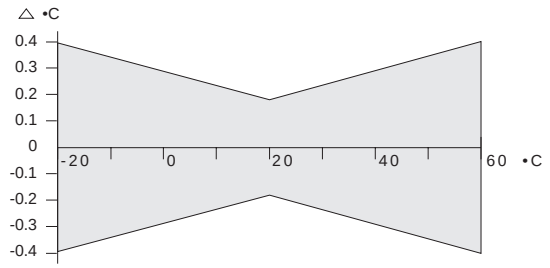
Measurement range	0...100 %RH non condensing
Accuracy at +68°F (+20°C) when calibrated against salt solutions (ASTM E014-85)	±2 %RH (0...90%RH) ±3 %RH (90...100%RH)
Temperature dependence of measurement	±0.03%RH/°F (±0.05 %RH/°C)
Typical long-term stability	better than 1 %RH per year
Sensor HMP 41 & 45	HUMICAP® 180
Sensor HMP 42	HUMICAP® MINI
Response time (90%) at +68°F (+20°C) in still air	(HMP 41, 45) 15s (HMP 42) 30s

Temperature

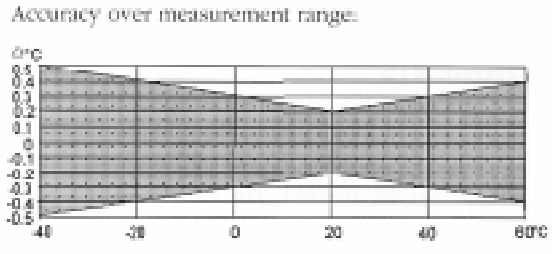
Measurement range Sensor head	
HMP 41 and 45	-4...+140°F (-20...+60 °C)
HMP 42	-40...+212°F (-40...+100 °C)
Sensor (HMP 41 & 45)	PT 1000 IEC 751 1/3 class B
(HMP 42)	PT 100 IEC 751 class B

Accuracy (including ±0.27°F (±0.15 °C) calibration accuracy)

HMP 41 and HMP 45



HMP 42



* Sensor Protection

HMP 41 & 45 option	pl. grid	HM46717
	membrane filter	2782HM
HMP42 membrane	steel grid	19867HM
	tube set (5pcs)	19858HM

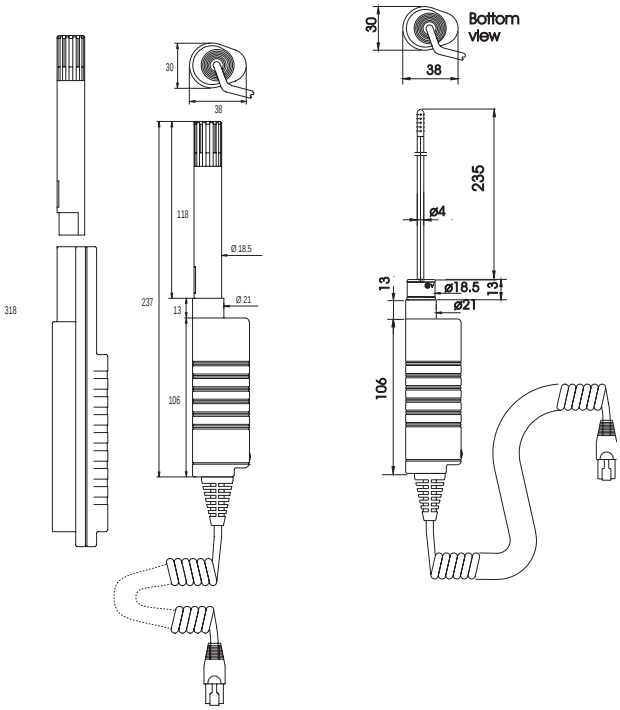
General

Typical ranges of calculated variables	
dewpoint temperature	-40°F…+140°F (40...+60°C)
absolute humidity	0...160 g/m³
wet bulb temperature	32…140°F (0...+60°C)
mixing ratio	0...160 g/Kg d.a.
Cable length (HMP 42 & 45)	1500 mm; extended spiral cable
Operating temperature range (41 & 45)	-40...+140°F (-40...+60 °C)
(HMP 42)	-4...+140°F (-20...+60 °C)
Housing material	ABS plastic
Housing classification electronics	NEMA 4 (IP 65)
Sensor protection*	

Weight	
HMP 41	30 g
HMP 45	160 g
HMP 42	200 g

Specifications subject to change without further notice.
HUMICAP® is a registered trademark of Vaisala.

HMP 41 HMP 45 HMP 42



BACK to Table of Contents
To INDEX
HMP 41, 42, 45 Price List

HM 34 Pocket-size Relative Humidity and Temperature Indicator

SPECIAL FEATURES

- Lightweight, pocket-sized
- Extendable probe
- Automatic POWER-OFF
- Measures humidity and temperature
- Fast response with ±2% accuracy

IDEAL FOR SPOT-CHECKING HUMIDITY LEVELS

This pocket-sized HM 34 meter provides a fast and convenient way to accurately spot-check relative humidity and temperature. The instrument includes a HOLD button which allows the user to retain an RH or T measurement until it has been noted or recorded. If no measurements are made for three minutes, the unit automatically switches itself off. This automatic POWER-OFF function prevents the possibility of accidental discharge of the HM 34's battery.

FAST AND EASY-TO-USE

The HM 34 indicator incorporates Vaisala's next generation HUMICAP® Sensor, which is accurate, durable and insensitive to dust and most chemical contaminants. Both the humidity and temperature sensors are housed in an extendable probe that is retracted back into the rugged plastic casing for storage, creating a compact and easy to carry device.

EACH UNIT INCLUDES:

- 9 V battery
- Attached probe
- 0.2 µm protective membrane filter
- Carrying case

HM 34

The handy HM 34 provides accurate spot checks of humidity and temperature.

HM 34 Carrying Case

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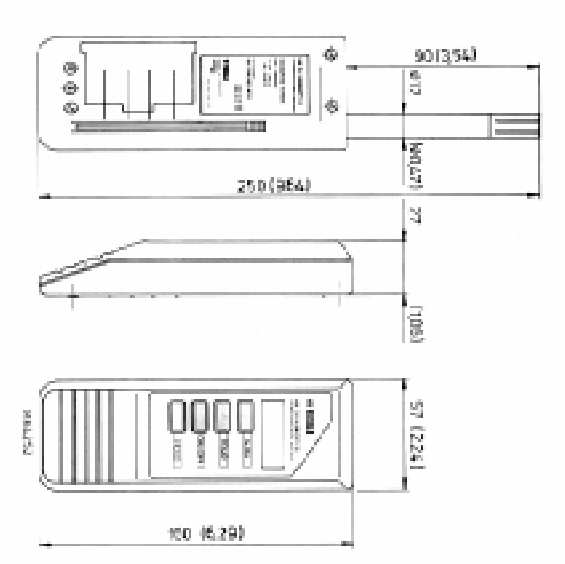
TECHNICAL DATA - HM 34



Relative Humidity

Range:	0 to 100% RH
Accuracy:	±2% (0 to 90% RH) ±3% (90 to 100% RH)
Resolution:	0.1% RH
Temperature Dependence:	±0.02%RH/°F (±0.04% RH/°C)
Sensor type:	HUMICAP®H thin film capacitive sensor
Response time (90%):	15 sec with membrane filter 15 sec with sintered filter 5 sec with plastic grid

Temperature

Range:	-4 to +140°F (-20 to +60°C)
Accuracy:	±0.5°F (±0.3 °C)
Resolution:	0.1 °F (0.1 °C)
Temperature Dependence:	±0.02 °F/°F (±0.02 °C/°C)
Sensor:	Pt 100 IEC 751 1/3 Class B

General

Display:	3 1/2 digit LCD
Weight:	250 g
Size:	6.3" x 2.2" x 1.1" (160 x 57 x 27mm)
Power supply:	9 V battery
Battery life:	50 h
Hold function:	Pushbutton hold of displayed value
POWER OFF:	Automatic, after 3 minutes, unless HOLD is activated

Ordering Information:

HM 34 C	with °C temperature reading
HM 34 F	with °F temperature reading

Specifications subject to change without notice.

BACK to Table of Contents

To INDEX

HM 34 Price List

HM 44 Concrete Humidity Measurement System

EVERYTHING YOU NEED TO CONDUCT MULTIPLE SAMPLINGS

Vaisala's HM 44 set is the ideal solution for measuring humidity in structures such as concrete. The kit includes the following parts:

- HMI 41 indicator with batteries
- HMP 44 RH & T probes
- Protective cover with lid, 3 pcs (19268HM)
- Rubber plugs, 12 pcs (19267HM)
- Plastic sleeves, 12 pcs (19266HM)
- Carrying case

TOO MUCH WATER IN STRUCTURES MEANS TROUBLE

Reducing the water content of concrete, or other materials, during construction work is an essential part of the building process. The same applies to drying out buildings after water damage.

The materials used should be dried just right – enough, but not too much. Excessive drying wastes both energy and precious time. On the other hand, too short a drying time may cause problems later on: floor coverings start swelling or bending, or adhesives break down, or mold begins to grow. To save time and money, a reliable and accurate method of measuring the optimum drying of the construction materials is needed.

A RELIABLE METHOD FOR MEASURING HUMIDITY IN STRUCTURES

Measuring relative humidity in a structural material such as concrete is a clear indication of whether the material is dry enough.

The HM 44 kit is ideal for measuring humidity in concrete. First, a hole is bored at the required depth, cleaned out, and a plastic sleeve inserted. At this point, the probe can be pushed into the sleeve and sealed. The material at the bottom of the hole releases humidity into the space around the probe until equilibrium is reached. The HMI 41 meter can then be connected to the probe cable and a reading taken. Alternatively, the sleeve can be plugged after insertion. When the humidity in the hole has reached equilibrium, the probe is inserted and left to stabilize for a short time before a reading is taken.

The supplied cover protects the probe on the construction site, and against the effects of the ambient conditions. Concrete dries unevenly and is usually drier on the surface. A surface measurement alone may give misleading information. The sleeve enables measurements to be made at the correct depth to give a true picture of the humidity in the concrete.

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TECHNICAL DATA - HM 44 SET

HMP 44 Probe

Relative humidity

Measurement range	0...100 %RH
Accuracy	
0...90 %RH	±2 %RH
90...100 %RH	±3 %RH
Typical long-term stability in air	better than 1 %RH/year
Response time (90%) at +68°F (+20°C) in still air	15s
Typical response time when the concrete and the probe are in the same temperature (stabilized hole)	30 min
Humidity sensor	HUMICAP® 180

Temperature

Measurement range	-4…+140°F (-20...+60 °C)
Accuracy at +68°F (+20°C)	±0.7°F (±0.4 °C)
Temperature sensor	Pt 1000 IEC 751 1/3 Class B

HMI 41 Indicator

Maximum error caused by the indicator at +68°F (+20 °C)	
humidity	±0.1 %RH
temperature	±0.18°F (±0.1 °C)
Calculated quantities	dewpoint temperature, absolute humidity, wet bulb temperature, mixing ratio
Resolution	0.1 %RH/0.1°F (0.1 °C)
Power supply	4 batteries, type IEC LR 6
Battery operation time (alkaline batteries)	72 h continuous use
Operating temperature range	-4…+140°F (-20...+60 °C)
Operating humidity range	0...100 %RH non-condensing
Storage temperature rang	-40…+158°F (-40...+70 °C)
Display	two line LCD
Housing material	ABS plastic
Housing classification	IP 53 (with connectors blocked)
Weight (incl. batteries)	300 g

Meet EMC standards EN50081-1 and EN50082-2

Specifications subject to change without prior notice.

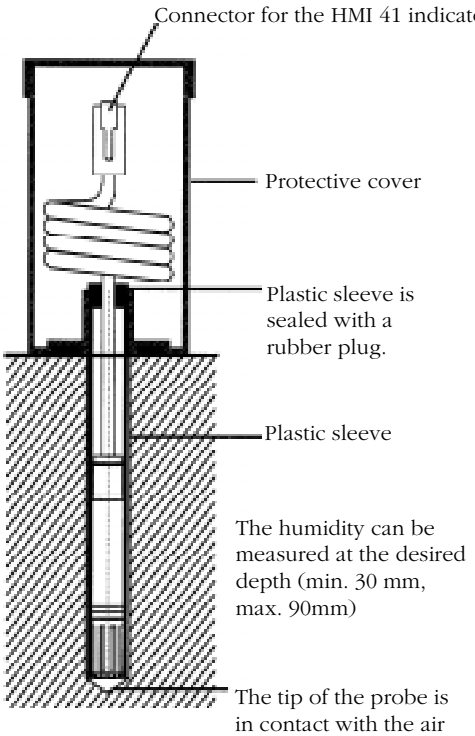
General

Cable length	0.3m
Operating temperature range of electronics	-4…+140°F (-40...+60 °C)
Housing material	ABS plastic
Housing classification	NEMA 4 (IP 65)
Sensor protection	membrane filter 17039HM
Sensor diameter	Æ12 mm
Bore hole diameter	16 mm
Measurement depth	min. 30 mm max. 90 mm

Other probes to be used with the HMI indicator for the measurement of humidity in materials:

HMP 42	23.5 cm probe, diameter 4mm
HMP44L	as HMP44 but with a 2.7 meter cable
HMP46	32 cm tube of stainless steel, diameter 12 mm

Installation of the HM 44 set.



HMP 44 probe

BACK to Table of Contents
To INDEX
HM 44 Price List

HMP 228 for Direct Measurement of Moisture in Oil

Vaisala's HMP 228 moisture transmitter enables fast and reliable on-line water detection in oil for various applications including lubrication systems and transformers. It also enables you to monitor functioning of a separator or a purifier for example.

FEATURES/BENEFITS

- HUMICAP sensor, 25+ years of proven field performance.
- Continuous moisture measurement in oil.
- Full measurement range of water activity 0...1.0
- Excellent long-term stability.
- Easy to install, calibrate, and maintain in the field.
- NIST traceable (certificate supplied).

CUT COSTS WITH MOISTURE MEASUREMENTS

Moisture in oil has a great affect on its environment. Water is the number one contaminant in lubrication systems and it causes corrosion especially during machine stoppages. Close detection of moisture prevents interruptions and helps cut maintenance costs. Thus the moisture content in lubrication systems should be kept as low as possible.

RUGGED AND VERSATILE

Vaisala's HMP 228 transmitters can be supplied with a cover which has a local display/keypad. The display shows the measurement readings and also functions as a user interface. A display/keypad transmitter is easy to use and configure with the menu-based commands of the built-in software.

The microprocessor-based transmitters measure water activity (aw) and temperature (T). The transmitters have two analog output channels and any two of the measured or calculated variables can be selected as output signals.

MEASURING WATER ACTIVITY

The primary measured variable in the HMP 228 is water activity (aw) which has several advantages compared to the traditionally measured variable, parts per million by weight (ppm_w).

The most important advantage is that the measured water activity value directly indicates whether the oil is too moist. Separate tables for different oil types are not needed, nor are estimates of oil temperature, age or conditions where it has been used.


HMP 228

INSTALLATION OPTIONS

The transmitter can be ordered with a ball valve set that enables insertion and removal of the moisture probe for calibration without the need to empty the oil system.

ALARM RELAYS

For applications where adjustable on/off alarm control is needed, the alarm relay option is the solution. Alarm relays include two SPCO (single pole change over) type relays with 8A / 230V contacts. They are easy to adjust with display keypad or through RS 232.

CONNECTORS

The transmitter has several different connector options for analog output signals, supply voltage (24 VAC/VDC) and RS lines (RS 232C/422/485). The connectors have the EMC and IP65 protection as well as easy screw connections.

CONNECTORS

- Transformer oil monitoring
- Lubrication systems monitoring (e.g. pulp and paper industry)
- Food oil processing
- Oil tank monitoring
- Mon-explosive fuel oil monitoring

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TECHNICAL DATA - HMP 228

MEASURED VARIABLES

Water activity

Measurement range	0...1
Accuracy (including nonlinearity and repeatability)	
when calibrated against salt solutions (ASTM E104-85):	
±0.02 (0...0.9)	±0.03 (0.9...1.0)
maximum achievable accuracy when calibrated against high-quality, certified humidity standards:	
±0.01 (0...0.9)	±0.02 (0.9...1.0)
Response time (90 %) at +68°F (+20 °C)	
in still oil (with stainless steel filter)	10 min.
Sensor	HUMICAP® K

Temperature

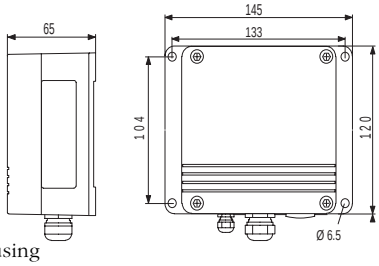
Measurement range	-40...+356 °F (-40...+180 °C)
Typical accuracy of electronics at +68°F (+20°C)	±0.18°F (±0.1 °C)
Typical temperature dependence of electronics	±0.0005°F/F (±0.005 °C/°C)
Sensor	Pt 100 IEC 751 1/3 class B

OUTPUTS

Two analog outputs	0...20 mA
selectable and scaleable	4...20 mA, 0...1 V
	0...5 V, 0...10 V
Typical accuracy of analog output at +68°F (+20°C)	±0.05 % FS
Typical temperature dependence of analog output	0.003% FS/°F (0.005 % FS/°C)
Serial output	RS 232C

GENERAL

Connections	screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
Operating voltage	24 VDC/isolated 24 VAC, (20...28 V)
option	115 VAC, 230 VAC
Recommended external load for	
current outputs	< 500 ohm
0...1 V output	> 2 kohm (to ground)
0...5 & 0...10 V outputs	> 10 kohm (to ground)
Operating temperature range for electronics	-40…140°F (-40...+60 °C)
with display cover	32…122°F (0...+50 °C)
with power supply unit	-40…113°F (-40...+45 °C)
Storage temperature range	-40…158°F (140…+70°C)
Housing material	G-AlSi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable)
Sensor protection stainless steel filter	(Ø 13.5 mm)



Electronic housing

OPTIONS

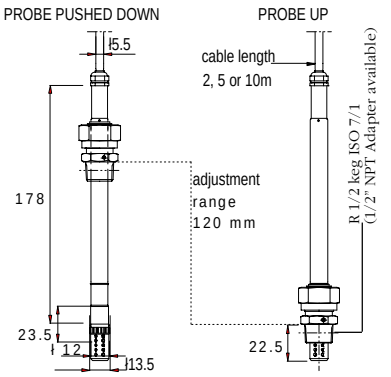
Display cover	local display/keypad
	2 x 16 characters LCD
Cable length	2, 5 or 10 meters
Alarm relays*	2 pcs 8 A/230 V SPCO
	(single pole change over)
Connectors	
Serial modules	RS 485/422
	digital current loop
Power supply module*	
Operating voltage	115 VAC (93...127 V)
	230 VAC (187...253 V)
Connections	
input	screw terminal for 1.5 mm² wires (AWG 16)
output	screw terminal for 0.5 mm² wires (AWG 20)

* Simultaneous installation with alarm outputs and internal power supply module is not possible.

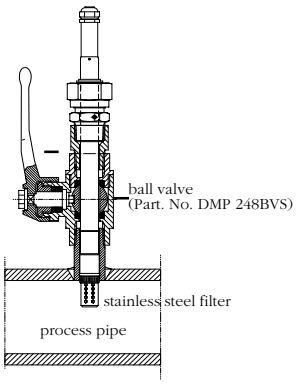
SERIAL INTERFACE MODULES

Module types	RS 485/422
	digital current loop
Connections	screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
Assembly	plug-in module
Number of devices on line	
RS 485/422	32
digital current loop	6 (single loop)
	9 (dual loop)
Network cable type	twisted pair
Network line length	1000 m max.
Network data speed	
RS 485/RS422	9600 baud max.
digital current loop	4800 baud max.

HMP 228



Installation with the ball valve set



BACK to Table of Contents
To INDEX
Price List HMP 228

HMP 231 "Smart" Humidity/Dewpoint Transmitter for High Performance Wall-Mount Applications

CUSTOMIZE YOUR INSTRUMENT

(Also see easy-to-use order form)
Vaisala's unique microprocessor design and modularity allow you to customize the HMP 231 at time of purchase:

- Selection of output parameters:
  - relative humidity
  - dewpoint
  - temperature
  - absolute humidity
  - mixing ratio
  - wet bulb temperature
  - enthalpy
- Selection of:
  - local display and keypad
  - serial bus type (RS 232, 422/485 or digital current loop)
  - type of sensor protection (variety of filters available)

After purchase, you can directly program either via computer or local display and keypad:

- Units (metric or non-metric)
- The two output parameters corresponding to analog channels 1 and 2 (note: all output parameters selected by users are also available via serial output and display)
- Selection of the following output signals:
  - 4 to 20 mA
  - 0 to 20 mA
  - 0 to 1V
  - 0 to 5V
  - 0 to 10V
- Scaling of measurement parameters and output signals (e.g. -10°C to +50°C corresponds to 1 to 5V)

RECOMMENDED FOR CHANGING ENVIRONMENTS

The HMP 231 is ideal for critical areas and applications where humidity, temperatures, or dewpoints tend to fluctuate. The unit is fully temperature compensated and provides unsurpassed accuracy over the entire temperature range of -40°F to +140°F (-40°C to +60°C).

NEW GENERATION HUMICAP®

The HMP 231 incorporates the latest generation of Vaisala's patented thin-film HUMICAP® sensor. Vaisala has pioneered the field of humidity since it developed the first HUMICAP® humidity sensor more than 20 years ago. Intensive in-house R&D has now produced a sensor which measures humidity more accurately (up to ±1%) and reliably at temperatures higher than other sensors. The sensor's tolerance to high temperature; its ability to operate in condensing environments; its resistance to harsh chemicals and contaminants; and its excellent long-term stability are of great value in monitoring and controlling critical environments.

HMP 231 shown with optional display and keypad. Supplied with NIST traceable certificate of calibration

ON-SITE, ONE-POINT CALIBRATION

By utilizing a reference RH (or temperature) probe for comparison, routine maintenance and/or calibration of the HMP 231 can be performed on-site within a matter of minutes without disturbing transmitter operation. This unique one-point calibration feature will save down time, reduce service costs, and ensure high accuracy operation.

NEW FEATURE: RE-GAINING

This option makes the HMP 231 transmitter more accurate and stable in environments where high concentration of chemicals or cleaning agents are present. In re-gaining, activated by a software command, the sensor is returned to normal following the evaporation of the chemicals from the sensor.

VAISALA
100 Commerce Way, Woburn, MA 01801
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TECHNICAL DATA - HMP 231

Measured Variables

Relative Humidity

Measurement range	0...100%
Accuracy (including non-linearity and repeatability)	
Maximum achievable when calibrated against high quality, certified humidity standards:	±1 %RH (0...90% RH) ±2%RH (90...100% RH)
When calibrated against salt solutions (ASTM E104-85)	±2 %RH (0...90% RH) ±3 %RH (90...100% RH)
Response time (90%) at +68°F (+20°C) in still air (w/sintered filter)	15s
Sensor	HUMICAP® K
Re-gaining sensor	HUMICAP® KC

Temperature

Measurement range	-40...+140°F (-40°...+60°C)
Accuracy at +68°F (+20°C)	0.36°F (±0.2°C)
Sensor	PT 100 RTD IEC 751 1/3 Class B
Typical temperature dependence of electronics	0.005°F/°F (0.005°C/°C)

Calculated Variables

Typical ranges:

dewpoint temperature	-40...+140°F (-40...+60°C)
mixing ratio	0...160 g/kg d.a.
absolute humidity	0...160 g/m³
wet bulb temperature	32°…+140°F (0...+60°C)
enthalpy	-40...+460 kJ/kg (-17.2...+198.8 BTU/lb)

The accuracies of these calculated values are limited by the accuracies of the measured variables on which they are based, namely RH and T. The RH and T accuracies are stated above under Measured Variables.

Outputs

Two analog outputs selectable and scaleable	0...20 mA 4...20 mA	0...1V 0...5V 0...10V
Serial output available	RS 232C, RS 485/422 or digital current loop	

General

Connections	screw terminals for 0.5 mm² wires (AWG 20)
Operating voltage	24 VDC/VAC (20...28V)
Power consumption (standard configuration)	100 mA maximum
Recommended external load for current outputs	< 500 ohm
Recommended external load for 0...1V ouput	> 2 kohm
Recommended external load for 0...5 and 0...10 V outputs	> 10 kohm
Operating temperature range for electronics	-40...+140°F (-40...+60°C)
Storage temperature range	40...+158°F (-40...+70°C)
Housing material	G-AlSi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable)
Sensor protection (ø 13.3 mm)	stainless steel sintered filter PPS grid with stainless steel netting

Meets EC requirements on electromagnetic compatibility (10V/m to 3V/m) depending on the filter.

Specifications subject to change without further notice.
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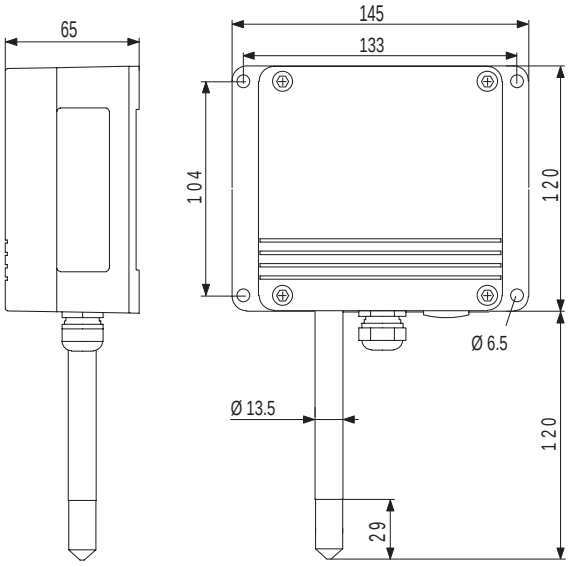
BACK to Table of Contents

To INDEX

HMP 231 Price List

HMP 231
Dimensions in mm

1/2" NPT conduit fitting adapter available



HMP 233 “Smart” Humidity/Dewpoint Transmitter for Measurement in Ducts and Small Spaces

CUSTOMIZE YOUR INSTRUMENT

(Also see easy-to-use order form)
Vaisala’s unique microprocessor design and modularity allow you to customize the HMP 233 at time of purchase:

- Selection of output parameters:
  - relative humidity
  - dewpoint
  - temperature
  - absolute humidity
  - mixing ratio
  - wet bulb temperature
  - enthalpy
- Selection of temperature range
- Selection of:
  - cable length (2, 5, or 10 meters)
  - local display and keypad
  - serial bus type (RS 232, 422/485 or digital current loop
  - type of sensor protection (variety of filter types available)
  - operating voltage 24 VDC, 115 VAC, 230 VAC, 50/60 Hz

After purchase, you can directly program either via computer or local display and keypad:

- Units (metric or non-metric)
- The two output parameters corresponding to analog channels 1 and 2 (note: all output parameters selected by users are also available via serial output and display)
- Selection of the following output signals:
  - 4 to 20 mA
  - 0 to 20 mA
  - 0 to 1V
  - 0 to 5V
  - 0 to 10V
- Scaling of measurement parameters and output signals (e.g. -10°C to +80°C corresponds to 0 to 5V)

FOR DUCTS & SMALL AREAS

The HMP 233 has been engineered for use in particularly tight spaces, including chambers and incubators, as well as for typical low temperature duct applications. Its small sensor head with its small thermal mass is an advantage especially in situations where the sensor head must respond quickly to surrounding temperature changes. An optional kit consisting of aluminum flange, lead-through piece, and steel support bar enables installation of the HMP 233 in ducts, channels, and through walls.

ON-SITE, ONE-POINT CALIBRATION

By utilizing a reference RH or temperature probe for comparison, routine maintenance and calibration of the HMP 233 can be performed on site within a matter of minutes without disturbing transmitter operation. This unique one-point calibration feature will save down time, reduce service costs, and ensure high accuracy operation.

HMP 233

Incorporates Vaisala’s next generation HUMICAP® sensor.

Cable available in lengths of 2 meters, 5 meters and 10 meters.

Supplied with NIST traceable certificate of calibration.

Small sensor head/small thermal mass for fast measurement in small spaces or chambers.

PPS grid with stainless steel netting and other filters are available for sensor protection.

NEW FEATURES:

- **Re-Gaining**
  This option makes the HMP 230 transmitters more accurate and stable in environments where high concentrations of chemicals or cleaning agents are present. With Re-Gaining, activated by a software command, the sensor returns to normal following the evaporation of the chemicals from the sensor.

- **Alarm Relays**
  For applications where adjustable on/off alarm control is needed, this option is the solution. These relays are easy to adjust with a display keypad or through RS 232.

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TECHNICAL DATA - HMP 233

Measured Variables

Relative Humidity

Measurement range	0...100%
Accuracy (including non-linearity and repeatability)	
Maximum achievable when calibrated against high quality, certified humidity standards:	±1%RH (0...90% RH) ±2%RH (90...100% RH)
When calibrated against salt solutions (ASTM E104-85)	±2%RH (0...90% RH) ±3%RH (90...100% RH)
Response time (90%) at +68°F (+20°C) in still air (with sintered filter)	15 s
Sensor	HUMICAP® K
Re-Gaining Sensor	HUMICAP® KC

Temperature

Measurement range	-40...+176 °F (-40...+80 °C) OR -40...+248°F (-40°...+120°C)
Accuracy at +68°F (+20°C)	±0.36°F (±0.2°C)
Sensor	PT 100 RTD IEC 751 1/3 Class B
Typical temperature dependence of electronics	0.005°F/°F (0.005°C/°C)

Calculated Variables

Typical ranges:

dewpoint temperature	-40...+212 °F (-40...+100°C)
mixing ratio	0...500 g/kg d.a.
absolute humidity	0...600 g/m³
wet bulb temperature	32…212°F (0...+100°C)
enthalpy	-40...+460 kJ/kg (-17.2...+198.8 BTU/lb)

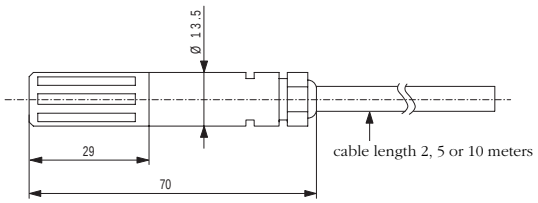
The accuracies of the calculated variables are limited by the accuracies of the measured variables on which they are based, namely RH and T. The RH and T accuracies are stated above under Measured Variables.

BACK to Table of Contents

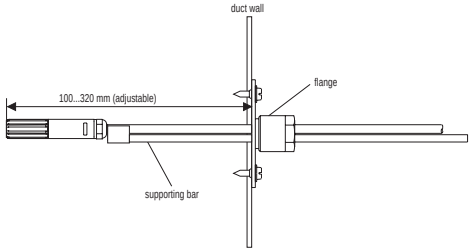
To INDEX

HMP 233 Price List

HMP 233 Maximum Temp Price List



Installation kit for duct mounting



Outputs

Two analog outputs selectable and scaleable	0...20 mA 4...20 mA	0...1V 0...5V 0...10V
Serial output available	RS 232C, RS 485/RS 422 digital current loop	
Alarm relays*	2 relays 8A/230VAC/24VDC SPCO**	

General

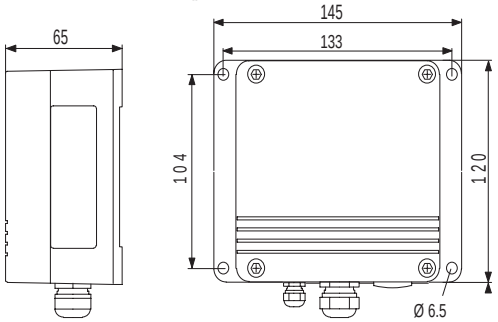
Connections	screw terminals for 0.5 mm² wires (AWG 20)
Operating voltage	24 VDC/VAC (20...28V) 115 VAC/230 VAC option
Power consumption (standard configuration)	100 mA maximum
Recommended external load for current outputs	< 500 ohm
Recommended external load for 0...1V ouput	> 2 kohm
Recommended external load for 0...5 and 0...10 V outputs	> 10 kohm
Operating temperature range for electronics	-40...+140 °F (-40...+60°C)
with display cover	32...122 °F (0...50 °C)
with power supply unit	-40...+113 °F (-40...+45 °C)
Storage temperature range	40...+158°F (-40...+70°C)
Housing material	G-AlSi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable
Sensor protection (ø 13.3 mm)	PPS grid with stainless steel netting recommended. Others, including sintered filter, are also available.

Meets EC requirements on electromagnetic compatibility (10V/m to 3V/m) depending on the filter

Specifications subject to change without further notice.
HUMICAP® is a registered trademark of Vaisala.

HMP 233

1/2" conduit fitting adapter available



* Simultaneous installation with alarm outputs and internal power supply module is not possible.

** SPCO = single pole change over

HMP 234 "Smart" Humidity/Dewpoint Transmitter for High Performance in Pressurized Spaces

CUSTOMIZE YOUR INSTRUMENT

(Also see easy-to-use order form)
Vaisala's unique microprocessor design and modularity allow you to customize the HMP 234 at time of purchase:

- Selection of output parameters:
  - relative humidity
  - dewpoint
  - temperature
  - absolute humidity
  - mixing ratio
  - wet bulb temperature
  - enthalpy
- Selection of:
  - power supply (24 VDC/VAC; 115 VAC, 230 VAC)
  - local display and keypad
  - serial bus type (RS 232 or 485/422, or digital current loop)

After purchase, you can directly program either via computer or local display and keypad:

- Units (metric or non-metric)
- The two output parameters corresponding to analog channels 1 and 2 (note: all output parameters selected by users are also available via serial output and display)
- Selection of the following output signals:
  - 4 to 20 mA
  - 0 to 20 mA
  - 0 to 1V
  - 0 to 5V
  - 0 to 10V
- Scaling of measurement parameters and output signals (e.g. -10°C to +80°C corresponds to 1 to 5V)

FOR PRESSURIZED SPACES/ CHANGING ENVIRONMENTS

The HMP 234's sensing head facilitates installation in pressurized processes to 10 MPa (1450 psi). This instrument is ideal for critical areas and applications where humidity, temperatures, or dewpoints tend to fluctuate. It is fully temperature compensated and provides unsurpassed accuracy over the entire temperature range -40°F to +356°F (-40°C to +180°C).

NEW FEATURES:

- **Re-Gaining**
  This option makes the HMP 230 transmitters more accurate and stable in environments where high concentrations of chemicals or cleaning agents are present. With Re-Gaining, activated by a software command, the sensor returns to normal following the evaporation of the chemicals from the sensor.

- **Alarm Relays**
  For applications where adjustable on/off alarm control is needed, this option is the solution. These relays are easy to adjust with a display keypad or through RS 232.

HMP 234

HMP 234 shown with optional display and keypad. Supplied with NIST traceable certificate of calibration

NEXT GENERATION HUMICAP®

The HMP 234 incorporates the latest generation of Vaisala's patented thin-film HUMICAP® sensor. Vaisala has pioneered the field of humidity since it developed the first HUMICAP® humidity sensor more than 20 years ago. Intensive in-house R&D has now produced a sensor which measures humidity more accurately (up to ±1%) and reliably at temperatures higher than other sensors. The sensor's tolerance to high temperature; its ability to operate in condensing environments; its resistance to harsh chemicals and contaminants; and its excellent long-term stability are of great value in monitoring and controlling critical environments.

ON-SITE, ONE-POINT CALIBRATION

By utilizing a reference RH (or temperature) probe for comparison, routine maintenance and/or calibration of the HMP 234 can be performed on-site within a matter of minutes without disturbing transmitter operation. This unique one-point calibration feature will save down time, reduce service costs, and ensure high accuracy operation.

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TECHNICAL DATA - HMP 234

Measured Variables

Relative Humidity

Measurement range	0...100% RH
Accuracy (including non-linearity and repeatability)	
Maximum achievable when calibrated against high quality, certified humidity standards:	±1%RH (0...90% RH) ±2%RH (90...100% RH)
When calibrated against salt solutions (ASTM E104-85)	±2%RH (0...90% RH) ±3%RH (90...100% RH)
Response time (90%) at +68°F (+20°C) in still air (with sintered filter)	15 s
Sensor	HUMICAP® K
Re-gaining Sensor	HUMICAP® KC

Temperature

Measurement range	-40...+356°F (-40°...+180°C)
Accuracy at +68°F (+20°C)	±0.36°F (±0.2°C)
Sensor	PT 100 RTD IEC 751 1/3 Class B
Typical temperature dependence of electronics	0.005°F/°F 0.005°C/°C

Calculated Variables

Typical ranges:

dewpoint temperature	-40...+212°F (-40...+100°C)
mixing ratio	0...500 g/kg d.a.
absolute humidity	0...600 g/m³
wet bulb temperature	32…212°F (0...+100°C)
enthalpy	-40...+460 kJ/kg (-17.2...+198.8 BTU/lb)

The accuracies of these calculated values are limited by the accuracies of the measured variables on which they are based, namely RH and T. The RH and T accuracies are stated above under Measured Variables.

Outputs

Two analog outputs selectable and scaleable	0...20 mA 4...20 mA	0...1V 0...5V 0...10V
Serial output available	RS 232C, RS 485/RS 422 digital current loop	
Alarm relays*	2 relays 8A/230VAC/24VDC SPCO**	

General

Connections	screw terminals for 0.5 mm² wires (AWG 20) stranded wires recommended
Operating voltage	24 VDC/VAC (20...28V)
Option	115 VAC, 230 VAC
Power consumption (standard configuration)	100 mA maximum
Recommended external load for current outputs	< 500 ohm
Recommended external load for 0...1V output	> 2 kohm (to ground)
Recommended external load for 0...5 and 0...10 V outputs	> 10 kohm (to ground)
Operating temperature range for electronics	-40...+140°F (-40...+60°C)
with display cover	32...+122°F (...+50°C)
with power supply unit	-40...+113°F (-40...+45°C)
Storage temperature range	-40...+158°F (-40...+70°C)
Pressure range of HMP 234	0...10 MPa (0...100 bar) absolute pressure
Housing material	G-AlSi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable)
Cable lengths	2, 5, or 10 meters
Sensor protection (ø 13.5 mm)	sintered filter of stainless steel

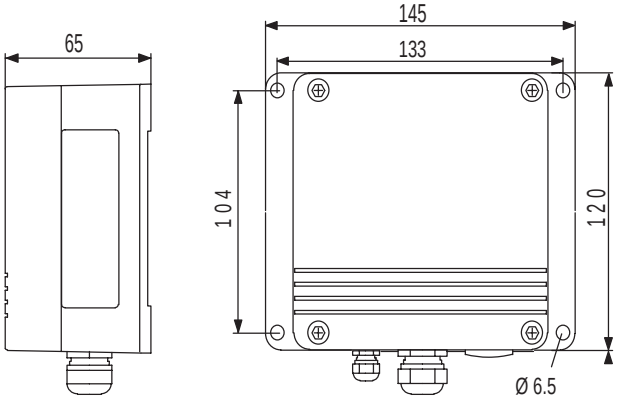
Meets EC requirements on electromagnetic compatibility (10V/m to 3V/m) depending on the filter.

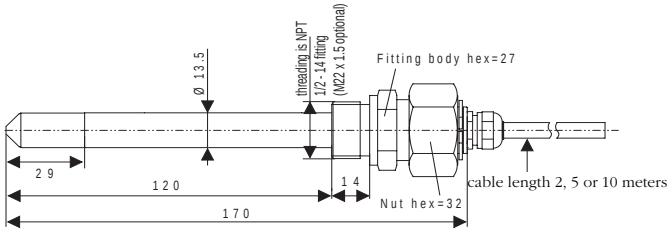
Specifications subject to change without further notice.
HUMICAP® is a registered trademark of Vaisala.

1/2" NPT conduit fitting adapter available.

HMP 234

Dimensions in mm





* Simultaneous installation with alarm outputs and internal power supply module is not possible.

** SPCO = single pole change over

BACK to Table of Contents
To INDEX
HMP 234 Price List

HMP 235 "Smart" Humidity/Dewpoint Transmitter for Demanding High Temperature Applications

CUSTOMIZE YOUR INSTRUMENT

(Also see easy-to-use order form)

Vaisala's unique microprocessor design and modularity allow you to customize the HMP 235 at time of purchase:

- Selection of output parameters:
  - relative humidity
  - dewpoint
  - temperature
  - absolute humidity
  - mixing ratio
  - wet bulb temperature
  - enthalpy
- Selection of:
  - power supply type (24 VDC/VAC; 110 VAC, 220 VAC)
  - cable length (2, 5, or 10 meters)
  - local display and keypad
  - serial bus type (RS 232, RS 485/422 or digital current loop)
  - mounting flange type (aluminum or stainless steel)
  - type of sensor protection (variety of filter types available)

After purchase, you can directly program either via computer or local display and keypad:

- Units (metric or non-metric)
- The two output parameters corresponding to analog channels 1 and 2 (note: all output parameters selected by users are also available via serial output and display)
- Selection of the following output signals:
  - 4 to 20 mA
  - 0 to 20 mA
  - 0 to 10V
  - 0 to 1V
  - 0 to 5V
- Scaling of measurement parameters and output signals (e.g. -10°C to +80°C corresponds to 1 to 5V)

NEW FEATURES:

- **Re-Gaining**
  This option makes the HMP 230 transmitters more accurate and stable in environments where high concentrations of chemicals or cleaning agents are present. With Re-Gaining, activated by a software command, the sensor returns to normal following the evaporation of the chemicals from the sensor.

- **Alarm Relays**
  For applications where adjustable on/off alarm control is needed, this option is the solution. These relays are easy to adjust with a display keypad or through RS 232.

HMP 235

HMP 235 shown with optional display and keypad. Supplied with NIST traceable certificate of calibration. Operating temperature range of -40°F to +356°F (-40°C to +180°C).
Note: Sensor can withstand temperatures up to 392°F (200°C) for short periods. Cable available in lengths of 2 meters, 5 meters and 10 meters.

Optional mounting flange available in either stainless steel or aluminum.

FULL TEMPERATURE COMPENSATION

The HMP 235 transmitter provides accurate measurement with full temperature compensation over the entire humidity range (0 to 100% RH) at temperatures from -40°F to +356°F (-40°C to +180°C). Additionally, the stainless steel sensor head can withstand temperatures up to 392°F (200°C) for short periods, and can be positioned directly in the environment being measured: ducts, kilns, and dryers, for example. The sensor is connected to the transmitter via either a 2, 5, or 10 meter cable, allowing the electronics and housing to be located outside of the hostile environment.

ON-SITE, ONE-POINT CALIBRATION

By utilizing a reference RH (or temperature) probe for comparison, routine maintenance and/or calibration of the HMP 235 can be performed on site within a matter of minutes without disturbing transmitter operation. This unique one-point calibration feature will save down time, reduce service costs, and ensure high accuracy operation.

