

# Counters, Panel Meters, Tachometers and Timers

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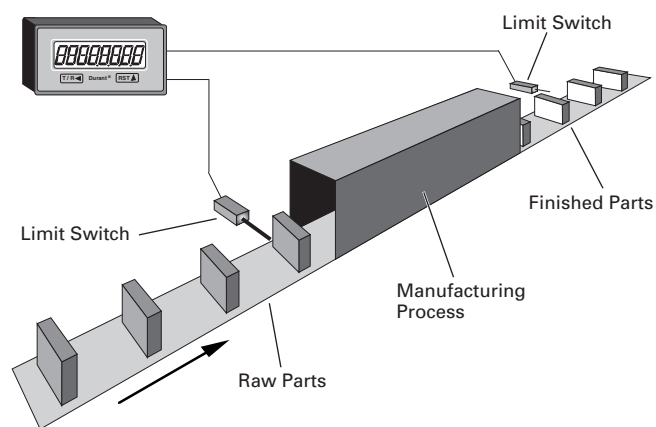
*Count and Flow Controls*

**Product Family Overview****Introduction**

Totalizers are used in a wide variety of applications where accurate totals are needed. Typical applications include counting the number of parts produced, amount of material used, or the number of machine cycles occurring. Totalizers are the simplest and most common type of counter. As an added bonus, some models can perform both totalizing and ratemeter functions.

**Application Example**

Parts are fed into a machine or process, an operation is performed, and the finished parts exit the machine or process. The subtract totalizer is used to indicate the number of parts in process.

**Application Example**

## Product Family Overview

### Totalizer Product Family Overview

Table 54-1. Product Family Overview

Product Family	Characteristics	Typical Applications	Panel Cutout in Inches (mm)	Catalog Page
 <b>E5-024-C</b>	<ul style="list-style-type: none"> <li>■ Non-replaceable battery (min. 8-yr. life)</li> <li>■ Compact, low cost and high efficiency</li> <li>■ 8-Digit LCD totalizers</li> <li>■ Manual or electrical reset</li> <li>■ Various counting modes/inputs</li> </ul>	<ul style="list-style-type: none"> <li>■ Replacement for mechanical counters</li> <li>■ Transaction counting</li> <li>■ Parts counting</li> <li>■ Position indication or measurement</li> </ul>	0.870 x 1.772 (22 x 44)	54-23
 <b>E5-24-E</b>	<ul style="list-style-type: none"> <li>■ Compact device with bright, LED display</li> <li>■ Multiple functions available: count, time, rate, multifunction, double-function</li> <li>■ 24V DC Power</li> </ul>	<ul style="list-style-type: none"> <li>■ Count, measure, time where small package and easy-to-read display required</li> <li>■ Position display</li> <li>■ Motor/pulley RPM</li> </ul>	0.870 x 1.772 (22 x 44)	54-25
 <b>E5-496-E</b>	<ul style="list-style-type: none"> <li>■ Economical, multifunction display</li> <li>■ Large, LED characters</li> <li>■ AC or DC power options</li> </ul>	<ul style="list-style-type: none"> <li>■ Large, easy-to-read display</li> <li>■ Position display</li> <li>■ Motor/pulley RPM</li> </ul>	1.772 x 1.622 (45 x 92)	54-28
 <b>Courier</b>	<ul style="list-style-type: none"> <li>■ Replaceable lithium battery</li> <li>■ 8-digit, high-visibility LCD display</li> <li>■ Optional backlighting</li> <li>■ Various input options available</li> </ul>	<ul style="list-style-type: none"> <li>■ Portable/mobile/remote flow monitoring (e.g. sewer pumping, pesticide application)</li> <li>■ Position display, RPM</li> <li>■ Length measurement (e.g. carpet, cable)</li> </ul>	1.299 x 2.677 (33 x 68)	54-26
 <b>Eclipse</b>	<ul style="list-style-type: none"> <li>■ 6-digit, super bright LED display</li> <li>■ Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls</li> </ul>	<ul style="list-style-type: none"> <li>■ Length measurement and control</li> <li>■ Flow monitoring and control</li> <li>■ Process monitoring and display</li> <li>■ Voltage and current monitoring and display</li> </ul>	1.772 x 1.622 (45 x 92)	54-29
 <b>Ambassador</b>	<ul style="list-style-type: none"> <li>■ 8-digit, high-visibility, 2-line LCD display</li> <li>■ User-configurable control inputs</li> <li>■ Highly flexible control/display</li> </ul>	<ul style="list-style-type: none"> <li>■ Flow control where simultaneous total and rate display are required</li> <li>■ Cut-to-length and other simple processes where flexibility of inputs/outputs required</li> </ul>	2.667 x 2.667 (68 x 68)	54-35
 <b>President</b>	<ul style="list-style-type: none"> <li>■ Bright LED display w/14 mm characters</li> <li>■ Simple configuration with 14-button tactile keypad</li> <li>■ Many different versions fit almost any application</li> </ul>	<ul style="list-style-type: none"> <li>■ Cut-to-length machinery with batching</li> <li>■ Parts batching/palletizing</li> <li>■ Die press positioning control</li> <li>■ Applications where parameter changes are required</li> </ul>	2.667 x 5.433 (68 x 138)	54-31
 <b>Electromechanical</b>	<ul style="list-style-type: none"> <li>■ Various price, voltage and size ranges for different duty cycles and environments</li> <li>■ Long life and always readable display</li> </ul>	<ul style="list-style-type: none"> <li>■ Coin-operated equipment</li> <li>■ Gaming machines</li> <li>■ Printing presses</li> <li>■ Secondary machines (e.g. punch press)</li> </ul>	Various Mounting Configurations	54-17
 <b>Mechanical</b>	<ul style="list-style-type: none"> <li>■ Various size ranges for different duty cycles and environments</li> <li>■ No power supply needed</li> <li>■ Long life and always readable display</li> </ul>	<ul style="list-style-type: none"> <li>■ Winding and spooling equipment</li> <li>■ Position display</li> <li>■ Mechanical piece/cycle counting</li> </ul>	Various Mounting Configurations	54-4
 <b>Hour Meter/Counter</b>	<ul style="list-style-type: none"> <li>■ Combination counter consists of time meter and adding counter in one</li> <li>■ Without reset</li> <li>■ High shock resistance</li> <li>■ Magnified figures</li> <li>■ Protection IP52 (front)</li> <li>■ Data retention if power is lost</li> <li>■ Long service life</li> <li>■ UL Approved</li> </ul>	<ul style="list-style-type: none"> <li>■ General counting</li> <li>■ Service interval for measurement systems (respiratory ventilators, oxygen machines, dialysis machines)</li> <li>■ Small appliances</li> <li>■ UV lamps</li> <li>■ Display panels in cars</li> </ul>	1.988 (50.5) dia. or DIN Rail	54-69

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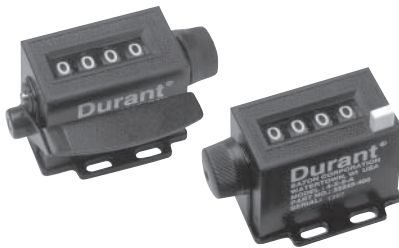


Cat. No. 5-X-1-1-R

**Product Description**

Model X Series is a dustproof and rustproof series of counters for light and medium-duty work. They are sound and durable, requiring a minimum of driving effort, and have been especially designed for incorporation as integral parts of a variety of machines and equipment.

**Pushbutton Desk Tally**



Ruggedly constructed counters with feather-touch pushbutton operation and maximum readability. Specifications and dimensions are basically the same as the X Series counters. Will give long and accurate service in areas requiring hand counting or during hand operations.

**Technical Data and Specifications**

- Figures: 4 or 5
  - Speed: 1000 cpm
  - Shaft: 0.125" (3.2 mm) diameter stainless steel
  - Drive: Drive parts of nylon
  - Bearings: Oil-less, maintenance free
  - Finish: Black frame and Cyclocac black cover
  - Stroke Operation: 33° minimum; 58° maximum ①
  - Figure Size: 3/16 inch (4.8 mm) high, white-on-black background
  - Reset: Knob
- ① Operating stroke angles apply to forward stroke counter only. Check factory for angles of reverse stroke counter.

**Product Selection**

Table 54-2. Product Selection — X Series Stroke Counters and Pushbutton Desk Tallies

No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
4	L.H. Lever	Knob	Base	4-X-1-1-L	40263400	
5	L.H. Lever	Knob	Base	5-X-1-1-L	40272401	
4	R.H. Lever	Knob	Base	4-X-1-1-R	40263401	
5	R.H. Lever	Knob	Base	5-X-1-1-R	40272402	
4	L.H. Lever	Knob	Base	4-X-1-1-L-REV ②	40263403	
4	R.H. Lever	Knob	Base	4-X-1-1-R-REV ②	40263402	
5	L.H. Lever	Knob	Base	5-X-1-1-L-REV ②	40272400	
5	R.H. Lever	Knob	Base	5-X-1-1-R-REV ②	40272403	
4	Push Bar	Knob	Base	4-X-2	21619400	
4	Pushbutton	Knob	Base	4-X-2-A	33245400	

② Reverse stroke.

**When Ordering Specify**

To determine a model number from the Product Selection table for Model X Series Stroke Counters and Pushbutton Desk Tallies, consider:

- Number of figures
- Drive

**Dimensions**

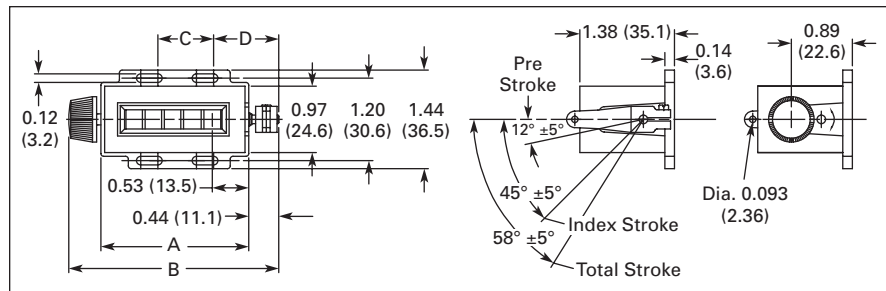


Figure 54-1. X Series — Approximate Dimensions in Inches (mm)

Table 54-3. X Series — Approximate Dimensions in Inches (mm)

Model	A	B	C	D
4-X-1-1_	1.86 (47.2)	2.76 (70.2)	0.62 (15.7)	0.89 (22.6)
5-X-1-1_	2.16 (54.8)	3.06 (77.8)	0.81 (20.6)	0.95 (24.1)



**Cat. No. 4-CS-1-1-R**

**Product Description**

Model CS Series of small, compact, top reading stroke counters is designed for use in most industrial applications. These counters are ruggedly built and feature a single casting case, which assures great rigidity and a tight seal for working parts.