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TECHNICAL DATA - HMP 235

Measured Variables

Relative Humidity

Measurement range	0...100%
Accuracy (including non-linearity and repeatability)	
Maximum achievable when calibrated against high quality, certified humidity standards:	±1%RH (0...90% RH) ±2%RH (90...100% RH)
When calibrated against salt solutions (ASTM E104-85)	±2%RH (0...90% RH) ±3%RH (90...100% RH)
Response time (90%) at +68°F (+20°C) in still air (with sintered filter)	15 s
Sensor	HUMICAP® K
Re-gaining sensor	HUMICAP® KC

Temperature

Measurement range	-40...+356°F (-40°...+180°C)
Accuracy at +68°F (+20°C)	0.36°F (±0.2°C)
Sensor	PT 100 RTD IEC 751 1/3 Class B
Typical temperature dependence of electronics	0.005°F/°F (0.005°C/°C)

Calculated Variables

Typical ranges:

dewpoint temperature	-40…+212°F (-40...+100°C)
mixing ratio	0...500 g/kg d.a.
absolute humidity	0...600 g/m³
wet bulb temperature	32°F (0...+100°C)
enthalpy	-40...+460 kJ/kg (-17.2...+198.8 BTU/lb)

The accuracies of the calculated values are limited by the accuracies of the measured quantities on which they are based, namely RH and T. The RH and T accuracies are stated above under Measured Variables.

Outputs

Two analog outputs selectable and scaleable	0...20 mA 0...1V 4...20 mA 0...5V 0...10V
Serial output available	RS 232C, RS 485/RS 422 or digital current loop
Alarm relays*	2 relays 8A/230VAC/24VDC SPCO**

General

Connections	screw terminals for 0.5 mm² wires (AWG 20)
Operating voltage	24 VDC/VAC (20...28V)
Power consumption (standard configuration)	100 mA maximum
Recommended external load for current outputs	< 500 ohm
Recommended external load for 0...1V ouput	> 2 kohm
Recommended external load for 0...5 and 0...10 V outputs	> 10 kohm
Operating temperature range for electronics	-40...+140°F (-40...+60°C)
with display cover	32...+122 °F (0...+50 °C)
with power supply unit	-40...+113 °F (-40...+45 °C)
Storage temperature range	-40...+158°F (-40...+70°C)
Housing material	G-AlSi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable)
Cable lengths	2, 5, or 10 meters
Sensor protection (ø 13.5 mm)	stainless steel sintered filter PPS grid with stainless steel netting

Meets EC requirements on electromagnetic compatibility (10V/m to 3V/m) depending on the filter.

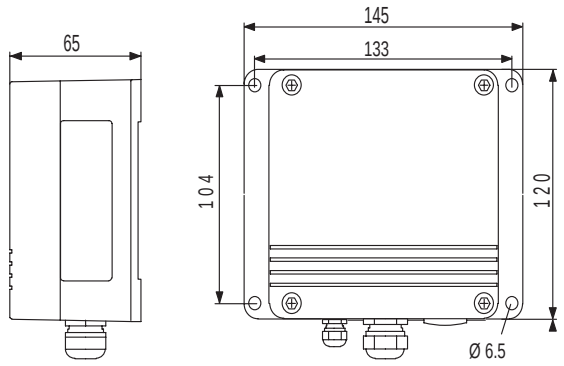
Specifications subject to change without further notice.
HUMICAP® is a registered trademark of Vaisala.

BACK to Table of Contents

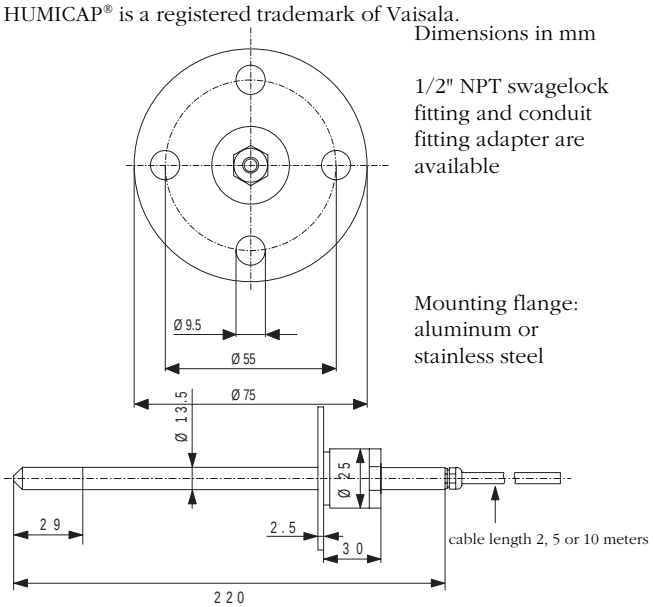
To INDEX

HMP 235 Price List

HMP 235



Dimensions in mm



* Simultaneous installation with alarm outputs and internal power supply module is not possible.

** SPCO = single pole change over

HMP 238 "Smart" Humidity/Dewpoint Transmitter with Adjustable Probe Head for Ease of Installation into Pressurized Spaces

FEATURES/BENEFITS

- Latest generation of HUMICAP® sensor
- Withstands and recovers from condensation
- Adjustable probe head ideal for "hot tapping"
- East to install, calibrate and maintain
- User-programmable, versatile and easy to use
- NIST traceable (certificate supplied)
- Optional alarms relays, sensor re-gaining, local display, sampling systems

CUSTOMIZE YOUR INSTRUMENT

Vaisala's unique microprocessor design and modularity allow you to customize the HMP 238 at time of purchase:

- Selection of output parameters:
  - relative humidity
  - absolute humidity
  - dewpoint
  - mixing ratio
  - temperature
  - enthalpy
  - wet bulb temperature
- Selection of:
  - Alarm outputs
  - Local display and keypad
  - Serial bus type (RS 232, 422/485 or digital current loop)
  - Power supply type (24/VDC, VAC; opt. 115 VAC, 230 VAC)

After purchase, program directly via computer, or local display and keypad:

- Units (metric or non-metric)
- The two output parameters corresponding to analog channels 1 and 2 (note: all output parameters selected by users are also available via serial output and display)
- Selection of the following output signals:
  - 4 to 20 mA
  - 0 to 1V
  - 0 to 20 mA
  - 0 to 5V
  - 0 to 10V
- Scaling of measurement parameters and output signals (e.g. -10°C to +50°C corresponds to 1 to 5V)

The HMP 238 incorporates the latest generation of Vaisala's patented thin-film HUMICAP® sensors. Vaisala has pioneered the field of humidity since it developed the first HUMICAP® humidity sensor more than 25 years ago. Intensive in-house R&D produced a sensor which measures humidity more accurately (up to ±1%) and reliably at temperatures higher than other sensors. The sensor's tolerance to high temperature; its ability to operate in condensing environments; its resistance to harsh chemicals and contaminants; and its excellent long-term stability are of great value in monitoring and controlling critical environments.

HMP 238

PRESSURIZED ENVIRONMENTS WITH VARYING HUMIDITY/DEWPOINTS

The HMP 238 probe head withstands pressure up to 600 psig. The probe depth may be adjusted under pressures up to 150 psig. Under greater pressures it becomes too difficult to slide the probe and tighten the hex lock nut. This versatile probe can be installed through a process wall, inserted through a ball valve (hot tapping), on the back side of a ball valve (leak position), or with a sample system for additional filtration or cooling.

THE HMP 238 "HOT TAPPING" FEATURE

"Hot tapping" is used to enter a system without exposing the process to ambient air, venting process gas, or shutting the process down. The HMP 238 probe head, designed with an adjustable locking hex nut, is hand screwed onto an existing ball valve assembly that is already secured to the process pipe/wall. Hand tighten the hex nut in the up position, open the ball valve, adjust the probe to the proper depth in the down position, and then tighten the hex nut with a wrench. The reverse procedure is followed when removing the probe from the process. 'Hot tapping" can be carried out in process pressures up to 150 psig. It is ideal for servicing and making portable measurements on compressed air lines without shutting the process down.

ON-SITE, ONE-POINT CALIBRATION

By utilizing a reference RH (or temperature) probe for comparison, routine maintenance and/or calibration of the HMP 238 can be performed on site within a matter of minutes. This unique one-point calibration feature will save down time, reduce service costs, and ensure high accuracy.

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TECHNICAL DATA - HMP 238

Measured Variables

Relative Humidity

Measurement range	0...100%
Accuracy (including non-linearity and repeatability)	
Maximum achievable when calibrated against high quality, certified humidity standards:	±1%RH (0...90% RH) ±2%RH (90...100% RH)
When calibrated against salt solutions (ASTM E104-85)	±2%RH (0...90% RH) ±3%RH (90...100% RH)
Response time (90%) at +68°F (+20°C) in still air (with sintered filter)	15 S
Sensor	HUMICAP® K
Re-gaining sensor	HUMICAP® KC

Temperature

Measurement range	-40°...+356°F (-40°...+180°C)
Accuracy at +68°F (+20°C)	±0.36°F (±0.2°C)
Sensor	PT 100 RTD IEC 751 1/3 Class B
Typical temperature dependence of electronics	0.005°F/°F (0.005°C/°C)

Calculated Variables

Typical ranges:

dewpoint temperature	-40°...+212°F (-40°...+100°C)
mixing ratio	0...500 g/kg d.a.
absolute humidity	0...600 g/m3
wet bulb temperature	32...+212°F (0...+100°C)
enthalpy	-40...+460 kJ/kg (-17.2...+198.8 BTU/lb)

The accuracies of the calculated values are limited by the accuracies of the measured quantities on which they are based, namely RH and T. The RH and T accuracies are stated above under Measured Variables.

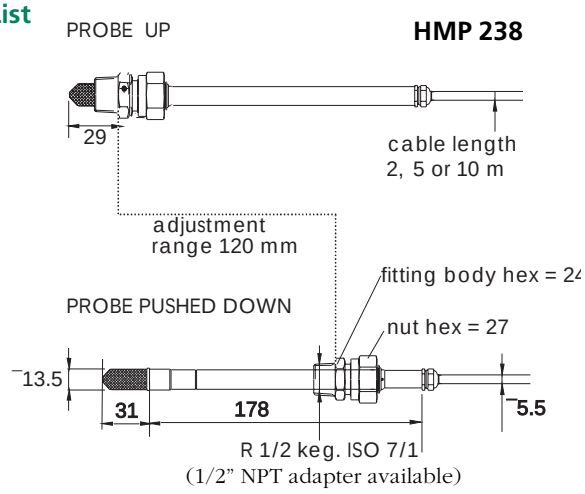
Outputs	
Two analog outputs selectable and scalable	0...20 mA 0...1V 4...20 mA 0...5V 0...10V
Serial output available	RS 232C, RS 485/RS 422 or digital current loop
Alarm relays	2 relays 8A / 230VAC/24VDC SPCO
General	
Connections	screw terminals for 0.5 mm2 wires (AWG 20)
Operating voltage	24 VDC/VAC (20...28V)
Power consumption (standard configuration)	100 mA maximum
Recommended external load for current outputs	< 500 ohm
Recommended external load for 0...1V output	> 2 kohm
Recommended external load for 0...5 and 0...10 V outputs	> 10 kohm
Operating temperature range for electronics	-40°...+140°F (-40°...+60°C)
with display cover	32°...+122°F (0°...+50°C)
with power supply unit	-40°...+113°F (-40°...+45°C)
Storage temperature range	-40°...+158°F (-40°...+70°C)
Housing material	G-AlSi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm2 shielded cable
Cable lengths	2, 5, or 10 meters
Sensor protection (ø 13.5 mm)	stainless steel sintered filter PPS grid with stainless steel netting

Meets EC requirements on electromagnetic compatibility (10V/m to 3V/m) depending on the filter.

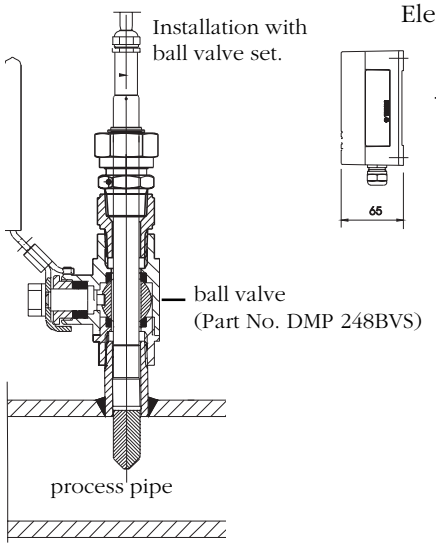
BACK to Table of Contents

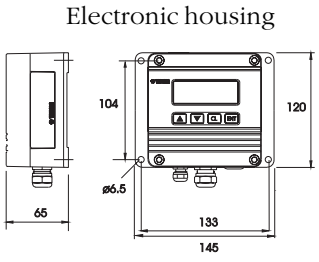
To INDEX

HMP 238 Price List



Dimensions in mm

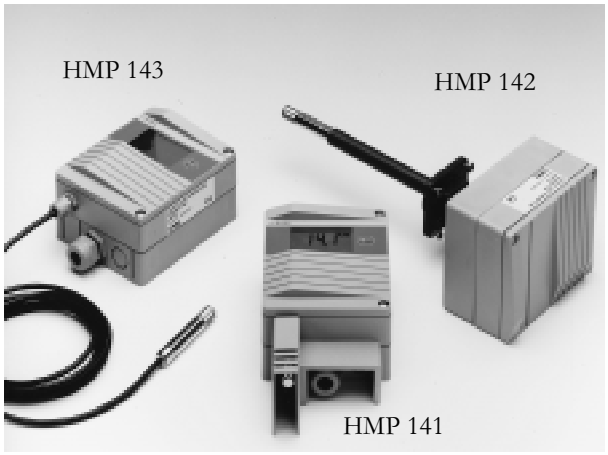




HMP 140 Series
Humidity and Temperature Transmitters

FEATURES/BENEFITS

- HUMICAP® sensor is resistant to dust & most chemicals
- 0...100 %RH measurement
- -40...+140 °F (-40...+60 °C) temperature measurement
- Temperature compensation
- 0...20 mA, 0...1 V, 0...5 V and 0...10 V outputs selectable
- IP 65 housing protects against dust & sprayed water
- One-point electronic calibration
- Optional local display



VERSATILE FAMILY OF TRANSMITTERS

The HMP 140 series includes the wall-mounted HMP 141, the HMP 142 for installation in ducts or channels and the HMP 143, which has a sensor head that can be installed directly in the process environment being measured. The HMP 143's cable can be extended by the user to a total of 100 meters in length.

A novel feature of the 140 series duct unit is the ability to remove the electronics without disassembling the unit from the duct.

HIGH PERFORMANCE SENSOR

The 140 series feature Vaisala's HUMICAP® humidity sensor, known for its accuracy, reliability, and long-term stability. Resistant to dust and most chemicals, the HUMICAP® is a great asset in industrial environments especially where there is risk of dew or particulate contamination.

QUICK ON-SITE CALIBRATION

These transmitters can be calibrated easily in minutes without disturbing operation, using Vaisala's portable calibrators. If using saturated salt solutions, the electronics of the transmitters can be disconnected easily without disconnecting the cable.

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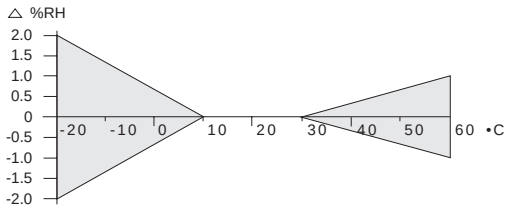
TECHNICAL DATA - HMP 140 SERIES

Relative Humidity

Measurement range	0...100 %RH
Accuracy (including non-linearity and repeatability) when calibrated against salt solutions (ASTM E104-85):	
0...90 %RH	±2 %RH
90...100 %RH	±3 %RH
Temperature dependence	



Response time (90%) at +68°F (+20 °C) in still air	15 s
Sensor	HUMICAP® 180

Temperature

Measurement range	-40...+140 °F (-40...+60 °C)
Typical accuracy	
at +68°F (+20 °C)	±0.36°F (±0.2 °C)
14°F…104°F (-10...+40 °C)	±0.54°F (±0.3 °C)
-40°F…140°F (-40...+60 °C)	±0.72°F (±0.4 °C)
Sensor	Pt 1000 IEC 751 Class B

General

Power supply	9...35 VDC/9...24 VAC (depending on the selected output range)
Current consumption	6...10 mA + output current
Electrical connections	three screw terminals for 0.5...1.5 mm² wires (AWG 15...20), stranded wires recommended
Two analog output signals selectable and scaleable	0...1 V, 0...5 V, 0...10 V
HMP 142/143 with current module	0...20mA, 4...20mA
External load for outputs	
current	max. 500 ohm
0...1 V	min. 2 k ohm (to ground)
0…5V	min 5 k ohm (to ground)
0...10	min. 10 k ohm (to ground)
Operating temperature range for electronics	-4...+140 °F (-20...+60 °C)
with display option	+32...122 °F (0...+50 °C)
Storage temperature range	-40...+176 °F (-40...+80 °C)
Operating humidity range	0...100 %RH
Bushing	for Ø 7...10 mm cables
Sensor protection	
standard	membrane filter, part no. 17039mm
option	plastic grid, part no. 17038mm
Cable length of HMP 143	
standard	2.5 m
maximum	100 m
Housing material	ABS plastic
Housing classification	NEMA 4 (IP 65)

Specifications subject to change without prior notice.
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BACK to Table of Contents

To INDEX

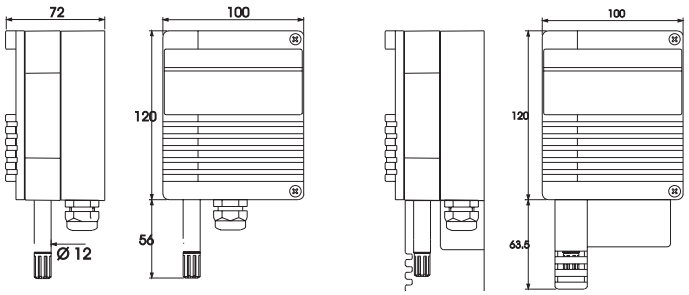
HMP 141 Price List

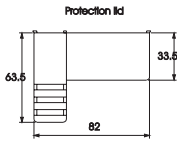
HMP 142 Price List

HMP 143 Price List

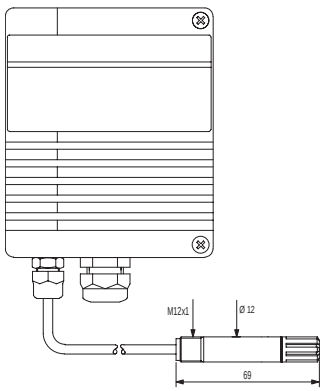
Dimensions in mm

HMP 141

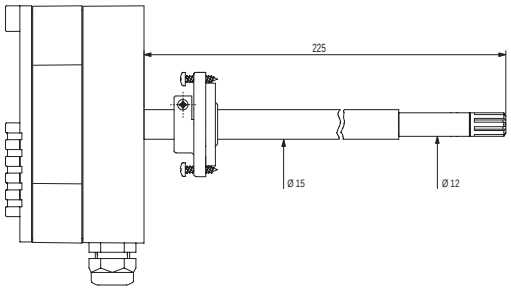




HMP 143



HMP 142



HMT 360 Intrinsically Safe Humidity and Dewpoint Transmitter with Interchangeable Probes

CONFORMS WITH HIGH INTERNATIONAL STANDARDS

The HMT 360 transmitter has been rigorously tested and conforms with all requirements for intrinsically safe instruments and EMC. It is the ideal solution for controlling humidity and dewpoint in potentially explosive applications.

SELECT THE CONFIGURATION TO SUIT YOUR APPLICATION

True flexibility is made possible by microprocessor-based electronics and a variety of options and accessories. Customers can specify the configuration of the HMT 360 transmitter when ordering, but if required, they can also easily make changes to the configuration in the field. In addition to the five probe types, there is a choice of:

- Local display
- Three different humidity sensors
- Two analog output channels (one standard, one optional)
- LonWorks® interface module

The transmitter measures relative humidity and temperature, and calculates various humidity quantities (dewpoint, wet bulb temperature, mixing ratio, and absolute humidity). All these features make the HMT 360 transmitter versatile and ensure its suitability for almost any application.

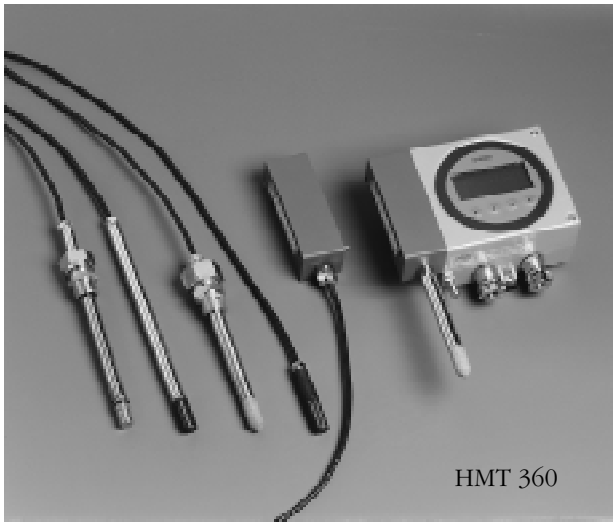
INTERCHANGEABLE PROBES

The HMT 360 intrinsically safe transmitters are based on a totally new approach for ease of operation, installation and maintenance. This new concept of modularity includes five different types of interchangeable probes, enabling fast and easy removal or reinstallation when required.

Calibration of the probes, for example, can be performed in a laboratory and the probe then easily replaced in the field without removing the transmitter.

SAFE INSTALLATION AND PERFORMANCE IN MOST HAZARDOUS AREAS

In hazardous environments, safe and reliable operation is a prerequisite for any instrument. Vaisala knows the humidity business and understands your need for accurate and trouble-free humidity control. In these environments, safety is of utmost importance.



HMT 360 Transmitter shown with selection of interchangeable probes.

Our new HMT 360 transmitter is rugged and employs the latest sensor technology. It operates safely and reliably even in Division 1.

The HMT 360 transmitter's proven performance and technology conform with the most rigorous international standards. And, as future standards change to reflect new knowledge, you can be confident that the HMT 360 series will conform to these standards as well.

The HMT 360 transmitters are an investment for the future; their longevity combined with trouble-free operation ensure a long term solution for your hazardous humidity and dewpoint monitoring requirements.

OPTIMIZED SENSORS

In addition to Vaisala's standard HUMICAP® Sensor, two application specific sensors are available:

- For environments with high concentrations of hydrogen (H_2)
- For environments with high concentrations of demanding chemicals.

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TECHNICAL DATA - HMT 360 INTRINSICALLY SAFE HUMIDITY AND DEWPOINT TRANSMITTERS WITH INTERCHANGEABLE PROBES

MEASURED VARIABLES

Relative humidity measurement range	0 - 100 %RH
Accuracy (including non-linearity and repeatability) when calibrated against:	
high quality, certified humidity standards	±1 %RH (0...90 %RH)
	±2 %RH (90...100 %RH)
salt solutions (ASTM E104-85)	±2 %RH (0...90 %RH)
	±3 %RH (90...100 %RH)
Response time (90%) at +68°F (+20°C) in still air (with sintered filter)	15 seconds
Sensors:	
HUMICAP®180	for typical applications
HUMICAP®180J	for hydrogen applications
HUMICAP®180L	for applications with a demanding chemical environment (max. 104°F (+40 °C) in high humidities)

Temperature

Measurement ranges:	
HMP361 probe	-40…140°F (-40...+60 °C)
HMP363 probe	-40°F…248°F (-40...+120 °C)
HMP364/365/368 probes	-40…356°F (-40...+180 °C)
Typical accuracy of electronics at +68°F (+20°C)	±0.18%F (±0.1 °C)
Typical temperature dependence of electronics	0.005°F/°F (0.005 °C/°C)
Sensor	Pt 1000 RTD 1/3 Class B IEC 751

CALCULATED VARIABLES (depends on model type)

Typical ranges

With HMP361 probe

dewpoint temperature	-40°F…140°F (-40...+60 °C)
mixing ratio	0...160 g/kg d.a.
absolute humidity	0...160 g/m³
wet bulb temperature	32…140°F (0...+60 °C)

With HMP363, HMP364, HMP365 & HMP368 probes

dewpoint temperature	-40…212F °(-40...+100 °C)
mixing ratio	0...500 g/kg d.a.
absolute humidity	0...600 g/m³
wet bulb temperature	0…212°F (0...+100 °C)

OUTPUTS

Two analog outputs (one standard, one optional)	Two wire 4...20 mA
Typical accuracy of analog outputs at +20 °C	±0.05% FS
Typical temperature dependence of analog outputs	0.003%/°F FS(0.005% /°C) FS
Optional LonWorks® channel	
RS232C serial output for service use	connector type RJ45

CLASSIFICATION WITH CURRENT OUTPUTS

Cenelec (76/117/EEC)	EEx ia IIC T5
	VTT No. Ex-99.E.005X
U.S.A., Canada, Japan and Australia	Pending
Safety factors with current outputs	Ui=28 V, Ii=100 mA, Ci=48nF, Li=22mH

LonWorks® MODULE

Connections	screw terminals, 0.33...2.0 mm²
wires (AWG 14-22)	
Connection type	XF78 (TP78)
Communication speed	78.125 kbit/s
Maximum cable length	
with dual terminated bus topology	1000 m
with free topology (incl. Terminators)	300 m
Application power	two-wire power & signal
Signalling form (unipolar)	IS node draws 20 mA to transmit

LonWorks® module classification

EU (76/117/EEC)	Eex ia IIC T4
VTT No. Ex-99.E.006X	
Safety factors with LonWorks® module	Ui=24 V, Ii=225 mA, Pi=1.2 W, Ci= 0 F, Li=22mH

GENERAL

Operating voltage	12...28 V
with serial port (service mode)	15...28 V
Connections	screw terminals, 0.33...2.0mm² wires (AWG 14-22)
Cable bushing	Pg11 (5...12mm)
Conduit fitting	Pg11/NPT 1/2"-14
Operating temperature range for electronics	-40…140°F (-40...+60 °C)
with display and/or with LonWorks® module	-4…140°F (-20...+60 °C)
Storage temperature range	-40…158°F (-40...+70 °C)
Housing material	G-A1Si 10 Mg (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Housing dimensions	164 x 115 x 62mm
Housing weight	950g
Fully electromagnetically compatible according to standards	EN50081-1 and EN50082-2

OPTIONS AND ACCESSORIES

Display	two-line LCD
character size (1st line/2nd line)	12 mm/10 mm
Calculated output variables	dewpoint temperature mixing ratio absolute humidity wet bulb temperature
Additional analog output	4...20 mA
LonWorks® channel	XF78 (TP78)

Duct mounting installation kit (for HMP363 sensor head)	Order code: HMP233FAH
Installation flange (for HMP365 sensor head)	
aluminium	Order code: HMP235FA
stainless steel	Order code: HMP235 FS
Ball valve set (for HMP368 sensor head)	Order code: DMP248VS
pressure range at 68°F (+20 °C)	0...70 bar
Serial interface cable for PC	
connectors RJ45 - D9 female	Order code: 19446ZZ

BACK to Table of Contents
To INDEX
HMT 360 Price List

LONMARK™ PARTNER

Probes for HMT 360 Intrinsically Safe Humidity and Dewpoint Transmitter

HMT 360 transmitter shown with HMP 361 probe.

The HMT 360 transmitter can be ordered with any one of the following five probe options:

HMP 361 - Wall mount
HMP 363 - Confined spaces
HMP 364 - High pressure
HMP 365 - High temperature
HMP 368 - Pressurized pipelines

Each probe design offers unique advantages for various applications.

The HMT 360 transmitter with the HMP 361 probe, shown to the left, together are referred to as: the HMT 361.

HMP 361 probe

HMP 361 - Wall Mount Probe

Temperature range	-40°...+248°F (-40°…+120°C)

Sensor protection options:

PPS grid with steel netting filter
Stainless steel sintered filter
PPS gird
Stainless steel filter

The HMP 361 probe together with the HMT 360 transmitter are referred to as: the HMT 361.

Price Lists:

HMT 360 Probes

HMT 361

HMT 363

HMP 363 probe

HMP 363 - Probe for Confined Spaces

Temperature range	-40°...+248°F (-40°…+120°C)

Sensor head cable length	2, 5, or 10 meters
Sensor head cable diameter	5.5mm

Sensor protection options:

PPS grid with steel netting filter
Stainless steel sintered filter
PPS gird
Stainless steel filter

The HMP 363 probe together with the HMT 360 transmitter are referred to as: the HMT 363.

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PROBES FOR HMT 360 INTRINSICALLY SAFE HUMIDITY AND DEWPOINT TRANSMITTER (CON'T.)


HMP 364 probe

HMP 364 - Probe for High Pressure

Temperature range	-40°...+356°F (-40°…+180°C)
Pressure range	0…10 Mpa (0…100 bar)
Sensor head cable length	2, 5, or 10 meters
Sensor head cable diameter	5.5mm
Sensor protection options:	
	PPS grid with steel netting filter
	Stainless steel sintered filter
	PPS gird
	Stainless steel filter

The HMP 364 probe together with the HMT 360 transmitter are referred to as: the HMT 364.


HMP 365 probe

HMP 365 - Probe for High Temperatures

Temperature range	-40°...+356°F (-40°…+180°C)
Sensor head cable length	2, 5, or 10 meters
Sensor head cable diameter	5.5m
Sensor protection options:	
	PPS grid with steel netting filter
	Stainless steel sintered filter
	PPS gird
	Stainless steel filter

The HMP 365 probe together with the HMT 360 transmitter are referred to as: the HMT 365.


HMP 368 probe

HMP 368 - Probe for Pressurized Pipe Lines

Temperature range	-40°...+356°F (-40°…+180°C)
Pressure range	0…4 Mpa (0…40 bar)
Sensor head cable length	2, 5, or 10 meters
Sensor head cable diameter	5.5m
Sensor protection options:	
	PPS grid with steel netting filter
	Stainless steel sintered filter
	PPS gird
	Stainless steel filter

The HMP 368 probe together with the HMT 360 transmitter are referred to as: the HMT 368.

BACK to Table of Contents

To INDEX

Price Lists:
HMT 364

HMT 365

HMT 368

HMP 260 EX Intrinsically Safe Humidity Transmitter

FEATURES

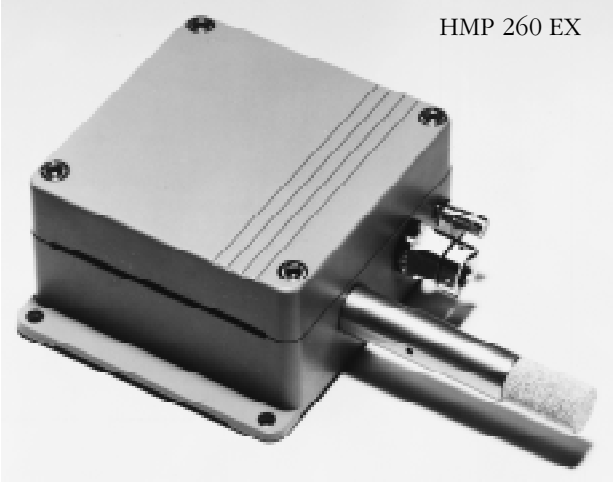
- Meets classification EEx ia IIC (T6) Classes I, II, III, Div 1, Groups A-G
- Temperature compensation
- Full 0 to 100% RH measurement
- Includes zener barriers enclosed in separate NEMA 4 housing

FOR USE IN HAZARDOUS LOCATIONS

An intrinsically-safe humidity transmitter, the HMP 260 EX is designed for use in potentially explosive environments. Hospitals, chemical and petrochemical industries, as well as many processing industries should use this transmitter where substances, such as solvents and explosive dusts, present such a hazard. The HMP 260 EX can even be used in hydrogen, one of the most easily ignitable gases. Its classification means that it can be used in areas where an explosive gas atmosphere is continuously present, or is present for long periods of time; and that protection is maintained with up to two components or other faults. When used in environments where explosion protection is essential, the HMP 260 EX must always be connected to the power supply through the zener barriers.

FAST AND RELIABLE

Fast, stable, and accurate, the HMP 260 EX has been fully temperature compensated over the entire measurement range of 0...100% RH in temperatures from -4 to +140 °F (-20°C to +60°C). It utilizes Vaisala's HUMICAP® capacitive thin-film humidity sensor which has proven successful in many demanding industrial applications with accuracies of up to ±2%RH. Furthermore, the sensor is not affected by most chemicals and dust particulates.



HMP 260 EX Complete with barriers enclosed in separate NEMA 4 housing.

Factory Mutual System
Approved

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - HMP 260 EX

General

Classification:	EEx ia ll C T6 Classes I,II,III, Div.1, Groups A,B,C,D,E,F,G
Maximum supply voltage:	26 VDC
Current consumption:	4...20 mA
Operating temperature range:	-4...+140°F (-20 ...+60°C)
Storage temperature range:	-40...+167°F (-40 ...+75°C)
Housing material:	Cast $AlSl_{12}$(DIN 1725)
Housing classification:	NEMA4 (lP 65)
Sensor head:	$AlMgsi_1$ (DIN 1725)
Sensor protection:	sintered filter 216 µm (part no. 6686)
Connections:	screw terminal 0.5 ...1.5 mm^2
Cable bushing:	for 5.5 ...10 mm cables
Grounding connection:	DFG/1 EN screw terminal (DIN EN 50014/19)
Barrier:	Stahl # 9001/51-280-110-14
Weight:	925 g

Relative Humidity

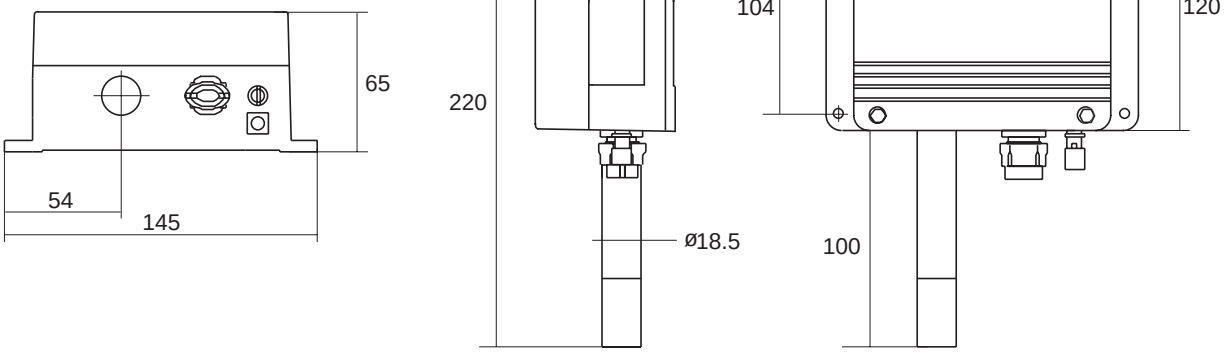
Measurement range:	0 ... 100% RH
Accuracy +68°F (+20°C) (including unlinearity, repeatability and hysteresis)	±2%RH (0...90%RH) ±3%RH (90...100% RH)
Temperature dependence:	±0.02%RH/°F (±0.04%RH/°C)
Output:	4...20 mA (load 0...250 ý)
Max. load with barrier	1000 ý
Long-term stability	better than 1%RH per year (typical)
Response (90% at +68°F (+20°C) in still air)	15 s with sintered filter
Sensor:	Capacitive thin-film HUMICAP® H

In explosive areas the HMP 260EX must be connected to the power supply through a zener barrier.

Specifications subject to change without prior notice.

HMP 260EX

Dimensions in mm



BACK to Table of Contents

To INDEX

HMP 260 Ex Price List

60/70 Series Duct & Wall-Mount Humidity & Temperature Transmitters for HVAC/EMCS

FEATURES/BENEFITS

- Full 0...100 %RH measurement
- True two-wire transmitters with 4...20 mA loop powered output (HMD 60 and HMW 60)
- Selectable signal output of 0...1 V, 0...5 V or 0...10 V (HMD 70 and HMW 70) with optional current module also 0...20 mA (HMD 70)
- Electromagnetically compatible
- Temperature compensated
- Excellent long-term stability
- Up to ± 2 %RH accuracy
- HUMICAP® humidity sensor for excellent accuracy and long-term stability, negligible hysteresis and resistance to dust and most chemicals.
- ±2% RH accuracy (0...90%)
  ±3% RH accuracy (90...100%)
- NEMA 4 housing (duct unit only)
- Also available as temperature-only transmitters HMD/W 60T/70T

OPTIMAL ENERGY MANAGEMENT

The duct and wall-mounted HMD/W 60 and HMD/W 70 transmitters are designed for monitoring relative humidity and temperature in building energy management systems. The combination of high accuracy, stability and reliable operation makes these products the ideal choice for demanding energy management applications.

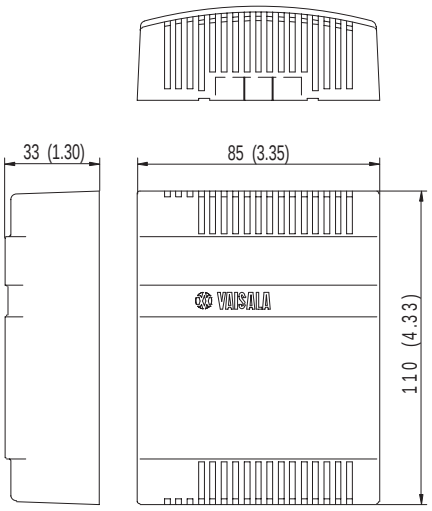
The duct mount transmitters can also be used in many industrial humidity monitoring applications, where their stability and resistance to chemicals and dust are of great value.

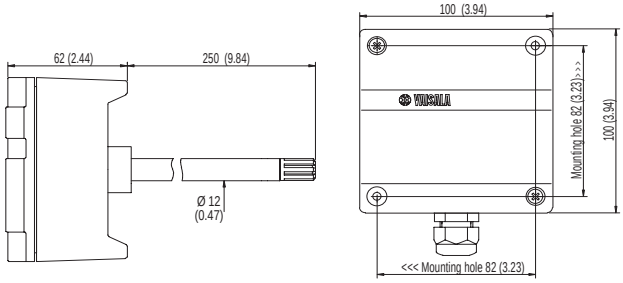
A novel feature of these duct mount transmitters is the ability to remove the electronics without disassembling the unit from the duct.

The HMD/W 60 and HMD/W 70 transmitters are available in three models: U for humidity measurement-only, Y for humidity and temperature measurement, and T for temperature only.

FAST, ON-SITE CALIBRATION

The accuracy of the transmitters is simple to check using the HMI 41 humidity calibrator. The calibration can be done in seconds with a single potentiometer without disturbing operation. This saves hours of maintenance time and ensures high system accuracy.





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E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - HMD/W 60 AND 70 SERIES

60 Series: 2-wire, 4 to 20 mA output

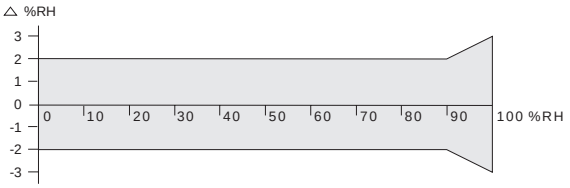
wall mount	RH only	HMW60U
	RH & T	HMW60Y
duct mount	RH only	HMD60U
	RH&T	HMD60Y

70 Series: 3-wire, variable voltage output

wall mount	RH only	HMW70U
	RH & T	HMW70Y
duct mount	RH only	HMD70U
	RH & T	HMD70Y

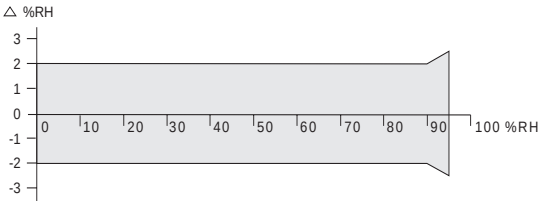
Relative Humidity (duct-mount models)

Measurement range 0...100 %RH*
Accuracy at +68°F (+20°C)

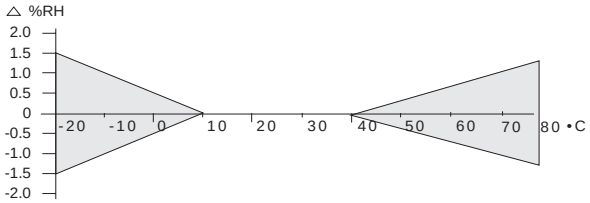


Relative Humidity (wall-mount models)

Measurement range 0...95 %RH*
Accuracy at +68°F (+20 °C)



Temperature dependence



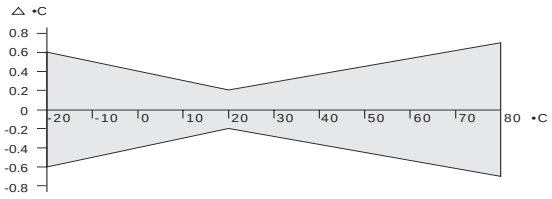
Response time at +68°F (+20 °C),
90% response 15 s (with membrane filter)
Sensor HUMICAP® 180

* Output signal corresponds to 0-100%RH

Meets EMC standard EN50081-1 and EN50082-1.
Specifications subject to change without notice.
HUMICAP is a registered trademark of Vaisala.

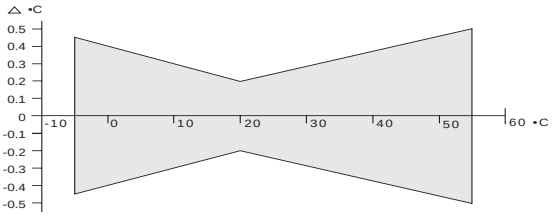
Temperature (Y-models only)

Linearity better than 0.18°F (0.1 °C)
Sensor PT 1000 IEC 751 class B
(HMD 60Y and HMD 70Y)
Measurement range -4...+176 °F (-20...+80 °C)
Accuracy



(HMW 60Y and HMW 70Y)

Measurement range +23...131°F (-5...+55 °C)
Accuracy



General - 60 series

Supply voltage 10...35 VDC (R_L = 0 ohm)
20...35 VDC (R_L = 500 ohm)
Output signal 4...20 mA

General - 70 Series

Supply voltage range depends on the selected output signal

	DC	AC
0...1V	10...35 V	9...24 V
0...5 V	14...35 V	12...24 V
0...10 V	19...35 V	16...24 V
0...20 mA (R_L = 0 ohm)	10...35 V	11...24 V**
0...20 mA (R_L = 500 ohm)	20...35 V	17...24 V**

** HMD models only.

General

Operating temperature range
electronics +23...+131°F (-5...+55 °C)
sensor head (duct mount) -4...+176°F (-20..+80 °C)
Storage temperature range -40...+176°F (-40...+80 °C)
Housing
sensor head (duct mount) stainless steel
electronics (duct mount) cast aluminum
electronics (wall mount) ABS plastic
Connections screw terminals 0.5...1.5 mm²
Sensor protection (duct mount)
standard membrane filter (17039 HM)
option stainless steel sintered filter (HM46670)

BACK to Table of Contents
To INDEX
Price Lists: Duct/Wall
Temp Only

HMW 21/31 Series
Humidity and Temperature Transmitters

FEATURES/BENEFITS

- Full 0 to 100%RH measurement
- 4 to 20 mA output (HMW 21)
- Selectable voltage output (HMW 31)
- Temperature compensation
- ±2% accuracy
- Optional temperature measurement
- NEMA 4 housing
- Electronic, on-site, one-point calibration

HMW 21/31 Series

NEMA 4 PROTECTIVE ENCLOSURE

The HMW 21 and HMW 31 series is configured for measuring relative humidity and temperature in systems in more demanding environments, where condensation and dust will commonly be encountered. A fully gasketed NEMA 4 enclosure, locking strain relief connector and membrane filter protect the electronics and sensors from environmental or mechanical damage. These transmitters are available as relative humidity only (UB), and as relative humidity and temperature (YB).