**Technical Data and Specifications**

- Figures: 4 or 5
- Speed: 600 cpm
- Stroke Operation: 37-1/2° minimum; 75° maximum
- Shaft: 0.25" (6.4 mm) diameter stainless steel, rustproof
- Drive: Accurately machined, hardened steel parts
- Bearings; Oil-less, maintenance free
- Figure Size: 11/32" (8.7 mm) high, black-on-white background
- Reset: Contoured wing nut
- Finish: Black frame
- Operating Lever: Cast zinc. Adjustable to any position. Furnished complete with pull spring.

**Product Selection**

**Table 54-4. Product Selection — CS Series Stroke Counters**

No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
4	R.H. Lever	Wing Nut	Base	4-CS-1-1-R	31062400	
5	R.H. Lever	Wing Nut	Base	5-CS-1-1-R	31062401	
5	L.H. Lever	Wing Nut	Base	5-CS-1-1-L	31061401	
5	R.H. Lever	Wing Nut	Base	5-CS-1-1-R-RP ①	01464400	
5	L.H. Lever	Wing Nut	Base	5-CS-1-1-L-RP ①	00445400	

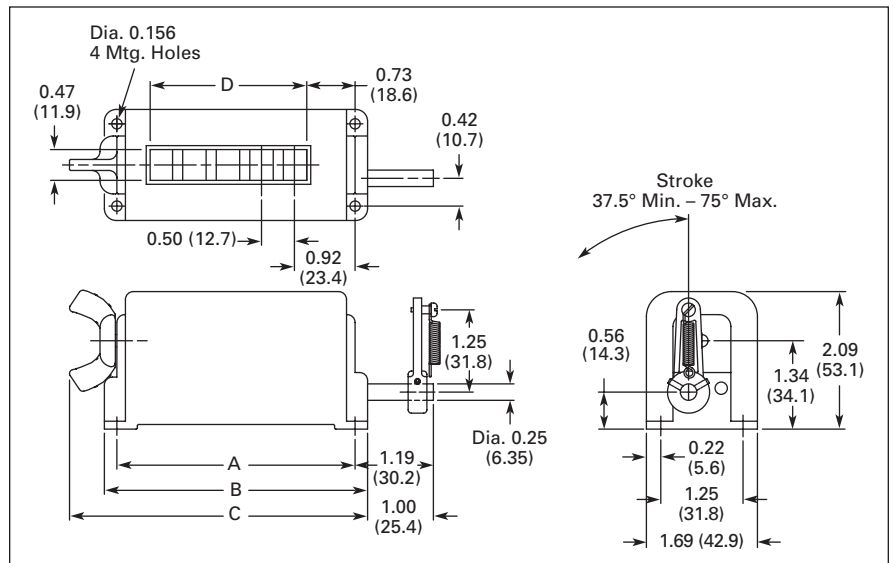
① Special Feature: Rustproof.

**When Ordering Specify**

To determine a model number from the Product Selection table for Model CS Series Stroke Counters, consider:

- Number of figures
- Drive lever

**Dimensions**



**Figure 54-2. CS Series — Approximate Dimensions in Inches (mm)**

**Table 54-5. CS Series — Approximate Dimensions in Inches (mm)**

Model	A	B	C	D
4-CS-1_	3.12 (79.2)	3.50 (88.9)	4.03 (102.3)	1.87 (47.6)
5-CS-1_	3.62 (91.9)	4.00 (101.6)	4.53 (115.0)	2.38 (60.5)



Cat. No. 5-H-1-1-R

### Product Description

Model H Series heavy-duty counters are designed for hard usage and long, trouble-free service. They are high speed, streamlined counters constructed of the highest quality materials and drive shaft moves in oil-less bearings. All shafts are stainless steel. The drive action is designed with overstroke so counter does not bottom, increasing life and permitting easier installation. The sturdy cover is stamped steel, locked into position on a heavy, die-cast base of a special alloy. A heavy steel mounting plate is adjustable for either bottom or back mounting. Model "H" has earned the reputation of being the "work horse" of industrial counters. Wing nut or tamper-proof reset lock which requires a key to reset the counter, guarding against unauthorized resetting or tampering.

### Technical Data and Specifications

- Figures: 5
- Speed: 800 cpm
- Stroke Operation: 37° stroke to count; 60° maximum stroke
- Shaft: 0.31" (7.9 mm) diameter stainless steel, rustproof
- Drive: Accurately machined, hardened steel parts; Geneva drive for extra long life
- Bearings: Oil-less, maintenance free
- Figure Sizes: 11/32" (8.7 mm) high, black-on-white background
- Reset: Wing nut or tumbler lock reset
- Finish: Black frame and cover
- Operating Lever: Adjustable to any position. Furnished complete with pull spring for attaching.