OUTPUT SIGNALS

The HMW 21 series features 2-wire, 4-20 mA output signals proportional to 0 to 100 %RH and -4 to +176°F (-20 to 80°C). It can be powered by AC or DC voltage. The HMW 31 series features output signals of 0-1V, 0-5V, 0-10V and 0-20 mA and can be powered by either AC or DC voltage.

FAST, ON-SITE CALIBRATION

The accuracy of the transmitters is simple to check using the HMI 41 humidity calibrator. The calibration can be done in seconds with a single potentiometer without disturbing operation. This saves hours of maintenance time and ensures high system accuracy.

THE UNIQUE HUMICAP® SENSOR

These relative humidity transmitters feature Vaisala's patented HUMICAP sensor. It is based on the capacitance change in a one-micron-thin polymer as it absorbs water vapor. The sensor exhibits fast response and has excellent long term stability, allowing the transmitters to achieve ±2 % accuracy. It is unaffected by dust and most chemicals.

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TECHNICAL DATA - HMW 21/31 SERIES

Relative Humidity

Measurement range	0 to 100 %RH
Accuracy at +68°F (+20 °C)	±2 %RH (0 to 90 %RH) ±3 %RH (90 to100 %RH) (includes calibration uncer-tainty, non-linearity, non-repeatability)
Temperature coefficient	±0.02%RH/°F s(±0.04%RH/°C)
90% response time	15 sec with protective filter
Sensor	HUMICAP® H

Temperature (HMW 21YB and HMW 31YB)

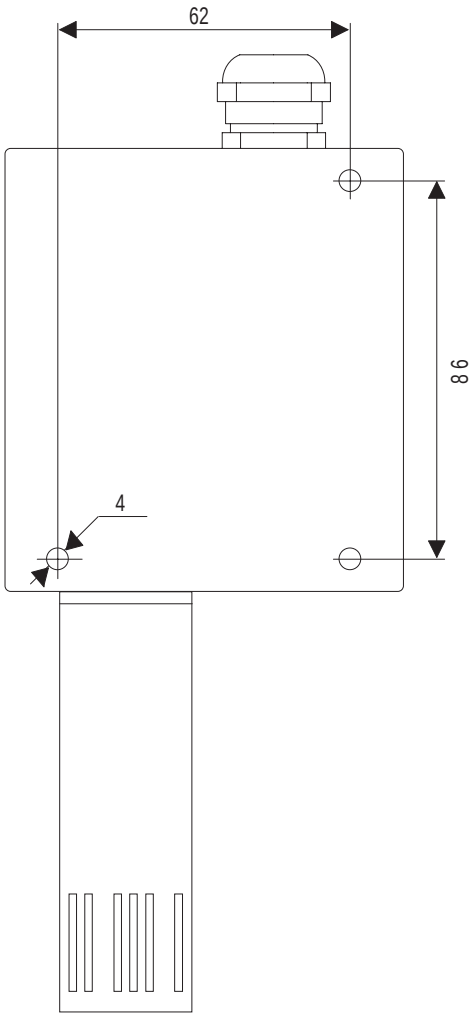
Electronics accuracy at +68°F (+20 °C)	±0.36°F (±0.2 °C)
Temperature coefficient	±0.02°F/°F (±0.02°/°C)
Linearity	better than 0.18°F (0.1 °C)
Sensor	Pt 100 IEC 751 1/3 Class B

General

Electrical connections	Screw terminals for wires 0.5...1.5 mm² (AWG 20...16)
Housing material	ABS plastic (NEMA 4)
Sensor protection	Ø 18 mm membrane filter or sintered filter (optional)
Operating temperature range	
Electronics	+23 to +131 °F (-5 to +55 °C)
Measurement range	-4 to +176 °F (-20 to +80 °C)

HMW 21 and HMW 31 Series

Dimensions in mm



HMW 21UB and HMW 21YB

Input voltage:	10 to 35 VDC (R_L = 0 ohms) 20 to 35 VDC (R_L = 500 ohms)
Output signals	4 to 20 mA

HMW 31UB and HMW 31YB

Output	Supply Voltage	
DC	DC	AC
0 to 1V	10 to 35V	9 to 24V
0 to 5V	13 to 35V	11 to 24V
0 to 10V	18 to 35V	15 to 24V
0 to 20mA	10 to 35V	9 to 24V (R_L = 0 ohm)
0 to 20mA	19 to 35V	16 to 24V (R_L = 500 ohm

Specifications subject to change without notice.

HUMICAP® is a registered trademark of Vaisala

BACK to Table of Contents

To INDEX

HMW 21/31 Price List

HMD 60UO/YO Reliable Outdoor Humidity & Temperature Transmitter with Solar Radiation/Precipitation Shield

STABLE PERFORMANCE IN DEMANDING OUTSIDE ENVIRONMENTS

The HMD 60U and HMD 60Y duct-mount transmitters provide excellent reliability, long-term stability, and reliable operation. They incorporate the HUMICAP® humidity sensor, which is insensitive to dust and most chemicals and is not damaged by condensation. In outdoor environments, the 2212 HM shield protects the sensors from solar radiation and precipitation, without affecting performance. The HMD 60U and HMD 60Y measure relative humidity from 0 to 100% RH, and temperature (Model HMD 60Y only) from
-40 to +140 °F (-40 to +60 °C). Easily installed, they feature two wire connections, making retrofitting, upgrading and new installations easy.

SPECIAL FEATURES INCLUDE:

- Full 0 to 100% RH measurement
- 2212 HM shield provides excellent ventilation while blocking direct and reflected solar radiation
- True two-wire transmitter with 4 to 20 mA loop powered output: compatible with most energy management systems
- Electromagnetically compatible
- Temperature compensated
- Excellent long-term stability
- Negligible temperature coefficient
- ±2% accuracy (0...90%) ±3% (90%...100%)
- NEMA 4 housing

FAST, ON-SITE CALIBRATION

The accuracy of the transmitters is simple to check using the HMI 41 humidity calibrator. The calibration can be done in seconds with a single potentiometer without disturbing operation. This saves hours of maintenance time and ensures high system accuracy.

METEOROLOGICAL EXPERIENCE RESULTS IN SUPERIOR PERFORMANCE

Vaisala has 60 years of experience in measuring RH &T in outdoor environments. Our experience has shown, that for accurate measurement, the shield must not only protect but must be properly ventilated. The 2212 HM shield provides these functions without affecting transmitter performance. The transmitter and shield can be mounted on the roof or the side of a building for installation flexibility.

Model HMD 60YO for Relative Humidity and Temperature, shown above with 2212 HM Radiation Shield.

Model HMD 60UO for Relative Humidity only.

Model HMD 60T for Temperature only.

FLEXIBILITY OF OUTPUTS

Versatile alternatives to the HMD 60UO/YO transmitters for outdoor applications are the HMD 70 UO/YO transmitters. These instruments feature selectable output signals of 0 to 1V, 0 to 5V, 0 to 10V or 0 to 20 mA. Powered by either AC or DC voltage, they are available with relative humidity only or relative humidity and temperature sensors. They are also equipped with the radiation/precipitation shield.

100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - HMD 60UO/HMD 60YO

General

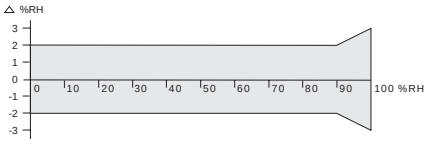
Supply voltage	10...35 VDC (R_L = 0 ý) 20...35 VDC (R_L = 500 ý)
Output signal	4...20 mA
Operating temperature range	
electronics	-40 to +140 °F (-40 to +60 °C)
sensor head	-40 to +140 °F (-40 to +60 °C)
Storage temperature range	-40...+176 °F (-40...+80 °C)
Connections	screw terminals 0.5...1.5 mm²
Housing	
sensor head	stainless steel
electronics housing	cast aluminum
Sensor protection	membrane filter
optional	stainless steel sintered filter

Relative Humidity

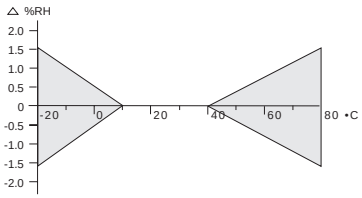
HMD 60U and HMD 60Y

Measurement range	0...100 %RH

Accuracy at +68°F (+20 °C)



Temperature dependence

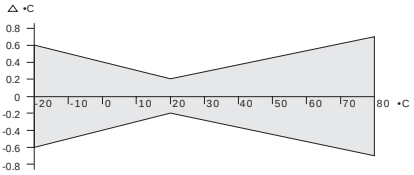


Response time at +68°F (+20 °C)	15 s with membrane filter
Sensor	HUMICAP® 180

Temperature (Y and T Models only)

Measurement range	-40 to +140 °F (-40 to +60 °C)

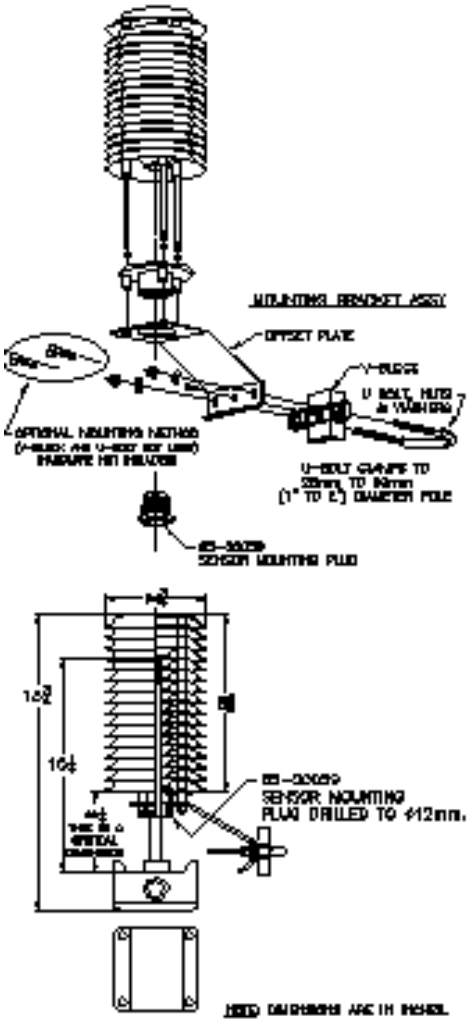
Accuracy



Linearity	better than 0.18°F (0.1 °C)
Sensor	PT 1000 IEC 751 class B

Specifications subject to change without notice.

MODEL 2212HM SOLAR RADIATION/PRECIPITATION SHIELD



2212 HM Shield

Diameter	4.7 in (12 cm)
Height	10.6 in (27 cm)
Plate thickness	0.08 in (2 mm)
Plate spacing	0.44 in (11 mm)
Weight	1.4 lbs (0.7 kg)
Materials	UV stabilized white thermoplastic
Sensor mounting	1 in threaded hex plug with hole drilled for sensor probe
Mounting	Offset mounting with V-block and U-bolt, fits pipe diameters 1-2 in 25-50mm
Optional mounting	Offset mounting bracket without U-bolt shield can be bolted into supporting surface (bolts not included)

BACK to Table of Contents
To INDEX
HMD 60/70 Price List

40/50 Series Calibration-Free Wall/Duct Mounted Humidity & Temperature Transmitters

FEATURES/BENEFITS

- Never need calibration
- Fully interchangeable INTERCAP® sensor is easy to replace
- Low cost
- 0...100 %RH measurement
- +14...140 °F measuring range (HMD 40Y/HMD 50Y)
- +23...131 °F measuring range (HMW 40Y/HMW 50Y)
- 4-20 mA 2-wire output (HMD/W 40)
- 3-wire selectable output (HMD/W 50)

INTERCHANGEABLE SENSOR

Vaisala's HMD/W 40 and HMD/W 50 series incorporate the revolutionary INTERCAP® sensor. Because the INTERCAP is fully interchangeable, these transmitters never need calibration. Instead, the user can easily replace the INTERCAP sensor himself without the expense and inconvenience sometimes associated with the calibration process. And, in the duct mount model, the sensor's membrane filter/mechanical housing protects it from dirt and dust.

HUMIDITY & TEMPERATURE OR HUMIDITY ONLY

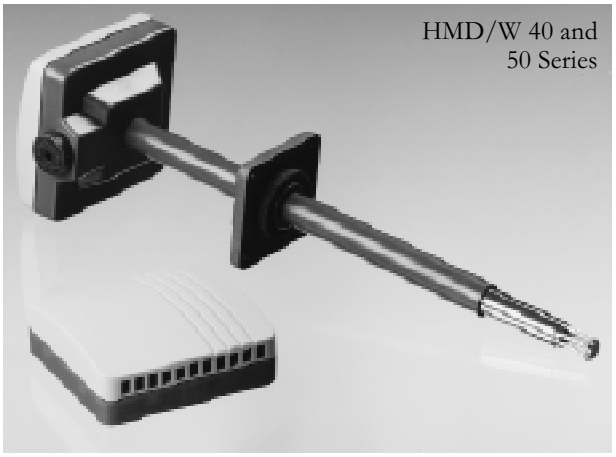
The duct and wall-mounted 40 and 50 series are available as humidity and temperature (Y), or humidity only (U) transmitters.

SELECTABLE FUNCTIONS (HMD/W 50)

The HMD/W 50 transmitters feature selectable output signals of 0 to 1V and 0 to 10 V. Powered by either AC or DC voltage, these transmitters can be duct or wall mounted.

HIGH PERFORMANCE AT LOW PRICES

Specifically designed for HVAC/EMCS applications, the HMD/W 40 and 50 series typically measure humidity levels with ±3 %RH accuracy and ±1 % stability per year. Easily installed directly into air ducts or within the controlled area, these transmitters feature two or three-wire connections, making retrofitting, upgrading or new installations easy. Competitively priced and requiring no routine maintenance, these calibration-free transmitters are a smart choice for your HVAC/EMCS applications.



HMD/W 40 and 50 Series

40 series: 2-wire, 4 to 20 mA output

Wall mount	*RH only HMW 40U*
	RH & T HMW 40Y
Duct mount	*RH only HMD 40U*
	RH & T HMD 40Y

50 series: 3-wire, voltage output

Wall mount	*RH only HMW 50U*
	RH & T HMW 50Y
Duct mount	*RH only HMD 50U*
	RH & T HMD 50Y

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TECHNICAL DATA - HMD/W 40 & 50 SERIES

Relative Humidity

Measuring range (for which accuracy is specified):	10...90 %RH
Accuracy at +68°F (+20 °C)	better than ±3 %RH
Stability	±2 %RH over 2 years
Temperature dependence:	< ±1.5% RH from -14° to +140°F (< ±1.5% RH from -10° to +60°C)
Sensor:	INTERCAP® part no. 15778

Temperature (40 Y and 50Y)

Measuring range	
HMD 40Y, HMD 50Y	+14...+140° (-10...+60°C)
HMW 40Y, HMW 50Y	+23...+131°F (-5...+55°C)
Total accuracy at +77°F (+25 °C)	±0.54°F (±0.3°C)
Temperature dependence	0.01°F/°F (0.01°C/°C)
Sensor	PT 1000 IEC 751 Class B

General

Output signal for relative humidity:	
HMD/HMW 40 series	4...20 mA
HMD/HMW 50 series	0...1 V and 0... 10 V (equals 0...100 %RH)
Output signal for temperature:	
HMD/HMW 40 series	4...20 mA
HMW 50 series	0...1 V and 0...10 V
HMD 50 series	0...10 V
HMD 40Y, HMD 50Y	equals -40…140°F (equals -40...+60 °C)
HMW 40Y, HMW 50Y	equals -23…131°F (equals -5...+55 °C)
Load resistance	>20 Kohm
Power supply	
HMD/W 40	10...28 VDC
HMD/W 50	12...35 VDC/12...24 VAC (for 0...1 V output) 15...35 VDC/15...24 VAC (for 0...10 V output)
Current consumption	
HMD/W 40	4 mA minimum
HMD/W 50	6.0 mA typical
Operating temperature range;	
HMD 40 and HMD 50	+14...+140 °F (-10...+60 °C)
HMW 40 and HMW 50	+23...+131°F (-5...+55 °C)
Storage temperature range	-40...+140°F (-40...+60 °C)
Operating humidity range	0...100 %RH (duct mounted) 0...90 %RH (wall mounted)
Sensor protection	
standard	membrane filter, part no. 17039
option	plastic grid, part no. 17038
Housing material and classifications	ABS plastic, IP 65 (HMD 40U/Y and HMD 50 U/Y)

Specifications subject to change without prior notice.
INTERCAP is a registered trademark of VAISALA.

1/2 " NPT conduit fitting adapter available.

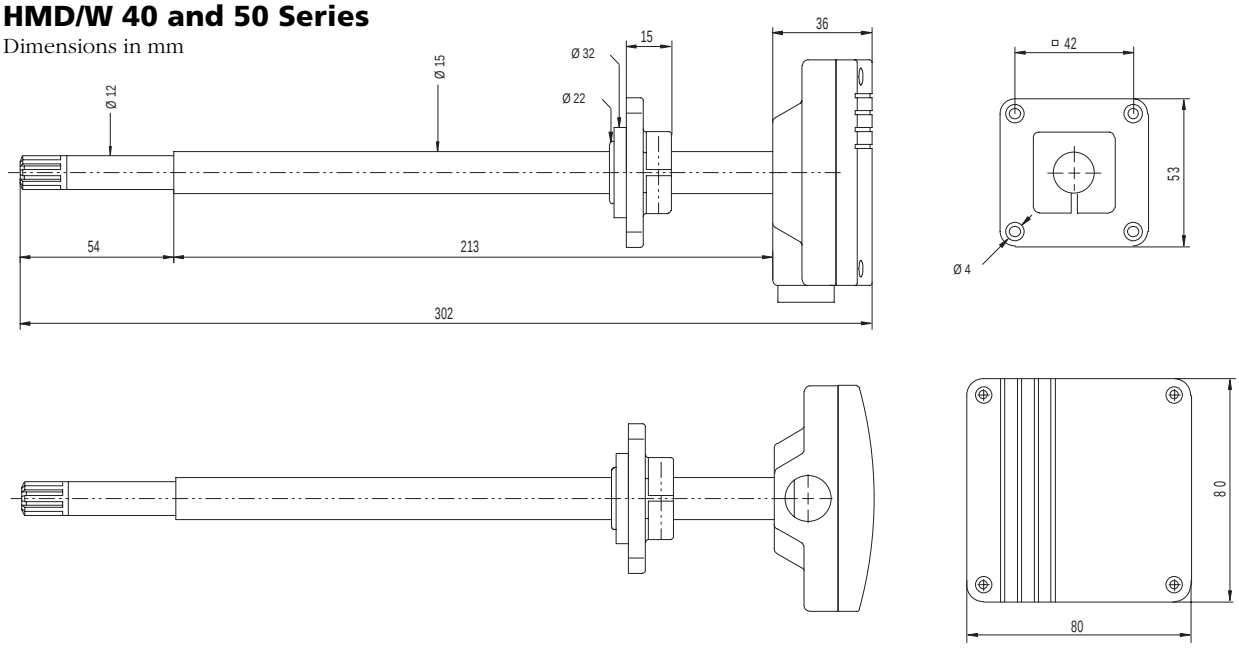
BACK to Table of Contents

To INDEX

HMD/W 40/50 Price List

HMD/W 40 and 50 Series

Dimensions in mm



HUMITTER® Calibration-Free Module with Interchangeable Sensor

FEATURES

- Never need calibration
- Fully interchangeable RH sensor is easy to replace
- Low cost
- 0...100% RH measurement
- 14…140°F (-10...+60°C) temperature measurement range (HUMITTER® 50Y and 50YX)
- Several user configurable outputs - mA or VDC
- ±3% accuracy with ±1% stability per year

IDEAL SOLUTION FOR OEM APPLICATIONS

Compact and easy to use, the HUMITTER® is available to measure humidity only (HUMITTER 50U), or humidity and temperature (HUMITTER 50Y and HUMITTER 50YX). The difference between the Y and YX models is in the output: the Y model has an active voltage output; and the YX model has a passive resistive output. The housing of the HUMITTER® transmitter is IP 65 classified, and due to its metallized surface, is also electromagnetically compatible. Output can be changed using external electronics in a wide range of voltages and currents. For these reasons the calibration-free HUMITTER® series is an ideal solution for various OEM and HVAC applications.

INTERCHANGEABLE FILTERED SENSOR

The HUMITTER® relative humidity transmitters incorporate the INTERCAP®, Vaisala's revolutionary, fully interchangeable sensor. Because of this feature, they never need calibration. Instead, the user can easily replace the INTERCAP® sensor himself without the expense and inconvenience sometimes associated with the calibration process. And, the sensor's membrane filter/mechanical housing protects it from dust and dirt.

EXPERIENCED R & D

To meet the demand for a low cost transmitter for volume applications and integration into other equipment, Vaisala designed the HUMITTER® series. Among Vaisala's most recent significant technological developments, the HUMITTER® series has benefitted from many years of research and development by Vaisala's highly respected, world-renowned scientists. Since inventing and patenting the first capacitive humidity sensor many years ago, Vaisala has consistently relied on past and ongoing research to quickly develop superior products which meet our customers' needs. We welcome the opportunity to apply our technology to satisfy your requirements.

HUMITTER® 50U Relative Humidity Transmitter

HUMITTER® 50Y Humidity/Temperature Transmitter with active voltage output

HUMITTER® 50YX Humidity/Temperature Transmitter with passive resistive output

100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - HUMITTER

Relative Humidity

Measuring range (for which accuracy is specified)	10...90% RH
Accuracy at 68°F (+20°C)	better than ±3% RH
Operating range	0...100% RH
Stability:	±2% RH over 2 years
Temperature dependence	< ±1.5% RH from -10° to +60°C
Sensor	INTERCAP® part no. 15778

Temperature

Y model -active output	
Measuring range	+14...140 °F (-10...+60°C)
Accuracy at 68°F (+20°C)	1.1°F (± 0.6 °C)
Sensor	PT 1000 IEC 751 Class B
YX model - passive output	
2-wire connection wire resistance	2 x 0.08 ohm
Sensor	PT 1000 IEC 751 Class B

General

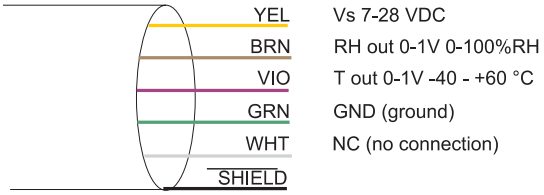
Input power	7...28 VDC
Output signal	0...1 V, R_L > 100 ký, (equals 0...100% RH and -40...140 °F (-40...+60°C) (10mV equals one % RH or °C)
	0...5 V available for model 50 U only.*
	other voltage outputs and 4...20 mA output available when using external electronics

YX Model has only passive resistive output corresponding to PT 1000 specification

Current consumption	2 mA typical
Operating temperature range	+14...+140°F (-10...+60°C)
Storage temperature range	-40...140 °F (-40...+60°C)
Operating humidity range	0 ... 100% RH
Sensor protection	membrane filter, part no. 16131
option	plastic grid, part no. 15724
Housing material and classification	ABS plastic, NEMA 4 (IP 65)
Dimensions	ø 12 mm, length 69 mm
Cable length	313 mm
Power supply	7...28 VDC

* Input power: 11-16 VDC
Specifications subject to change without notice.
INTERCAP® is a registered trademark of VAISALA, Inc.

Cable connections



BACK to Table of Contents

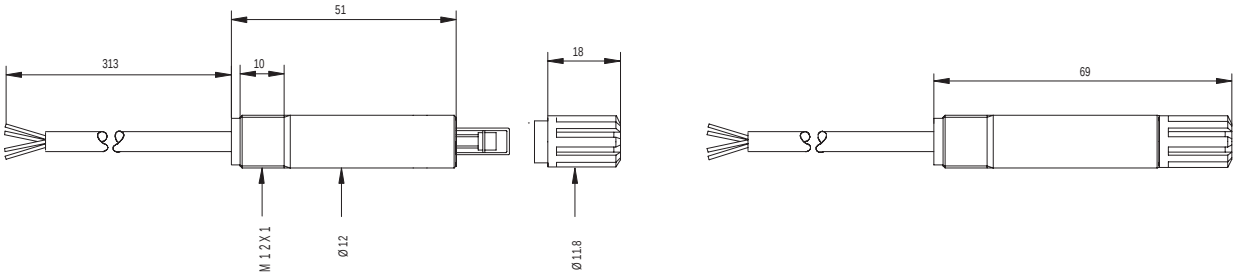
To INDEX

HUMITTER Price List

In HUMITTER 50YX resistive temperature output via the violet and white wires

HUMITTER® Series

Dimensions in mm



HMM 22D and HMM 30C Relative Humidity Modules for Custom Applications

SMALL, EASY-TO INSTALL PRODUCTS FEATURE RUGGED SENSOR

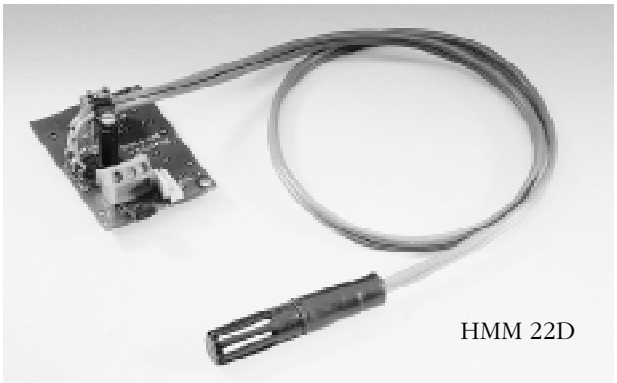
Vaisala has developed several different products for OEM applications. Two of these products, the HMM 22D and HMM 30C, were developed for installation into environmental control chambers and are excellent examples of how Vaisala can meet the specific requirements of our customers.

Both the HMM 30C and the HMM 22D are small and easy to install directly onto the wall of a chamber or other device. The HMM 30C was designed for high temperature, high performance environmental chambers, such as those used for accelerated aging tests, or for 85°C/85% RH testing. The probe is separated from the circuit board, allowing the electronics to be housed along with other sensor and controller boards. The HMM 22D module provides a 4 to 20 mA output and operates over a temperature range of -40 to +176 °F (-40 to +80 °C). It uses a small sensing head, separated from the circuit board via a cable. Both of these products use the HUMICAP® sensor to measure relative humidity from 0 to 100%, and can be maintained using Vaisala's on-site electronic calibration method.

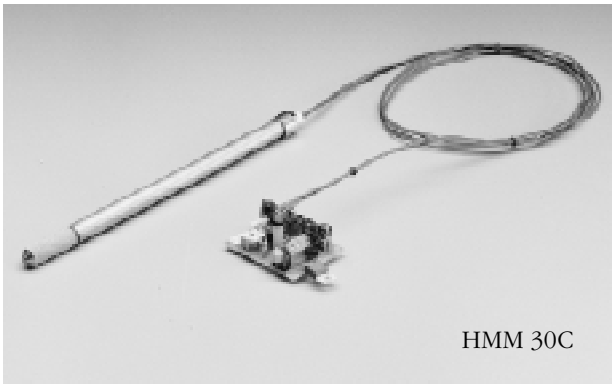
EXPERIENCED R&D DEPARTMENT DEVELOPS NEW PRODUCTS FOR SPECIFIC APPLICATIONS

Vaisala has a large R&D staff devoted to improving humidity sensing technology and to developing new products. Twenty five years ago this group invented and patented the first thin film capacitive humidity sensor and this team continues to be the industry leader. The expertise residing in this group makes it possible for Vaisala to develop products that will meet the specific requirements of OEM (Original Equipment Manufacturers) customers. Vaisala Inc. also has a knowledgeable technical sales force who provide the interface between our OEM customers and our R&D engineers. This capability is particularly useful when a customer is designing or manufacturing a product with rigid mechanical or electronic requirements.

The HMM 22D and HMM 30C are just two examples of the diverse products that have been designed to meet specific customer requirements. Contact Vaisala for new ideas on how to incorporate humidity monitoring into your product.



HMM 22D
For use in environmental chambers



HMM 30C
For high temperature environmental chambers

VAISALA
100 Commerce Way, Woburn, MA 01801
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E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - HMM 22D AND HMM 30C

HUMIDITY TRANSMITTERS - HMM 22D

General

Input voltage:	10 to 35 VDC (R_L=0 ohms) 20 to 35 VDC (R_L=500 ohms)
Output signal:	4 to 20 mA (true two-wire)
Electrical Connections:	Screw terminals for wires 0.5 to 1.5 mm²
Sensor protection:	Membrane filter or Sintered filter (optional)
Dimensions:	55 x 42 mm
Operating temperature range	
Electronics:	+23 to +131 °F (-5 to +55 °C)
Sensor:	-40 to +176 °F (-40 to +80 °C)
Cable length:	65 cm (25.6 in)
Probe dimensions:	ø 12 mm

Relative Humidity

Measuring range:	0 to 100% RH
Accuracy at +68°F (+20 °C)	±2% RH (0 to 90% RH) ±3% RH (90 to 100% RH) (includes calibration inaccuracy, nonlinearity, nonrepeatability)
Temperature coefficient:	±0.02%RH/°F (±0.04%RH/°C) when electronics & probe in same temp.
90% response time:	15 sec with membrane filter
Sensor:	HUMICAP®

HUMIDITY TRANSMITTER - HMM 30C

General

Output	Supply Voltage	
DC	DC	AC
0 to 1 V	10 to 35 V	9 to 24 V
0 to 5 V	14 to 35 V	12 to 24 V
0 to 10 V	19 to 35 V	16 to 24 V
0 to 20 mA	10 to 35 V	9 to 24 V (R_L = 0 ohm)
0 to 20 mA	20 to 35 V	17 to 24 V (R_L =500 ohm)

Electrical Connections:	Screw terminals for wires 0.5 to 1.5 mm²
Sensor protection:	Sintered filter
Operating temperature range:	
Electronics:	+23 to +131 °F (-5 to +55 °C)
Sensor:	-40 to +320°F (-40 to + 160°C)
Cable length:	1.6 m (5 ft)
Probe dimensions:	ø 12 mm, length: 200 mm

Relative Humidity

Measuring range:	0 to 100% RH
Accuracy at +68°F (+20 °C):	±2% RH (0 to 90% RH) ±3% RH (90 to 100% RH) (includes calibration inaccuracy, nonlinearity, nonrepeatability)
90% response time:	15 sec
Sensor:	HUMICAP® H

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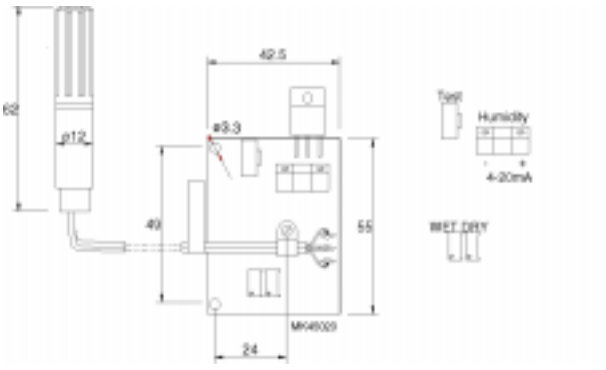
BACK to Table of Contents

To INDEX

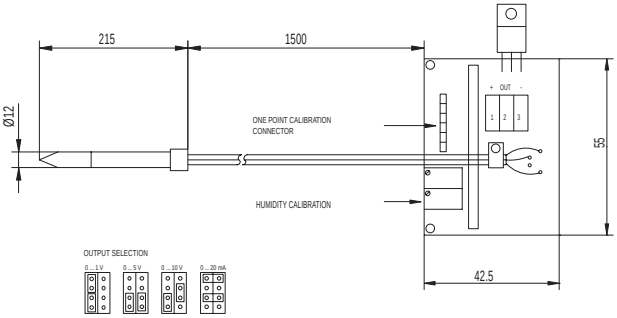
HMM 22D/30C Price List

HMM 22D



HMM 30C

Dimensions in mm



HMM 210 Series Humidity, Dewpoint and Temperature Modules for Demanding Applications

DIFFERENT CONFIGURATIONS TO MEET DEMANDING APPLICATIONS

The HMM 210 series modules are designed for Original Equipment Manufacturers (OEM's) needing humidity and dewpoint measurements in demanding applications. Examples include manufacturers of environmental chambers, growth chambers, incubators, and hatchers. These modules provide high accuracy over wide temperature and relative humidity ranges. Also, they remain accurate and reliable under extreme conditions where a combination of high humidity and rapidly changing temperature can result in condensation on the sensor head.

THREE PROBE CONFIGURATIONS

- RH + T probe
- Dewpoint probe features Vaisala's unique Composite Sensor, which remains heated a few degrees above ambient to prevent dew formation (condensation) on the sensor.
- Dewpoint probe described above, together with a temperature probe for obtaining dewpoint, relative humidity, and temperature outputs

THREE BOARD CONFIGURATIONS

- HMM 211 has analog outputs, and three-wire design. It is compatible with all three probes
- HMM 212 has current outputs, and two-wire design. It is compatible only with the RH + T probe.
- HMM 213 has RS232 output, and is compatible with all three probes

DIFFERENT PROBE AND CABLE LENGTHS AVAILABLE

- The probes are 12 mm in diameter and available in lengths of 90* or 215 mm.
- Cable lengths of 65 cm, 150 cm or 300 cm are available for the RH+T and dewpoint probes
- Cable lengths of 150 cm or 300 cm available for the temperature probe

*Humidity probe warming only available for the 90 mm probe.

HMM 211 shown with dewpoint probe

UNIQUE COMPOSITE SENSOR DESIGN OFFERS SEVERAL ADVANTAGES

This Composite Sensor, available on the dewpoint probe configuration, is warmed to always remain a few degrees higher than ambient. Advantages of this patented technique include:

- No condensation problems on the sensor, as the temperature of the probe always remains higher than the ambient
- Fast response time, especially in rapidly changing temperatures
- Improved stability and accuracy in high humidities

NEW RE-GAINING OPTION

For 25 years, Vaisala's HUMICAP sensor has proven its resistance to dust and most chemicals, time and time again. However, for some extreme applications such as chemical exposure in chambers, when there is a risk of certain rare chemicals accumulating on the sensor, thereby decreasing accuracy, Vaisala's new re-gaining option is recommended. With this option, contaminants are evaporated from the sensor and performance is returned to normal. Re-gaining is always activated when the module is switched on to remove the effects of cleaning, sterilization, etc.

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TECHNICAL DATA - HMM 210 SERIES

RELATIVE HUMIDITY

Measurement range	0...100%RH
Accuracy against salt solutions (ASTM E104-85)	±2%RH (0...90%RH) ±3%RH (90...100%RH)
Achievable accuracy when calibrated against high quality humidity standards	±1%RH (0...90%RH) ±2%RH (0...100%RH)
Response time	(90%) at +68°F (+20 °C)
in still air (with sintered filter)	15 s
Typical temperature dependence of electronics	±0.01%RH/°F (0.02 %RH/°C)
Humidity sensor	HUMICAP®180

TEMPERATURE

Measurement range	-94°… +356 °F (-70°...+180°C)
Typical accuracy of electronics at +68°F (+20°C)	±0.18% (±0.1°C)
Typical temperature dependence of electronics	0.0025°F/F (0.0025°C/°C)
Temperature sensor in RH+T probe	Pt 100 RTD IEC 751 1/3 Class B
Additional temperature probe	Pt 100 RTD IEC 751 1/4 Class B

OUTPUTS

Two analog outputs selectable	
HMM 211	0...1 V, 0...5 V, 0...10V 0...20 mA
HMM 212	4...20mA (loop powered)
Digital output	
HMM 213	RS232

GENERAL

Operating temperature range	
Probe	-94°… +356°F (-70°...+180 °C)
Electronics	-23°… +131°F (-5...+55 °C)
Storage temperature range (Electronics)	-40°… +160°F (-40°...+70 °C)
Sensor protection (standard)	stainless steel sintered filter
Connections	screw terminals for 0.5...1.5 mm2 wires

Meet EMC standards EN50081-1 and EN50082-2.

POWER SUPPLY

Operating voltage	10...35 VDC

In modules with analog outputs the supply range depends to a certain extent on the selected output range.

Current consumption without sensor head warming or re-gaining option	
HMM 211 & 213	12 mA at 35 VDC

CONFIGURATION OPTIONS

Probes	Compatible with modules: HMM 211	HMM 212	HMM 213
RH+T	yes	yes	yes
Dewpoint (heated composite sensor)	yes		yes
Temperature	yes		yes

Cable lengths

RH+T and Dewpoint probes	65, 150 and 300 cm
Temperature probe	150 and 300 cm

Regaining Automatically takes place at power-up

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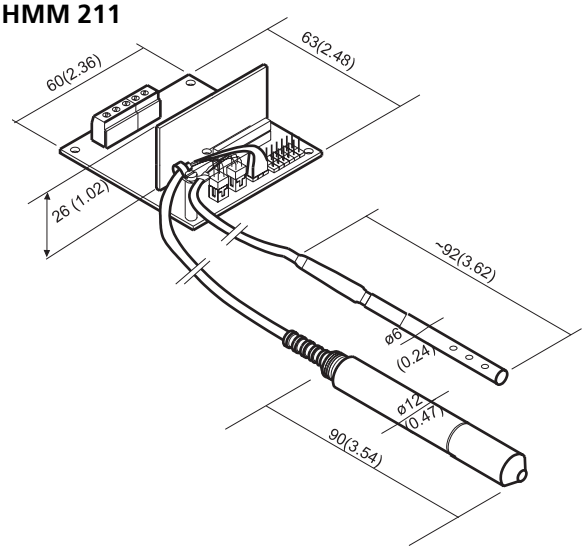
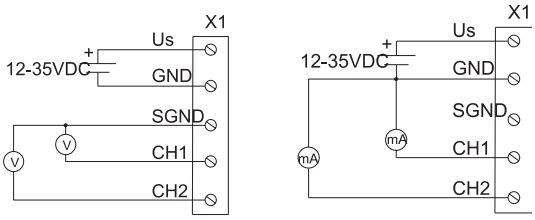
Specifications subject to change without further notice.

Dimensions in mm (inches)

HMM 211



HMM 211 Wiring diagram



BACK to Table of Contents
To INDEX
HMM 210 Price List

HMK 15 Humidity Calibrator

EASY AND RELIABLE CALIBRATION

No measuring instrument stays accurate by itself. It is essential that the functioning of an instrument is checked against a reference from time to time. Vaisala has developed the Humidity Calibrator HMK 15 to make calibration and spot checking of humidity probes and transmitters easy and reliable.

The operating principle of the HMK 15 is based on the fact that a saturated salt solution generates a certain relative humidity in the air above it. The reading of the humidity probe or transmitter can then be adjusted accordingly. This is a generally accepted and reliable method for calibrating humidity instruments - many leading laboratories use this method. Usually two or three different salt solutions are used which are chosen according to the application.

The structure of the HMK 15 is designed to ensure fast and stable temperature equilibration. No external power is required. In addition to laboratory use, it is also suitable for on-site checks. Special transit covers make the HMK 15 particularly simple to transport. These features, together with the premeasured salts with a long life-span (even after taken into use), make the HMK 15 the ideal choice for the most demanding user.

The calibrator can be ordered with certified salts. A sample calibration is made from each batch in Vaisala's Measurement Standards Laboratory (MSL). The uncertainties achieved using these salts at e.g. +20 °C are given here:

- LiCl salt, 11 %RH (±1.3 %RH)
- $MgCl_2$ salt, 33 %RH (±1.2 %RH)
- NaCl salt, 75 %RH (±1.5 %RH)
- K_2SO_4 salt, 97 %RH (±2.0 %RH)

HMK 15 includes a thermometer which is used for measuring the temperature during the calibration, and can also be used for checking temperature measurement accuracy of the transmitter. The accuracy of the thermometer is ±0.54°F (±0.3°C). Each thermometer has been calibrated in Vaisala's Measurement Standards Laboratory (MSL).

HMK 15

Vaisala's Measurement Standards Laboratory is a FINAS accredited calibration laboratory. FINAS is a member of the EA (the European co-operation for Accreditation).

FINAS AKKREDITOINTI SUOMI FINLAND

K008 (EN45001)

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TECHNICAL DATA - HMK 15 HUMIDITY CALIBRATOR

HUMIDITY CALIBRATOR HMK15

The standard HMK15 consists of the following parts:

- Two salt chambers, chamber covers and transit covers
- Base plate
- Calibrated thermometer (19728HM)
- Measurement cup and mixing spoon.

Salts, ion exchanged water (19767HM) and extra salt chambers (19766HM) can be ordered as options as well as a handy carrying bag (HM27032).

Each salt chamber of the HMK15 has holes with a diameter of 12, 13.5 and 18.5 mm. There are two holes with the diameter of 13.5 mm.

HMK 15

BACK to Table of Contents

To INDEX

HMK 15 Price List

HUMICAP® ACCESSORIES

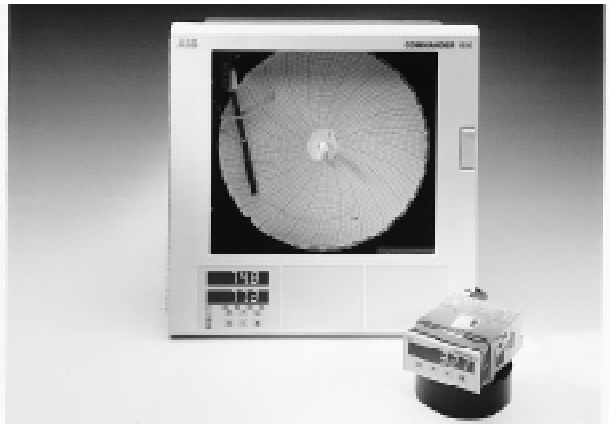
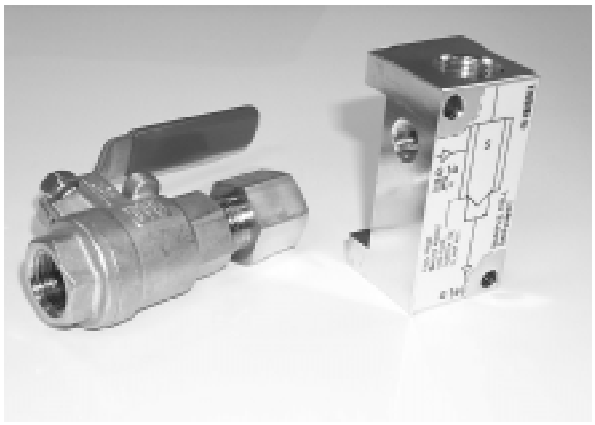


Chart Recorder and Process Meter



Ball Valve Assembly and Sample Cell

Adapters and Mounting Flange

Enclosure and Power Supply

HUMICAP Sensors and Filters

NEW CHART RECORDER AND PROCESS INDICATOR OFFER OUTSTANDING PERFORMANCE

The HMR 1900 chart recorder is available with either 1, 2, 3, or 4 pen recording. A hosedown-resistant housing, tough polycarbonate window and NEMA 4 X protection ensure flexible and reliable performance in even the harshest environments. Six-digit displays simultaneously provide information on up to four process variables. Charts can be set from one hour to 32 days per revolution.