### Product Selection

Table 54-6. Product Selection — H Series Stroke Counters

No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
5	R.H. Lever	Wing Nut	Base	5-H-1-1-R	40205400	
5	L.H. Lever	Wing Nut	Base	5-H-1-1-L	40205401	
5	R.H. Lever	Wing Nut	Base	5-H-1-1-R-REV ②	00597400	
5	L.H. Lever	Wing Nut	Base	5-H-1-1-L-REV ②	00598400	
5	R.H. Lever	Wing Nut	Base	5-H-1-1-R-RP ③	40205404	
5	L.H. Lever	Wing Nut	Base	5-H-1-1-L-RP ③	40205405	
5	R.H. Lever	Lock Reset	Base	5-H-1-2-R	40206404	
5	L.H. Lever	Lock Reset	Base	5-H-1-2-L	40206405	
5	R.H. Lever	Lock Reset	Base	5-H-1-2-R-RP ③	40206400	
5	R.H. Lever	Lock Reset	Base	5-H-1-2-L-RP ③	40206401	
5	R.H. Lever	Wing Nut	Rear	5-H-1-4-R	00507400	
5	L.H. Lever	Wing Nut	Rear	5-H-1-4-L	00508400	
5	R.H. Trip Arm	Wing Nut	Base	5-H-5-A	31049400	
5	R.H. Trip Arm	Wing Nut	Base	5-H-5-B	31049401	
5	L.H. Trip Arm	Wing Nut	Base	5-H-5-C	31049402	
5	L.H. Trip Arm	Wing Nut	Base	5-H-5-D	31049403	
5	R.H. Trip Arm	Lock Reset	Base	5-H-6-A	01533400	
5	R.H. Trip Arm	Lock Reset	Base	5-H-6-B	01534400	
5	L.H. Trip Arm	Lock Reset	Base	5-H-6-C	01535400	
5	L.H. Trip Arm	Lock Reset	Base	5-H-6-D	01536400	

② Special Feature: Reverse stroke.

③ Special Feature: Rustproof.

#### When Ordering Specify

To determine a model number from the Product Selection table for Model H Series Stroke Counters, consider:

- Number of figures
- Drive lever location (left or right side)
- Type of reset (lock or wing nut)

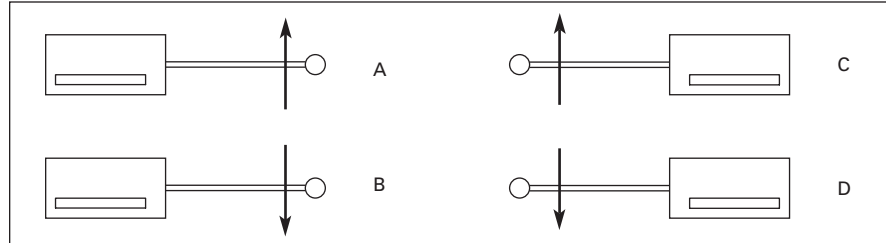


Figure 54-3. Direction Location for 5H5 and 5H6

### Dimensions

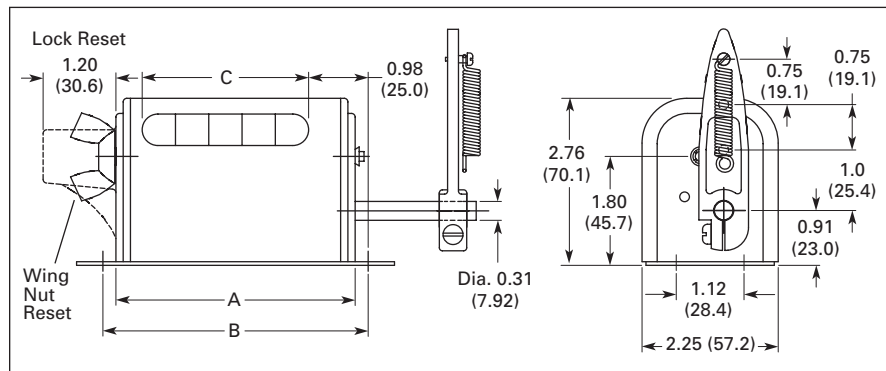


Figure 54-4. H Series — Approximate Dimensions in Inches (mm)

Table 54-7. H Series — Approximate Dimensions in Inches (mm)

Model	A	B	C
5 Figure Units	3.95 (100.4)	4.38 (111.3)	2.75 (69.9)

Discount Symbol ..... CC-2



**Cat. No. 5-D-1-1-R**

**Product Description**

Model D Series are medium-duty stroke counters available with 4, 5 or 6 figures that have been designed for general service on small production machines. Although compact, Durant® “D” models are sturdily constructed and thoroughly tested for accuracy and efficient operation.

**Technical Data and Specifications**

- Figures: 4, 5 and 6
- Speed: 400 cpm
- Shaft: 0.25" (6.4 mm) diameter stainless steel, rustproof
- Drive: Nylon ratchet and Delrin drive plate. Right-hand drive standard; left-hand drive available
- Bearings: Oil-less, maintenance free
- Figure Size: 1/4" (6.4 mm) high, black-on-white background
- Reset: Wing nut
- Finish: Black frame and cover
- Operating lever: Adjustable to any position. Furnished complete with pull string

**Product Selection**

**Table 54-8. Product Selection — D Series Stroke Counters**

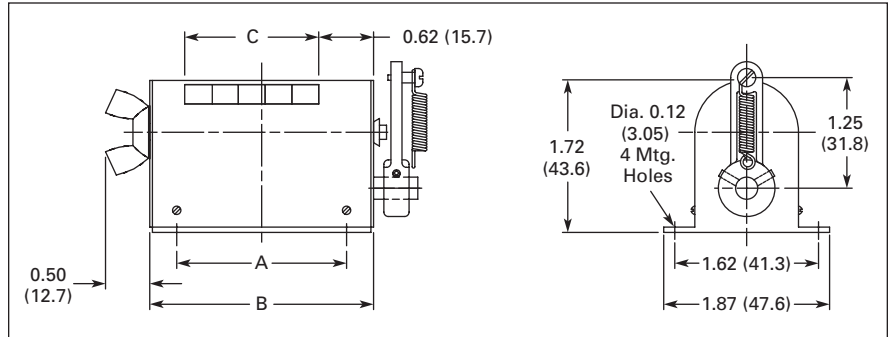
No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
4	R.H. Lever	Wing Nut	Base	4-D-1-1-R	34269401	
5	R.H. Lever	Wing Nut	Base	5-D-1-1-R	34269402	
6	R.H. Lever	Wing Nut	Base	6-D-1-1-R	34269403	
4	L.H. Lever	Wing Nut	Base	4-D-1-1-L	34269405	
5	L.H. Lever	Wing Nut	Base	5-D-1-1-L	34269406	
6	L.H. Lever	Wing Nut	Base	6-D-1-1-L	34269407	

**When Ordering Specify**

To determine a model number from the Product Selection table for Model D Series Stroke Counters, consider:

- Number of figures
- Drive lever

**Dimensions**



**Figure 54-5. D Series — Approximate Dimensions in Inches (mm)**

**Table 54-9. D Series — Approximate Dimensions in Inches (mm)**

Model	A	B	C
4-D-1-1_	1.59 (40.4)	2.20 (55.9)	1.20 (30.6)
5-D-1-1_	1.92 (48.8)	2.53 (64.3)	1.51 (38.5)
6-D-1-1_	2.26 (57.5)	2.87 (73.0)	1.83 (46.4)



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Cat. No. 5-X-7-1-L-CL

**Product Description**

Model X Series are dust- and rust-proof counters designed for small, medium-duty units, accurate, durable and require a minimum of driving effort. They are especially designed for incorporation as integral parts of a variety of equipment that gets severe usage under adverse climatic conditions.

**Technical Data and Specifications**

- Figures: 4 or 5
- Speed —
  - 1000 cpm in 1:1 ratio;
  - 10,000 cpm in 10:1 ratio for intermittent duty
- Rotation Direction: Clockwise or anti-clockwise when viewed from right-hand end of counter
- Ratio —
  - 1:1 and 10:1 standard in 4-X-7 models
  - 10:1 standard in 5-X-7 models
- Shaft: 0.125" (3.2 mm) diameter stainless steel; standard length 0.44" (11.1 mm)
- Bearings: Oil-less, maintenance free
- Figure Size: 3/16 inch (4.8 mm) high, white-on-black background
- Reset: Knob
- Finish: Black frame, Cycolac black cover
- Drive: Right- or left-hand drive; drive parts of Delrin
- Ratio Information: 1:1 is one count to each revolution of drive shaft, 10:1 is ten counts to each revolution

**Product Selection**

Table 54-10. Product Selection — X Series Revolution Counters

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
4	L.H.	Clockwise ④	Knob	Base	4-X-7-1-L-CL	40270406	
5	L.H.	Clockwise ④	Knob	Base	5-X-7-1-L-CL	40275404	
4	L.H.	Anti-Clockwise ⑤	Knob	Base	4-X-7-1-L-AC	40270404	
5	L.H.	Anti-Clockwise ⑤	Knob	Base	5-X-7-1-L-AC	40275407	
4	R.H.	Clockwise ②	Knob	Base	4-X-7-1-R-CL	40270407	
5	R.H.	Clockwise ②	Knob	Base	5-X-7-1-R-CL	40275405	
4	R.H.	Anti-Clockwise ③	Knob	Base	4-X-7-1-R-AC	40270405	
5	R.H.	Anti-Clockwise ③	Knob	Base	5-X-7-1-R-AC	40275406	
4	L.H.	Clockwise ④	Knob	Base	4-X-7-1-L-CL ①	40270402	
5	L.H.	Clockwise ④	Knob	Base	5-X-7-1-L-CL ①	40275402	
4	L.H.	Anti-Clockwise ⑤	Knob	Base	4-X-7-1-L-AC ①	40270400	
5	L.H.	Anti-Clockwise ⑤	Knob	Base	5-X-7-1-L-AC ①	40275400	
4	R.H.	Clockwise ②	Knob	Base	4-X-7-1-R-CL ①	40270403	
5	R.H.	Clockwise ②	Knob	Base	5-X-7-1-R-CL ①	40275403	
4	R.H.	Anti-Clockwise ③	Knob	Base	4-X-7-1-R-AC ①	40270401	
5	R.H.	Anti-Clockwise ③	Knob	Base	5-X-7-1-R-AC ①	40275401	

① Special Feature: 10:1 ratio.