Model 21801 indicator provides readouts of temperature, pressure, flow, level, and other variables. An analog output for retransmission to a chart recorder, PLC or controller is standard, as are an alarm relay, and a hosedown-resistant panel for harsh environments.

FIELD PROVEN ACCESSORIES ENHANCE PERFORMANCE

Vaisala provides a broad assortment of accessories and supporting instruments to help you obtain optimal results from your HUMICAP® products. These additional items include:

- Calibration devices to ensure that your HUMICAP® instruments continue to perform accurately and reliably
- Additional accessories that make it easier to install or use your HUMICAP® products.
- Accessories to ensure optimal performance for your particular application
- Spares and replacement items to keep your instrument operating for years.

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TECHNICAL DATA - HUMICAP ACCESSORIES

HMR 1900 CHART RECORDER

Recording	1,2,3,or 4 pens (red, blue, green, black) 3 position real-time event pen 10" dia or 105mm radius charts 1 hour to 32 days per revolution
Analog Inputs	
signal types:	mV, V, mA, ohm
Pt 100 resistance thermometer	
Accuracy	±0.1% of reading
Transmitter power supply	
1 per channel	
24 Vdc	
Analog outputs	4...20 mA ±0.1% accuracy
Relay outputs	
SPDT	
Rating	5A at 115/230 Vac
Operating range	32° to 130 °F (0° to 55°C) 5 to 95 %RH (non-condensing)
Environmental	IP66/NEMA 4 X case sealing
Approvals	CE Mark CSA; UL
Power supply	115/230 or 24 V ac ±15%. 50/60 Hz
Consumption	< 40 VA (typical)
Product warranty	2 years parts and labor

PANEL METER, MODEL 21801

Display	High-intensity, 7 segment, 1 x 6 digit red LED display
Configuration	User defined through keypad
Alarms	Three user-defined High/low process; High/low latch
Maths function	Maximum and minimum value detection Average value calculation
Analog inputs	
Number	One as standard
Input sampling rate	250ms per channel
Accuracy	±0.1 % of reading
Type	Universal, configurable for: Thermocouple, RTD, mV, mA, V dc
Linearizer functions	Transmitter power supply fitted as standard
Outputs	
Retransmission	Analog, configurable in range 4 to 20 mA
Relay output	One 5A relay as standard (SPDT)
Assignable to alarms, totalizer count pulse, totalizer wrap	
Environmental	
Operating limits	32° to 131 °F (0° to 55° C) 5 to 95 %RH non-condensing
Temperature stability <0.02 % of reading at 1µV/°F (2µV/°C)	
Front face	NEMA 3/IP65
Approvals	CE Mark CSA; UL
Product warranty	2 years parts and labor

BACK to Table of Contents

To INDEX

HUMICAP Price List

SENSORS AND FILTERS

HUMICAP® Sensors: Replacement HUMICAP® sensors are available with and without membrane filters. The type of replacement sensor recommended will depend on both the instrument in use and its operating conditions. Refer to the specific instrument data sheet for the appropriate replacement sensor, or contact Vaisala for assistance.

Protective filters: Filter selection is important. Apart from screening the sensor head from any stray electromagnetic fields, the main purpose of the filter is to protect the sensor. If the environment is clean and a particularly fast temperature response is required, then an open cage grid can be used. Otherwise a membrane or netting filter is recommended for the majority of applications. When saturated, membrane or netting filters dry out faster than sintered ones. For temperatures above 176°F (80°C) or when there is a risk of damage from fast moving particles, then a sintered or stainless steel net filter should be used.

Vaisala probe heads can be installed in air streams with speeds up to 40 meters per second when fitted with the appropriate sintered filter.

Membrane filters:	
Part # 2787HM	ø 18.5mm, 0.5 µm
Part # 10159	ø 12.0mm, 0.5 µm
Filters for INTERCAP products:	
Part# 15724 metallized plastic grid (non-filtering)	ø 12 mm
Part# 16131 metallized membrane filter	ø 12.0 mm, 0.5µm
Sintered bronze filters:	

Sintered bronze filters are useful where mechanical strength is necessary, in very dusty environments, or at extremely high temperatures. Three options are available:

Part # 0195 HM	ø 12 mm, 133 µm
Part # 6685 HM	ø 18.5 mm, 37 µm
Part # 6686 HM	ø 18.5 mm, 216 µm
Filters for the HMP 230 & HMP 360 series:	
Part # 16452 sintered filter	ø 13.5 mm, 38 µm
Part # 16720 PPS grid w/stainless steel net	ø 13.5 mm, 14 µm
Part # 16562 PPS grid (non-filtering)	ø 13.5 mm
Part # 16720 PPS grid w/membrane filter	ø 13.5 mm, 2 µm

OTHER ACCESSORIES

11990 HM Mounting Flange: This stainless steel mounting flange is easily attached to 12 mm diameter probes, allowing them to be used with flanged connections.

90-2271 Power Supply: This power supply is UL-Approved, uses 110 VAC power and supplies 24 VDC out.

85-HMPS Power Supply with NEMA 4 Enclosure

85-21797 Carrying Case: This case makes it easy to carry the HMI 41, additional probes and other small items.

45-20618 Conduit Adaptor:	Pg 9 to 1/2 in NPT
45-20775 Conduit Adaptor:	Pg 11 to 1/2 in NPT
85-20557 Compression Fitting	14mm to 1/2 in NPT fitting
85-21804 Thread Adaptor	1/2 inch ISO to 1/2 in NPT
DMP248SC Sample Cell	stainless steel (SS) chamber
DMP248BVS Ball Valve Assembly	1/2 in SS w/adaptor

HMP 243 Dewpoint Transmitter for Condensing Environments and Challenging Outdoor Applications

UNIQUE COMPOSITE SENSOR PROVIDES EXCELLENT STABILITY UNDER EXTREME CONDITIONS

The HMP 243 provides fast and reliable dewpoint measurement even under extreme conditions where a combination of high humidity and rapidly changing temperature can present unwanted dew formation on the sensor head. Because the temperature of the HMP 243's sensor head is constantly higher than ambient, the possibility of dew formation is eliminated. The result is uninterrupted, accurate and stable dewpoint measurement that is unmatched by more common chilled mirror and psychrometric instruments.

FEATURES/BENEFITS

- Versatile and easy to use
- Wide temperature range from -40 to +356 °F (-40° to +180°C)
- Configuration and parameters can be set by the user
- Electronic, on-site, one-point calibration
- Typically requires calibration/maintenance only every one to two years
- Aluminum housing protects against dust/sprayed water and electromagnetic interference
- Optional sensor re-gaining function for resistance to interfering chemicals
- Optional temperature sensor head for ambient temperature reference and calculation of relative humidity, dewpoint difference, mixing ratio, absolute humidity, wet bulb temperature
- Supplied with NIST certificate of calibration

CUSTOMIZE YOUR INSTRUMENT

Vaisala's unique microprocessor design and modularity allow you to customize the HMP 243 at time of purchase. You can select:

- Local display or no display
- Sensor head cable length (2, 5 or 10 meters)
- Serial bus (RS 232C, RS 485/422, digital current loop)
- Choice of filter
- Choice of analog output signals
- Various temperature measurement ranges
- Metric or non-metric units
- Installation kit for duct mounting
- Re-Gaining option for extra protection against interference from rare chemicals
- Optional temperature sensor

Note: The temperature probe should be kept at least 1 meter apart from the heated probe. For outdoor installations, ask for the meteorological installation kit. (MIK)

HMP 243

MEASURE DEWPOINT AND CALCULATE OTHER VARIABLES

With the addition of an optional temperature sensor to measure ambient temperatures, the HMP 243 can calculate relative humidity or absolute humidity; the difference between ambient and dewpoint temperature; and the mixing ratio and wet bulb temperature of ambient air. Small and light, the temperature sensor reacts quickly to changes in ambient temperature, providing very fast response time even for the calculated variables.

NEW RE-GAINING OPTION

For 25 years, Vaisala's HUMICAP® sensor has proven its resistance to dust and most chemicals time and time again. When there is the risk of certain rare chemicals accumulating in the humidity sensor, thereby decreasing the accuracy, Vaisala's new re-gaining option is recommended. With this option, contaminants are evaporated from the sensor and performance is returned to normal. Re-gaining can be activated using a software command or it can be programmed to occur at set intervals.

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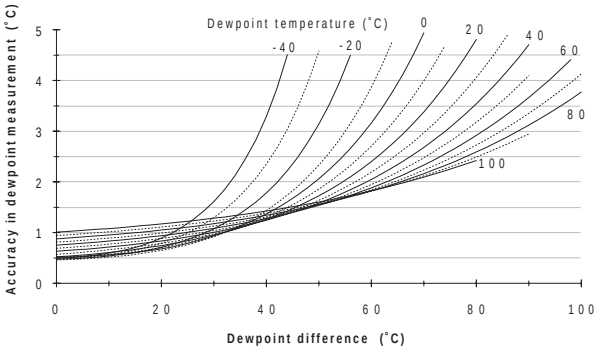
TECHNICAL DATA - HMP 243

Dewpoint Temperature

Measurement range	-40...+212 °F (-40...+100°C)
Reponse time (90%) at 68°F (+20°C) in still air (with sintered filter)	15 s
Sensor	HUMICAP® KC

Accuracy: find the intersection of the dewpoint temperature curve and the dewpoint difference reading (process temperature-dewpoint temperature) on the x-axis and read the accuracy in dewpoint measurement at the y-axis.

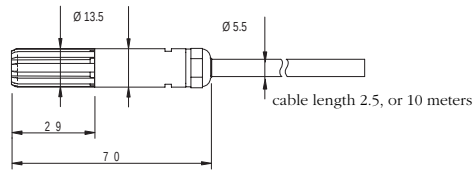


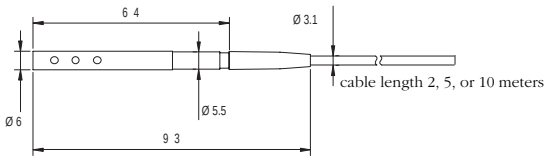
Temperature (option)

Measurement range	-40...+356 °F (-40...+180°C)
Typical accuracy at 68°F (+20°C)	0.18°F (±0.1°C)
Typical temperature dependence of electronics	0.005 °F/°F (0.005 °C/°C)
Sensor	Pt 100 RTD IEC 751, class 1/4 B

Outputs

Two analog outputs selectable and scaleable	0...20 mA, 4...20mA, 0...1 V, 0...5 V, 0...10V
Typical accuracy of analog output at 68° F (+20°C)	±0.05% FS
Typical temperature dependence of analog output	0.005 % FS/°F (0.005 % FS/°C)
Serial output available	RS 232C





Calculated Variables

Available only when temperature sensor head is in use.

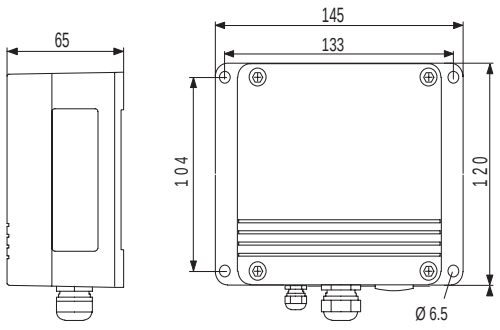
Typical ranges	
relative humidity	0...100 %RH
dewpoint difference	0...+90 °F (0...+50 °C)
mixing ratio	0...500 g/kg d.a.
absolute humidity	0...600 g/m3
wet bulb temperature	32…+212°F (0...+100 °C)
Accuracy of RH measurement	±(0.5 %RH + 2.5% of reading)

General

Connections	screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
Operating voltage	24 VDC/VAC (20..28 V)
Power consumption	200 mA max. (24 VDC)
during re-gaining	270 mA max. (24 VDC)
Recommended external load for	
current outputs	< 500 ohm
0...1 V ouput	> 2 kohm (to ground)
0...5 & 0...10 V outputs	> 10 kohm (to ground)
Electromagnetic compatibility	IEC 801-3
with sintered filter	HMP 2433 V/m
with steel netting PPS grid	10 V/m
Operating temperature range for	
electronics	-40...+140 °F (-40...+ 60 °C)
with display cover	+32...122 °F (0...+50 °C)
Storage temperature range	-40...+158 °F (-40...+70 °C)
Housing material	G-Alsi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable)
Sensor head cable lengths	2, 5, or 10 meters
Humidity sensor protection Ø 13.5 mm	sintered filter of stainless steel PPS grid with steel netting

Specifications subject to change without prior notice.
HUMICAP® is a registered trademark of Vaisala.

HMP 243



BACK to Table of Contents
To INDEX
Price Lists: HMP 243 Dewpoint only
HMP 243 Dewpoint & Temp.

DMP 246 Dewpoint Transmitter For High Temperature Applications

FEATURES/BENEFITS

- New DRYCAP® sensor for accurate, reliable, long-term stability and fast response
- Measures moisture content at process temperatures up to 662 °F (350 °C)
- Excellent long-term stability
- User-programmable, versatile and easy to use
- Easy to install, calibrate, maintain
- NIST traceable (certificate supplied)
- Two analog outputs, serial interface
- Optional alarm relays and local display

The DMP 246 transmitter incorporates the new DRYCAP® thin film polymer sensor. The DRYCAP® sensor is optimized to high temperature applications and is accurate, reliable and stable for long periods. Immune to particulate contamination, condensation and most chemicals, the sensor can be used with confidence in industrial environments. Even though the polymer element has an upper operating limit of below 392°F, a new probe design eliminates the need for complicated sampling systems and allows the sensor to be placed directly in temperatures up to 662°F without sacrificing accuracy or stability. This is accomplished without moving parts, additional power, or cooling utilities, therefore eliminating the risk of damaging the transmitter due to a cooling failure.

The microprocessor-based transmitter measures water vapor pressure, enabling it to output dewpoint and mixing ratio. Relative humidity and temperature measurements are used only during calibration and when checking for the proper cooling effect.

THE COOLING SET

The DMP 246 comes with a cooling set as a standard feature. The cooling effect may be regulated by adding the cooling profiles, or removing them from the set, to eliminate too effective cooling that could increase the possibility of condensing water vapor. Should there be any condensation, it only alters the moisture reading until the water evaporates. The DRYCAP® sensor is fully recoverable from a saturated state.

The cooling rate is controlled by the process flow rate and the delta temperature between the process gas and surrounding ambient temperatures. If the transmitter is operating close to the condensation point and the operator is unsure of the process conditions, the transmitter has a simple check method for determining whether to install the profiles or remove them.

DMP 246

OPTIONS AND ACCESSORIES

Display/Keypad Cover: The display/keypad option displays the measurements at the point of installation.

It also makes the DMP 246 transmitter simple and easy to use; the menus help the user to configure and operate the transmitter.

Alarm Outputs: For applications where adjustable on/off alarm control is needed, the alarm relay option is the solution. Alarm relays include two SPCO (single pole change over) type relays with up to 8 A/230 VAC contacts.

Cables: The probe cable of the DMP 246 can be either two, five or ten meters long.

Power Unit: The DMP 246 has, in addition to the standard 24 VAC/VDC, options for 115 VAC or 230 VAC operating voltages.

CALIBRATIONS MADE EASY

The transmitter software allows the user to perform either one or two-point calibration, which ensures a ±2°C dewpoint accuracy in specified measurement ranges. Calibrations are made against relative humidity references (e.g. salt baths). The transmitter can also be sent to Vaisala for a NIST traceable calibration. In typical conditions calibration once a year is recommended.

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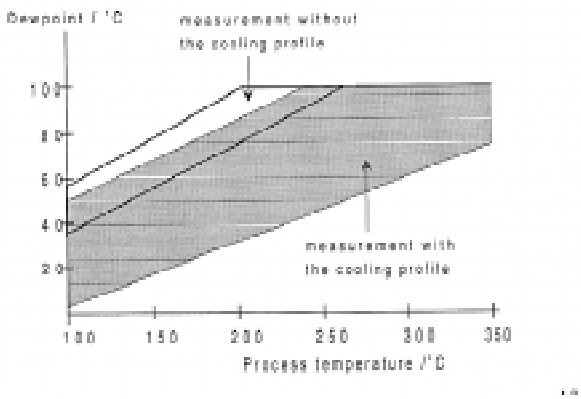
TECHNICAL DATA - DMP 246

Measured Variables

Dewpoint temperature	
Measurement range	+50...+212°F (+10...+100 °C)
Accuracy	±3.6°F (±2 °C)

(in the full measurement range displayed in the graph below)



Response time (90%)	
at 135 °C, from dry to wet	10 s
at 135 °C, from wet to dry	50 s
Mixing ratio	0...500g/kg dry air

Outputs

Two analog outputs selectable	0...20 mA, 4...20 mA 0...1V, 0...5 V, 0...10 V
Typical accuracy of analog output at +68°F (+20°C)	±0.05%FS
Typical temperature dependence of analog output	0.003%FS/°F (0.005%FS/°C)

General

Sensor	DRYCAP® sensor
Connections	screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
Operating voltage	isolated 24 VDC/VAC (20...28 V) option* 115 VAC, 230 VAC
Power consumption	100 mA max. (24 VDC)
Recommended external load for	
current outputs	< 500 ohm
0...1 V output	> 2 kohm (to ground)
0...5 & 0...10 V outputs	> 10 kohm (to ground)
Operating temperature range for	
sensor head	32°...662°F (0...350°C)
electronics	-40...+140 °F (-40...+60 °C)
with display cover	32...+122°F (0...+50 °C)
with power supply unit	-40...+113 °F (-40...+45 °C)
with alarm outputs up to 8A	-40...+104 °F (-40...+40 °C)
with alarm outputs up to 6 A	-40...+140 °F (-40...+60 °C)
Storage temperature range	-40...+158 °F (-40...+70 °C)
Housing material	G-Alsi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Housing dimensions	145 x 120 x 65 mm
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm² shielded cable)
Sensor protection	sintered filter of stainless steel (HM46780)

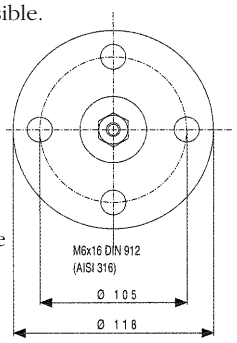
Serial Interface Modules

Module types	RS 485/422 digital current loop
Connections	screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
Assembly	plug-in module
Number of devices on line	
RS 485/422	32
digital current loop	6 (single loop) 9 (dual loop)
Network cable type	twisted pair
Network cable length	1000 m max.
Network data speed	
RS 485/RS 422	9600 baud max.
digital current loop	4800 baud max.

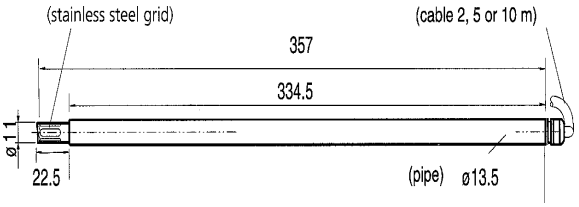
* simultaneous installations with alarm outputs and internal power supply is not possible.

Dimensions in mm

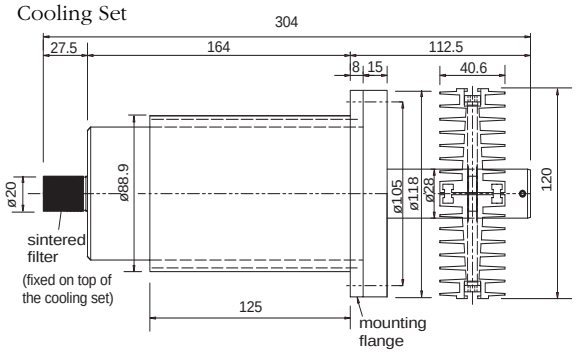
Mounting Flange



DMP 246 probe



Cooling Set



BACK to Table of Contents
To INDEX
DMP 246 Price List

DMP 248 Dewpoint/Temperature Transmitter For Low Dewpoint Applications

FEATURES/BENEFITS

- New DRYCAP® sensor for accurate, reliable, long-term stability and fast response
- Unique automatic self-calibration
- User-programmable, versatile and easy to use
- Easy to install, calibrate, maintain
- NIST traceable (certificate supplied)
- Two analog outputs, serial interface
- Optional alarm relays, sensor re-gaining function, local display, sampling system

DMP 248

DRYCAP® PERFORMANCE

DMP 248 transmitter incorporates the DRYCAP® thin film polymer sensor and advanced software programming. The combination makes the DRYCAP 248 dewpoint transmitter ideal for dry ambients. It offers reliable, accurate measurements with excellent long-term stability.

The DRYCAP® sensor is immune to particulate contamination, water condensation, oil vapor and most chemicals and can be used with confidence in industrial environments. Since the sensor can withstand condensation, its performance becomes unmatchable for low dewpoint applications that might see water spikes in the process. The sensor will not only withstand free water contact, but will rapidly recover 100% from such exposure, and accurately monitor process dewpoints.

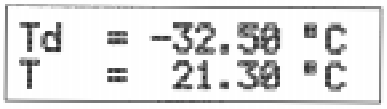
The DMP 248 provides Vaisala's most accurate and stable measurement in dry ambients. The "auto-calibration," or self-evaluation, is done in-line, while the process is running. If the measurement accuracy is not confirmed, the software makes the corrections to the calibration curve. The corrections may be due to contamination or aging of the sensor. In either case the transmitter adjusts the measurement and continues to function. Calibration occurs so quickly, and corrections are so minor, that the user will not even realize it has taken place. "Auto-calibration" parameters are set by the factory, but can be changed by the user.

SETTINGS AND ADJUSTMENTS MADE EASY

Selecting, scaling and calibrating the analog output signals and parameters can be done in minutes with simple software commands.

These commands can be given, using the menus on the local display, or with a PC or terminal connected to the transmitter's serial bus.

The microprocessor-based DMP 248 transmitter measures water vapor pressure and temperature, enabling it to display dewpoint, relative humidity, ppm_v and temperature. The transmitter has two analog outputs and any two of the four measured variables may be selected as output signals.



The transmitter software allows the user to perform a one or two point calibration against relative humidity references, e.g. Vaisala's electronic calibrators or HMK 15 salt baths. The transmitter can also be sent to Vaisala for a NIST traceable calibration. The calibration intervals depend on the application where the transmitter is used. In normal conditions, calibration once a year is recommended.

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TECHNICAL DATA - DMP 248

Measured Variables

Dewpoint

Measurement range	-76°...+176°F (-60°...+80°C)
Accuracy	±3.6° F (-58°...+176°F)
	±2°C (-50...+80°C)
Response time (90%) at flow rate 0.08 m/s, 1 bar and +68°F (+20°C)	
-40 -> -4°F dp (-40 -> -20°C dp)	35s
-4 -> -40°F dp (-20 -> -40°C dp)	240s

Relative Humidity

Measurement range	0...100%
Accuracy	<±0.5% (0...10%)
	±1.0% (10...90%)
	±2.0% (90...100%)

Temperature

Measurement range	-40°...+176°F (-40°...+80°C)
Typical accuracy of electronics at +68°F (+20°C)	±0.18°F (±0.1°C)
Typical temperature dependence of electronics	±0.005°F/°F (±0.005 °C/°C)
Temperature sensor	Pt 100 IEC 751 1/3 class B

ppm_v (dry)

Measurement range (typical)	0...5000 ppm

Accuracy at 68°F (20°C), 1013mbar 7.3 ppm +8.3% of reading

Outputs

Two analog outputs	0...20 mA
selectable and scaleable	4...20 mA
	0...1V
	0...5 V
	0...10 V
Typical accuracy of analog output at +68°F (+20°C)	±0.05 % FS
Typical temperature dependence of analog output	0.003 % FS/°F (0.005 % FS/°C)
Serial output	RS 232C

Options and Accessories

Display cover	local display/keypad 2 x 16 characters' LCD
Cable lengths	2, 5 or 10 meters
Alarm relays*	2 pcs 8 A/230 V SPCO (single pole change over)
Serial modules	RS 485/422 digital current loop
Sensor re-gaining	
Sample systems	sample cell or configurable sample systems (see DSS 10)
Power supply module*	115/230 VAC

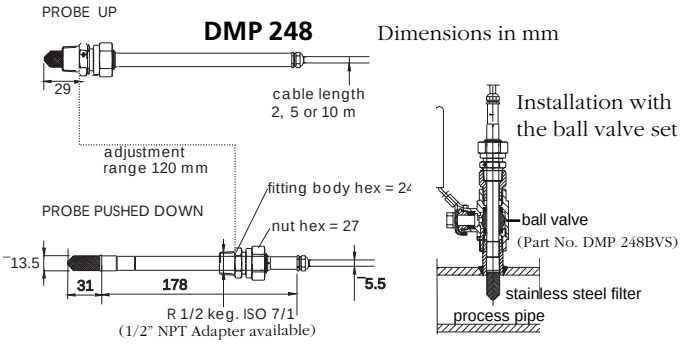
* simultaneous installations with alarm outputs not possible.

General

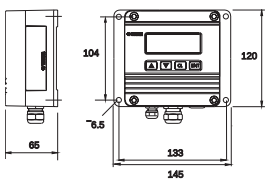
Sensor	DRYCAP®
Connections	screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
Operating voltage option:	isolated 24 VDC/VAC (20...28 V) 115 VAC, 230 VAC*
Power consumption (st. configuration)	100 mA max. (24 VDC)
Recommended external load for current outputs	< 500 ohm
0...1 V output	> 2 kohm (to ground)
0...5 & 0...10 V outputs	> 10 kohm (to ground)
Operating temperature range for electronics	-40°...+140°F (-40°...+60°C)
with display cover	32°...+122°F (0°...+50°C)
with power supply unit	-40°...+113°F (-40°...+45°C)
with alarm outputs up to 8A	-40°...+104°F (-40°...+40°C)
with alarm outputs up to 6A	-40°...+140°F (-40°...+60°C)
Storage temperature range	-40°...+158°F (-40°...+70°C)
Pressure range of DMP248 absolute pressure	
probe	0...2mPa (0...20 bar)
sliding probe	0...1mPa (0...10 bar)
Housing material	G-Alsi12 (DIN 1725)
Housing classification	NEMA 4 (IP 65)
Bushing	for 7...10 mm diameter cables (8 x 0.5 mm2 shielded cable)
Sensor protection (ø 13.5 mm)	sintered filter of stainless steel (16452)

Serial Interface Modules

Module types	RS 485/422 digital current loop
Connections	screw terminals for 0.5 mm2 wires (AWG 20), stranded wires recommended
Assembly	plug-in module
Number of devices on line	
RS 485/422	32
digital current loop	6 (single loop) 9 (dual loop)
Network cable type	twisted pair
Network line length	1000 m max.
Network data speed	
RS 485/RS 422	9600 baud max.
digital current loop	4800 baud max.



Electronic housing



BACK to Table of Contents
To INDEX
DMP 248 Price List

DSS 10 Configurable Sample Systems for the DMP 248 and HMP 238 Dewpoint Transmitters

DEWPOINT MEASUREMENTS IN EXTREME CONDITIONS

When the operating environment is not suitable for the moisture probe to be directly installed in the process an alternate solution could possibly be found with a Vaisala sampling system.

The sample system allows for greater measurement accuracy and stability by controlling the temperature, pressure and filtration levels to optimize the performance of the sensor. The sampling systems can be configured with cooling coils to reduce temperatures above 176°F (80°C), filters to remove particulate down to 0.01 micron in size, along with valves, flow meters, pressure gauges and vacuum pumps to control flow rates and pressure levels.

Vaisala's sample systems are easy to install, operate and virtually maintenance free. Each system comes mounted on a steel plate that is fixed to the wall. Stainless steel tubing is then connected from the process tap to the sample system to allow gas flow from the process to the sample system. Power will need to be supplied to the dewpoint transmitter as well as the vacuum pump, if ordered. The system will only need a one time adjustment of valves to achieve the desired gas flow rates and pressure levels.

The DSS 10 sample system offers the flexibility and customization necessary to meet various demanding applications. The systems may contain any, or all, of those items listed on the DSS 10 order form in the 1999 price list. When unsure about which components to select, and why, consult a Vaisala representative.

SAMPLE SYSTEM COMPONENT OPTIONS

- Sample cell
  House the DMP248 dewpoint probe
- Cooling Coil
  Cool high temperature process gas to room temperature prior to the moisture sensor
- Inlet ball valve
  Acts as a shut off between process tap and sample system
- Inlet 3-way ball valve
  Manual control of two-process sample taps tied into one sample system
- Vent ball valve
  Acts as a drain if condensation occurs or as a pressure release for a closed loop system
- Outlet needle valve
  Adjustable control valve for system pressure and flow
- Sintered filter
  Protection against pipe scaling and other particulate larger than 7 microns and other particulate larger than 0.01 microns
- Pressure gauge
  Pressure indicator when sample system is pressurized
- Coalescing filter
  Protection against pipe scaling, liquid carry-over,
- Flow meter
  Indicates flow rate through sample system
- Flow switch
  A relay that indicates when there is low flow through the system
- Vacuum pump
  Pulls a sample of gas from the process through the sample system

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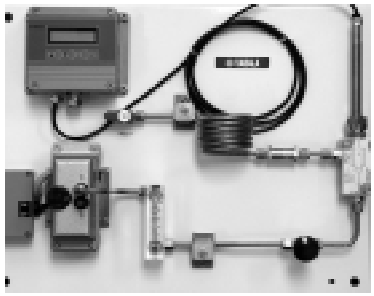
RECOMMENDED DESIGNS FOR COMMON APPLICATIONS

Configuration for High Temperature Zones, i.e. Plastic Hoppers

#DSS10 B2B1A2(*)(*)B*

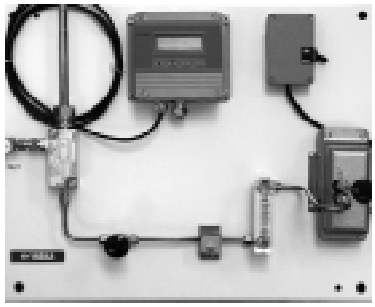


Designed for process conditions:
1. Temperatures exceeding 176 °F (80°C)
2. Presence of dry particulate larger than 7-micron
3. Low pressure environments 0.280...1.2bar (4.0...17.4 psi) absolute

The system has been designed to remove process gas from the high temperature zones. The process gas enters the system through a cooling coil that reduces the gas to ambient temperature. An in-line filter then removes particulate larger than 7-micron from entering the sensor chamber. The gas is being removed from the process and cooled to room temperature to achieve the highest accuracy with Vaisala's moisture sensors. The customer will need to choose the flow meter scale and vacuum pump supply power.

Configuration for Fluidized Bed Applications

#DSS10 (*)1A1A2(*)(*)B(*)



Designed for process conditions:
1. Process temperatures 176...250°F (80...120°C)
2. Clean process gas
3. Low pressure environments 0.28...1.2 bar (4.0...17.4 psi) absolute

The system has been designed to remove clean process air from a heated supply duct and cool it to room temperature by the sample tubing. Since the air being supplied must be clean of particulate there is no need for additional filtration other than the sintered end cap on the probe head. The gas is being removed from the process and cooled to room temperature to achieve the highest accuracy with Vaisala's moisture sensors. The customer will need to choose the flow meter scale, vacuum pump supply power and whether the optional inlet ball valve is needed or not.

BACK to Table of Contents

To INDEX

Configuration for High Temperature Metal Treatment Applications

#DSS10 (*)2D1A2(*)(*)B(*)

Designed for process conditions:
1. Temperatures exceeding 176° F (80°C)
2. Presence of particulate submicron and larger
3. Low pressure environments 0.28...1.2 bar (4.0...17.4 psi) absolute

The system has been designed to remove process gas from a high temperature zone. The process gas enters the system through a cooling coil that reduces the gas to ambient temperature. To ensure sensor protection from the aggressive process environment, the system has dual filters. The first filter element will need to be replaced periodically (dependent on operating environment). The second should not need to be replaced for extended periods of time. Both elements may be purchased from Vaisala, found in the spare parts list. This dual filter system offers the needed protection from the given environment. The customer will need to choose the flow meter scale, vacuum pump supply power, and whether they would like a 2-way or 3-way inlet ball valve. The 3-way inlet valve is manual and will only allow the system to monitor one location at a time.

*** SEE DSS 10 ORDER FORM FOR OPTIONS**

GM 12A/12B Portable CO_2 Meter

FEATURES / BENEFITS

- Excellent long term stability
- High accuracy
- Operates in demanding environments
- Low cost
- Operates over full relative humidity range
- Digital display and voltage output

HIGH PERFORMANCE/LOW COST MEASUREMENT

Vaisala's GM 12 meter incorporates a single wavelength non-dispersive infrared (NDIR) gas sensor for CO_2-specific sensing. Other gases, including water vapor, do not affect its performance, nor is it adversely affected by high concentrations of CO_2. The sensor is accurate and stable, and has a short warm-up time, which is particularly important in spot measurements.

VERSATILE AND EASY TO USE

The portable GM 12 is used in a wide variety of applications including environmental, process and ventilation survey and monitoring. It is available in two measurement ranges: 0 to 3000 ppm (GM 12A) and 0 to 3% carbon dioxide (GM 12B).

The GM 12 comes with an analog output and a digital display. Operated via a membrane keypad, the GM 12 has a user-selectable alarm level with audible and visual signals. The audible alarm and red light are activated when the measured gas concentrate exceeds the desired level. CO_2 concentration is shown on the clear 4 digit LCD. A voltage output is also available.

The meter's low flow indicator shows if the filter becomes dirty or the pump stops operating. The gas inlet nozzle is situated on the front panel of the meter to allow easy access for periodical replacement of the particle filter.

The GM 12 has a standard battery life of 12 hours. The rechargeable batteries are contained in a detachable section of the meter housing. A simple key function allows the user to check remaining battery life.

The meter housing is rated NEMA 4 for use in the most rigorous environments. It comes in a rugged weatherproof carrying case, which includes a battery. There is also enough space for other accessories.

GM 12A/12B Portable CO_2 Meter

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - GM 12A/B

CARBON DIOXIDE

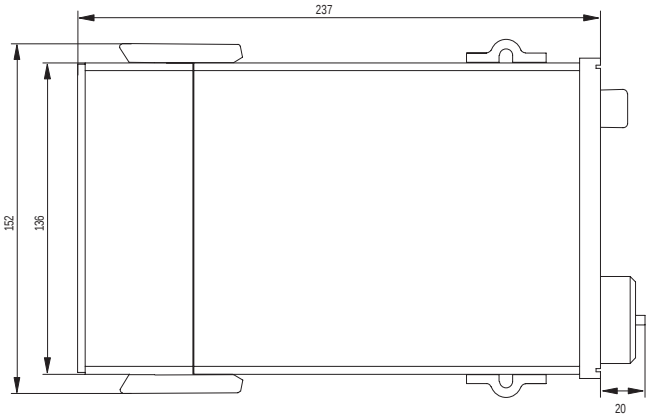
Measurement range:	
-GM 12 A	0 to 3000 ppm
-GM 12 B	0 to 3%
Accuracy	<± [1% of FS + 2% Reading]
Stability (over 1 year)	<±5% FS
Repeatability	
-Zero	<± 0.5% FS
-Full scale	<± 1.5% FS
Response time	
(10 to 90% response)	30 sec
Zero drift	
with time	< ±2% FS/year
with temperature	< ±0.5% FS/°F (< ±0.1% FS/°C)
Sensing technique	single beam NDIR

GENERAL

Output signal	0...1V linear
Power supply	rechargeable Battery Pack
Battery life (minimum)	12 hours
Display	4 digit 12.5 mm LCD
Alarm	adjustable 0 to full scale
Warm up time	
-Operational	2 min
-Full specification	<5 min
Operating temperature	
Range	+32 to 113°F (0 to 45°C)
Operating humidity	
Range	0 to 100% RH (non-condensing)
Storage temperature	
Range	-4 to 140°F (-20 to +60°C)
Housing material:	ABS Plastic
Housing classification	NEMA 4
Weight	1.8 KG

GM 12A & GM 12B

Dimensions in mm

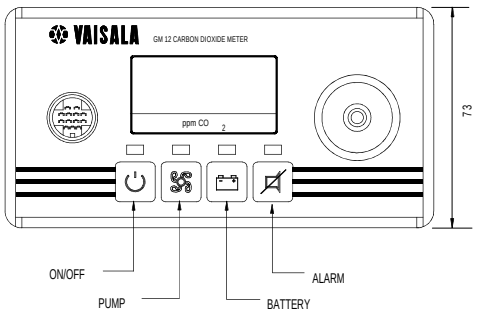


ACCESSORIES

18180	3 m PVC tube for remote sampling
18181	spare battery pack
18182	230 V battery charger
18192GM	field calibration kit

(for calibration checks of stationary instruments)
Calibration gases with related accessories

Specifications subject to change without notice.



BACK to Table of Contents

To INDEX

GM 12A/B Price List

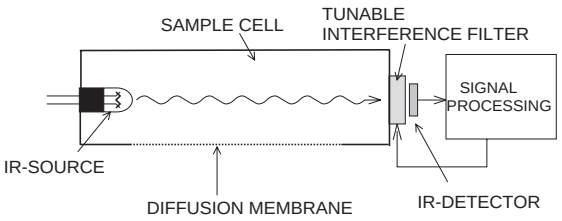
GMD 20 and GMW 20 Series CO_2 Transmitters for Indoor Air Quality and Demand Controlled Ventilation

INTRODUCING THE CARBOCAP®

Vaisala's duct mounted GMD 20 and wall mounted GMW 20 series transmitters use the new silicon based CARBOCAP sensor. The simple structure and reference measurement capabilities make this Single-Beam Dual-Wavelength NDIR sensor extremely stable and reliable. The GMD/W series transmitters are specially designed for Indoor Air Quality (IAQ) and Demand Controlled Ventilation (DCV) applications. They are easy to install and require almost no maintenance.

CARBOCAP® TECHNOLOGY

The structure of the diffusion aspirated Single-Beam Dual-Wavelength sensor is remarkably simple: it consists of an infrared source, a sample cell, a tunable solid state interference filter and an IR detector.



The tunable interference filter enables measurements at two wavelengths. As a result, the reference measurements can be made without the typical weaknesses of Dual-Beam sensors.

The use of the new CARBOCAP sensor and the GMD/W 20 series has several advantages:

- high accuracy
- excellent stability
- negligible temperature dependence
- reliable operation
- ease of installation
- five year recommended calibration interval

The measurement accuracy of the sensor is not affected by dust, water vapor or most chemicals.

Use of the GMD/W 20 series transmitters results in considerable savings in installation, operation, maintenance and recalibration costs. In addition, it ensures the best possible control of air quality.

VERSATILE TRANSMITTERS

The GMD/W 20 series transmitters can be used independently or they can be incorporated into building energy management systems. The series

GMD/W Series

CARBOCAP®'s breakthrough self compensating sensor technology provides superior stability, accuracy, and temperature dependence over a broader temperature range. There's no add-on software fix or external software compensation. Just excellent sensor stability - for five years!

consists of a duct mount unit and wall mount units with display (D), or without display. The duct unit's compact sensor head design requires only a small hole in a ventilation duct, thereby minimizing the risk of leaking gaskets and measurement errors. In addition to the standard 0...20 mA, 4...20 mA and 0...10 V outputs, there are also two options: a LonWorks® interface and a relay output. The relay output is standard with the display units.

TEMPERATURE OPTION

The GMA 20T temperature module, an option with the GMW 21 wall mount unit, combines both CO_2 and temperature measurement into one transmitter. The GMA 20T has a temperature range of 32°…122°F (0…50°C), an accuracy @ 25°C of ±0.9°F (±0.5°C), and an output of 0…10V.

The versatile GMD/W 20 transmitters are easy to install and provide superior stability, accuracy, and temperature dependence over a broad temperature range. The self-compensating CARBOCAP® sensor technology ensures long term measurement stability (better than ±100ppm) over a 5-year period – without calibration.

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - GMD 20 AND GMW 20 SERIES

Measured Variables

Measurement range (nominal; can be calibrated for other ranges:0...5000 ppm, 0...10000 ppm, 0...20000 ppm,)	0...2000 ppm
Accuracy at 77 °F (+25 °C) against certified factory references (incl. nonlinearity and calibration uncertainty)	<±1 % FS + 1.5% of reading)
Repeatability	<±1 % FS
Temperature dependence of output (typical value)	0.05 % FS/°F (0.1 % FS/^{0}C)
Long-term stability	<5% FS/5 years
Response time (0...63% response)	60 seconds
Temperature (optional with wall model)	
Output signal	0…10v
Temperature range	32…122°F (0…50°C)
Accuracy (@25°C)	±0.9°F (±0.5°C)
Warm up time	30 min
Sensor	Semiconductor IC

General

Output signals	0...20 mA or 4...20 mA and 0..10 V
Optional outputs	relay LonWorks® interface RS 232 (with serial COM adapter)
Recommended external load:	
current output	max. 500 Ohm
voltage output	min. 1 kohm
Power supply (18...30 VDC)	nominal 24 VDC/VAC
Power consumption	<2.5 W
Warm-up time	<5 minutes
Operating temperature range	+23 to 113^{0}F (-5...+45 °C)
Operating humidity range	
short term	0...100 %RH non-condensing
long term	0...85 %RH non-condensing
Air flow range	0…10m/s
Housing material	ABS plastic
Housing classification (electronics housing GMD20)	NEMA 4 (IP 65)
Weight:	
GMW 21 (D)	100 g (130 g)
GMD 20 (D)	140 g (170g)
Dimensions (l x h x d):	see drawings below
Wall-mount also available in smaller size. Contact Vaisala for details.	

Accessories and Options

GMW 21D	wall unit with display & relay
GMD 20D	duct unit with display & relay
GMI 21	display and relay option for GMW21
GMR 20	relay output option
GML 20	LonWorks® module with CO_2 signal
GML 20T	LonWorks® module with both CO_2 signal and temperature signals
19222GM	calibration software kit (disk and serial COM adapter)
18192GM	field calibration kit (used with Vaisala's portable CO_2 meters)
GMA 20T	Analog temperature module for GMW 21

Specifications subject to change without notice.