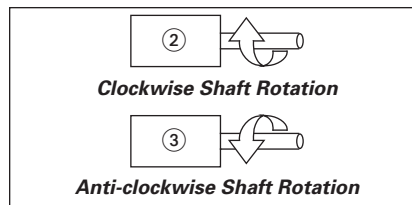


Figure 54-6. Top View — Right-Hand Drive

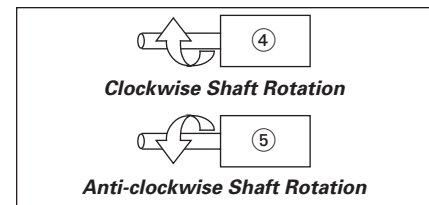


Figure 54-7. Top View — Left-Hand Drive

**Note:** When shaft is turned in the reverse direction of rotation, the counter will subtract.

**When Ordering Specify**

To determine a model number from the Product Selection table for Model X Series Revolution Counters, consider:

- Number of figures
- Drive shaft location
- Ratio
- Shaft rotation direction

**Dimensions**

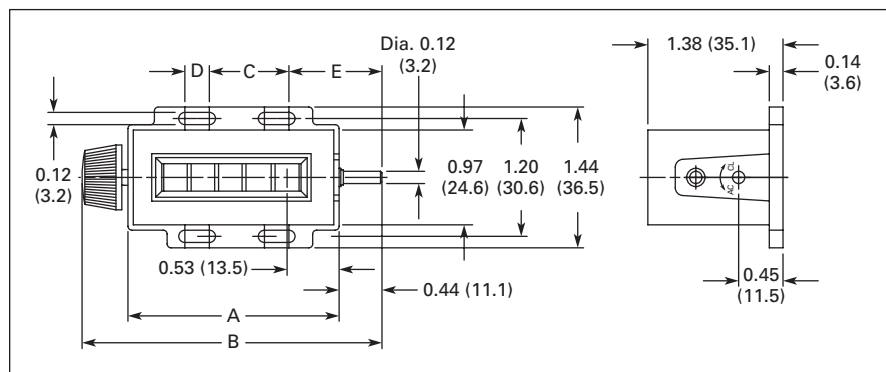


Figure 54-8. X Series — Approximate Dimensions in Inches (mm)

Table 54-11. X Series — Approximate Dimensions in Inches (mm)

Model	A	B	C	D	E
4-X-7-1_	1.86 (47.2)	2.76 (70.2)	0.62 (15.7)	0.19 (4.8)	0.89 (22.6)
5-X-7-1_	2.16 (54.8)	3.06 (77.8)	0.81 (20.6)	0.25 (6.4)	0.95 (24.1)

Discount Symbol ..... CC-2





**Cat. No. 5-CS-7-1-R-CL**

**Product Description**

Model CS Series top reading revolution counters are designed for use in most industrial applications. The entire case is a single casting. This provides greater rigidity, tighter seal of working parts and more streamlined contour. The unit is compact, rugged and features a flush mounted window to assure greater visibility.

**Technical Data and Specifications**

- Figures: 4 or 5
- Speed: 600 cpm in 1:1 ratio
- Rotation Direction: Clockwise or anti-clockwise when viewed from right-hand end of counter
- Ratio: 1:1 standard
- Shaft: 0.25" (6.4 mm) diameter stainless steel; standard length 1" (25.4 mm)
- Drive: Spur gear
- Bearings: Oil-less, maintenance free
- Figure Size: 11/32 inch (8.7 mm) high, black-on-white background
- Reset: Contoured wing nut
- Finish: Black frame

**Table 54-12. X Series — Approximate Dimensions in Inches (mm)**

Model	A	B	C	D
4-CS-7_	3.12 (79.2)	3.50 (88.9)	4.03 (102.3)	1.89 (47.9)
5-CS-7_	3.62 (91.9)	4.00 (101.6)	4.53 (115.0)	2.38 (60.5)

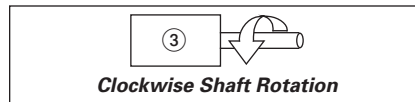
**Product Selection**

**Table 54-13. Product Selection — CS Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
5	L.H.	Clockwise ③	Wing Nut	Base	5-CS-7-1-L-CL	31060408	
5	R.H.	Clockwise ③	Wing Nut	Base	5-CS-7-1-R-CL	31060409	
5	L.H.	Anti-Clockwise ⑤	Wing Nut	Base	5-CS-7-1-L-AC	31060410	
5	R.H.	Anti-Clockwise ⑤	Wing Nut	Base	5-CS-7-1-R-AC	31060411	
5	L.H.	Clockwise ③	Wing Nut	Base	5-CS-7-1-L-CL ①	00440400	
4	R.H.	Clockwise ③	Wing Nut	Base	4-CS-7-1-R-CL ①	31057401	
5	R.H.	Clockwise ③	Wing Nut	Base	5-CS-7-1-R-CL ①	00441400	
5	L.H.	Anti-Clockwise ⑤	Wing Nut	Base	5-CS-7-1-L-AC ①	00442400	
4	R.H.	Anti-Clockwise ⑤	Wing Nut	Base	4-CS-7-1-R-AC ①	31057403	
5	R.H.	Anti-Clockwise ⑤	Wing Nut	Base	5-CS-7-1-R-AC ①	00443400	
4	R.H. & L.H.	Clockwise ④	None	Base	4-CS-7-3-CL ②	31057408	
4	R.H. & L.H.	Anti-Clockwise ⑥	None	Base	4-CS-7-3-AC ②	31057409	
5	R.H. & L.H.	Clockwise ④	None	Base	5-CS-7-3-CL ②	31057410	
5	R.H. & L.H.	Anti-Clockwise ⑥	None	Base	5-CS-7-3-AC ②	31057411	

① Special Feature: 10:1 ratio.

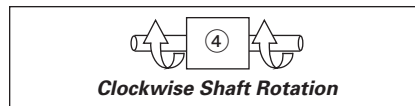
② Special Feature: 10:1 ratio, non-reset, double shaft.



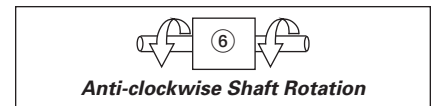
**Figure 54-9. Top View — Right-Hand Drive**



**Figure 54-11. Top View — Right-Hand Drive**



**Figure 54-10. Top View — R.H. and L.H. Drive**



**Figure 54-12. Top View — R.H. and L.H. Drive**

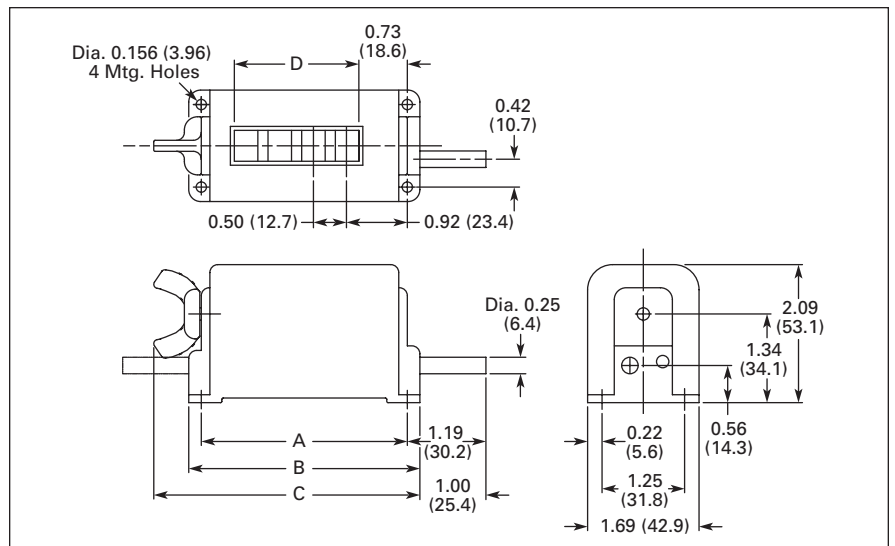
**Note:** When shaft is turned in the reverse direction of rotation, the counter will subtract.

**When Ordering Specify**

To determine a model number from the Product Selection table for Model CS Series Revolution Counters, consider:

- Number of figures
- Drive shaft location
- Ratio
- Shaft rotation direction

**Dimensions**



**Figure 54-13. CS Series — Approximate Dimensions in Inches (mm)**

Discount Symbol ..... **CC-2**

D-7 Series — Durant®



Cat. No. 5-D-7-1-L-CL

Product Selection

Table 54-14. Product Selection — D-7 Series Revolution Counters

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
5	L.H.	Clockwise ③	Wing Nut	Base	5-D-7-1-L-CL	31127408	
5	L.H.	Anti-Clockwise ④	Wing Nut	Base	5-D-7-1-L-AC	31127405	
5	R.H.	Clockwise ①	Wing Nut	Base	5-D-7-1-R-CL	31127431	
5	R.H.	Anti-Clockwise ②	Wing Nut	Base	5-D-7-1-R-AC	31127400	
5	L.H.	Clockwise ③	None	Base	5-D-7-3-L-CL	31127416	
5	L.H.	Anti-Clockwise ④	None	Base	5-D-7-3-L-AC	31127412	
5	R.H.	Clockwise ①	None	Base	5-D-7-3-R-CL	31127438	
5	R.H.	Anti-Clockwise ②	None	Base	5-D-7-3-R-AC	31127442	

Product Description

Model D-7 Series spur gear end drive units are compact counters that meet a variety of needs. Accurate, dependable and moderately priced, they are especially recommended for braiding machines, low-speed coil winders, wire measuring equipment and all medium-duty revolution applications.

Technical Data and Specifications

- Figures: 5 standard
- Speed: Up to 800 cpm in 1:1 ratio
- Rotation Direction: Clockwise or anti-clockwise when viewed from right-hand end of counter
- Ratio: 1:1 standard
- Shaft: 0.31" (7.9 mm) diameter stainless steel; 0.66" (16.7 mm) right-hand drive, 0.63" (15.9 mm) left-hand drive
- Drive: Right- or left-hand spur gear drive
- Bearings: Oil-less, maintenance free
- Figure Size: 1/4 inch (6.4 mm) high, black-on-white background
- Finish: Black frame and cover
- Reset: Wing nut or non-reset

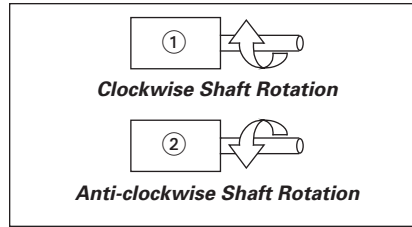


Figure 54-14. Top View — Right-Hand Drive

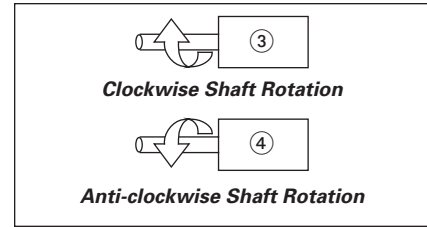


Figure 54-15. Top View — Left-Hand Drive

Note: When shaft is turned in the reverse direction of rotation, the counter will subtract.