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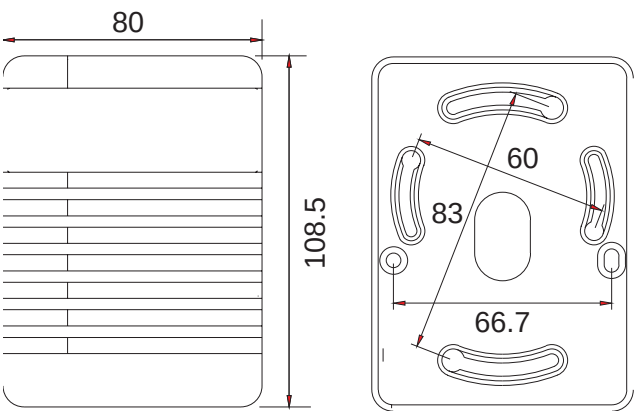
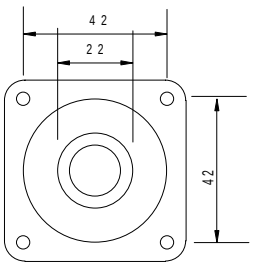
BACK to Table of Contents

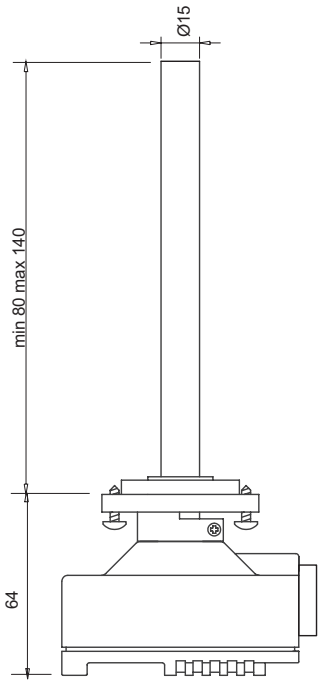
To INDEX

GMD/W 20 Price List

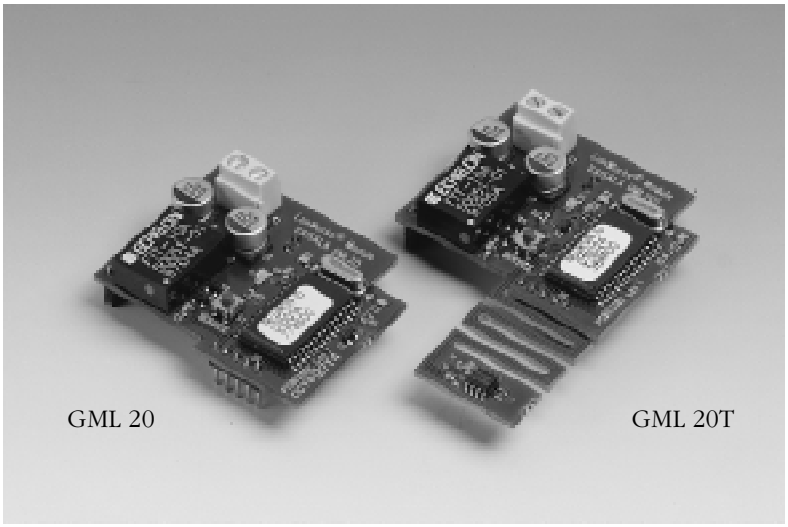
GMD 20 AND GMW 20 SERIES







LonWorks® Options for GML 20 and 20T Series CO_2 Transmitters



SIGNIFICANT SAVINGS

Vaisala's GML 20 and GML 20T are interface modules for distributing signals from GM 20 series transmitters digitally to a LonWorks® network over a twisted pair. The GML 20 module distributes CO_2 signals; the GML 20T module distributes both CO_2 and temperature signals. The GML 20T module can be used with the GMW 21 transmitter only. The use of these modules and GM 20 series transmitters with a LonWorks® networked control system contributes to considerable savings in cabling, installation and maintenance costs.

INTELLIGENT LonTalk® PROTOCOL

In a LonWorks® network, devices called nodes communicate with each other using the LonTalk® protocol. Every node consists of a Neuron® chip and a transceiver. The Neuron® chip is a microprocessor which contains an application program and LonTalk® protocol. The transceiver adapts the Neuron® chip into the hardware environment used. The nodes communicate with each other, sending messages containing the value of the desired variables.

With Vaisala modules, these variables are CO_2 (GML 20) or CO_2 and temperature (GML 20T). Some network variables are so-called configuration variables, which are used to define the behavior of the node. With the GML 20 and GML 20T, they are used to designate how much the temperature and/or carbon dioxide level must change before a measured value is sent again.

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100 Commerce Way, Woburn, MA 01801
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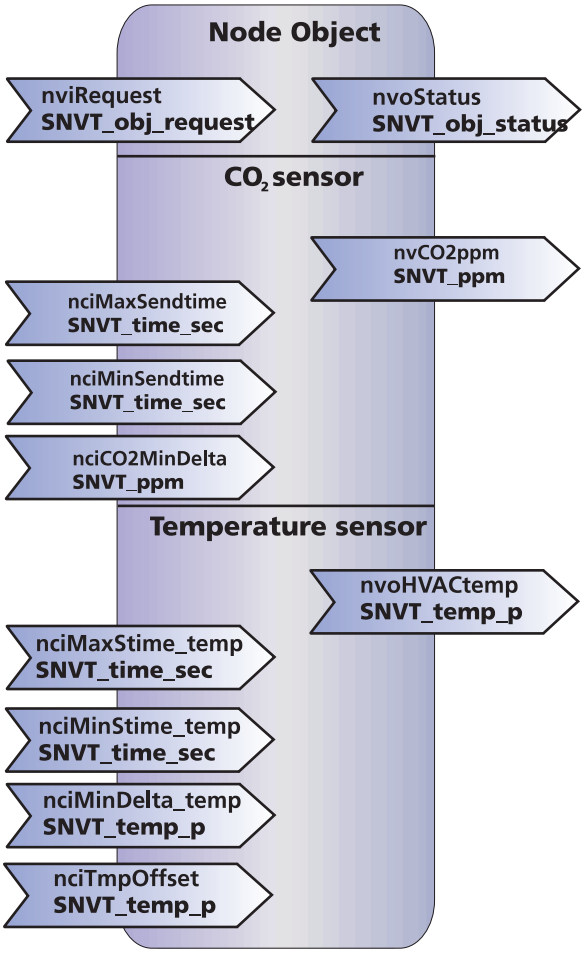
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - GML 20 T AND GML 20

- LonWorks® interoperable
- Twisted pair free topology, network type TP/FT-10 at 78kbps
- Additional two wires needed for powering the transmitter; can thus be connected to both powered and non-powered networks
- Service button and service led for simple installation and configuration
- External interface (xif.) file available on request (GML 20 part no. 19412GM, GML 20T part no. 19748GM)
- Temperature (GML 20T only):
  measurement accuracy 0.9°F (0.5 °C)
  measurement range +32°...113 °F (0°...+45 °C)
- Warm-up time 30 min.



NETWORK VARIABLES FOR CO_2 (BOTH MODELS GML 20 AND 20T)

nviRequest: to request modes for objects within this node
nvoStatus: to report status of objects on this node
nvoCO_2ppm: this output variable reports the CO_2 level detected by the sensor
nciMaxSendtime: indicates the maximum period of time that expires before the sensor object automatically updates all its output variables
(default value: 300 seconds)
nciMinSendtime: indicates the minimum period between output network variable transitions
(default value: 5 seconds)
nciCO2MinDelta: indicates the minimum CO_2 level change required to update the output network variables
(default value: 10 ppm)

NETWORKS VARIABLES FOR TEMPERATURE (GML 20T MODEL ONLY)

nvoHVACtemp: this output variable reports the temperature detected by the sensor
nciMaxStime_temp: indicates the maximum period of time that expires before the sensor object automatically updates all its output variables
(default value: 300 seconds)
nciMinStime_temp: indicates the minimum period between output network variable transitions
(default value: 5 seconds)
nciMinDelta_temp: indicates the minimum temperature change required to update the output network variables
(default value: 0.3 °C)
nciTmpOffset: indicates the temperature offset level
(default value: -0.8 °C)

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BACK to Table of Contents
To INDEX
GML 20/T Price List

GMP 111 & GMP 111E CO_2 Transmitters for Industrial Applications

FEATURES / BENEFITS

- Excellent long term stability
- High accuracy
- Operates in demanding environments
- Low cost
- Operates over full relative humidity range
- Optional digital display

RELIABLE LOW COST SENSOR

Vaisala's GMP 111 and GMP 111E use a single wavelength non-dispersive infrared (NDIR) gas sensor for CO_2-specific gas sensing. Other gases, including water vapor, do not affect its performance, nor is it adversely affected by high concentrations of CO_2. The transmitters provide high accuracy and excellent long-term stability with low power consumption. This long term stability reduces the costs associated with the replacement of other types of CO_2 sensors. The sensor is diffusion aspirated, (the CO_2 gas enters the sensor through a gas permeable membrane). This silent sampling method is reliable and provides rapid response time.

VERSATILE AND EASY TO USE

The GMP 111 and GMP 111E are low cost CO_2 transmitters designed for a wide variety of applications including: environmental, agricultural, process, and ventilation monitoring and control. The GMP 111's measurement range is 0 to 3000 ppm carbon dioxide, and the GMP 111E's range is 0 to 7000 ppm. These transmitters provide user selectable 4 to 20 mA, 0 to 20 mA and 0 to 10 V linear outputs and include a relay output with selectable switching levels of 400, 600, 800, or 1000 PPM (GMP 111) and 1000, 2000, 3000, or 5000 ppm (GMP 111E). The nominal supply voltage for the transmitter is 24 VDC. These transmitters are rated NEMA 12 and can meet NEMA 4 requirements with the addition of an optional splash shield around the diffusion tube.

APPLICATIONS

Environmental chambers
HVAC (DCV, Energy Management)
Industrial process control
Laboratories
Food processing/packaging
Breweries/wineries
Greenhouses
Mushroom growing

GMP 111 and GMP 111E:
Shown with standard enclosure and with optional GMI 111 digital display.

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - GMP 111 AND GMP 111E CO_2 TRANSMITTERS

CARBON DIOXIDE

Measurement range:	
GMP 111	0 to 3000 ppm
GMP 111E	0 to 7000 ppm
Accuracy:	<± [1% of FS + 2% reading]
Stability over 1 year:	<± 5% FS
Temperature dependence	<± 0.05%FS/^{0}F (<± 0.1%FS/^{0}C)
Repeatability:	
-Zero	<± 0.5% of FS
-Span	<± 1.5% of FS
Response time (from 10 to 90%):	50 sec
Zero drift	
with time	<± 2%FS/year
with temperature	<± 0.05%FS/^{0}F (<± 0.1%FS/^{0}C)
Sensing method:	NDIR
Air sampling method:	Diffusion

GENERAL

Analog outputs	4 to 20 mA
(linear and switch selectable)	0 to 20 mA
	0 to 10 V
Relay output	voltage free contact closure, contact rating 5 A 30 VDC (resistive)
GMP 111	for 400, 600, 800 or 1000 ppm
GMP 111E	for 1000, 2000, 3000, or 5000 ppm
Power supply	24 VDC (18...30VDC)
Power consumption	2.0 W typical, 3.6 W max
Warm up time	
-Operational	2 min.
-Full specification	<5 min.
Operating temperature Range	+32 +113^{0}F (0 to 45°C)
Operating humidity Range	0 to 100% RH (non-condensing)
Storage temperature Range	-4 to +140°F (-20 to + 60°C)
Housing material	ABS Plastic
Housing classification	NEMA 12
-with splash shield	NEMA 4
Weight	0.5 Kg
Accessories	splash shield LCD display unit

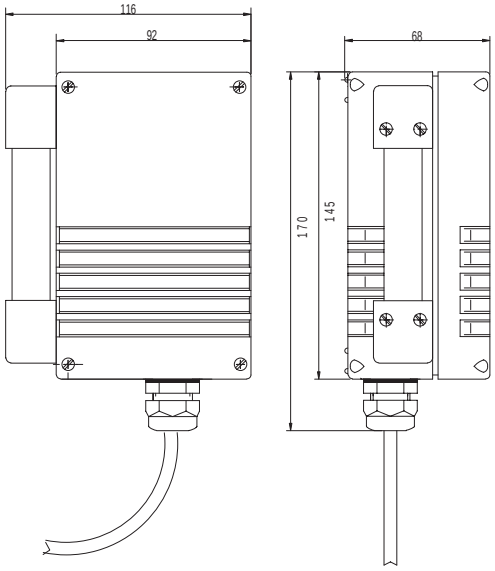
Specifications subject to change without notice.

BACK to Table of Contents

To INDEX

GMP 111/E Price List

GMP 111 and GMP 111E



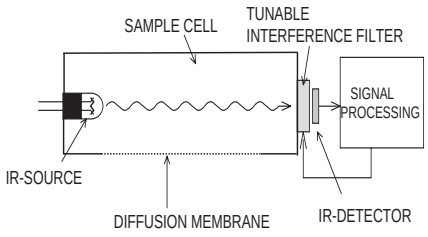
GMM 20W CO_2 Module for OEM Applications

INTRODUCING THE CARBOCAP®

Vaisala's GMM 20W transmitter uses the new silicon based CARBOCAP® sensor. The simple structure and reference measurement capabilities make this Single Beam Dual Wavelength NDIR sensor extremely stable and reliable. The GMM 20W transmitter is intended for OEM applications related to ambient CO_2 measurement.

CARBOCAP® TECHNOLOGY

The structure of the diffusion aspirated Single Beam Dual Wavelength sensor is remarkably simple: it consists of an infrared source, a sample cell, a tunable solid state interference filter and an IR detector.



The tunable interference filter enables measurements at two wavelengths. This means that the reference measurements can be made without the typical weaknesses of Dual Beam sensors.

SUPERIOR PERFORMANCE

Incorporating the new CARBOCAP® sensor in the GMM 20W transmitter provides several advantages: high accuracy and excellent stability, negligible temperature dependence, and reliable operation as well as a five year recommended calibration interval. The measurement accuracy of the sensor is not affected by dust, water vapor or most chemicals. Using the GMM 20W can result in considerable savings in operation, maintenance and recalibration costs, while ensuring the best possible quality of measurement.

GMM 20W

CARBOCAP® 's breakthrough self-compensating sensor technology provides superior stability, accuracy, and temperature dependence over a broader temperature range. There's no add-on software fix or external software compensation. Just excellent sensor stability - for five years!

VERSATILE TRANSMITTER

The GMM 20W transmitter has several output alternatives. In addition to the standard 0...20 mA, 4...20 mA and 0...10 V outputs, there are also two options: a LonWorks® interface and a relay output.

The GMM 20W can also be equipped with an optional LCD display unit.

In addition to the standard 0...2000 ppm measurement range, the GMM 20W can be recalibrated for 0...5000 ppm, 0...10,000 ppm and 0...20,000 ppm ranges.

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - GMM 20W

CARBON DIOXIDE

Measurement range	0...2000 ppm (can be recalibrated for other ranges: 0...5,000 ppm, 0...10,000 pppm, 0...20,000 ppm)
Accuracy at 77°F (+25°C) (incl. nonlinearity and calibration uncertainty)	<±(1% FS+ 1.5% of reading
Repeatability	<1% FS
Temperature dependence of output	0.1%FS
Long-term stability (in ambient conditions)	<5 %FS/5 years
Response time (0...63% response)	1 minute

GENERAL

Output signals	0...20 mA or 4...20 mA and 0...10 V
Optional outputs	relay LonWorks® interface
Recommended external load:	
current output	max. 500 Ohm
voltage output	min. 1 kohm
Power supply	nominal 24 VDC/VAC (18...30 VDC)
Power consumption	<2.5 W
Warm-up time	<5 minutes
Operating temperature range	+23...113°F (-5...+45 °C)
Operating humidity range	
short term	0...100 %RH non-condensing
long term	0...85 %RH non-condensing
Air flow range	0…10m/s
Weight	56 g
Dimensions (l x h x d)	72 x 74 x 19 mm

ACCESSORIES/OPTIONS

GMI 21	display and relay option
GMR 20	relay output option
GML 20	LonWorks® module with CO_2 signal
GML 20T	LonWorks® module with both CO_2 and temperature signals
19222GM	calibration software kit (disk and serial COM adapter)
18192GM	field calibration kit (used with Vaisala's portable CO_2 meters.)

LONMARK™ PARTNER

BACK to Table of Contents

To INDEX

GMM 20 Price List

GMM 11 and GMM 12 CO_2 Modules for Custom Applications

FEATURES / BENEFITS

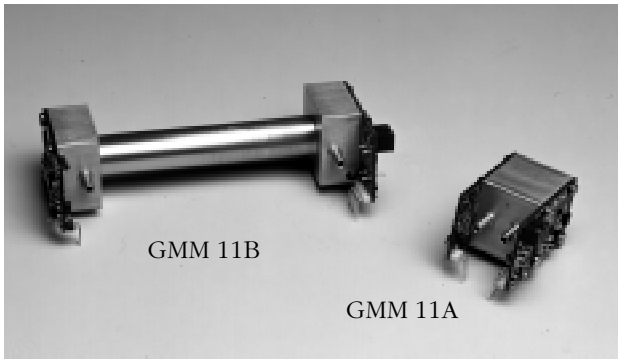
- Excellent long term stability
- Low cost
- High accuracy
- Available in four CO_2 measurement ranges
- Operates over full relative humidity range
- Quick warm up cycle and response time

VERSATILE SOLUTIONS FOR OEM APPLICATIONS

Vaisala's CO_2 detectors use a single wavelength non-dispersive infrared (NDIR) gas sensor. This technique makes the sensor CO_2 specific, meaning it is not sensitive to the presence of other gases, including water vapor. The GMM modules provide high accuracy and excellent long term stability with low power consumption. They are available in various sensitivity ranges to cover the spectrum of measurement requirements. Output for the GMM 11 is 0 to 1V (non-linear). For the GMM 12, the output is linear and user selectable between 0 to 20 mA, and 4 to 20 mA. Linear voltage outputs are also possible with the addition of a resister soldered on the PCB, by the user. The versatility and long term stability of these sensor modules make them excellent solutions for a wide variety of OEM applications.

DIFFUSION OR PUMP ASPIRATION

All GMM 11/12 models can be pump aspirated with a pump supplying 0.3...1.0 l/min air flow (pump/part #18515). Also, GMM 11AD and GMM 12AD can be aspirated with a fixed or remote diffusion tube. When using pump aspiration, an appropriate filter (part #18179, or any other with 1 mm filtration) should always be used to avoid sensor contamination. With the diffusion tube the filtration is not needed. For the GMM 11AD/12AD models, use Vaisala part #18191 when a fixed diffusion tube is needed, and part #19255 GM for remote use. The pump, filter and neoprene tubing (for the remote diffusion tube) must be ordered separately.



APPLICATIONS

- Environmental chambers
- HVAC (DCV, Energy Management)
- Industrial process control
- Laboratories
- Food processing/packaging
- Breweries/wineries
- Greenhouses
- Mushroom growing

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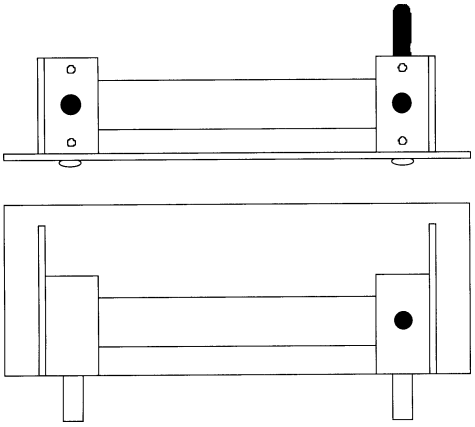
TECHNICAL DATA - GMM 11 AND GMM 12 CO_2 MODULES

CARBON DIOXIDE

Measurement range:	
- GMM 11/12 A / GMM 11/12 AD	0 to 3000 ppm
- GMM 11/12 B	0 to 3%
- GMM 11/12 C	0 to 10%
Accuracy:	<±(1%FS+2% Reading)
Temperature dependence at zero:	< ±0.5% FS/°F (< ±0.1% FS/°C)
Repeatability:	
Zero	±0.5%FS
Span	±1.5%FS
Response time:	
(from 10 to 90%)	20 sec (50 sec with diffusion units)
Sensing method:	NDIR
Sampling technique:	
Diffusion tube	GMM 11AD/12AD
Pump aspiration	GMM 11/12A, B and C models

GMM 11



GENERAL

Analog output:	
GMM 11	0 to 1V (non-linear)
GMM 12	4 to 20 mA 0 to 20 mA (linear and switch selectable)
Power supply: GMM 11	15 VDC (14.25...15.75V)
GMM 12	24 VDC (18...30V)
Power consumption:	
GMM 11	0.9 W
GMM 12	2.0 W
Warm up time:	
- Operational	3 min.
- Full specification	5...15 min depending on installation
Operating temperature:	
Range	+32…+113°F (0 to 45°C)
Operating humidity:	
Range	0 to 100% RH (non-condensing)
Storage temperature:	
Range	-4…+140°F (-20 to +60°C)
Dimensions vary between different modules	
GMM 11A	140 x 51 x 32 mm
GMM 11AD	140 x 65 x 50 mm
GMM 11B	40 x 51 x 32 mm
GMM 11C	40 x 51 x 32 mm
GMM 12A	150 x 55 x 35 mm
GMM 12AD	150 x 70 x 50 mm
GMM 12B	150 x 55 x 35 mm
GMM 12C	150 x 55 x 35 mm

Specifications subject to change without notice.

BACK to Table of Contents

To INDEX

GMM 11/12 Price List

GMM 220 Series Carbon Dioxide Modules for Demanding OEM Applications

DIFFERENT CONFIGURATIONS TO MEET YOUR DEMANDING APPLICATIONS

The GMM 220 series modules are designed for Original Equipment Manufacturers (OEM's) needing CO_2 measurements in demanding applications. These modules are optimized for integration into equipment for such applications as greenhouse control, incubators, fermentors, and safety alarming. These modules provide high CO_2 measurement accuracy and long term stability over wide temperature and relative humidity ranges. For example, long-term stability is better than plus/minus 5% of full-scale readings over a two-year period.

- **GMM 221 - for Accurate CO_2 Measurements From 0% to 20%**
  This module can be ordered from Vaisala with a detachable probe, 100 mm in length, which has been calibrated to operate within one of the five following concentration ranges:
  0 to 2% CO_2
  0 to 3%
  0 to 5%
  0 to 10%
  0 to 20%
  These probes are directly detachable from the cable and are interchangeable in the field. For example, different probes, each calibrated to a different range, can be swapped in the field to meet different application requirements.

- **GMM 222 - for Accurate CO_2 Measurements Up To 10,000 ppm (1%)**
  This module can be ordered from Vaisala with a detachable probe, 145 mm in length, which has been calibrated to operate within one of the four following concentration ranges:
  0 to 3000 ppm CO_2
  0 to 5000 ppm
  0 to 7000 ppm
  0 to 10000 ppm
  These probes are also directly detachable from the cable and are interchangeable in the field. For example, different probes, each calibrated to a different range, can be swapped in the field to meet different application requirements.

- **Different Cable Lengths and Connectors**
  - Cables available in 0.6 and two meter lengths
  - Connectors between the probe and cable are available in two configurations, straight and 90°, to facilitate ease of installation and increase application flexibility


GMM 221

- **Versatile Design, Interchangeable Probes**
  The field interchangeability of the GMM 221 and 222 make calibration and field service easy. It is also easy to change the measurement range in the field by simply replacing one probe with another.

Different mounting, power supply, and output options are available.

CARBOCAP – THE SILICON-BASED CO_2 SENSOR

The functioning of the CARBOCAP sensor is based on the absorption of infrared light using a patented leading-edge silicon technology. This solid state sensor provides a reliable and stable constant reference measurement, resulting in excellent stability over time, even with wide temperature variations. Since water vapor, dust, and most chemicals do not effect the measurement, the GMM 220 series modules can be used in harsh and humid environments.

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TECHNICAL DATA - GMM 220 SERIES

MEASUREMENT RANGES

GMM221	0...2 % CO2
	0...3 % CO2
	0...5 % CO2
	0...10 % CO2
	0...20 % CO2
GMM222	0...3000 ppm
	0...5000 ppm
	0...7000 ppm
	0...10 000 ppm
Accuracy at 77°F (+25 °C) against certified factory references	<±[1 %FS + 1.5 % of reading] (incl. nonlinearity and calibration uncertainty)
Repeatability	<±1 %FS
Temperature dependence of output (typical value)	0.05 %FS /°F (0.1 %FS /°C)
Pressure dependence (typ.)	0.1 %FS/hPa
Long-term stability	<±5 %FS/2 years
Response time (63%)	
GMM 221	15 seconds
GMM 222	30 seconds

GENERAL

Output signals	0...20 or 4...20 mA and 0...1 V or 0...2 V, 0...2.5 V, 0...5 V
Resolution of analog outputs	0.03 %FS
Recommended external load:	
current output	max. 200 Ohm
voltage output	min. 1 kohm
Power supply	11...20 VDC or 18...30 VDC
Serial output	@ 5V level
Power consumption	<2.5 W
Warm-up time	<5 minutes
Operating temperature Range	-4°...+140 °F (-20°...+60 °C)
Operating humidity range:	
probe	0...100 %RH non-condensing
mother board	0...85 %RH non-condensing
Housing material	ABS plastic
Housing classification (probe only)	NEMA4 (IP 65)
Weight:	
GMM 221probe	max. 175 g
GMM 222 probe	max. 200 g

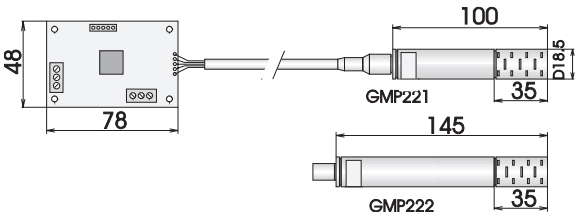
ACCESSORIES

GMP221, GMP222	spare probe
(use the order form to define measurement range etc.)	
GM25245	clips (2 pcs) for attaching the probe
GM45156	mounting flange for the probe
	0.6 m cable with straight or 90° connector
	2.0 m cable with straight or 90° connector
19040GM	serial COM adapter

The GMM221 and GMM222 modules comply with the following EMC standards and have passed the following tests:
EN 50081-1 (EN 55022 class B = CISPR 22)
En 50082-1 (IEC 1000-4-2, 4 KV contact, 8KV air)
(IEC 1000-4-3, 80 - 1000 MHz, 80 % AM, 3V/m)
(IEC 1000-4-4, 500V)
(IEC 1000-4-6, 0.15 - 80 MHz, 80%, 3V/m)

CARBOCAP® is a registered trademark of Vaisala Oyj. Specifications subject to change without prior notice.

Dimensions in mm



BACK to Table of Contents
To INDEX
GMM 220 Price List

Accessories for CO_2 Instruments

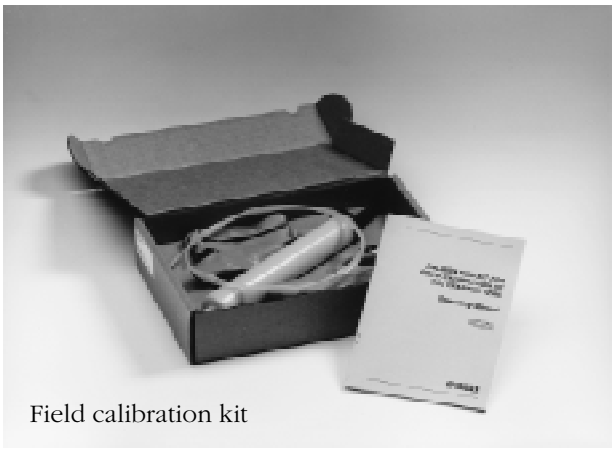
GMI 111 REPLACEMENT COVER WITH DIGITAL DISPLAY FOR GMP 111 & 111E

A direct replacement for the front cover of the GMP 111 and GMP 111E. Its four-digit LCD display reads to the nearest ppm. It connects directly to the nine pin connector on the transmitter electronics and can be used as a digital indicator or as part of a calibrator.

GMP 111E shown with optional display cover

FIELD CALIBRATION KIT

Made up of six calibration balloons, a hand pump and a calibration tube, it supports both one and two point calibration. In one point calibration ambient air is used as zero gas; in two point calibration the customer creates span gases using exhaled breath. Output of the transmitter is checked using a common DMM or the GMI 111. The transfer standard is the GM 12 portable meter. Quick and easy to use, it permits two point calibration without using heavy gas bottles.



Field calibration kit

PROTECTION SHIELD FOR GMP 111/111E

This protection shield prevents the ingress of water into the gas sample chamber during spray or wash down, providing protection of the sensor without impacting response time. It snaps in place and can be removed easily for cleaning or maintenance.

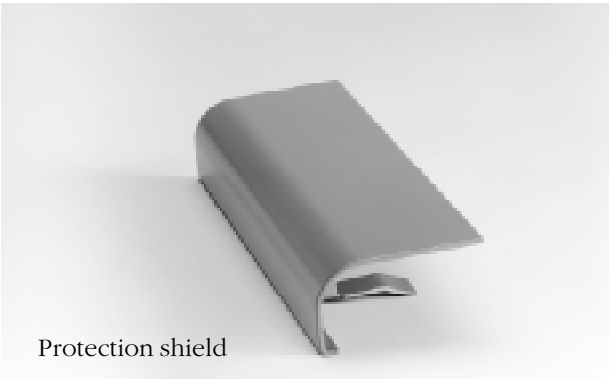
BACK to Table of Contents

To INDEX

Accessories Price List

OTHER CO_2 ACCESSORIES

- Display and relay option for GMM 20W and GMW 20 series
- Relay output option for GMM 20W and GMD/W 20 series
- Calibration software kit for GMM 20W and GMD/W 20 series
- Field calibration kit used with Vaisala's portable CO_2 meters
- Battery pack for GM 11 and GM 12
- Calibration pipe with T-piece for GM 11 and GM 12
- Calibration gases: 0, 1000, 2000, 3000, 7000 ppm and 3 %CO_2
- Two-stage pressure regulator for gas bottles
- Rotameter with needle valve for gas bottles
- Calibration pipe for GMP 111/E



Protection shield

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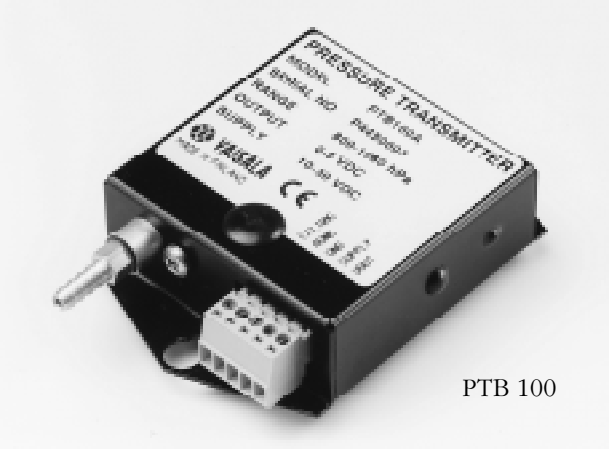
PTB 100 Series Analog Barometers

FEATURES

- Standard pressure ranges
  (1 hPa=1 mbar)
  900...1100 hPa
  800...1060 hPa
  600...1060 hPa
- Accuracy at room temperature including NIST traceability
  ±0.3 hPa 900...1100 hPa
  ±0.3 hPa 800...1060 hPa
  ±0.5 hPa 600...1060 hPa
- Long-term stability ±0.1 hPa/year
- Supply voltage 10...30 VDC
- On/off control with external trigger
- Output voltage 0...2.5 or 0...5 VDC
- Current consumption less than 4 mA
- Mountable on a 35 mm wide DIN rail



PTB 100

APPLICATIONS

- Environmental pressure monitoring
- Agriculture
- Hydrology
- Data buoys
- Laser interferometers

EXCELLENT LONG-TERM STABILITY

The PTB 100 series analog barometers are designed both for accurate barometric measurements at room temperature, and for general environmental pressure monitoring over a wide temperature range. The excellent long-term stability of the barometers minimizes or even removes the need for field adjustment in many applications.

The compact PTB 100 series barometers are ideal for data logger applications because of their low power consumption, selectable external on/off control, practical output voltage ranges and three or four wire connection capability.

The PTB 100 series barometers use the BAROCAP® silicon capacitive absolute pressure sensor developed by Vaisala for barometric pressure measurement applications. The Barocap sensor combines the outstanding elasticity characteristics and mechanical stability of single-crystal silicon with the proven capacitive detection principle.

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TECHNICAL DATA - PTB 100 SERIES

Note: Hectopascal (hPa) is the barometric pressure unit recommended by WMO and also accepted by ISO.
1 hPa = 1 mbar

Operating Range

Pressure range	
PTB 100A	800...1060 hPa
PTB 100B/PTB 101B	600...1060 hPa
PTB 101C	900...1100 hPa
Temperature range	-40...+140°F (-40...+60°C)
Humidity range	non-condensing

Accuracy

	PTB100A/PTB101C	PTB 100B/PTB101B
Linearity*	±0.25 hPa	±0.45 hPa
Hysteresis*	±0.03 hPa	±0.05 hPa
Repeatability*	±0.03 hPa	±0.05 hPa
Calibration uncertainty**	±0.15 hPa	±0.15 hPa
Accuracy at +68°F (+20°C***)	±0.3 hPa	±0.5 hPa

* Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error or repeatability error
** Defined as ±2 standard deviation limits of inaccuracy of the working standard at 1000 hPa including traceability to NIST
*** Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature

Total accuracy	PTB 100A/PTB101C	PTB100B/PTB101B
+68°F (+ 20 °C)	±0.3 hPa	±0.5 hPa
0…104°F (0...+40°C)	±1 hPa	±1.5 hPa
-4…113°F (-20...+45°C)	±1.5 hPa	±2 hPa
-40…140°F (-40...+60°C)	±2.5 hPa	±3 hPa
Long-term stability		±0.1 hPa/year
Effect of thermal or mechanical shocks		< ±0.2 hPa

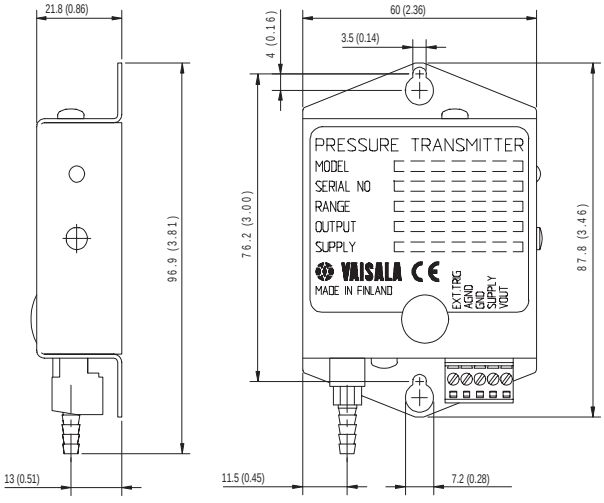
General

Supply voltage	10 to 30 VDC
Supply voltage control with TTL level trigger when enabled with an internal jumper, barometer can be triggered on/off using external TTL level trigger	
Supply voltage sensitivity	less than 0.1 hPa
Current consumption	less than 4 mA less than 1 µA in shutdown mode
Output voltage	
PTB 100A/PTB 100B	0...5 VDC
PTB 101B/PTB101C	0...2.5 VDC
Resolution	0.1 hPa
Load resistance	10 kohm minimum
Load capacitance	47 nF maximum
Settling time	1 s to reach full accuracy after power-up
Response time (100% response)	300 ms
Warm-up shift	less than 0.1 hPa
Acceleration sensitivity	negligible
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8" I.D. tubing
Maximum pressure limit	2000 hPa abs.
Electrical connector	a removable connector for five wires (AWG 28...16)
Housing material	aluminum
Weight	85 g

BAROCAP® is a registered trademark of Vaisala. Specifications subject to change without further notice.

PTB 100 Series

Dimensions in mm (inches)



BACK to Table of Contents
To INDEX
PTB 100 Price List

PTB 220 Series Digital Barometers

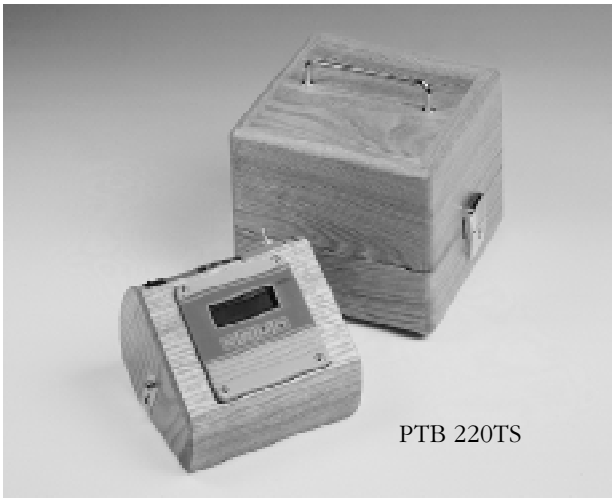
FEATURES

- 500...1100 hPa pressure range
- -40...+140 °F (-40...+60 °C) temperature range
- Total accuracy
  class A ±0.15 hPa
  class B ±0.25 hPa
- 0.01% reading accuracy
  (class A/800...1100 hPa/+20 °C)
- Long term stability ±0.1 hPa/year
- Available with one, two or three barometric pressure transducers
- Available with:
  RS 232C/TTL level,
  RS 485/RS 422 serial interface, or
  RS 232C/0…5VDC (0…20mA) output
- Available with local display with backlight
- Fast measurement mode

PTB 220

APPLICATIONS

- Barometric transfer standard
- Electronic alternative for Hg barometer
- Weather stations
- Data buoys and ships
- Laser interferometers



PTB 220TS

ACCURACY AND STABILITY

The PTB 220 series digital barometers are designed for a wide environmental pressure and temperature range. The class A barometers are fine adjusted and calibrated against a deadweight tester. The class B barometers are adjusted and calibrated using electronic working standards.

A single barometer can have one, two or three pressure transducers. Two or three transducers provide redundancy which improves measurement reliability in airport, weather station and pressure standard applications.

The local display has two rows and it can simultaneously show the barometric pressure, three-hour pressure trend and WMO pressure tendency code.

The PTB 220 series digital barometers use the BAROCAP® silicon capacitive absolute pressure sensor developed by Vaisala for barometric pressure measurement applications. The BAROCAP sensor has excellent hysteresis and repeatability characteristics and outstanding temperature and long-term stability.

The PTB 220TS (transfer standard) is comprised of the PTB 220 transmitter and rechargeable battery. Conveniently housed in an attractive and rugged oak carrying case, it provides added protection and ease of portability. The high accuracy of the PTB 220 makes the PTB 220TS ideal as a transfer standard for calibrating barometers in the field.

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TECHNICAL DATA - PTB 220 SERIES

Note: Hectopascal (hPa) is the barometric pressure unit recommended by WMO and also accepted by ISO.
1 hPa = 1 mbar

Operating Range

Pressure range	500...1100 hPa
Temperature range	
operating	-40...+140°F (-40...+60 °C)
with local display	32...+140 °F (0...+60 °C)
storage	-76...+140°F (-60...+60 °C)
storage with local display	-4...+140°F (-20...+60 °C)
Humidity range	non-condensing

Accuracy

	0.01% R¤	Class A
Linearity*	±0.05 hPa	±0.05 hPa
Hysteresis*	±0.02 hPa	±0.03 hPa
Repeatability*	±0.02 hPa	±0.03 hPa
Calibration uncertainty**	±70 ppm	±0.07 hPa
Accuracy at +68°F (+20°C)***	±100 ppm	±0.10 hPa

	Class B
Linearity*	±0.10 hPa
Hysteresis*	±0.03 hPa
Repeatability*	±0.03 hPa
Calibration uncertainty**	±0.15 hPa
Accuracy at +68°F (+20°C)***	±0.20 hPa
Temperature dependence****	±0.1 hPa

Total accuracy

Class A	±0.15 hPa
Class B	±0.25 hPa
Long-term stability	±0.1 hPa/year

¤ Class A / 800...1100 hPa /+68°F (+20°C)
* Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error or repeatability error.
** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.
*** Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.
**** Defined at ±2 standard deviation limits of temperature dependence over the operating temperature range.

General

Supply voltage	10...30VDC reverse polarity protected
Supply voltage sensitivity	negligible
Current consumption	
operation mode	less than 30 mA
with local display	less than 50 mA
hardware shutdown mode	less than 0.1 mA
Serial I/O	RS 232C• full duplex or bidirectional TTL level or RS 485/422 half duplex
code	ASCII
parity	none, even•, odd
data bits	7• or 8
stop bits	1• or 2
Pulse output	TTL level pulse output at about 5 kHz or 50 kHz
Optional analog output module	
output range	0…5VDC•,0…20mA
resolution	4 Pa
total accuracy	60°…85°F (+15…+30°C)
class A	±0.25 hPa
class B	±0.30 hPa

(The module provides a secondary barometer output and is supplied without a calibration certificate.)

Pressure units	hPa•, mbar, kPa, Pa, inHg, mmH20, mmHg, torr, psia
Baud rates	300, 600, 1200, 2400, 4800, 9600•
Resolution	
class A 0.01 hPa•	class B 0.1 hPa•
Settling time at power-up (one sensor)	
class A 3 s•	class B 2 s•
Response time (one sensor)	
class A 2 s•	class B 1 s•
fast measurement mode	0.2 s•
Acceleration sensitivity	negligible
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8" I.D. tubing
Maximum pressure limit	5000 hPa abs.
Electrical connector	female 9-pin subD
Housing	epoxy painted aluminum
Weight	1 kg

Specifications subject to change without prior notice.
• Factory setting

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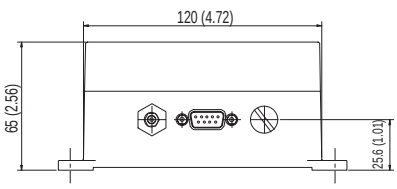
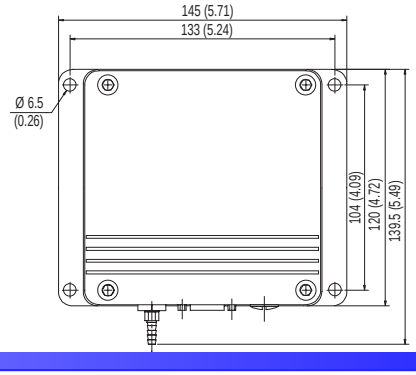
BACK to Table of Contents
To INDEX
PTB 220 Price List

PTB 220 Series

Dimensions in mm (inches)





PTU 200 Combined Pressure, Humidity and Temperature Transmitter

FEATURES/BENEFITS

- Barometric Pressure:
  ± 0.15 hPa (500...1100 hPa /-40...140°F (-40...+60°C)
- Temperature and Humidity:
  ± 0.9°F (-40...+140°F), ±0.36°F @68°F
  ± 0.5°C (-40...+60 °C), ±0.2°C @20°C
  ± 2% RH (0...90 %RH), ± 3 % RH (90...100%RH)
- Remote RH+T probe with 3.5m or 20m cable
- Optional NEMA 4 outdoor installation kit
- RS232C serial interface with NMEA protocol for GPS use
- 12VDC /30mA operation
- Optional LCD display cover

APPLICATIONS:

- Meteorological/Environmental Monitoring
- Calibration laboratory monitoring
- GPS Precipitable Water Vapor detection
- GPS accuracy improvement

THREE-IN-ONE MEASUREMENT

The PTU 200 combines barometric pressure, humidity and temperature measurement in one transmitter. It can be used to improve the accuracy of GPS (Global Positioning System) coordinate measurements. Together with the ground-based GPS receivers, the PTU can also be used to estimate Precipitable Water Vapor (PWV) in the atmosphere: data which can be useful in improving weather forecasting accuracy. The PTU 200 is also an ideal instrument package for use in calibration laboratories and for data which can be useful in improving environmental monitoring applications.

VAISALA'S PROVEN SENSOR TECHNOLOGY

The PTU 200 transmitter is based on Vaisala's PTB 220 digital barometer. For pressure measurement, it uses the BAROCAP® silicon capacitive barometric pressure sensor. The BAROCAP® has excellent measurement repeatability and outstanding temperature and long-term stability. The humidity and temperature probe uses Vaisala's HUMICAP®180 capacitive thin film sensor for relative humidity measurement, with better than ±1%RH annual measurement stability. The temperature sensor is a platinum RTD sensor.

SERIAL COMMUNICATION

An RS232C serial interface is standard with PTU 200 transmitters. The transmitter software is also compatible with major GPS receivers and NMEA (National Marine Electronics Association) coded messages. An optional RS485 interface is also available.

PTU 200

OUTDOOR INSTALLATION KIT

For outdoor use an optimized outdoor installation kit PTU 200 MIK is available. The PTU 200 MIK includes a NEMA 4 rated enclosure for the barometer, a static pressure head and a radiation shield for the humidity and temperature probe. An optional tripod, the PTU 200 TRIPOD, is available to enable quick field setup.

PTU 200 shown with meteorological installation kit (PTU 200 MIK) and tripod.

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TECHNICAL DATA - PTU 200

Note: Hectopascal (hPa) is the barometric pressure unit recommended by WMO and also accepted by ISO.
1 hPa = 1 mbar

Barometric Pressure

Operating Range

Pressure range	500...1100 hPa
Temperature range	
operating	-40...+140°F (-40...+60 °C)
with local display	32...+140°F (0...+60 °C)
storage	-76...+140°F (-60...+60 °C)
with local display	-4...+140°F (-20...+60 °C)
Humidity range	non-condensing

Accuracy	Class A	Class B
Linearity*	±0.05 hPa	±0.10 hPa
Hysteresis*	±0.03 hPa	±0.03 hPa
Repeatability*	±0.03 hPa	±0.03 hPa
Calibration uncertainty**	± 0.07 hPa	±0.15 hPa
Accuracy at 68°F (+20 °C***+)	± 0.10 hPa	±0.20 hPa

Temperature dependence****	±0.1 hPa
Total accuracy including one year drift	
Class A ±0.15 hPa	Class B ±0.25 hPa
Long-term stability	±0.1 hPa/year
Response time (one sensor 100% response)	
Class A 2 s•	Class B 1 s•

* Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error or repeatability error.
** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.
*** Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.
**** Defined at ±2 standard deviation limits of temperature dependence over the operating temperature range.

Relative Humidity & Temperature (HMP 45A-P)

Measurement Range	0...100 %RH
Accuracy at +20 °C (including non-linearity and hysteresis)	
against factory references	±1 %RH
field calibration against references	±2 %RH (0...90 %RH)
	±3 %RH (90...100 %RH)
Typical long-term stability	better than 1 %RH per year
Temperature dependence	±0.03 %RH/°F (±0.05 %RH/°C)
Response time (90%) at +20 °C	15 sec. with membrane filter
Sensor	HUMICAP® 180
Measurement Range	-40...+140 °F (-40...+60 °C)

Accuracy	Temp	Accuracy
	-40°F (-40 °C)	±0.9°F (±0.5 °C)
	68°F (20 °C)	±0.4°F (±0.2 °C)
	140°F (+60 °C)	±0.7°F (±0.4 °C)

Temperature sensor	HMP 45 A-P Pt 1000 IEC 751 1/3 Class B
	HMP 45D Pt 100 IEC 751 1/3 Class B
Cable length	
HMP 45 A-P	20m with binder connector
HMP 45 D	3.5m, hard-wired

Pt100 Sensor Head

Measurement Range	-40...+140 °F (-40...+60 °C)
Accuracy	±0.4°F (±0.2°C)
Sensor	Pt 100 IEC 751 1/4 Class B
Cable length	2m

General

Supply voltage	10...30 VDC reverse polarity protected
Supply voltage sensitivity	negligible
Current consumption	
operation mode	less than 30 mA
with local display	less than 30 mA (without back light)
	less than 50 mA (with back light)
hardware shutdown mode	less than 0.1 mA
Serial I/O	RS 232C• full duplex or bidirectional TTL level or RS 485/422 half duplex two-wire
code	ASCII
parity	none, even•, odd
data bits	7• or 8
stop bits	1• or 2
Pressure units	hPa•, mbar, kPa, Pa, inHg, mmH20, mmHg, torr, psia
Humidity units	%RH
Temperature units	°F, °C
Baud rates	300, 600, 1200, 2400, 4800, 9600•
Resolution	
class A	0.01 hPa•
class B	0.1 hPa•
Settling time at power-up (one sensor)	
class A	5 s•
class B	4 s•

Acceleration sensitivity	negligible
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8" I.D. tubing
Maximum pressure limit	5000 hPa abs.
Electrical connector	female 9-pin subD
Housing	
body	epoxy painted aluminum
RH&T probe	ABC plastic
Weight	
depending on selected probe	2.3/1.3/1.1 kg

Specifications subject to change without prior notice.
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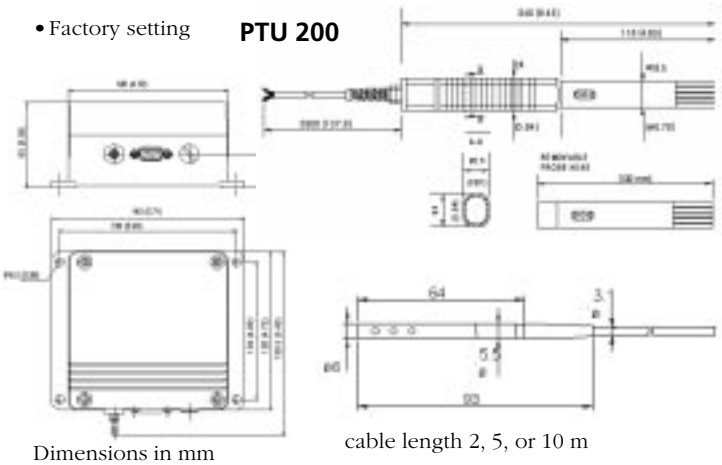
• Factory setting

PTU 200



Dimensions in mm

cable length 2, 5, or 10 m

BACK to Table of Contents
To INDEX
PTU 200 Price List

HMP 45A & HMP 45D Relative Humidity and Temperature Probes; Solar Radiation Shield

VERSATILE PROBES

The HMP 45A and HMP 45D humidity and temperature probes are designed for a wide range of instrumentation e.g. recorders, data loggers, laboratory equipment and weather stations.* They interface easily and are simple to service.

RELIABLE PERFORMANCE IN DEMANDING ENVIRONMENTS

The HMP 45A and HMP 45D provide up to 100% RH measurement with high accuracy. Both feature Vaisala's HUMICAP®180 sensor, one of the most reliable sensors on the market. The sensor can be used in a wide range of environments, has high accuracy, negligible hysteresis and excellent long-term stability - even in very high humidities. It is insensitive to dust and tolerant to most chemicals.

NEW FEATURES

Field calibration is easy with one or two references. The probe head containing the sensor and electronics can be quickly removed from the probe body, a replacement installed and the measurements continued while the other sensor head is calibrated in a laboratory. If necessary, the humidity and temperature readings in the HMP 45A can be checked with Vaisala's HMI 41 humidity indicator on site. Routine checks and calibrations can be made without interrupting measurements for long periods of time.

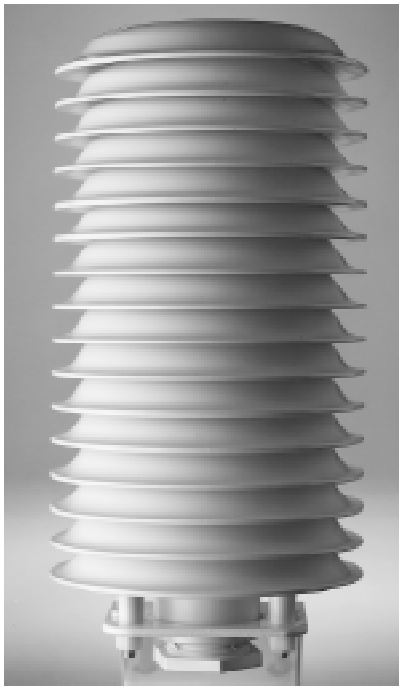
The combined performance of the HUMICAP®180 sensor and improved NEMA 4 protected probe enables you to make accurate and repeatable humidity and temperature measurements with confidence. These probes can be operated from a wide range of supply voltages and have low power consumption. Combine these features with the probes' wide temperature range, temperature compensation and full-scale humidity range and you have a versatile solution for many applications.

SHIELD PROVIDES SENSOR PROTECTION

Vaisala also offers the 2212 HM shield to protect the humidity and temperature sensors from solar radiation and precipitation. It provides excellent ventilation while blocking direct and reflected solar radiation. The 2212 HM's flexible fastening system makes probe installation simple, and an offset U-bolt makes mounting equally as easy.

*The HMP 45A/D is an excellent solution for measuring humidity in weather stations. However, the HMP 243, with warmed sensor head, is a better solution if condensation continuously disturbs measurement.

HMP 45A & HMP 45D humidity and temperature probes for meteorological applications provide EMI/RF protection.



2212 HM shield provides protection from solar radiation and precipitation.

100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - HMP 45A, HMP 45D, 2212 HM

GENERAL

Operating temperature range	-40...+140°F (-40...+60°C)
Storage temperature range	-40...+176°F (-40...+80°C)
Supply voltage	7...35 VDC
Settling time	500 ms
Power consumption	<4 mA
Output load	>10kohm (to ground)
Weight	350 g (incl. package)
Cable length	3.5 m
Housing material	ABS plastic
Housing classification (electronics)	NEMA 4 (IP 65)
Sensor protection	
standard	membrane filter part no.2787HM
option	sintered filter 37 µm part no. 6685
	sintered filter 216 µm part no. 6686
	grid, part no. 6597

RELATIVE HUMIDITY

HMP 45A & HMP 45D

Measuring range:	0.8 to 100% RH
Output scale	0...100 %RH equals 0...1 VDC
Accuracy at +68°F (+20°C) (incl. nonlinearity and hysteresis)	
against factory references	±1 %RH
field calibration against references	
	±2 %RH (0...90 %RH)
	±3 %RH (90...100 %RH)
Typical long-term stability	< 1 %RH / year
Temperature dependence	±0.03 %RH/°F (±0.05 %RH/ °C)
Response time (90% at +68°F (+20°C))	15 s with membrane filter
Humidity sensor	HUMICAP® 180

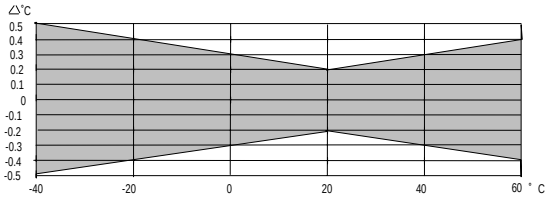
Dimensions in mm (inches)

TEMPERATURE

HMP 45A

Measurement range	-39.2...+140 °F (-39.2...+60 °C)
Output scale	-40...+140 °F equals 0...1 VDC
Accuracy at +68°F (+20 °C)	±0.36°F (±0.2 °C)

Accuracy over measurement range:

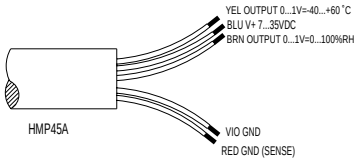


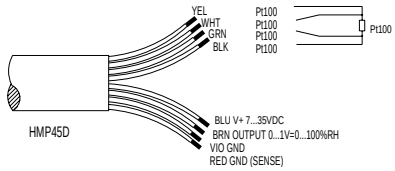
Temperature sensor	Pt 1000 IEC 751 1/3 Class B

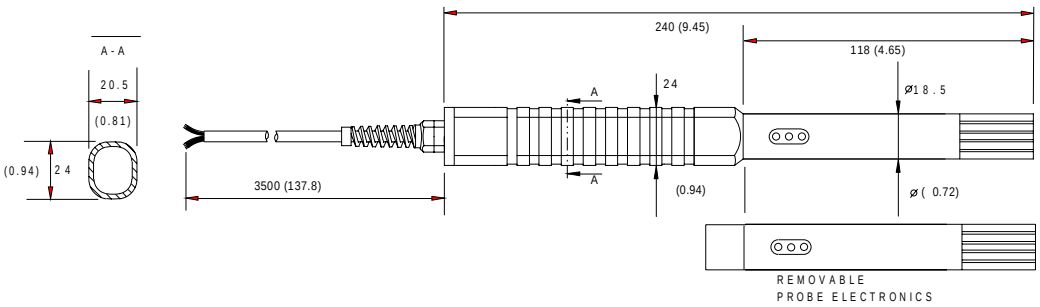
HMP 45D

Measurement range	-40...+140 °F (-40...+60 °C)
Output signal	resistive four wire connection
Temperature sensor	Pt 100 IEC 751 1/3 Class B

Specifications subject to change without prior notice.







BACK to Table of Contents

To INDEX

HMP 45A/D Price List

Wind Measurement Instruments and Systems for Industrial Applications

WIND SENSORS TO MEET YOUR NEEDS

WMS 301: Vaisala's WMS 301 is a compact sized wind sensor with wind speed and direction capability integrated into one unit. The electronic design makes the sensor suitable for applications where **low power** consumption is essential.

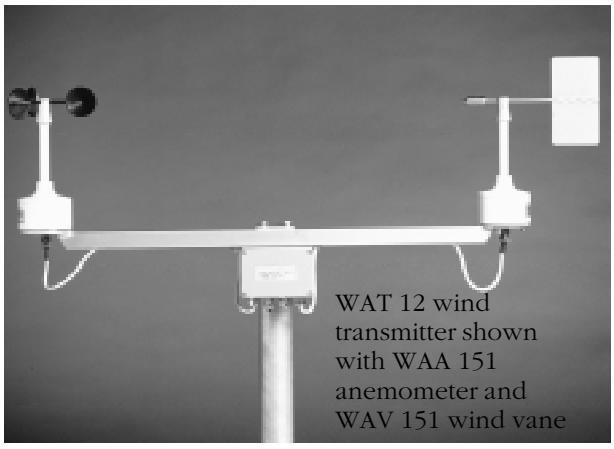
WAT 12: For long distances between the sensor installations and displays (> 100 meters), Vaisala's WAT 12 Wind Transmitter System is the solution. This system is comprised of the WAA 151 anemometer, WAV 151 wind vane, and WAT 12 wind transmitter. The sensors are fast response, low threshold, with **heated shafts for colder climates.** The WAT 12 transmitter converts the wind speed and direction data into two analog current loop signals. The power to the sensors is also supplied through the WAT 12 unit. An **ICE-free heated anemometer, WAA 251**, is recommended where there is a high risk of ice formation.


WMS 301 wind sensor

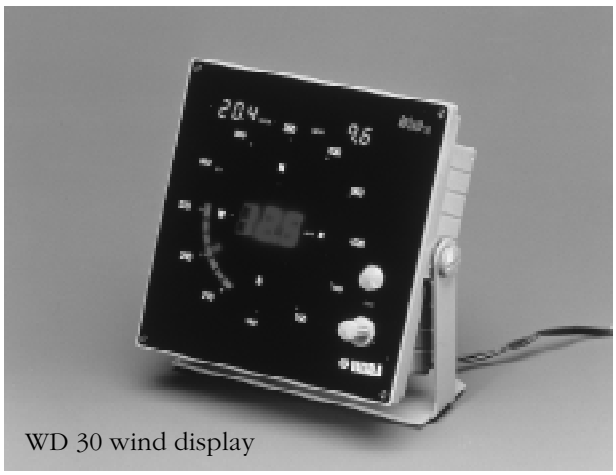
VERSATILE AND COST-EFFECTIVE WIND DISPLAYS

WD 20: The WD 20 Wind Display is directly compatible with the above wind sensors and offers an economic solution to display instant values of wind speed and wind direction. Features include automatic brightness control, on-line configuration, and capability for desktop, panel or wall mounting.

WD 30: The WD 30 is a multi-channel wind display for displaying and processing wind data. It provides instantaneous, as well as time-averaged data over two and ten minute periods. In addition to the features listed for the WD 20, the WD 30 can be used with up to four WAT 12 wind sensor systems.


WAT 12 wind transmitter shown with WAA 151 anemometer and WAV 151 wind vane


WD 20 wind display


WD 30 wind display

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - WIND MEASURMENT SYSTEMS

WMS 301 Combined Wind Sensor

Anemometer

Sensor/transducer type	Dual Reed switch
Measuring range	0.5…60 M/S
Starting threshold	<0.4 M/S
Transducer output	1Hz~0.7 M/S
Accuracy	(<= 10M/S) ± 0.3 M?S

Vane

Sensor/transducer type	Potentiometer
Measuring range	0…355 degrees
Starting threshold	<0.1 M/S
Transducer output	Vref/360= 1 degree
Accuracy	Better than ± 3 degrees

Supply voltage	3…15 VDC
Operating temperature	41...+131 °F (+5...+55°C)
Storage temperature	-76°…149°F (-60…+65°C)
Body	AlMgSi Gray Anodized
Cups	PA, reinforced carbon fiber
Vane	PA, reinforced glassfibre
Dimensions	265 (H) X 360 (W) MM
Weight	360G

WAT 12 Wind Transmitter

Function	Digital-to-analog current loop converter for Vaisala wind sensors
Temperature range	
operating	-41...+131 °F (+5...+55°C)
storgae	-76…158°F (-60...+70°C)
Power	12 VDC to 28 VDC, 30 mA max. (incl. sensors, excl. loop current)
Electrical connections	Screw terminals, max wire cross section area 1.5mm²

Signal input from wind sensors (see above)

Output signals

Two analog current loops, one for direction, one for speed. High side drivers; the loops return to the common signal & power ground. Loop driving voltage typically 10V

Output accuracy	Better than 1% of full scale
Loop current options	0-5 mA; 1-5 mA; 0-10 mA; 0-20 mA; 4-20 mA
Full scale options	0-360°/0-540° for direction 60 m/s for speed (optionally larger scales)
Signal cable	Preferably 3-pair shielded twisted pair cable

WAA 151 Anemometer

Measuring range	0.4...75 m/s
Threshold	0.4 m/s
Distance constant	4 m
Accuracy below 10 m/s	±0.1 m/s
Accuracy 10...75 m/s	±2%
Sensor-transducer type	LED/phototransistor (chopper)
Operating power supply	11..15.5 VDC; 20 mA typically
Heating power supply	20 V, 500 mA
Operating temperature	41...+131 °F (+5...+55°C)
Storage temperature	-76...+158 °F (-60...+70°C)
Cup material	Carbon fiber
Aluminum finish	Paint
Dimensions	240 (h) x 86 (diam.) mm
Weight	500 g

WAV 151 Wind Vane

Measuring range	0..360°(wind speed 0.4..75 m/s)
Threshold	0.4 m/s
Resolution	5.6°
Damping ratio	0.14
Delay distance	0.4 m
Accuracy	better than ±3 °
Transducer type	Optical code disc
Sensor-transducer output code	GRAY code, 6-bit parallel
Operating power supply	U_{in}=9.5...15.5 VDC; 20 mA typical
Heating power supply	AC or DC; 20 V, 500 mA
Operating temperature with shaft heating below +0°C	-58...+131°F (-50...+55°C)
Storage temperature	-76..+158°F (-60...+70°C)
Dimensions swept radius of vane 172 mm	300 (h) x 90 (diam.) mm
Weight	660 g

WAC 151 Cross Arm Assembly

Length	800 mm
Max. outside diameter for mast tube	60 mm
Cross arm material	Aluminum
Weight	1.5 kg

WD 20/WD 30 Wind Displays

Type WD 20	Single channel wind display
Type WD 30	Multichannel averaging wind display
Features:	Automatic brightness control Desktop, panel or wall mounting (stand included)
Material:	Aluminum frame, ABS case, grey
Dimensions:	144x144 mm, depth 65 mm Body design allows 120 mm panel mounting
Weight:	
WD 20	580 g
WD 30	610 g
Supply voltage:	10.5 0 15.5 VDC
Power consumption at max. brightness	
WD 20	3.8w
WD 30	15w
User Interface:	
Speed	3-digit 7-segment LEDS
Speed min./channel	3-digit 7 segment LEDs
Speed max.	3-digit 7 segment LEDs
Speed unit	Back-illuminated LED; m/s, km/h, kt
Direction	Analog 2 x 36 LED elements in a circle (inner circle for direction, outer circle for variation)
Operating mode:	Back-illuminated yellow LED; instant, 2 min or 10 min
Environmental:	
Storage temperature	-40...+140 °F (-40...+60°C)
Operating temperature	41...+131 °F (+5...+55°C)
Humidity	2...100%
EMC	CE compliant
Vibration test	according to MIL-STD-167-1
Options	
Power supply for 110...220 VAC	

BACK to Table of Contents

To INDEX

Wind Price List

MAWS 101 Automatic Weather Station for Industrial Applications

The MAWS (mobile automatic weather station) series of small weather stations are new generation AWSs (automatic weather stations) for both permanent installations as well as for those applications requiring portability. MAWS features high performance fitted into a very compact package. Imbedded with sophisticated technology, yet easy to use, MAWS is the ideal choice for a wide range of applications requiring reliable and accurate meteorological measurements and low cost-of-ownership.

FEATURES

- Compact, portable, and light- weight
- Easy to install, configure, and maintain
- Low power consumption for extended operation
- Reliable and accurate
- Extensive software capability
- Multiple serial ports for display and telemetry options.

MAWS IS USER FRIENDLY

MAWS is easy to set up. All sensors are equipped with ready-made cables and connectors for easy installation. Components fit together with ease: no special tools are needed. Once assembled, simply connect the power and MAWS will be fully operational. Sensor measurements, calculations, data logging, and data transmission will be performed according to the user- configured program.

The operation of MAWS can be easily modified with the help of the user-friendly "Lizard" program. Using the ready-made templates, this program guides you through the simple setup routines. Not only is it easy to use, but there are enough setup options to satisfy even the most demanding user.

MAWS IS ACCURATE

Utilizing Vaisala's recognized expertise and field-proven design, MAWS provides features previously seen only in larger systems. The accurate measurements begin with the sensors.

The basic suite of sensors measures wind, pressure, temperature, relative humidity, and precipitation. In addition, other sensors such as, soil/water temperature(s), solar radiation, net radiation and water level can be added. The sensors are derived from the same field-proven instruments that Vaisala has developed for demanding customers such as the FAA and the military. The use of a 32-bit CPU, a 16-bit A/D conversion, and advanced software ensure the continuous accuracy of your weather information.

MAWS 101

MAWS 101 saves you time and money when installing, using, and maintaining a basic AWS. Due to its lightweignt compact design there is no need to install large concrete foundation.

MAWS 101 comes either by itself in its compact enclosure or with a three meter mast. By itself it is ideal for customer-specific installations where the standard tripod or mast installations are not viable solutions.

VAISALA
100 Commerce Way, Woburn, MA 01801
TEL: 1-888-VAISALA (824-7252) FAX: (781) 933-8029
E-MAIL: incsales@vaisala.com Access catalog on-line at: www.vaisala.com/inc/ssdcat

TECHNICAL DATA - MAWS

GENERAL

Processor	32-bit Motorola
A/D conversion	16-bit
Accuracy	
Resistance measurements (Pt-100)	< ±0.05 % F.S.
Voltage measurements	< ±0.2 % F.S.
Data logging memory	2 MB internal flash
Inputs	10 analog inputs (diff.) 2 counter/frequency inputs Internal channel for PTM16A pressure transducer
Serial communication	RS-232 standard, optional up to 5 pcs with two (2) plug-in slots for communication modules Baud rate 300 ... 9600 bps

POWERING

Voltage	8 ... 14 VDC
recommended (30 V max.)	
Standard internal battery	1.3 Ah/6 V
Power consumption	
Typically	< 10 mA/6 V
Solar panel	2.2 W/6 V
Optional	2 pcs 2.2W/6 V panels
Mains power (outdoor)	WHP151

ENVIRONMENTAL

Temperature		
Operating		-31°... +131°F (-35°... +55°C)
Storage		-58°... +158 °F(-50°... +70°C), without battery
Humidity		0 ... 100 % RH
Wind		
With tripod mast		up to 35 m/s
With pole mast		up to 60 m/s
EMI and ESD protection		
Emissions		CISPR 22 class B
Immunity	RF immunity	IEC 61000-4-3
	EFT immunity	IEC 61000-4-3
	ESD immunity	IEC 61000-4-2
Electromagnetic compatibility		IEC-801-4

PHYSICAL

Weight	
Example: portable system with 3 m tripod (pressure, temperature/humidity and wind sensors; 2.2 W solar panel)	15 kg
Basic enclosure	
Material	anodized aluminum
Ingress protection	NEMA 4X (IP66)
Dimensions	dia. 120 mm, height 420 mm
Weight	3.0 kg

OPTIONS AND ACCESSORIES

- Communication modules
- Mains power supply
- PC Card modem & adapter
- Carry cases for MAWS201
- Extra 1.3 Ah rechargeable battery
- 35 Ah lithium battery pack (non-rechargeable)
- Hand-held terminal
- Spread Spectrum radio (remote)
- Spread Spectrum radio (base)
- YourVIEW display software, standard version
- YourVIEW display software, Internet version

For the latest list of MAWS options, please bookmark Vaisala's web site at www.vaisala.com.

BACK to Table of Contents

To INDEX

MAWS Price List

Calibration and Service Laboratory

ISO 9002 CERTIFICATION

Vaisala Inc.'s Woburn, Massachusetts headquarters has earned ISO 9002 certification of its Quality System. Our Calibration and Service Laboratory is an integral part of this Quality System and has been expanded to meet the most demanding customer requirements for calibration traceability and rapid service turnaround.

ISO 9002
DNV
DNV Certification, Inc.
REGISTERED FIRM

RETURNING FOR SERVICE

To take advantage of the services presented here, please call Vaisala's customer service department at 1-888-VAISALA or (781) 933-4500. Our customer service representative will assign you an RMA (Return Material Authorization) number for returning your Vaisala instrument for recalibration or repair. Recalibration of other suppliers' relative humidity/temperature instruments is also available. You will be informed of all charges within one week of the calibration lab receiving your instrument.

Capabilities

All Vaisala calibrations comply with ANSI-7540-1-1994

BACK to Table of Contents

To INDEX

Calibration Price List

HUMIDITY CALIBRATION

- 100 % NIST traceable calibrations
  Standard calibrations consist of 4 points with adjustments at 0 % and 75.5 % and linearity checked at 11.3 % and 97.6 %RH.

- Two-pressure generator enables special NIST traceable calibrations:
  - Any points between 10 % to 95 %RH
  - Temperature range 32 to 158 °F (0 to 70 °C)

TEMPERATURE CALIBRATION

- Temperature calibrations from -13 to +257 °F (-25 to +125 °C)
  - NIST traceable temperature calibration between the specified range.

DEWPOINT CALIBRATION

- Temperature calibrations from -94 to +68 °F (-70 to +20 °C)
  - NIST traceable dewpoint calibration between the specified range.

CO_2 CALIBRATION

- Certified CO_2 calibration
- Calibration at 0%, 2000 ppm (0.2%), 3000 ppm (0.3%), and 3%

WARRANTY REPAIR OF VAISALA INSTRUMENTS

For warranty repairs, no authorization from the customer is needed and we guarantee one week turnaround from the date we receive your instrument(s).

NON-WARRANTY REPAIR OF VAISALA INSTRUMENTS

For non-warranty repairs, we will inform you, within one week of receiving your instrument(s), of the charges for the needed repairs. Vaisala then guarantees a one week turnaround from the date we receive your authorization to proceed.

EXPRESS SERVICE

Two-day guaranteed turnaround service is available for a nominal fee.

100 Commerce Way, Woburn, MA 01801
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Page Blank on Purpose

Product Index

Product	Page Number
Calibration Laboratory Service	99
CO_2 Accessories	85
DMP 246	65-66
DMP 248	67-68
DSS 10	69-70
GM 12 A	71-72
GM 12 B	71-72
GMD 20	73-74
GML 20	75-76
GML 20 T	75-76
GMM 11	81-82
GMM 12	81-82
GMM 20 W	79-80
GMM 220	83-84
GMP 111	77-78
GMP 111 E	77-78
GMW 20	73-74
HM 34	21-22
HM 44	23-24
HMD 40	51-52
HMD 50	51-52
HMD 60	45-46
HMD 70	45-46
HMD 60 OU	49-50
HMD 60 YO	49-50
HMI 38	13-14
HMI 41	17-18
HMK 15	59-60
HMM 210	57-58
HMM 22 D	55-56
HMM 30 C	55-56
HMP 35 E	15-16
HMP 36 E	15-16
HMP 37 E	15-16
HMP 41	19-20
HMP 42	19-20
HMP 45	19-20
HMP 45 A	93-94
HMP 45 D	93-94

Product	Page Number
HMP 46	17-18
HMP 141	37-38
HMP 142	37-38
HMP 143	37-38
HMP 228	25-26
HMP 231	27-28
HMP 233	29-30
HMP 234	31-32
HMP 235	33-34
HMP 238	35-36
HMP 243	63-64
HMP 260 EX	43-44
HMP 361	41
HMP 363	41
HMP 364	42
HMP 365	42
HMP 368	42
HMT 360	39-40
HMW 21	47-48
HMW 31	47-48
HMW 40	51-52
HMW 50	51-52
HMW 60	45-46
HMW 70	45-46
HUMICAP Accessories	61-62
HUMITTER	53-54
MAWS 101	97-98
Meteorological Probes	93-94
PTB 100	87-88
PTB 220	89-90
PTB 220 TS	89-90
PTU 200	91-92
Wind Instruments, displays, and systems	95-98

Price List ..... Cover/Index

Selection Guide ..... Cover/Index

BACK to Table of Contents

U.S. Price List
Table of Contents

ORDER FORMS

HMP 228 Moisture in Oil (pricing and order form) 1

230's Series

HMP 231 Wall Mount (pricing and order form) 2

HMP 233 Tight Spaces Maximum Operating Temp: 80C/176F (pricing and order form) 3

HMP 233 Tight Spaces Maximum Operating Temp: 120C/248F (pricing and order form) 4

HMP 234 Pressurized Spaces (pricing and order form) 5

HMP 235 High Temperatures (pricing and order form) 6

HMP 238 Pressurized Pipelines (pricing and order form) 7

140's Series

HMP 141 Wall Mount (pricing and order form) 8

HMP 142 Duct Mount (pricing and order form) 9

HMP 143 Tight Spaces (pricing and order form) 10

360's Series

HMT 360 Transmitter Unit-HMP 360 Series (pricing and order form) 11

HMT 360 Series Intrinsically Safe Humidity & Temperature Transmitter Probes (pricing and order form) 12

HMT 361 - Wall Mount (pricing and order form) 13

HMT 363 - Small Probe (pricing and order form) 14

HMT 364 - Probe for High Pressures (pricing and order form) 15

HMT 365 - Probe for High Temperatures (pricing and order form) 16

HMT 368 - Oil Transmitter Probe for Pipeline Installations (pricing and order form) 17

240's Series

HMP 243 Dewpoint Sensor Head (pricing and order form) 18

HMP 243 Dewpoint & Temperature Sensor Heads (pricing and order form) 19

DMP 246 Extremely High Temperatures (pricing and order form) 20

DMP 248 Low Dewpoints (pricing and order form) 21

HMK 15 Calibrator (pricing and order form) 22

PTB 220 Pressure Transmitter (pricing and order form) 23

PTU 200 Transmitter (pricing and order form) 24

BACK to Catalog Table of Contents

Next Page

U.S. Price List
Table of Contents (page 2)

HUMIDITY, TEMPERATURE AND TEMPERATURE INSTRUMENTS

Portables 25-26

Special Pricing on Selected Combinations of Portable Indicators & Probes 26

INDUSTRIAL TRANSMITTERS

HMP 140 Series ..... See Order Guides Pages 8-10

HMP 230 Series ..... See Order Guides Pages 2-7

HMP 240 Series ..... See Order Guides Pages 18-21

HMP 260 EX 26

HMT 360 Intrinsically Safe Humidity and Temperature Transmitters ..... See Order Guides Pages 12-17

HVAC/EMCS TRANSMITTERS

Duct and Wall Mount 26-27

Outdoor Use 27

Calibration Free 27-28

Temperature-Only 28

OEM and CUSTOM HUMIDITY INSTRUMENTS 28

CALIBRATION INSTRUMENTS and ACCESSORIES

Calibration Devices 28

Accessories 29

Spares/Replacement Parts 29-31

CARBON DIOXIDE INSTRUMENTS 31-32

NIST TRACEABLE BAROMETERS 32

METEOROLOGICAL PRODUCTS 33

Maws Options 33

CALIBRATION LABORATORY and SERVICE

Humidity 34

Temperature 34

Carbon Dioxide 34

Pressure 34

BACK to Catalog Table of Contents

BACK to Price List Index Page 1

Price: F.O.B. Woburn, Massachusetts

Delivery: Generally within 14 days A.R.O.

Prices are subject to change without notice. Please contact factory to confirm prices.

HUMICAP®, INTERCAP®, BAROCAP®, and HUMITTER® are trademarks of Vaisala

HMP 228 Moisture and Temperature Transmitter

	HMP 228			PRICE
Transmitter type	aw+T			$1,785
Transmitter	**no display**		1	
	display and keypad		2	$295
Sensor head cable	**2 m**		A	
length	5 m		B	$150
	10 m		C	$350
Power supply,	**24 VAC/VDC**		0	
alarm output	115 VAC		1	$190
	230 VAC		2	$190
	24 V, + alarm output unit		3	$165
Serial bus	**RS232C**		A	
	RS485/RS422		B	$140
	Digital current loop		C	$140
Sensor protection	**46999 HM Stainless steel filter**		1	
Analog output	**4... 20 mA**		A / A	
signals	0... 20 mA		B / B	
	0... 1V		C / C	
	0... 5 V		D / D	
	0... 10 V		E / E	
		Ch1		
		Ch2		
Analog output	**aw (0... 1)**		A / A	
signals (Ch1, Ch2)	T (Range below)	T (Range below)	B / **B**	
		Ch1		
		Ch2		
Temperature	**-20... +80°C**	**(-4.0... +176 °F)**	A	
range	-40...+60 °C	(-40...+140 °F)	B	
	-20...+100 °C	(-4.0...+212 °F)	C	
	-40...+180 °C	(-40...+356 °F)	D	
	0...+100 °C	(+32...+212 °F)	E	
	Other (specify)		X	
Output units	**metric**		1	
	non-metric		2	
Installation kit	**no**		A	
	Ball valve set (DMP 248 BVS)		B	$65
Power cord	**No power cord**		3	
	6 Ft. A/C power cord P/N 85-20671		2	$10
Cable Connections	NPT 1/2 Conduit Fitting P/N 45-20618		A	
	PG 9 Cable Gland		B	
			TOTAL	
	aw = water activity		QTY	
			TOTAL VALUE	

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 228	1	A	0	A	1	A	A	A	B	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 231 for Wall Mounting

		HMP 231			A											A		PRICE
Transmitter type	***RH+T***				***A***													$950
	RH, T, Td+a+Tw+x+h				D													$1,150
Transmitter cover	***no display***					***1***												
	local display and keypad					2												$295
Probe length	***120 mm***						***A***											
Pow er supply	***24 VAC/VDC***							***0***										
Serial bus module	***RS 232C***								***A***									
	RS 485/ RS 422								B									$140
	digital current loop								C									$140
Sensor protection	16452 (sintered filter, stainless steel)									1								$50
	16720 (PPS Grid & stainless steel netting)									***2***								$30
	16562 (PPS Grid)									3								$25
	17230 (PTFE membrane)									5								$25
Analog output	***4...20 mA***										***A***	***A***						
signals	***0...20 mA***										***B***	***B***						
(Ch1 and Ch2)	***0...1 V***										***C***	***C***						
	0...5 V										***D***	***D***						
	0...10 V										***E***	***E***						
		channel 1																
		channel 2																
Parameters for the	***RH***	(0...100 %RH)											***1***	1				
analog outputs	***T***	(range: see below)											2	***2***				
(Ch1 and Ch2)	Td	(-40...+60 °C)		(-40 .. +140 °F)									3	3				
	a	(0...160 g/ m3)		(0 .. 69.9 gr/ ft3)									4	4				
	Tw	(0...+60 °C)		(+32 .. +140 °F)									5	5				
	x	(0...160 g/ kg d.a.)		(0 .. 1120 gr/ lb)									6	6				
	h	(-40 .. +460 kJ/ kg)		(-17.2 .. +197.8 Btu/ lb)									7	7				
		channel 1																
		channel 2																
Temperature	***-20...+60 °C -4 .. +140 °F***														***A***			
range	***-40...+60 °C***	***-40 .. +140 °F***													***B***			
(measurement)	***0.±60 C***	***+32.±140F***													***C***			
	Other (Specify)														***X***			
Units (local display	***metric***															***1***		
and serial bus)	***non-metric***															***2***		
Mounting flange	***no flange***																***A***	
Cable Connectors	***NPT 1/2 Conduit Fitting P/N 45-20618***																***A***	
	PG 9 Cable Gland																***B***	
																	TOTAL	
	RH = Relative Humidity			a = Absolute Humidity g/ m 3													QTY	
	T = Temperature			x = Mixing Ratio g/ Kg												TOTAL VALUE		
	Td = Dewpoint Temperature			Tw = Wet Bulb Temperature														
	h = Enthalpy																	

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 231	A	1	A	0	A	2	A	A	1	2	A	1	A	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 233 for Tight Spaces Maximum Operating Temperature: 80C°/176°F

	HMP 233	Code	Code (channel 2)	PRICE
Transmitter type	***RH+T***	***A***		$995
	RH+T+Td+a+Tw+x+h	D		$1,195
Transmitter cover	***no display***	***1***		
	local display and keypad	2		$295
Cable length	***2 m cable, +80 °C (+176 °F)***	***A***		
	5 m cable, +80 °C	B		$130
	10 m cable, +80 °C	C		$170
Pow er supply, alarm output	**24 VAC/VDC**	***0***		
	115 V AC	1		$190
	230 VAC	2		$190
	24 V, + alarm output unit	3		$165
Serial bus module	***RS 232C***	***A***		
	RS 485/ RS 422	B		$140
	digital current loop	C		$140
Sensor protection	16452 (sintered filter, stainless steel)	1		$50
	16720HM (PPS grid & stainless steel netting)	2		$30
	16562 (PPS Grid)	3		$25
	17230 (PTFE membrane)	5		$25
Analog output signals (Ch1 and Ch2)	***4...20 mA***	***A***	***A***	
	0...20 mA	***B***	***B***	
	0...1 V	***C***	***C***	
	0...5 V	***D***	***D***	
	0...10 V	***E***	***E***	
		channel 1	channel 2	
Parameters for the analog outputs (Ch1 and Ch2)	***RH*** (0...100 %RH)	***1***	1	
	T (range: see below)	2	***2***	
	Td (-40...+100 °C) (-40 .. +212 °F)	3	3	
	a (0...600 g/ m3) (0 .. 262 gr/ ft3)	4	4	
	Tw (0...+100 °C) (+32 .. +212 °F)	5	5	
	x (0...500 g/ kg d.a.) (0 .. 3500 gr/ lb d.a.)	6	6	
	h (-40 .. 1500 kJ/ kg) (-17.2 .. 644.9 Btu/ lb)	7	7	
		channel 1	channel 2	
Temperature (measurement)	***-20...+80 °C -4 .. +176 °F***	***A***		
	-40...+80 °C -40 .. +176 °F	***C***		
	Other (Specify)	***X***		
Units (local display and serial bus)	***metric***	***1***		
	non-metric	***2***		
Installation kit for duct mounting	***no***	***A***		
	yes: +80 °C cable (+176 °F)	B		$45
Power Cord	***No power cord***	***3***		
	6 Ft. A/ C power cord P/ N 85-20671	2		$10
Cable Connections	***NPT 1/2 Conduit Fitting P/ N 45-20618***	***A***		
	PG 9 Cable Gland	***B***		
			TOTAL	
			QTY	
			TOTAL VALUE	

RH = Relative Humidity   a = Absolute Humidity g/ m 3
T = Temperature   x = Mixing Ratio g/ Kg
Td = Dewpoint Temperature   Tw = Wet Bulb Temperature
h = Enthalpy

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 233	A	1	A	0	A	2	A	A	1	2	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 233 for Tight Spaces Maximum Operating Temperature: 120C°/248°F

(see page 3 for other temperature version)

	HMP 233																					PRICE
Transmitter type	***RH+T***																				***A***	$1,270
	RH+T+Td+a+Tw+x+h																				D	$1,770
Transmitter cover	***no display***																			***1***		
	local display and keypad																			2		$295
Cable length	2 m cable, +120 °C (+248°F)																		D			
	5 m cable, +120 °C																		E			$140
	10 m cable, +120 °C																		F			$255
Pow er supply,	***24 VAC/VDC***																	***0***				
alarm output	115 VAC																	1				$190
	230 VAC																	2				$190
	24 V, + alarm output unit																	3				$165
Serial bus module	***RS 232C***																***A***					
	RS 485/ RS 422																B					$140
	digital current loop																C					$140
Sensor protection	16452 (sintered filter, stainless steel)															1						$50
	16720HM (PPS grid & stainless steel netting)															2						$30
	16562 (PPS Grid)															3						$25
	17230 (PTFE membrane)															5						$25
Analog output	***4...20 mA***														***A***	***A***						
signals	***0...20 mA***														***B***	***B***						
(Ch1 and Ch2)	***0...1 V***														***C***	***C***						
	0...5 V														***D***	***D***						
	0...10 V														***E***	***E***						
												channel 1										
												channel 2										
Parameters for the	***RH*** (0...100 %RH)																	***1***	1			
analog outputs	***T*** (range: see below)																	2	***2***			
(Ch1 and Ch2)	Td	(-40...+100 °C)				(-40 .. +212 °F)												3	3			
	a	(0...600 g/ m3)				(0 .. 262 gr/ ft3)												4	4			
	Tw	(0...+100 °C)				(+32 .. +212 °F)												5	5			
	x	(0...500 g/ kg d.a.)				(0 .. 3500 gr/ lb d.a.)												6	6			
	h	(-40 .. 1500 kJ/ kg)				(-17.2 .. 644.9 Btu/ lb)												7	7			
							channel 1															
							channel 2															
Temperature range	***-20...+120 °C***				***-4 .. +248 °F***															***B***		
(measurement)	***-40...+120 °C***				***-40 .. +248 °F***															***D***		
	Other (Specify)																			***X***		
Units (local display	***metric***																				***1***	
and serial bus)	***non-metric***																				***2***	
Installation kit for	***no***																					***A***
duct mounting	yes: +120 °C cable (+248 °F)																					C
Power Cord	***No power cord***																					***3***
	6 Ft. A/ C power cord P/ N 85-20671																					2
Cable Connections	***NPT 1/ 2 Conduit Fitting P/ N 45-20618***																					***A***
	PG 9 Cable Gland																					***B***

			TOTAL
RH = Relative Humidity	a = Absolute Humidity g/ m 3		QTY
T = Temperature	x = Mixing Ratio g/ Kg		TOTAL VALUE
Td = Dewpoint Temperature	Tw = Wet Bulb Temperature		
h = Enthalpy			

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings.

HMP 233	A	1	D	0	A	1	A	A	1	2	B	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 234 for Pressurized Spaces

Item	Option		Code (Ch1)	Code (Ch2)	PRICE
	HMP 234				
Transmitter type	***RH+T***		***A***		$1,935
	RH+T+Td+a+Tw+x+h		D		$2,435
Transmitter cover	***no display***		***1***		
	local display and keypad		2		$295
Cable length	***2 m cable, +180 °C***	***(+356 °F)***	***A***		
	5 m cable, +180 °C		B		$150
	10 m cable, +180 °C		C		$350
Power supply, alarm output	**24 VAC/VDC**		***0***		
	115 VAC		1		$190
	230 VAC		2		$190
	24 V, + alarm output unit		3		$165
Serial bus module	***RS 232C***		***A***		
	RS 485/ RS 422		B		$140
	digital current loop		C		$140
Sensor protection	16452 (sintered filter, stainless steel)		1		$50
	16720 (PPS Grid & stainless steel netting)		2		$30
	17230 (PTFE membrane)		5		$25
Analog output signals (Ch1 and Ch2)	***4...20 mA***		***A***	***A***	
	0...20 mA		***B***	***B***	
	0...1 V		***C***	***C***	
	0...5 V		***D***	***D***	
	0...10 V		***E***	***E***	
			channel 1	channel 2	
Parameters for the analog outputs (Ch1 and Ch2)	***RH*** (0...100 %RH)		***1***	1	
	T (range: see below)		2	***2***	
	Td (-40...+100 °C)	(-40 .. +212 °F)	3	3	
	a (0...600 g/ m3)	(0 .. 262 gr/ ft3)	4	4	
	Tw (0...+100 °C)	(+32 .. +212 °F)	5	5	
	x (0...500 g/ kg d.a.)	(0 .. 3500 gr/ lb d.a.)	6	6	
	h (-40 .. 1500 kJ/ kg)	(-17.2 .. 644.9 Btu/ lb)	7	7	
			channel 1	channel 2	
Temperature range (measurement)	***-20...+80 °C***	***-4 .. +176 °F***	***A***		
	-20...+120 °C	***-4 .. +248 °F***	***B***		
	-20...+180 °C	***-4 .. +356 °F***	***C***		
	-40...+80 °C	***-40 .. +176 °F***	***D***		
	-40...+120 °C	***-40 .. +248 °F***	***E***		
	-40...+180 °C	***-4 .. +356 °F***	***F***		
	Other (Specify)		***X***		
Units (local display and serial bus)	***metric***		***1***		
	non-metric		***2***		
Mounting flange	***no flange available***		***A***		
Power Cord	***No power cord***		***3***		
	6 Ft. A/ C power cord P/ N 85-20671		2		$10
Cable Connections	***NPT 1/ 2 Conduit Fitting P/ N 45-20618***		***A***		
	PG 9 Cable Gland		***B***		

RH = Relative Humidity	a = Absolute Humidity g/ m 3	TOTAL	
T = Temperature	x = Mixing Ratio g/ Kg	QTY	
Td = Dewpoint Temperature	Tw = Wet Bulb Temperature	TOTAL VALUE	
h = Enthalpy			

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings.

HMP 234	A	1	A	0	A	1	A	A	1	2	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 235 for High Temperatures

	HMP 235																						PRICE
Transmitter type	***RH+T***																					***A***	$1,340
	RH+T+Td+a+Tw+x+h																					D	$1,840
Transmitter cover	***no display***																				***1***		
	local display and keypad																				2		$295
Cable length	***2 m cable, +180 °C (+356 °F)***																			***A***			
	5 m cable, +180 °C																			B			$150
	10 m cable, +180 °C																			C			$350
Power supply,	***24 VAC/VDC***																		***0***				
alarm output	115 VAC																		1				$190
	230 VAC																		2				$190
	24 V, + alarm output unit																		3				$165
Serial bus module	***RS 232C***																***A***						
	RS 485/ RS 422																B						$140
	digital current loop																C						$140
Sensor protection	16452 (sintered filter, stainless steel)															1							$50
	16720HM (PPS grid & stainless steel netting)															2							$30
	16562 (PPS Grid)															3							$25
	17230 (PTFE membrane)															5							$25
Analog output	***4...20 mA***														***A***	***A***							
signals	***0...20 mA***														***B***	***B***							
(Ch1 and Ch2)	***0...1 V***														***C***	***C***							
	0...5 V														***D***	***D***							
	0...10 V														***E***	***E***							
							channel 1																
							channel 2																
Parameters for the	***RH*** (0...100 %RH)																	***1***	1				
analog outputs	***T*** (range: see below)																	2	***2***				
(Ch1 and Ch2)	Td	(-40...+100 °C)					(-40 .. +212 °F)											3	3				
	a	(0...600 g/ m3)					(0 .. 262 gr/ ft3)											4	4				
	Tw	(0...+100 °C)					(+32 .. +212 °F)											5	5				
	x	(0...500 g/ kg d.a.)					(0 .. 3500 gr/ lb d.a.)											6	6				
	h	(-40 .. 1500 kJ/ kg)					(-17.2 .. 644.9 Btu/ lb)											7	7				
							channel 1																
							channel 2																
Temperature range	***-20...+18(-4 .. +356 °F***																			***A***			
(measurement)	***0...+180 °C +32 .. +356 °F***																			***B***			
	Other (Specify)																			***X***			
Units (local display	***metric***																				***1***		
and serial bus)	***non-metric***																				***2***		
Mounting flange	***no mounting flange***																					***A***	
	stainless steel flange																					C	$60
Power Cord	***No power cord***																					***3***	
	6 Ft. A/ C power cord P/ N 85-20671																					2	$10
Cable Connections	***NPT 1/ 2 Conduit Fitting P/ N 45-20618***																						***A***
	PG 9 Cable Gland																						***B***
																						TOTAL	
	RH = Relative Humidity							a = Absolute Humidity g/ m 3														QTY	
	T = Temperature							x = Mixing Ratio g/ Kg														TOTAL VALUE	
	Td = Dewpoint Temperature							Tw = Wet Bulb Temperature															
	h = Enthalpy																						

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 235	A	1	A	0	A	1	A	A	1	2	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 238 for Pressurized Pipelines

	HMP 238																						PRICE
Transmitter type	RH+T												A										$1,620
	RH+T+Td+a+Tw+x+h												D										$2,120
Transmitter cover	***no display***															***1***							
	local display and keypad															2							$295
Cable length	***2 m cable, +180 °C (+356 °F)***																***A***						
	5 m cable, +180 °C																B						$150
	10 m cable, +180 °C																C						$350
Pow er supply,	**24 VAC/VDC**																	***0***					
alarm output	115 VAC																	1					$190
	230 VAC																	2					$190
	24 V, + alarm output unit																	3					$165
Serial bus module	***RS 232C***																		***A***				
	RS 485/RS 422																		B				$140
	digital current loop																		C				$140
Sensor protection	16452 (sintered filter, stainless steel)																			1			$50
Analog output	***4...20 mA***																				***A***	***A***	
signals	***0...20 mA***																				***B***	***B***	
(Ch1 and Ch2)	***0...1 V***																				***C***	***C***	
	0...5 V																				***D***	***D***	
	0...10 V																				***E***	***E***	
								channel 1															
								channel 2															
Parameters for the	***RH*** (0...100 %RH)																					***1***	1
analog outputs	***T*** (range: see below)																					2	***2***
(Ch1 and Ch2)	Td	(-40...+100 °C)						(-40 .. +212 °F)														3	3
	a	(0...600 g/m3)						(0 .. 262 gr/ft3)														4	4
	Tw	(0...+100 °C)						(+32 .. +212 °F)														5	5
	x	(0...500 g/kg d.a.)						(0 .. 3500 gr/lb d.a.)														6	6
	h	(-40 .. 1500 kJ/kg)						(-17.2 .. 644.9 Btu/lb)														7	7
								channel 1															
								channel 2															
Temperature	***-20...+80 °C***							***('-4 .. +176 °F)***															***A***
range	***-20...+120 °C***							***('-4 .. +248 °F)***															***B***
(measurement)	***-20...+180 °C***							***('-4 .. +356 °F)***															***C***
	-40...+80 °C							***('-40 .. +176 °F)***															***D***
	-40...+120 °C							***('-40 .. +248 °F)***															***E***
	-40...+180 °C							***('-40 .. +356 °F)***															***F***
	Other (Specify)																						***X***
Units (local display	***metric***																						***1***
and serial bus)	***non-metric***																						***2***
Mounting flange	***no mounting flange***																						***A***
	DMP 248 BVS ball valve set																						***D***
Power Cord	***No power cord***																						***3***
	6 Ft. A/C power cord P/N 85-20671																						2
Cable Connection	***NPT 1/2 Conduit Fitting P/N 45-20618***																						***A***
	PG 9 Cable Gland																						***B***

			TOTAL
RH = Relative Humidity	a = Absolute Humidity g/m 3		QTY
T = Temperature	x = Mixing Ratio g/Kg		TOTAL VALUE
Td = Dewpoint Temperature	Tw = Wet Bulb Temperature		
h = Enthalpy			

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 238	A	1	A	0	A	1	A	A	1	2	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

140's Series
HMP 141 for Wall Mounting

					HMP 141A					1	A	1		PRICE
Signal	***voltage - no display***					***A***								$840
output	0...20 mA - no display					B								$870
	4...20 mA - no display					C								$870
	voltage - with display					D								$1,020
	0...20 mA - with display					E								$1,050
	4...20 mA - with display					F								$1,050
Output	***0...1 V***						***1***	***1***						
ranges	0...5 V						2	2						
	0...10 V						3	3						
	current outputs						4	4						
					humidity									
					temperature									
Temperature	***-40...+60 °C***								***A***					
range	-40...+140 °F								B					
Probe length	***55 mm***									***1***				
Mounting flange	***no***										***A***			
Protection lid	***yes***											***1***		
for probe														
Cable feedthrough	***for surface mounting***												***A***	
	for mounting on a junction box												B	
													TOTAL	
													QTY	
												TOTAL VALUE		

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 141	A	A	1	1	A	1	A	1	A

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 142 for Duct Mounting

			HMP 142A			1	A	0	C	PRICE
Signal output	***voltage***	***no display***	***A***							$930
	0...20 mA	no display	B							$955
	4...20 mA	no display	C							$955
	voltage	with display	D							$1,110
	0...20 mA	with display	E							$1,135
	4...20 mA	with display	F							$1,135
Output ranges	***0...1 V***			***1***	***1***					
	0...5 V			2	2					
	0...10 V			3	3					
	current outputs			4	4					
				humidity						
					temperature					
Temperature range	***-40...+60 °C***					***A***				
	-40...+140 °F					B				
Probe length	***225 mm***						***1***			
Mounting flange	***no***							***A***		
Protection lid for probe	***no***								***0***	
Cable feedthrough	***for duct mounting***								***C***	
									TOTAL	
									QTY	
									TOTAL VALUE	

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings.

HMP 142	A	A	1	1	A	1	A	0	C

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 143 for Tight Spaces

				HMP 143A						0	PRICE
Signal	***voltage***	***no display***	***A***								$895
output	0...20 mA	no display	B								$925
	4...20 mA	no display	C								$925
	voltage	with display	D								$1,075
	0...20 mA	with display	E								$1,100
	4...20 mA	with display	F								$1,100
Output	***0...1 V***			***1***	***1***						
ranges	0...5 V			2	2						
	0...10 V			3	3						
	current outputs			4	4						
		humidity									
		temperature									
Temperature	***-40...+60 °C***					***A***					
range	-40...+140 °F					B					
Sensor head cable	***2.5 m***						***2***				
length	***Extended cable / meter $2.85 (specify length)***						***X***				
Mounting flange	***no***							***A***			
	yes							B			$45
Protection lid	***no***								***0***		
for probe											
Cable feedthrough	***for surface mounting***									***A***	
	for mounting on a junction box									B	
										TOTAL	
										QTY	
										TOTAL VALUE	

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings.

HMP 143	A	A	1	1	A	2	A	0	A

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 360 Transmitter Unit for HMP 360 Series Humidity and Temperature Probes

Transmitter Unit			HMT 360		PRICE
Transmitter type	**RH+T**		**A**		$1,485
	RH+T+Td+a+Tw+x		*D*		$1,985
Display on cover	**no**		**1**		
	yes		*2*		$105
Signal output	**1 analog output channel (Ch1)**	**4... 20 mA**	**1**		
	2 analog output channels (Ch1 + Ch2)	*4... 20 mA*	*2*		$230
	LonWorks field bus (no analog outputs)	*TP78*	*3*		$285
Analog output signals for Ch1 and Ch2	**No analog output**		**A**	**A**	
	RH (0... 100%RH)		**B**	**B**	
	Temperature (choose range-next section)		**C**	**C**	
	Td (-40...100°C)	***(-40...212°F)***	**H**	**H**	
	a (0...500g/m3)	***(0...218.5gr/ft3)***	**J**	**J**	
	Tw (0...100°C)	***(+32...+212°F)***	**K**	**K**	
NOTE:	**x (0...500g/kg d.a)**	***(0...3500gr/lb)***	**L**	**L**	
	- Choose A for both channels with LonWorks field bus				
	- Td, a, Tw and x are only available with transmitter type D		**Ch1**		
	- If only one analog output has been chosen, choose A for Ch2			**Ch2**	
Analog output range for temperature	**-40...+60°C**	***(-40...+140°F)***	**A**		
	-20...+60°C	***(-4...+140°F)***	**B**		
	0...+60°C	***(+32...+140°F)***	**C**		
	-20...+80°C	***(-4...+176°F)***	**D**		
	-20...+120°C	***(-4...+248°F)***	**E**		
	-40...+80°C	***(-40...+176°F)***	**F**		
	-40...+120°C	***(-40...+248°F)***	**G**		
	0...+100°C	***(+32...+ 212°F)***	**H**		
	-20...+180°C	***(-4...+356°F)***	**J**		
	-40...+180 °C	***(-40...+356°F)***	**K**		
	0...+180 °C	***(+32...+356°F)***	**L**		
	Other (specify)		**X**		
Output units	**metric**		**1**		
	non-metric		**2**		
Cable bushings	**cable gland Pg11**		**A**		
	conduit fitting NPT1/2"	**(for wire conduits)**	**B**		
Ex certification an	**CENELEC 76/117/EEC (VTT)**		**1**		
Operating manua	**no manual**		**A**		
	english		**B**		
				TOTAL	
	RH = Relative Humidity	a = Absolute Humidity g/m 3		QTY	
	T = temperature	x = Mixing Ratio g/Kg		TOTAL VALUE	
	Td = Dewpoint Temperature	Tw = Wet Bulb Temperature			

(Left-side label of the table: **Transmitter unit**)

Sections in italic are available at extra cost.

Sections in bold text are included in the purchase price.

Example of order code with typical settings:

HMT 360	A	1	2	B	C	A	1	A	1	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 360 Series
Intrinsically Safe Humidity and Temperature Transmitters Probes

Humidity and Temperature Probe			HMP 36	Code	PRICE
Probe type	**HMP 361**		for w all mounting	1	$595
	HMP 363		small probe	3	$795
	HMP 364		for high pressures	4	$1,625
	HMP 365		for high temperatures	5	$1,230
	HMP 368		for pipeline installations	8	$1,400
Probe length and probe cable length	HMP 361 only:	**no cable**	**120mm probe, max +60°C**	A	
	HMP 363 only:	**2m (6ft)**	**60mm probe, max 120°C**	B	
		5 m (16 ft)	*60mm probe, max +120°C*	*C*	$150
		10 m (33 ft)	*60mm probe, max +120°C*	*D*	$305
	HMP 364 only:	**2m (6ft)**	**150mm probe, max 180°C**	E	
		5 m (16 ft)	*150mm probe, max +180°C*	*F*	$150
		10 m (33 ft)	*150m probe, max +180°C*	*G*	$350
	HMP 365 only:	**2m (6ft)**	**150mm probe, max 180°C**	H	
		5 m (16 ft)	*150mm probe, max +180°C*	*J*	$150
		10 m (33 ft)	*150mm probe, max +180°C*	*K*	$350
	HMP 368 only:	**2m (6ft)**	**178mm probe, max 180°C**	L	
		5 m (16 ft)	*178mm probe, max +180°C*	*M*	$150
		10 m (33 ft)	*178mm probe, max +180°C*	*N*	$350
		2m (6ft)	*400mm probe, max 180°C*	*P*	$75
		5 m (16 ft)	*400mm probe, max +180°C*	*Q*	$225
		10 m (33 ft)	*400mm probe, max +180°C*	*R*	$425
Humidity sensor type	**general purpose***			1	
	special sensor for high solvent concentrations			2	
	special sensor for hydrogen environments			3	
Sensor protection in probe	HMP 361, 363 only:		**PPS plastic grid & stainless steel netting***	1	$30
			PPS plastic grid	2	$25
			PPS plastic grid with PTFE membrane filter	5	$25
	HMP 364,365,368 only:		**PPS plastic grid/stainless steel netting***	1	$30
			PPS plastic grid	2	$25
			sintered stainless steel filter*	3	$50
			PPS plastic grid with PTFE membrane filter	5	$25
	HMP368 moisture/oil:		**sintered stainless steel filter**	3	$50
			stainless steel grid filter *	4	$50
Installation kit			**no kit**	A	
	HMP 363 only:		*duct installation kit*	*B*	$45
	HMP 365 only:		*mounting flange, stainless steel*	*D*	$60
	HMP 368 only:		*ball valve set for installation into pipeline*	*E*	$65
Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**			1	
	*recommended choice			TOTAL	
				QTY	
				TOTAL VALUE	

Probe

Selections in bold text are supplied free of charge.

Selections in italic are available at extra cost.

Example of order code with typical settings:

HMP 36	**5**	**H**	**1**	**A**	**3**	**A**	**1**

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 361 Intrinsically Safe Transmitter
Model for Wall Mount

			transmitter unit												probe				PRICE
Humidity and Temperature Transmitter		**HMT 361**														**A**		**A**	
Transmitter unit	Transmitter type	**RH+T**											**A**						$2,015
		RH+T+Td+a+Tw+x											*D*						$2,575
	Display on cover	**no**										**1**							
		yes										*2*							$105
	Signal output	**1 analog output channel (Ch1)**					**4... 20 mA**			**1**									
		2 analog output channels (Ch1 + Ch2)					*4... 20 mA*			*2*									$230
		LonWorks field bus (no analog outputs)					*TP78*			*3*									$285
	Analog output signals	**No analog output**									**A**	**A**							
	for Ch1 and Ch2	**RH (0... 100%RH)**									**B**	**B**							
		Temperature (choose range-next section)									**C**	**C**							
		Td (-40…60°C)				**(-40... 140°F)**					**H**	**H**							
		a (0... 160g/m3)				**(0...70gr/ft3)**					**J**	**J**							
		Tw (0…60°C)				**(+32...+140°F)**					**K**	**K**							
	NOTE:	**x (0...160g/kg d.a)**				**(0…1120gr/lb)**					**L**	**L**							
	- Choose A for both channels with LonWorks field bus option																		
	- Td, a, Tw and x are only available with transmitter type D						**Ch1**												
	- If only one analog output has been chosen, choose A for Ch2						**Ch2**												
	Analog output range	**-40...+60°C**				**(-40...+140°F)**							**A**						
	for temperature	**-20...+60°C**				**(-4...+140°F)**							**B**						
		0...+60°C				**(+32...+140°F)**							**C**						
		Other (specify)											**X**						
	Output units	**metric**												**1**					
		non-metric												**2**					
	Cable bushings	**cable gland Pg11**													**A**				
		conduit fitting NPT1/2"					**(for wire conduits)**								**B**				
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**														**1**			
	Operating manual language	**no manual**															**A**		
		english															**B**		
Probe	Probe type	**120mm probe, max +60°C**																**A**	
	Humidity sensor type	**general purpose***													**HUMICAP 180**			**1**	
		special sensor for high solvent concentrations													**HUMICAP 180L**			**2**	
		special sensor for hydrogen environments													**HUMICAP 180J**			**3**	
	Sensor protection in probe	**PPS plastic grid & stainless steel netting***														**16720HM**		**1**	$30
		PPS plastic grid														**16526**		**2**	$25
		PPS plastic grid with PTFE membrane filter														**17230HM**		**5**	$25
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**																	**1**
		*recommended choice																	TOTAL
		RH = Relative Humidity									a = Absolute Humidity g/ m 3								QTY
		T = Temperature									x = Mixing Ratio g/ Kg								TOTAL VALUE
		Td = Dewpoint Temperature									Tw = Wet Bulb Temperature								

Selections in italic are available at extra cost.

Selections in bold text are supplied free of charge.

Example of order code with typical settings:

HMT 361	A	1	2	B	C	A	1	A	1	B	A	1	A	1	A	1

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 363 Intrinsically Safe Transmitter
Model with Small Probe

Humidity and Temperature Transmitter — **HMT 363** (transmitter unit / probe: A)

Section	Option	Selection	Details	Code	PRICE
Transmitter unit	Transmitter type	**RH+T**		**A**	$2,220
		RH+T+Td+a+Tw+x		*D*	$2,720
	Display on cover	**no**		**1**	
		yes		*2*	$105
	Signal output	**1 analog output (Ch1)**	**4... 20 mA**	**1**	
		2 analog output (Ch1 + Ch2)	*4... 20 mA*	*2*	$230
		LonWorks field bus (no analog opt.)	*TP78*	*3*	$285
	Analog output signals for Ch1 and Ch2	**No analog output**		**A** / **A**	
		RH (0... 100%RH)		**B** / **B**	
		Temperature (choose range-next section)		**C** / **C**	
		Td (-40... 100 °C)	***(-40... 212 °F)***	**H** / **H**	
		a (0... 500g/m3)	***(0... 218.5 gr/ft3)***	**J** / **J**	
		Tw (0... 100 °C)	***(+32... +212 °F)***	**K** / **K**	
	NOTE:	**x (0... 500 g/kg d.a)**	***(0... 3500 gr/lb)***	**L** / **L**	
	- Choose A for both channels with LonWorks field bus				
	- Td, a, Tw and x only available w/transmitter type D		**Ch1**		
	- If only one analog output, choose A for Ch2		**Ch2**		
	Analog output range for temperature	**-20...+80°C**	***(-4...+176°F)***	**D**	
		-20...+120°C	***(-4...+248°F)***	**E**	
		-40...+80°C	***(-40...+176°F)***	**F**	
		-40...+120°C	***(-40...+248°F)***	**G**	
		0...+100°C	***(+32...+212°F)***	**H**	
		Other (specify)		**X**	
	Output units	**metric**		**1**	
		non-metric		**2**	
	Cable bushings	**cable gland Pg11**		**A**	
		conduit fitting NPT1/2"	**(for wire conduits)**	**B**	
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**		**1**	
	Operating manual language	**no manual**		**A**	
		english		**B**	
Probe	Probe cable length	**2 m (6 ft)**	**60mm probe, max +120°C**	**B**	
		5 m (16 ft)	*60mm probe, max +120°C*	*C*	$150
		10 m (33 ft)	*60mm probe, max +120°C*	*D*	$305
	Humidity sensor type	**general purpose (recommended choice)**	**HUMICAP 180**	**1**	
		special sensor for high solvent concentrations	**HUMICAP 180L**	**2**	
		special sensor for hydrogen environments	**HUMICAP 180J**	**3**	
	Sensor protection in probe	**PPS plastic grid & stainless steel netting (recommended choice)**	**16720HM**	**1**	$30
		PPS plastic grid	**16526**	**2**	$25
		PPS plastic grid with PTFE membrane filter	**17230HM**	**5**	$25
	Installation kit	**no kit**		**A**	
		duct installation kit		*B*	$45
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**		**1**	
				TOTAL	
				QTY	
				TOTAL VALUE	

RH = Relative Humidity   a = Absolute Humidity g/m3
T = Temperature   x = Mixing Ratio g/Kg
Td = Dewpoint Temperature   Tw = Wet Bulb Temperature

Selections in italic are available at extra cost.

Sections in bold text are included in purchase price.

Example of order code with typical settings:

HMT 363	A	1	2	B	C	D	1	A	1	B	B	1	A	1	A	1

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 364 Intrinsically Safe Transmitter
Model with Probe for High Pressures

			transmitter unit										probe				PRICE
Humidity and Temperature Transmitter			**HMT 364**												**A**	**A**	
Transmitter unit	Transmitter type	**RH+T**								**A**							$3,040
		RH+T+Td+a+Tw+x								*D*							$3,540
	Display on cover	**no**									**1**						
		yes									*2*						$105
	Signal output	**1 analog output channel (Ch1)**							**4... 20 mA**		**1**						
		2 analog output channels (Ch1 + Ch2)							*4... 20 mA*		*2*						$230
		LonWorks field bus (no analog outputs)							*TP78*		*3*						$285
	Analog output signals	**No analog output**										**A**	**A**				
	for Ch1 and Ch2	**RH (0... 100%RH)**										**B**	**B**				
		Temperature (choose range in next section)										**C**	**C**				
		Td (-40... 100 °C	**(-40... 212 °F)**									**H**	**H**				
		a (0... 500g/m3)	**(0... 218.5 gr/ft3)**									**J**	**J**				
		Tw (0... 100 °C)	**(+32... +212 °F)**									**K**	**K**				
	NOTE:	**x (0... 500 g/kg d**	**(0... 3500 gr/lb)**									**L**	**L**				
	- Choose A for both channels with LonWorks field bus																
	- Td, a, Tw and x are only available with transmitter type D								**Ch1**								
	- If only one analog output has been chosen, choose A for Ch2								**Ch2**								
	Analog output range	**-20...+80°C**	**(-4...+176°F)**								**D**						
	for temperature	**-20...+120°C**	**(-4...+248°F)**								**E**						
		-40...+80°C	**(-40...+176°F)**								**F**						
		-40...+120°C	**(-40...+248°F)**								**G**						
		0...+100°C	**(+32...+ 212°F)**								**H**						
		-20...+180°C	**(-4...+356°F)**								**J**						
		-40...+180 °C	**(-40...+356°F)**								**K**						
		0...+180 °C	**(+32...+356°F)**								**L**						
		Other (specify)									**X**						
	Output units	**metric**										**1**					
		non-metric										**2**					
	Cable bushings	**cable gland Pg11**											**A**				
		conduit fitting NPT1/2"							**(for wire conduits)**				**B**				
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**												**1**			
	Operating manual language	**no manual**													**A**		
		english													**B**		
Probe	Probe cable length	**2 m (6 ft)**	**150mm probe, max +180°C**													**E**	
		5 m (16 ft)	*150mm probe, max +180°C*													*F*	$150
		10 m (33 ft)	*150mm probe, max +180°C*													*G*	$350
	Humidity sensor type	**general purpose (recommended choice)**										**HUMICAP 180**			**1**		
		special sensor for high solvent concentrations										**HUMICAP 180L**			**2**		
		special sensor for hydrogen environments										**HUMICAP 180J**			**3**		
	Sensor protection in probe	**PPS plastic grid & stainless steel netting**											**16720HM**			**1**	$30
		PPS plastic grid											**16526**			**2**	$25
		sintered stainless steel filter (recommended choice)											**16452**			**3**	$50
		PPS plastic grid with PTFE membrane filter											**17230HM**			**5**	$25
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**														**1**	
																TOTAL	
		RH = Relative Humidity							a = Absolute Humidity g/m3							QTY	
		T = Temperature							x = Mixing Ratio g/Kg							TOTAL VALUE	
		Td = Dewpoint Temperature							Tw = Wet Bulb Temperature								

Selections in italic are available at extra cost.

Selections in bold text are supplied free of charge.

Example of order code with typical settings:

HMT 364	A	1	2	B	C	D	1	A	1	B	E	1	A	3	A	1

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 365 Intrinsically Safe Humidity and Temperature Transmitter
Model with Probe for High Temperatures

Section	Parameter	Option	Detail	Code	PRICE
				transmitter unit / probe	PRICE
	Humidity and Temperature Transmitter		**HMT 365**	A (probe)	
Transmitter unit	Transmitter type	**RH+T**		**A**	$2,650
		RH+T+Td+a+Tw+x		*D*	$3,150
	Display on cover	**no**		**1**	
		yes		*2*	$105
	Signal output	**1 analog opt. channel (Ch1)**	**4... 20 mA**	**1**	
		2 analog opt. Channels (Ch1 + Ch2)	*4... 20 mA*	*2*	$230
		LonWorks field bus (no analog outputs)	*TP78*	*3*	$285
	Analog output signals for Ch1 and Ch2	**No analog output**		**A** (Ch1) **A** (Ch2)	
		RH (0... 100%RH)		**B** (Ch1) **B** (Ch2)	
		Temperature (choose range-next section)		**C** (Ch1) **C** (Ch2)	
		Td (-40...100°C)	***(-40...212°F)***	**H** (Ch1) **H** (Ch2)	
		a (0...500g/m3)	***(0...218.5gr/ft3)***	**J** (Ch1) **J** (Ch2)	
		Tw (0...100°C)	***(+32...+212°F)***	**K** (Ch1) **K** (Ch2)	
	NOTE:	**x (0...500g/kg d.**	***(0...3500gr/lb)***	**L** (Ch1) **L** (Ch2)	
	- Choose A for both channels with LonWorks field bus				
	- Td, a, Tw and x are only available with transmitter type D		**Ch1**		
	- If only one analog output, choose A for Ch2		**Ch2**		
	Analog output range for temperature	**-20...+80°C**	***(-4...+176°F)***	**D**	
		-20...+120°C	***(-4...+248°F)***	**E**	
		-40...+80°C	***(-40...+176°F)***	**F**	
		-40...+120°C	***(-40...+248°F)***	**G**	
		0...+100°C	***(+32...+ 212°F)***	**H**	
		-20...+180°C	***(-4...+356°F)***	**J**	
		-40...+180 °C	***(-40...+356°F)***	**K**	
		0...+180 °C	***(+32...+356°F)***	**L**	
		Other (specify)		**X**	
	Output units	**metric**		**1**	
		non-metric		**2**	
	Cable bushings	**cable gland Pg11**		**A**	
		conduit fitting NPT1/2"	**(for wire conduits)**	**B**	
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**		**1**	
	Operating manual language	**no manual**		**A**	
		english		**B**	
Probe	Probe cable length	**2 m (6 ft)**	**150mm probe, max +180 °C**	**H**	
		5 m (16 ft)	*150mm probe, max +180 °C*	*J*	$150
		10 m (33 ft)	*150mm probe, max +180 °C*	*K*	$350
	Humidity sensor type	**general purpose (recommended choice)**	**HUMICAP 180**	**1**	
		special sensor for high solvent concentrations	**HUMICAP 180L**	**2**	
		special sensor for hydrogen environments	**HUMICAP 180J**	**3**	
	Sensor protection in probe	**PPS plastic grid & stainless steel netting**	**16720HM**	**1**	$30
		PPS plastic grid	**16526**	**2**	$25
		sintered stainless steel filter (recommended choice)	**16452**	**3**	$50
		PPS plastic grid with PTFE membrane filter	**17230HM**	**5**	$25
	Installation kit	**no kit**		**A**	
		mounting flange, stainless steel		*D*	$60
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**		**1**	
		RH = Relative Humidity	a = Absolute Humidity g/ m 3	TOTAL	
		T = Temperature	x = Mixing Ratio g/ Kg	QTY	
		Td = Dewpoint Temperature	Tw = Wet Bulb Temperature	TOTAL VALUE	

Selections in italic are available at extra cost.

Selections in bold text are supplied free of charge.

Example of order code with typical settings:

HMT 365	A	1	2	B	C	D	1	A	1	B	H	1	A	3	A	1

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMT 368 Intrinsically Safe Humidity and Temperature Transmitter Model with Probe for Pipeline Installations

Section	Parameter	Selection	Detail	Code	PRICE
	Humidity and Temperature Transmitter		**HMT 368**	transmitter unit / probe (A)	
Transmitter unit	Transmitter type	**RH+T**		**A**	$2,825
		RH+T+Td+a+Tw+x		*D*	$3,325
	Display on cover	**no**		**1**	
		yes		*2*	$105
	Signal output	**1 analog output (Ch1)**	**4... 20 mA**	**1**	
		2 analog output (Ch1 + Ch2)	*4... 20 mA*	*2*	$230
		LonWorks field bus (no analog opts	*TP78*	*3*	$285
	Analog output signals for Ch1 and Ch2	**No analog output**		**A A**	
		RH (0... 100%RH)		**B B**	
		Temperature (choose range-next section)		**C C**	
		Td (-40...100°C)	***(-40...212°F)***	**H H**	
		a (0...500g/m3)	***(0...218.5gr/ft3)***	**J J**	
		Tw (0...100°C)	***(+32...+212°F)***	**K K**	
	NOTE:	**x (0...500g/kg d.a)**	***(0...3500gr/lb)***	**L L**	
	- Choose A for both channels with LonWorks field bus				
	- Td, a, Tw and x are only available with transmitter type D	**Ch1**			
	- If only one analog output has been chosen, choose A for	**Ch2**			
	Analog output range for temperature	**-20...+80°C**	***(-4...+176°F)***	**D**	
		-20...+120°C	***(-4...+248°F)***	**E**	
		-40...+80°C	***(-40...+176°F)***	**F**	
		-40...+120°C	***(-40...+248°F)***	**G**	
		0...+100°C	***(+32...+ 212°F)***	**H**	
		-20...+180°C	***(-4...+356°F)***	**J**	
		-40...+180 °C	***(-40...+356°F)***	**K**	
		0...+180 °C	***(+32...+356°F)***	**L**	
		Other (specify)		**X**	
	Output units	**metric**		**1**	
		non-metric		**2**	
	Cable bushings	**cable gland Pg11**		**A**	
		conduit fitting NPT1/2"	**(for wire conduits)**	**B**	
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**		**1**	
	Operating manual language	**no manual**		**A**	
		english		**B**	
Probe	Probe type and cable length	**2 m (6 ft)**	**178mm probe, max +180 °C**	**L**	
		5 m (16 ft)	*178mm probe, max +180 °C*	*M*	$150
		10 m (33 ft)	*178mm probe, max +180 °C*	*N*	$350
		2 m (6 ft)	*400mm probe, max +180 °C*	*P*	$75
		5 m (16 ft)	*400mm probe, max +180 °C*	*Q*	$225
		10 m (33 ft)	*400mm probe, max +180 °C*	*R*	$425
	Humidity sensor type	**general purpose***	**HUMICAP 180**	**1**	
		special sensor for high solvent concentrations	**HUMICAP 180L**	**2**	
		special sensor for hydrogen environments	**HUMICAP 180J**	**3**	
	Sensor protection in probe	**PPS plastic grid & stainless steel netting**	**16720HM**	**1**	$30
		PPS plastic grid	**16526**	**2**	$25
		sintered stainless steel filter*	**16452**	**3**	$50
		PPS plastic grid with PTFE membrane filter	**17230HM**	**5**	$25
	Installation kit	**no kit**		**A**	
		ball valve set for installation into pipeline		*E*	$65
	Ex certification and issuer	**CENELEC 76/117/EEC (VTT)**		**1**	
				TOTAL	
				QTY	
				TOTAL VALUE	

*recommmended choice

RH = Relative Humidity
T = Temperature
Td = Dewpoint Temperature
a = Absolute Humidity g/ m 3
x = Mixing Ratio g/ Kg
Tw = Wet Bulb Temperature

Selections in italic are available at extra cost.

Selections in bold text are supplied free of charge.

Example of order code with typical settings:

HMT 368	**A**	**1**	**2**	**B**	**C**	**D**	**1**	**A**	**1**	**B**	**L**	**1**	**A**	**3**	**A**	**1**

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

240's Series
HMP 243 with Dewpoint Sensor Head

Order code: HMP 243 G _ _ 1 _ _ _ _ _ _ A _ _ _ _

Item	Option	Code	PRICE
Transmitter type	Td + x	G	$2,485
Transmitter cover	***no display***	***1***	
	local display and keypad	2	$295
Dewpoint sensor head cable length	***2 m cable***	***A***	
	5 m cable	B	$185
	10 m cable	C	$400
Temperature sensor head cable length	***no temperature sensor head***	***1***	
Serial bus module	***RS 232C***	***A***	
	RS 485/ RS 422	B	$140
	digital current loop	C	$140
Sensor protection	16452 (stainless steel sintered filter)	1	$50
	16720 (PPS Grid & stainless steel netting)	2	$30
	17230 (PTFE membrane)	5	$25
Analog output signals (Ch1 and Ch2)	***4...20 mA***	***A*** (channel 1) / ***A*** (channel 2)	
	0...20 mA	***B*** / ***B***	
	0...1 V	***C*** / ***C***	
	0...5 V	***D*** / ***D***	
	0...10 V	***E*** / ***E***	
Parameters for the analog outputs (Ch1 and Ch2)	***Td (-40...+100 °C) (-40 .. +212 °F)***	***3*** (channel 1) / 3 (channel 2)	
	x (0 .. 500 g/ kg d.a.) (0 .. 3500 gr/ lb d.a.)	6 (channel 1) / 6 (channel 2)	
Temperature range (measurement)		***A***	
Units (local display and serial bus)	***metric***	***1***	
	non-metric	***2***	
Installation kit for duct mounting	***no***	***A***	
	yes	B	$55
Power cord	***No power cord***	***3***	
	6 Ft. A/ C power cord P/ N 85-20671	2	$10
Cable Connections	***NPT 1/ 2 Conduit Fitting P/ N 45-20618***	***A***	
	PG 9 Cable Gland	***B***	
		TOTAL	
		QTY	
		TOTAL VALUE	

Td = Dewpoint Temperature

x = Mixing Ratio g/ Kg

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings;

HMP 243	G	1	A	1	A	1	A	A	3	6	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMP 243 with Dewpoint and Temperature Sensor Heads

	HMP 243	D																PRICE
Transmitter type	RH+T+Td+a+Tw+x+dT																	$2,915
Transmitter cover	***no display***					***1***												
	local display and keypad					2												$295
Dewpoint sensor	***2 m cable***						***A***											
head cable length	5 m cable						B											$185
	10 m cable						C											$400
Temperature	***2 m cable***							***2***										
sensor head cable	5 m cable							3										$55
length	10 m cable							4										$120
Serial bus module	***RS 232C***								***A***									
	RS 485/ RS 422								B									$140
	digital current loop								C									$140
Sensor protection	16452 (stainless steel sintered filter)									1								$50
	16720 (PPS grid & stainless steel netting)									2								$30
	17230 (PTFE membrane)									5								$25
Analog output	***4...20 mA***										***A***	***A***						
signals	***0...20 mA***										***B***	***B***						
(Ch1 and Ch2)	***0...1 V***										***C***	***C***						
	0...5 V										***D***	***D***						
	0...10 V										***E***	***E***						
						channel 1												
						channel 2												
Parameters for the	***RH (0...100 %RH)***												***1***	1				
analog outputs	***T (range: see below)***												2	***2***				
(Ch1 and Ch2)	Td	(-40...+100 °C)	(-40 ..+212 °F)										3	3				
	a	(0...600 g/ m3)	(0 .. 262 gr/ft3)										4	4				
	Tw	(0...100 °C)	(+32 .. +212 °F)										5	5				
	x	(0...500 g/ kg d.a.)	(0 .. 3500 gr/lb d.a.)										6	6				
	dT	(-10...+50 °C)	(-18 .. +90 °F)										7	7				
						channel 1												
						channel 2												
Temperature	***-40...+60 °C***	***-40 .. +140 °F***													***A***			
range	***-40...+120 °C***	***-40 .. +248 °F***													***B***			
(measurement)	***-40...+180 °C***	***-40 .. +356 °F***													***C***			
	0...+120 °C	***+32 .. +248 °F***													***D***			
	0...+180 °C	***+32 .. +356 °F***													***E***			
	0...+100 °C	***+32 .. +212 °F***													***F***			
	Other (Specify)														***X***			
Units (local display	***metric***															***1***		
and serial bus)	***non-metric***															***2***		
Installation kit for	***no***																***A***	
duct mounting	yes: 2 kits (for both sensor heads)																C	$105
Power Cord	***No power cord***																***3***	
	6 Ft. A/C power cord P/N 85-20671																2	$10
Cable Connections	***NPT 1/2 Conduit Fitting P/N 45-20618***																	***A***
	PG 9 Cable Gland																	***B***
																		TOTAL
	RH = Relative Humidity							a = Absolute Humidity g/ m 3										QTY
	T = Temperature							x = Mixing Ratio g/ Kg								TOTAL VALUE		
	Td = Dewpoint Temperature							Tw = Wet Bulb Temperature										
	dT = Process Temperature - Dew point Temperature																	

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings:

HMP 243	D	1	A	2	A	1	A	A	1	2	A	1	A	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

DMP 246 for Extremely High Temperatures

																			PRICE
				DMP 246															
Transmitter cover	***no display***					***A***													$3,995
	local display and keypad					B													$295
Cable length	***2 m cable***						***1***												
	5 m cable						2												$150
	10 m cable						3												$375
Alarm outputs	***no***							***A***											
	yes *)							B											$165
Power supply	***24 VAC/ VDC***								***0***										
module	115 VAC *)								1										$190
	230 VAC *)								2										$190
Serial bus module	***RS 232C***									***A***									
	RS 485/ RS 422									B									$140
	digital current loop									C									$140
Analog output	***4...20 mA***										***1***	***1***							
signals	0...20 mA										2	2							
(Ch1 and Ch2)	0...1 V										3	3							
	0...5 V										4	4							
	0...10 V										5	5							
								channel 1											
								channel 2											
Parameters for the	Td	(+40...+100 °C)		(+104…+212°F)									A	A					
analog outputs	Td	(0...+100 °C)		(+32…+212°F)									B	B					
(Ch1 and Ch2)	x	(0...400 g/ kg)		(0…2800gr/lbd.a.)									E	E					
	x	(0...800 g/ kg)		(0…5600gr/lbd.a.)									F	F					
	x	(0...2000 g/ kg)		(0…14000gr/lbd.a.)									G	G					
								channel 1											
								channel 2											
Units (local display	metric														1				
and serial bus)	non-metric														2				
Power Cord	No Power cord															3			
	6 Ft. A/ C Power cord P/ N 85-20671															2			$10
Cable Connectors	NPT 1/ 2 Conduit Fitting P/ N 45-20618																A		
	PG 9 Cable Gland																B		
																	TOTAL		
* NOTE! Simultaneous installation of both alarm output and 115/ 230 VAC																	QTY		
pow er supply module in same transmitter is not possible.																	TOTAL VALUE		
	Td = Dewpoint Temperature																		
	x = Mixing Ratio g/ Kg																		
The highlighted sections are included in the prices of the basic versions.																			
Example of order code with typical settings:																			
DMP 246	A	1	A	0	A	1	1	A	E	1	3	B							

BACk to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

DMP 248 for Low Temperatures

	DMP 248																		PRICE
Transmitter cover	***no display***									***A***									$2,430
	local display and keypad									B									$295
Cable length	***2 m cable***								***1***										
	5 m cable								2										$150
	10 m cable								3										$340
Alarm outputs	***no***							***A***											
	yes *)							B											$165
Power supply	***24 VAC/VDC***									***0***									
module	115 VAC *)									1									$190
	230 VAC *)									2									$190
Serial bus module	***RS 232C***										***A***								
	RS 485/RS 422										B								$140
	digital current loop										C								$140
Sensor protection	16452 (sintered filter, stainless steel)											1							$45
	46999 stainless steel filter for vacuum											6							$45
Analog output	***4...20 mA***												***A***	***A***					
signals	0...20 mA												B	B					
(Ch1 and Ch2)	0...1 V												C	C					
	0...5 V												D	D					
	0...10 V												E	E					
										channel 1									
										channel 2									
Units (local display	metric														***1***				
and serial bus)	non-metric														2				
Parameters for the	Td	(-40...+20 °C)			(-40...+68°F)											A	A		
analog outputs	Td	(-40...+60 °C)			(-40 ...+140°F)											B	B		
(Ch1 and Ch2)	Td	(-60...+20 °C)			(-76 ...+68°F)											C	C		
	ppm	(0...100)														F	F		
	ppm	(0...1000)														G	G		
	ppm	(0...5000)														H	H		
	T	(0...+60 °C)														L	L		
	T	(-40...+80 °C)			(+32 ...+140°F)											M	M		
	RH	(0...100%RH)			(-40 ...+176°F)											R	R		
											channel 1								
											channel 2								
Power cord	***No power cord***																	***3***	
	6 Ft. A/C power cord P/N 85-20671																	2	$10
Cable Connectors	NPT 1/2 Conduit Fitting P/N 45-20618																		A
	PG 9 Cable Gland																		B
																		TOTAL	
*) NOTE! Simultaneous installation of both alarm output and 115/230 VAC																		QTY	
pow er supply module in same transmitter is not possible.																		TOTAL VALUE	

Td = Dewpoint Temperature — RH = Relative Humidity

ppm = Parts per Million — T = Temperature

The selections in bold italic are included in the prices of the basic versions.

Example of order code with typical settings:

DMP 248	A	1	A	0	A	1	A	A	1	A	L	3	B

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

HMK 15A Calibrator

	HMK 15A																	PRICE
Two Standard Chambers																		$460
Additional Chambers																		
	0 to 4 (Specify Number)																	
	$135.00 each																	$
LiCl Salt, Premeasured with Certificate, 15 gms (18 ml)																		
	No LiCl							***0***										
	LiCl for one chamber							1										$40
	LiCl for two chambers							2										$80
MgCl2 Salt, Premeasured with Certificate, 30 gms (13 ml)																		
	no MgCl2								***0***									
	MgCl2 for one chamber								1									$40
	MgCl2 for two chambers								2									$80
NaCl Salt, Premeasured with Certificate, 20 gms (15 ml)																		
	no NaCl									***0***								
	NaCl for one chamber									1								$40
	NaCl for two chambers									2								$80
K2SO4 Salt, Premeasured with Certificate, 30 gms (20 ml)																		
	no K2SO4										***0***							
	K2SO4 for one chamber										1							$40
	K2SO4 for two chambers										2							$80
Ion exchanged water	***no water***											***A***						
	water for three chambers											B						$15
Carrying bag	***no bag***												***0***					
	carrying bag												1					$130
Thermometer	***with mercury***													**1**				
	with red capillary liquid													**2**				
LiCl Salt, 500 gms	***no salt***														**0**			
	Bulk HM-LiCl														1			$68
NaCl Salt, 500 gms	no salt															**0**		
	Bulk HM-NaCl															*1*		$30
K2SO4 Salt,	no salt																**0**	
500 gms	Bulk K2SO4																1	$50
																	TOTAL	
																	QTY	
															TOTAL VALUE			

The highlighted sections are included in the prices of the basic versions.

Example of order code with typical settings.

HMK 15A	0	1	0	1	0	B	0	1	0	0	0

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

PTB 220 Pressure Transmitter

	PTB 220						PRICE
Accuracy class	class A	A					$1,600
	class B	B					$1,400
Transducer	Range 500...1100 hPa:						
configuration	***1 x pressure transducer (P1)***	***A***					
	2 x pressure transducer (P1, P2)	B					$400
	3 x pressure transducer (P1, P2, P3)	C					$800
Output options	***RS 232C / TTL serial / pulse***	***A***					
	RS 232C / RS 485 / RS 422	B					$150
	RS 232C / 0 .. 5 VDC / 0 .. 20 mA	C					$300
Transmitter cover	***no display***	**1**					
	LCD display with backlight	2					$400
Pressure fitting	***barbed fitting 1/8"***	***A***					
	barbed fitting 1/8" / 2 ports *)	B					
Pressure connector/	***connector 1: P1***	***1***					
transducer coupling	connector 1: P1 and P2	2					
	connector 1: P1 and P2 and P3	3					
	connector 1: P1 - connector 2: P2	4					
						TOTAL	
*) The two pressure port option is available only for a						QTY	
barometer with two pressure transducers.					TOTAL VALUE		

Example of order code with typical settings:

PTB 220	A	A	A	1	A	1

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

PTU 200 Pressure, Temperature, Humidity Transmitter

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

BACK to Tech Data Sheet

		PTU 200					PRICE
Pressure	500...1100 hPa abs. class A	A					$1,600
	500...1100 hPa abs. class B	B					$1,400
	500...1100 hPa abs. class A (2 transducers)	C					$2,000
	500...1100 hPa abs. class B (2 transducers)	D					$1,800
Temperature and	HMP 45A-P (T+U), 20m cable with connector		A				$800
humidity	HMP 45D (T+U), 3.5m cable		B				$800
	PT 100 (T only), 2.0m cable		C				$800
Output options	**RS 232C / TTL**			**A**			
	RS 232C / RS 485 / RS 422			B			$150
Transmitter cover	**No display**				**1**		
	LCD display with backlight				2		$400
Pressure fitting	**Barbed fitting for 1/8" hose**					**A**	
	Quick connector with shutoff valve for 1/8" hose					B	
					TOTAL		
						QTY	
				TOTAL VALUE			

Selections in bold are included in the prices of the basic versions.

Example of order code with typical settings:

PTU 200	A	A	A	1	A

HUMIDITY, DEWPOINT AND TEMPERATURE INSTRUMENTS
Portables:

HMI 38	Humidity data processor and field calibrator for measurement and calculation of relative humidity, temperature, dewpoint, mixing ratio, absolute humidity and wet bulb temperature complete with: 4 x 4 keypad, 4 x 16 LCD display; 0-1 VDC or 0-5 VDC analog outputs; RS 232C/RS 485 serial output, data logging and storage of 254 values; rechargeable battery and AC adapter; female D9S connectors for up to 2 probes. Field humidity calibrator function.	$1,780.00
HMP 35E	Humidity and temperature probe complete with: H Series HUMICAP RH sensor, Pt 100 temperature element; membrane filter, compatible with HMI 38 data processor. Temperature range -40 to +80 °C.	$495.00
HMP 36E	Humidity and temperature probe with: H-series HUMICAP RH sensor, Pt 100 temperature element; stainless steel filter; compatible with HMI 38 data processor. Temperature range -40 to +160 °C.	$695.00
HMP 37E	Humidity and temperature probe complete with: H-series HUMICAP RH sensor; Pt 100 temperature element; 5 meter probe/cable assembly; stainless steel filter; compatible with HMI 38 data processor. Temperature range -40 to +180 °C.	$960.00
18326	HM Carry case for HMI 38 and accessories.	$195.00
15902	HM10 M extension cable for HMP 35E, 36E, and 37E	$200.00
HMI 41	Humidity and temperature indicator and field calibrator complete with: two line LCD display of humidity, temperature, dewpoint, absolute humidity, wet bulb temperature, mixing ratio; selectable metric/non-metric display; field humidity calibrator function.	$490.00
HMP 41	Humidity and temperature probe complete with: HUMICAP® RH sensor; PT 1000 RTD; calibrated.	$325.00
HMP 42	Humidity and temperature prove complete with: 4mm (0.16 in.) diameter; HUMICAP® RH sensor; PT 1000 RTD; 1500 mm (59.1 in.) spiral cable; calibrated.	$795.00
HMP 45	Humidity and temperature probe complete with: 1500 mm (59.1 inch) spiral cable; HUMICAP® RH sensor; PT 1000 RTD; calibrated.	$385.00
HMP 46	Humidity and temperature probe complete with: 1500 mm (59.1 inch) spiral cable; HUMICAP® RH sensor; PT 1000 RTD; calibrated.	$670.00
HM 34	Pocket-size relative humidity and temperature meter complete with: retractable probe; 3-1/2 digit LCD display; 9 V battery; automatic power off; H Series HUMICAP RH sensor and Pt 100 temperature element; carrying case; calibrated.	$495.00
18100ZZ	Calibration cable for field calibration of HM 20/30/130's using the HMI 38	$95.00
18200ZZ	Calibration cable for field calibration of digital transmitters using the HMI 38	$75.00
18300ZZ	Calibration cable for field calibration of HM 60/70/140's using the HMI 38	$95.00
19116ZZ	Calibration cable for field calibration of HM60/70 and HMP 140 series, using the HMI 41	$30.00
19164ZZ	Calibration cable for field calibration of HMP 230 and HMP 240 series, using the HMI 41	$30.00
19165ZZ	Calibration cable for field calibration of HM 20/30 and HMP 130 series, using the HMI 41	$30.00
19446ZZ	Serial interface cable for HMI 41	$30.00
HM 44	Concrete monitoring set complete with: HMI 41 indicator; HMP 44 probe; 26849 carry case; 19267 rubber plugs (12); 19266 plastic sleeves (12); 19268 protective cover (3).	$850.00
HMP 44	Probe for use in HM 44 concrete measurement.	$265.00
HMP 44L	HMP 44 probe with extended cable.	$285.00
26849	Carry case for HM 44 products.	$185.00
19266	Plastic sleeves (12) for use with HM 44.	$15.00

BACK to Catalog Table of Contents
BACK to Price List Table of Contents

19267	Rubber plugs (12) for use with HM 44.	$15.00
19268	Protective covers (3) for use with HM 44.	$15.00

Special Pricing on Selected Combinations of Portable Indicators and Probes:

HMI 41 & HMP 41	Humidity and temperature indicator/field calibrator plus humidity and temperature probe.	$775.00
HMI 41& HMP 42	Humidity, dewpoint and temperature indicator/field. plus humidity and temperature probe.	$1245.00
HMI 41 & HMP 45	Humidity and temperature indicator/field calibrator plus humidity and temperature probe with cable.	$875.00
HMI 41 & HMP 46	Humidity, dewpoint, and temperature indicator/field calibrator plus humidity and temperature probe and cable. ±1% accuracy.	$995.00
HMI 38 & HMP 35E	Data processor plus RH and T probe.	$1,995.00
HMI 38 & HMP 36E	Data processor plus RH and T probe for wide temperature range.	$2,295.00
HMI 38 & HMP 37E	Data processor plus RH and T probe with 5 meter cable.	$2,550.00

INDUSTRIAL TRANSMITTERS

140 Series	See Order Guides	Pages 8,9,10
230 Series	See Order Guides	Pages 2,3,4,5,6,7
240 Series	See Order Guides	Pages 18,19,20,21

BACK to Catalog Table of Contents

HMP 260 EX:	Intrinsically-safe humidity transmitter for hazardous environments. Factory Mutual approved for use in Class I, Division I, Groups A through G. 24 VDC ±2 VDC input power; 4 to 20 mA output signal corresponding to 0 to 100% RH; -20°C to +60°C (-4°F to +140°F) temperature operation range; 216 microns sintered bronze filter; H-series HUMICAP RH sensor; supplied with Zener barriers, calibrated.	$1,525.00

HVAC/EMS TRANSMITTERS
Duct and Wall Mount:

BACK to Price List Table of Contents

HMD 60Y	Humidity and temperature 2-wire transmitter for duct mounting complete with 4 to 20 mA output corresponding to 0 to 100 %RH and -20°C to +80°C (-4 to + 176°F) temperature; temperature compensated; 10 to 35 VDC input power; HUMICAP® 180 sensor; PT 1000 RTD; single point electronic calibration; 0.5 micron membrane filter; calibrated.	$480.00
HMD 60U	Humidity transmitter for duct mounting; same as HMD 60Y but humidity only.	$390.00
HMW 60Y	Humidity and temperature 2-wire transmitter for wall mounting complete with 4 to 20 mA output corresponding to 0 to 100% RH and -5 to +55°C (+23 to + 131 °F) temperature; temperature compensated; 10 to 35 VDC input power; HUMICAP® 180 sensor; PT 1000 RTD; single point electronic calibration; calibrated.	$450.00
HMW 60U	Humidity transmitter for wall mounting; same as HMW 60Y but humidity only.	$325.00
HMD 70Y	Humidity and temperature 3-wire transmitter for duct mounting complete with selectable 0 to 1, 0 to 5, or 0 to 10 VDC output signals corresponding to 0 to 100% RH and -20 to +80°C (-4 to +176°F) temperature; 10 to 35VDC or 9 to 24 VAC input power; temperature compensated; HUMICAP® 180 sensor; PT 1000 RTD; single point electronic calibration; 0.5 micron membrane filter; calibrated.	$480.00
HMD 70U	Humidity transmitter for duct mounting; same as HMD 70Y, but humidity only.	$390.00

HMW 70Y	Humidity and temperature transmitter for wall mounting complete with selectable 0 to 1, 0 to 5, or 0 to 10 VDC output signals corresponding to 0 to 100 %RH and -5 to +55 °C (+23 to +131 °F) temperature; 10 to 35 VDC or 9 to 24 VAC input power; temperature compensated; HUMICAP® 180 sensor; PT 1000 RTD; calibrated.	$450.00
HMW 70U	Humidity transmitter for wall mounting; same as HMW 70Y but humidity only.	$325.00
HMW 21YB	Humidity and temperature 2-wire transmitter for space mounting complete with: 4 to 20 mA output corresponding to 0 to 100%RH and -20 to +80°C (-4 to 176°F) temperature; 10 to 35 VDC input power; HUMICAP H-sensor and PT 100 temperature element; single-point electronic calibration; 0.5 micron membrane filter; calibrated.	$635.00
HMW 21UB	Humidity transmitter for space mounting; same as HMW 21YB, but humidity only.	$510.00
HMW 31YB	Humidity and temperature 3-wire transmitter for space mounting complete with jumper selectable 0 to 1, 0 to 5, or 0 to 10 VDC output corresponding to 0 to 100% RH and -20 to +80°C (-4 to +176°F) temperature; 10 to 35 VDC or 24 VAC input power; HUMICAP H-sensor and Pt 100 temperature element; single-point electronic calibration; 0.5 micron membrane filter; calibrated.	$650.00
HMW 31UB	Humidity transmitter for space mounting: same as HMW 31YB, but humidity only.	$585.00

Outdoor Use:

HMD 60YO	Humidity and temperature 2-wire transmitter for use outdoors complete with 4 to 20 mA output corresponding to 0 to 100% relative humidity and -40°C to +60°C temperature; 10 to 35 VDC input power; HUMICAP 180 sensor; PT 1000 temperature element; single point electronic calibration; 0.5 micron membrane filter; solar radiation shield; calibrated.	$700.00
HMD 70YO	Humidity and temperature 3-wire transmitter for use outdoors complete with user selectable 0 to 1, 0 to 5, 0 to 10 VDC or 0 to 20 mA output corresponding to 0 to 100 % relative humidity and -40°C to +60°C temperature; 10 to 35 VDC or 9 to 24 VAC input power; HUMICAP 180 sensor; PT 1000 temperature element; single point electronic calibration; 0.5 micron membrane filter; solar radiation shield; calibrated.	$775.00
HMD 60UO	Humidity 2-wire transmitter for use outdoors; same as HMD 60YO but humidity only	$585.00
HMD 70UO	Humidity 3-wire transmitter for use outdoors.	$615.00

BACK to Catalog Table of Contents

Calibration-Free:

BACK to Price List Table of Contents

HMD 40Y	Two-wire humidity and temperature transmitter for duct mounting complete with: 4 to 20 mA output signal corresponding to 0 to 100% RH and -40°C to +60°C temperature; 10 to 28 VDC input power; INTERCAP relative humidity sensor; PT 1000 temperature element.	$250.00
HMD 40U	Humidity transmitter for duct mounting: same as HMD 40Y, but humidity only.	$180.00
HMW 40Y	Two-wire humidity and temperature transmitter for wall mounting complete with: 4 to 20 mA output signal corresponding to 0 to 100% RH relative humidity and -5°C to +55°C temperature; 10 to 28 VDC input power; INTERCAP relative humidity sensor; PT 1000 temperature element.	$225.00
HMW 40U	Humidity transmitter for wall mounting; same as HMW 40Y, but humidity only.	$170.00
HMD 50Y	Three-wire humidity and temperature transmitter for duct mounting complete with: selectable 0 to 1V or 0 to 10V output signal corresponding to 0 to 100% relative humidity and -40°C to +60°C temperature; 15 to 35 VDC or 12 to 24 VAC input power; INTERCAP relative humidity sensor; PT 1000 temperature element.	$250.00
HMD 50U	Humidity transmitter for duct mounting; same as HMD 50Y, but humidity only.	$180.00

HMW 50Y	Three-wire humidity and temperature transmitter for wall mounting complete with: selectable 0 to 1V or 0 to 10V output signal corresponding to 0 to 100% relative humidity and -5°C to +55°C temperature; 15 to 35 VDC or 12 to 24 VAC input power; INTERCAP relative humidity sensor; PT 1000 temperature element.	$225.00
HMW 50U	Humidity transmitter for wall mounting; same as HMW 50Y, but humidity only.	$170.00

Temperature-Only:

HMD 60T	Temperature two-wire transmitter for duct mounting complete with: 4 to 20mA output corresponding to -20°C to +80°C (-4°F to +176°F) temperature; 10 to 35 VDC input power; PT 1000 temperature element; membrane filter; calibrated.	$375.00
HMW 60T	Temperature two-wire transmitter for wall mounting complete with: 4 to 20 mA output corresponding to -5°C to +55°C (+23°F to +131°F) temperature; 10 to 35 VDC input power; PT 1000 temperature element; calibrated.	$325.00
HMD 70T	Temperature three-wire transmitter for duct mounting complete with: jumper-selectable 0 to 1V, 0 to 5V, or 0 to 10V output corresponding to -20°C to +80°C (-4°F to +176°F) temperature; 10 to 35 VDC or 12 to 24 VAC input power; PT 1000 temperature element; membrane filter; calibrated.	$410.00
HMW 70T	Temperature three-wire transmitter for wall mounting complete with: jumper-selectable 0 to 1V, 0 to 5V, or 0 to 10V output corresponding to -5°C to +55°C (+23°F to +131°F) temperature; 10 to 35 VDC or 12 to 24 VAC input power; PT 1000 temperature element; calibrated.	$325.00

OEM and CUSTOM HUMIDITY INSTRUMENTS

HUMITTER 40	Integrated humidity transmitter incorporates INTERCAP interchangeable relative humidity sensor; linear 0.25 to 1.25 V output signal corresponding to 0 to 100% relative humidity (can be converted to 4 to 20 mA with external components); 7 to 28 VDC input power.	$175.00
HUMITTER 50Y	Integrated humidity and temperature transmitter incorporates INTERCAP interchangeable relative humidity sensor and PT 1000 temperature element; 0 to 1V output signal corresponding to 0 to 100% relative humidity and -40°C to +60°C temperature; 7 to 28 VDC input power .	$220.00
HUMITTER 50YX	Same as HUMITTER 50Y, but passive resistance output from PT 1000 RTD for temperature.	$195.00
HUMITTER 50U	Same as HUMITTER 50Y, but relative humidity only. 0-5 V model available.	$175.00
HMM 30C	OEM humidity transmitter for environmental chambers complete with: 0 to 1 0 to 5, 0 to 10 VDC or 0 to 20 mA output corresponding to 0 to 100% RH, 10 to 35 VDC or 9 to 24 VAC supply voltage, HUMICAP H-sensor, 1.6 m (5.2 ft.) of cable, 200 mm (7.8 in) sensing head; sintered filter; calibrated. Available with or without mounting flange.	contact factory
HMM 22D	OEM humidity transmitter for environmental chambers complete with: 4 to 20 mA output corresponding to 0 to 100% RH; 10 to 35 VDC input power; HUMICAP H-sensor; single-point calibration; 60 cm cable; membrane filter; calibrated.	contact factory
HMM 211	OEM humidity, temperature and dewpoint transmitter complete with 0 to 1, 0 to 5, 0 to 10V, or 0 to 20mA output signals; variable cable lengths; normal or warmed probes	contact factory

CALIBRATION INSTRUMENTS and ACCESSORIES
Calibration Devices:

HMK 13	Multi-probe calibrator.	contact factory
HMK 15	Humidity probe calibrator	See Order Guide Pages 22
HMK 41	Field calibrator complete with: HMI 41/HMP 46 indicator and probe; two calibration cables; carry case; NIST certificate of calibration at ±1 % accuracy.	$1,150.00

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

Accessories:

1558 HM	Single use sleeve for the measurement of humidity in concrete with HMP 36 probe, package of 25.	$50.00
11990 HM	Mounting flange for 12 mm diameter probes.	$55.00
0639	Carrying case for the HMI 31 digital meter and HMP 35 probe	$49.50
36736	Carrying case for HMI 41	$49.50
HMPC 12	Extension cable (specify length) - Plugs and assembly work (specify Amphenol or Lemo connectors) - Additional cable/foot	 $85.00 $9.00
HMR 19	Circular chart recorder 120/240V, 60/50 Hz.	$1,575.00
HMPM 21801	1X6 digit display panel meter; adjustable zero and span; universal input.	$300.00
37067	Calibration adapter for the HMP 42 probe	$70.00
19809	Rubber sleeve set (10 pcs) for the HMP 42 probe	$15.00
45-20618	PG 9 NPT 1/2 cable connector	$15.00
45-20775	PG 11 to NPT 1/2 cable connector	$15.00
85-21804	ISO 1/2 to NPT 1/2 pressure fitting	$ 25.00
85-20557	Compression fitting, 13.5 mm	$25.00
DMP 248 BVS	Ball valve installation set	$65.00
DMP 248 SC	Sample cell	$140.00
90-2271	Power supply	$165.00
85-HMPS	Power supply in NEMA 4 enclosure	$195.00
85-20671	6 ft. Ac power cord	$10.00
Psycalc software		$25.00

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

Spare/Replacement Parts:

18258HM	HUMICAP HC composite RH sensor HUMICAP KC composite RH sensor	$185.00 $185.00
19283HM	DRYCAP sensor for DMP 248 transmitter	$250.00
	HUMICAP H-180 sensor, capsulates with connector	$112.00
16663HM	HUMICAP H-series sensor, capsulated with connector. Replaces 0062HM and 0174HM sensors	$112.00
16665HM	HUMICAP H-series sensor, capsulated with membrane filter and connector	$112.00
0062 HM	HUMICAP H-series sensor, capsulated with connector	$112.00
0174 HM	HUMICAP H-series sensor, capsulated with connector	$112.00
15202 HM	HUMICAP H-series sensor, capsulated with membrane filter and connector	$112.00
	HUMICAP J-series sensor, capsulated with membrane filter and connector	$112.00
	HUMICAP K-series sensor, capsulated with membrane filter and connector	$112.00

1518 HM	HUMICAP AK-sensor, w/o connector	$112.00
1638 HM	HUMICAP AK sensor, with connector	$112.00
15778 HM	INTERCAP sensor encapsulated	$82.90
15872 HM	INTERCAP sensor encapsulated with membrane filter	$82.90
HMP 42P 235SP	Sensor head assembly for the HMP 42 probe.	$305.00
7095	PT 100 RTD temperature element for HMP 36B and 130 series	$50.00
10429	PT 100 RTD temperature element for all but HMP 36B and 130 series	$50.00
17086	PT 1000 RTD temperature element	50.00
0195 HM	Sintered filter, 133 microns, ø 12.0 mm	$45.00
46670 HM	Sintered ss filter for HMD 60/70, ø 12.0 mm	$45.00
6685 HM	Sintered filter, 37 microns, ø 18.5 mm	$30.00
6686 HM	Sintered filter, 216 microns, ø18.5 mm	$30.00
16452	Sintered filter, stainless steel, 13.5 mm.	$50.00
16562	PPS Grid, 13.5 mm.	$25.00
16720	PPS Grid and stainless steel net, 13,5 mm.	$30.00
17230	PTFE membrane, 13.5 mm.	$25.00
10159 HM	Membrane filter, 0.5 microns, ø12.0 mm	$25.00
2787 HM	Membrane filter, 0.5 microns, ø 18.5 mm	$25.00
6221	Plastic grid, ø 12.0 mm	$25.00
6597	Plastic grid, ø 18.5 mm	$25.00
15795	Metallized plastic grid, ø 18.5 mm	$25.00
16126	Metallized membrane filter, ø 18.5 mm	$25.00
15724	Metallized plastic grid, ø 12 mm for HMD 40U/50U and HUMITTER	$25.00
16131	Metallized membrane filter, ø 12 mm for HMD 40/50 and HUMITTER	$25.00
17039	Membrane filter for HMD 60/70/40/50 and HUMITTER	$25.00
46717	Plastic grid, 18.5mm	$25.00
46780	Stainless steel filter for DMP 246 CS.	$95.00
46782	Stainless steel grid for DMP 246.	$50.00
46999	Sintered stainless steel filter for HMP 228.	$45.00
19858 HM	Membrane filter tube set (5pcs.) for the HMP 42 probe.	$25.00
19867 HM	Steel grid for the HMP 42 probe.	$45.00
HM-LiCl	Granulated salt (500 g) in container, for HMK 11	$ 67.50

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

HM-K_2SO_4	Granulated salt (500 g) in container, for HMK 11	$ 40.00
HM-NaCl	Granulated salt (500 g) in container, for HMK 11	$ 50.00

CARBON DIOXIDE (CO_2) INSTRUMENTS

GMD 20	CARBOCAP carbon dioxide transmitter for duct mounting complete with: 24 VDC or 24 VAC input power; selectable 0 to 20 mA, 4 to 20 mA, or 0 to 10 VDC output signal corresponding to 0 to 2,000 ppm CO_2.	$495.00
GMD 20D	CARBOCAP carbon dioxide transmitter for duct mounting complete plus local display and relay option.	$540.00
GMW 21	CARBOCAP carbon dioxide transmitter for duct mounting complete with: 24 VDC or 24 VAC input power; selectable 0 to 20 mA, 4 to 20 mA, or 0 to 10 VDC output signal corresponding to 0 to 2,000 ppm CO_2.	$460.00
GMW 21D	CARBOCAP carbon dioxide transmitter for wall mounting. Same as GMW 21 plus local display and relay options.	$505.00
GMA 20T	Analog temperature option for GMW 21.	$55.00
GMI 21	Local display and relay option for GMW 21.	$80.00
GMR 20	Relay option for GMW 21	$55.00
GML 20	LonWorks module for GM 20 transmitters.	$155.00
GML 20T	LonWorks® module including temperature for GM 20 transmitters.	$240.00
GMP 111	Carbon dioxide transmitter for wall mounting complete with: 18 to 30 VDC input power; selectable 0 to 20mA, 4 to 20mA, or 0 to 10V output signal; 0 to 3,000 ppm CO_2 range; selectable relay output settings; nondispersive infrared (NDIR) technology.	$650.00
GMP 111E	Carbon dioxide transmitter for wall mounting. Same as above except 0 to 7,000 ppm CO_2 range.	$650.00
GMI 111	Display unit for GMP 111.	$180.00
GM 12A	Portable carbon dioxide (CO_2) meter complete with: rechargeable battery and AC adapter; 0 to 3,000 ppm CO_2 range; selectable alarm setting; pump aspirated for remote or local measurements. NDIR (non-dispersive infrared technology).	$1,995.00
GM 12B	Portable carbon dioxide (CO_2) meter. Same as GM 12A but with 0 to 3% CO_2 range.	$1,995.00
GMM 11A/ B/C	OEM CO_2 module with nonlinear 0 to 1 VDC output signal corresponding to: 0 to 3,000 ppm (CO_2 (GMM 11A) 0 to 3% CO_2 (GMM 11B) 0 to 10% CO_2 (GMM 11C)	contact factory
GMM 12/A/B/C	Same as above except linear 4 to 20 mA output signal.	contact factory
GMM 20W	CARBOCAP OEM module.	contact factory
GMM 11 AD GMM 12 AD	CO_2 OEM module for 0 to 3,000 ppm CO_2. to be used with 18191 fixed diffusion tube.	contact factory
GMM 221	CO_2 OEM module for demanding applications complete with 11 to 30 VDC input power, user selectable analog output corresponding to various CO_2 ranges. Features remote probe and circuit board assembly and Carbocap® technology.	contact factory

BACK to Catalog Table of Contents

BACk to Price List Table of Content

Options:

18192	Calibration kit for CO_2 transmitters to include: balloons, pump and tubing	$175.00
19222 GM	Calibration software kit for GM 20 series CO_2 transmitter to include cable and disk.	$155.00
18515	Pump for CO_2 OEM modules.	$195.00
18179	Filter pump aspirated CO_2 OEM modules.	$20.00
18191	Diffusion tube assembly for GMM 11 AD/12 AD CO_2 OEM modules.	$70.00
19255	Remote diffusion tube for pump aspirated CO_2 OEM modules.	$70.00

NIST TRACEABLE BAROMETERS

PTB 100A	Analog barometric pressure transmitter. NIST traceable with calibration certificate included. Measuring range 800...1060mb/-40...+60°C; accuracy at room temperature ±0.3mb, supply voltage 10...30 VDC; output signal 0...5 VDC.	$795.00
PTB 100B	Analog barometric pressure transmitter. Same as PTB 100A, but measuring range 600...1060 mb/-40...+60°C, accuracy at room temperature ±0.5 mbar.	$1,030.00
PTB 101B	Analog barometric pressure transmitter. Same as PTB 100B, except output is 0 to 2.5 VDC corresponding to 600 to 1060 mb.	$595.00
PTB 101C	Analog barometric pressure transmitter. Same as PTB 100A, except output is 0 to 2.5 VDC corresponding to 900 to 1100 mb.	$650.00
PTB 200A	Digital barometric pressure transmitter. NIST traceable with calibration certificate included. Measuring range 600...1100 mbar/-40...+60°C. Total accuracy including temperature dependence ±0.20 mbar. Supply voltage 10...30 VDC.	$1,600.00
PTB 220	Pressure Transmitter	See Order Guide page 23
PTU 200	Pressure, Temperature and Humidity Transmitter	See Order Guide page 24
PTB 220 TS	Oak carrying case and recharging electronics	$1,760.00
PTU 200 MIK	Meteorological installation kit for PTU 200	$1,100.00
PTU 200 Tripod	For PTU 200 MIK	$1,470.00

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

METEOROLOGICAL PRODUCTS

HMP 45A	Humidity and temperature probe for meteorological measurement complete with: 7 to 35 VDC input power; < 4mA current consumption; linear 0 to 1 VDC output signal corresponding to 0 to 100% relative humidity and -40°C to +60°C (-40°F to +140°F); HUMICAP 180 RH sensor; PT 1000 RTD temperature element; membrane filter; calibrated.	$ 595.00
HMP 45 D	Same as HMP 45A, except temperature output is a 4-wire resistance from Pt 100 RTD.	$565.00
2212 HM	Solar radiation shield with offset U-bolt bracket. Specify probe diameter.	$295.00

A typical digital wind system includes an anemometer, wind vane, crossarm assembly and junction box, wind sensor controller and digital display of wind speed and direction. Contact factory for additional configurations, specifications, or pricing.

WAA 151	Anemometer (wind speed)	$640.00
WAV 151	Wind vane (wind direction)	$690.00
WAA 251	Cup/shaft heated anemometer	$1,675.00
WAC 151	Crossarm for anemometer and wind vane	$400.00
DKP 15W	Pole Mast, 3.0M with wind sensor extension	$580.00
WAT 12	Wind transmitter/cross arm assembly	$950.00
WMS 301	WMS Combo wind sensor	$850.00
WD 20	Wind 20 digital display	$850.00
WD 30	Multichannel averaging wind display	$1330.00
MAWS 101	Standard System w/the following:	$4,500.00

QML 101 Logger w/2Mb flash memory for data logging
QMB 101 1.3 Ah internal rechargeable battery
Pole mast (2M) with total weight of 3M
QMH101 Temperature and Relative Humidity sensors w/radiation shield
One sensor arm for QMH 101 and e.g. for QMR 101
QMW 101 Wind Direction and Speed Sensor cable
RS232 Cable
Lizard Operating Software

BACK to Catalog Table of Contents

BACK to Price List Table of Contents

Maws Options:

PMT 16A	Pressure Sensor	$641.00
QMR 101	Rain Gauge on Sensor Arm	$291.00
QMR 102	Stand Alone model w/6M of cable connector base plate	$738.00
QMS 101	Solar Radiation: Global 1 w/sensor arm	$334.00
QMS 102	Solar Radiation: Global 2 w/sensor arm	$773.00
QMN 101	Solar Radiation: Net Radiation w/sensor arm	$1,087.00
QMT 103	Soil Temperature: 1,2 or 3 Sensors	$103.00
DSI 485	Serial Modules: Isolated RS-485 module	$194.00
QMP 102	Solar Power: Solar Panel 2.2W/6V	$247.00
WHP 151	Mains Power Supply for Outdoor Use	$480.00

CALIBRATION LABORATORY AND SERVICE

Humidity:

2% standard calibration	$100.00
1% calibration**	$150.00
Certificate of calibration	$50.00
Sensor	$112.00
Labor	$95.00/hour
Parts	List cost for all parts
Turn around time	5 days after receipt by calibration lab
Special humidity calibrations (range 10% to 95% @ 10°C to 70°C)	$75.00 per point
Express service; 2 day guarantee	10% of total charge

* The standard calibration consists of a 4-point calibration with adjustments made at 0% and 75.5% and linearity checked at 11.3% and 97.6%. Temperature is verified at ambient.

** 1% Calibration is available for the HMP 230 and HMP 260 series, HMP 243, and the HMI 38 with HMP 35E/36E/37E, HMI 41 and HMP 46.

Temperature:

Calibration*** (with certificate) (range -20°C to +120 °C)	$75.00 per point
Temperature respanning (1st unit)	$50.00
Additional respanning (each additional unit)	$35.00
Turn around time	5 days after receipt by calibration lab
Express service; 2 day guarantee	10% of total charge

*** Two point minimum on temperature calibrations

Carbon Dioxide:

Calibration****	$100.00
Certificate	$50.00
Labor	$95.00/hour
Parts	List cost for all parts
Turn around time	7 to 21 days

**** Standard calibration; zero and span, special calibration can be arranged.

BACK to Catalog Table of Contents

Pressure:

Calibration (standard) PTA427, PTB 100 Series	$195.00
Calibration (Class A) PA11A, PTB 200 and PTB 220 Series,	$295.00
NIST certificates	Included
Parts	List cost for all part
Turn around time	21 to 28 days
Labor	$95.00

BACK to Price List Table of Contents

Prices subject to change without notice.

Humidity Transmitter Selection Guide

- Match your requirements to the product features listed on the chart to select the best humidity or dewpoint transmitter for your needs.

Click here for 220/230, 240 and 260/360 Series

Click here for the 140 and 60/70 Series

Click here for the 21/31 and 40/50 Series

BACK to Catalog Table of Contents

To Index

- *Still not sure?*
  Contact Vaisala and ask to speak with the sales engineer responsible for your location.

1-888-VAISALA (824-7252)

VAISALA

100 Commerce Way, Woburn, MA 01801
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FAX: 781-933-8029
Online catalog: www.vaisala.com/inc/ssdcat
www.vaisala.com

BACK to Page 1 of the Selection Guide

BACK to Catalog Table of Contents

Humidity Transmitter Selection Guide

		220/230 Series						240 Series			260/360 Series						
	Product Features	HMP 228	HMP 231	HMP 233	HMP 234	HMP 235	HMP 238	DMP 243	DMP 246	DMP 248	HMP 260EX	HMT 361	HMT 363	HMT 364	HMT 365	HMT 368
Measurement of:	Relative Humidity only (RH)										X					
	RH and temperature (T)															
	RH, T, dewpoint, absolute humidity, mixing ratio, wet bulb temperature, and enthalpy		S	S	S	S	S	X				X	X	X	X	X
	Water activity, temperature	S														S
	Dewpoint (Td), mixing ratio								S							
	Td, RH, T, and ppmv									S						
Accuracy:	RH one percent		S	S	S	S	S	S		S		X	X	X	X	X
	RH two percent										X					
	RH three percent															
	Td two degrees Celsius								S	S						
Configuration:	Wall-mount measurement		X								X	X				
	Duct-mount measurement			X		X		X					X		X	
	Probe with cable	S		S	S	S	S	X	S	S			X	X	X	X
	Local digital display option	S	S	S	S	S	S	X	S	S		X	X	X	X	X
**Can use the*	Alarm Relay output option *	S	S	S	S	S	S	S	S	S						
internal power module if alarm	Metal construction - additional electromagnetic protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
outputs are not	Plastic construction															
used in same	Ball Valve and Hot Tap compatible	S					S			S						S
transmitter.	NEMA - protection against dirt and moisture (wash down)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Special Applications:	High temperature	X		X	X	S	X			X			X	X	X	X
	High temperature & high humidity								S							
	Low temperature	X	X	X	X	X	X			S		X	X	X	X	X
	Pressurized spaces - overpressure & underpressure	X			S		X			X				S		X
	Tight spaces			S									S			
	Intrinsically safe										S	S	S	S	S	S
	Outdoor			S				S								
	Extreme humidity conditions							S	S	S						
	High levels of gaseous contaminants	X	X	X	X	X	X	S	X	X						
	Process requires sampling apparatus									S						
Powered by:	24 VDC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	24 VAC	X	X	X	X	X	X	X	X	X						
	Optional 115/230 VAC *	X		X	X	X	X		X	X						
Calibration:	Interchangeable sensor-no calibration															
	One point field calibration	X	X	X	X	X	X	X	X	X						
Output:	mA 2-wire current loop										X	X	X	X	X	X
	mA	X	X	X	X	X	X	X	X	X						
	Volts, selectable range	X	X	X	X	X	X	X	X	X						
	Serial	X	X	X	X	X	X	X	X	X		X	X	X	X	X

"S" indicates especially significant feature that most distinguishes a particular product model from others.

Humidity Transmitter Selection Guide

	Product Features	140 Series			60/70 Series									
		HMP 141	HMP 142	HMP 143	HMD 60U	HMD 60Y	HMD 60UO	HMD 60YO	HMW 60U	HMW 60Y	HMD 70U	HMD 70Y	HMW 70U	HMW 70Y
Measurement of:	Relative Humidity only (RH)				X		X		X		X		X	
	RH and temperature (T)	X	X	X		X		X		X		X		X
	RH, T,dewpoint, absolute humidity, mixing ratio, wet bulb temperature, and enthalpy													
	Water activity, temperature													
	Dewpoint (Td), mixing ratio													
	Td, RH, T, and ppmv													
Accuracy:	RH one percent													
	RH two percent	S	S	S	S	S	S	S	S	S	S	S	S	S
	RH three percent													
	Td two degrees Celsius													
Configuration:	Wall-mount measurement	X							X	X			X	X
	Duct-mount measurement		X		X	X					X	X		
	Probe with cable			S										
	Local digital display option	S	S	S										
**Can use the*	Alarm Relay output option *													
internal power module if alarm	Metal construction - additional electromagnetic protection				X	X	X	X			X	X		
outputs are not	Plastic construction	X	X	X					X	X			X	X
used in same	Ball Valve and Hot Tap compatible													
transmitter.	NEMA - protection against dirt and moisture (wash down)	S	X	X	X	X	X	X			X	X		
Special Applications:	High temperature				X	X					X	X		
	High temperature & high humidity													
	Low temperature				X	X					X	X		
	Pressurized spaces - overpressure & underpresssure													
	Tight spaces			S										
	Intrinsically safe													
	Outdoor							S	S					
	Extreme humidity conditions													
	High levels of gaseous contaminants													
	Process requires sampling apparatus													
Powered by:	24 VDC	X	X	X	X	X	X	X	X	X	X	X	X	X
	24 VAC	X	X	X							X	X	X	X
	Optional 115/230 VAC *													
Calibration:	Interchangeable sensor-no calibration													
	One point field calibration	X	X	X	X	X	X	X	X	X	X	X	X	X
Output:	mA 2-wire current loop				X	X	X	X	X	X				
	mA	X	X	X										
	Volts, selectable range	X	X	X							X	X	X	X
	Serial													

"S" indicates especially significant feature that most distinguishes a particular product model from others.

BACK to Page 1 of the Selection Guide

BACK to Catalog Table of Contents

Humidity Transmitter Selection Guide

	Product Features	21/31 Series				40/50 Series							
		HMW 21UB	HMW 21YB	HMW 21YB	HMW 31YB	HMD 40U	HMD 40Y	HMW 40U	HMW 40Y	HMD 50U	HMD 50Y	HMW 50U	HMW 50Y
Measurement of:	Relative Humidity only (RH)	X				X		X		X		X	
	RH and temperature (T)		X		X		X		X		X		X
	RH, T,dewpoint, absolute humidity, mixing ratio, wet bulb temperature, and enthalpy												
	Water activity, temperature												
	Dewpoint (Td), mixing ratio												
	Td, RH, T, and ppmv												
Accuracy:	RH one percent												
	RH two percent	S	S	S	S								
	RH three percent					S	S	S	S	S	S	S	S
	Td two degrees Celsius												
Configuration:	Wall-mount measurement	X	X	X	X			X	X			X	X
	Duct-mount measurement					X	X			X	X		
	Probe with cable												
	Local digital display option												
**Can use the*	Alarm Relay output option *												
internal power module if alarm	Metal construction - additional electromagnetic protection												
outputs are not	Plastic construction	X	X	X	X	X	X	X	X	X	X	X	X
used in same	Ball Valve and Hot Tap compatible												
transmitter.	NEMA - protection against dirt and moisture (wash down)	S	S	S	S	X	X			X	X		
Special Applications:	High temperature												
	High temperature & high humidity												
	Low temperature												
	Pressurized spaces - overpressure & underpresssure												
	Tight spaces												
	Intrinsically safe												
	Outdoor												
	Extreme humidity conditions												
	High levels of gaseous contaminants												
	Process requires sampling apparatus												
Powered by:	24 VDC	X	X	X	X	X	X	X	X	X	X	X	X
	24 VAC			X	X					X	X	X	X
	Optional 115/230 VAC *												
Calibration:	Interchangeable sensor-no calibration					S	S	S	S	S	S	S	S
	One point field calibration	X	X	X	X								
Output:	mA 2-wire current loop	X	X			X	X	X	X				
	mA												
	Volts, selectable range			X	X					X	X	X	X
	Serial												

"S" indicates especially significant feature that most distinguishes a particular product model from others.