When Ordering Specify

To determine a model number from the Product Selection table for Model D-7 Series Revolution Counters, consider:

- Number of figures
- Shaft rotation direction
- Shaft drive
- Reset or Non-reset

Dimensions

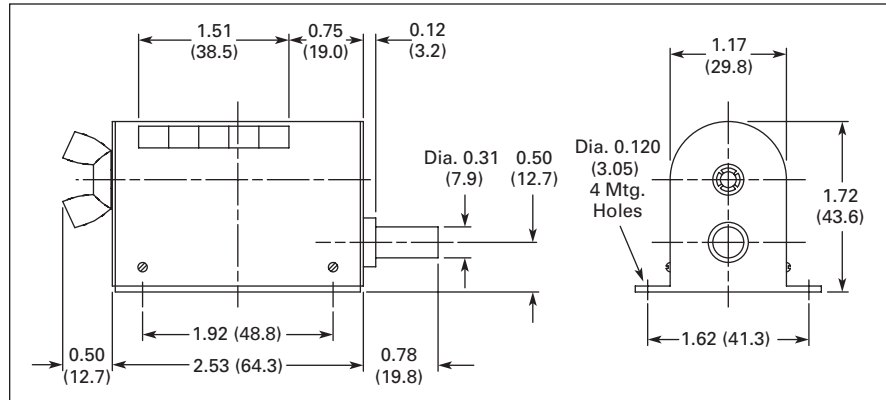


Figure 54-16. D-7 Series — Approximate Dimensions in Inches (mm)



**Cat. No. 5-D-6-1-AC**

**Product Description**

Model D-6 right-angle worm drive counters are ruggedly designed for high speeds on light duty applications. Small “D” counters are easily adapted as accessory equipment on machinery where right-angle drive is desired to permit full view reading of the counter.

**Technical Data and Specifications**

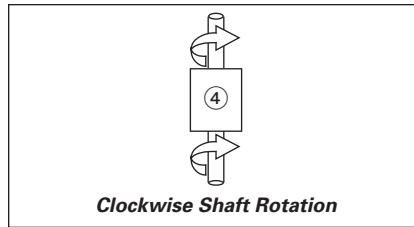
- Figures: 5
- Speed: Up to 1500 cpm in 1:1 ratio
- Rotation Direction: Clockwise or anti-clockwise when viewed from right-hand end of counter
- Ratio: 1:1 standard
- Shaft: 0.31" (7.9 mm) diameter stainless steel; 1.25" (31.8 mm) length standard
- Drive: Worm drive
- Bearings: Oil-less, maintenance free
- Figure Size: 1/4" (6.4 mm) high, black-on-white background
- Finish: Black frame and cover
- Reset: Wing nut

**Product Selection**

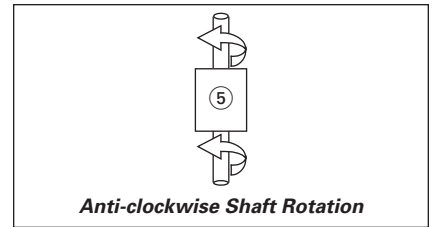
**Table 54-15. Product Selection — D-6 Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
5	Front & Rear	Anti-Clockwise ⑤	Wing Nut	Base	<b>5-D-6-1-AC</b>	<b>31052401</b>	
5	Front & Rear	Anti-Clockwise ⑤	Wing Nut	Base	<b>6-D-6-1-AC</b>	<b>31052402</b>	
5	Front & Rear	Clockwise ④	Wing Nut	Base	<b>5-D-6-1-CL</b>	<b>31052404</b>	
5	Front & Rear	Clockwise ④	Wing Nut	Base	<b>6-D-6-1-CL</b>	<b>31052405</b>	
5	Front & Rear	Anti-Clockwise ⑤	Wing Nut	Base	<b>5-D-8-1-AC</b> ①	<b>40187401</b>	
5	Front & Rear	Anti-Clockwise ⑤	Wing Nut	Base	<b>6-D-8-1-AC</b> ①	<b>40187402</b>	
5	Front & Rear	Clockwise ④	Wing Nut	Base	<b>5-D-8-1-CL</b> ①	<b>40187417</b>	
5	Front & Rear	Clockwise ④	Wing Nut	Base	<b>6-D-8-1-CL</b> ①	<b>40187418</b>	
5	Front & Rear	Clockwise ④	Wing Nut	Base	<b>5-D-9-1-CL</b> ②	<b>40187404</b>	
5	Front & Rear	Anti-Clockwise ⑤	Wing Nut	Base	<b>5-D-9-1-AC</b> ②	<b>40187410</b>	
5	Front & Rear	Clockwise ④	Wing Nut	Base	<b>5-D-90-1-CL</b> ③	<b>40187414</b>	
5	Front & Rear	Anti-Clockwise ⑤	Wing Nut	Base	<b>5-D-90-1-AC</b> ③	<b>40187408</b>	

- ① Special Feature: Measuring wheels and brackets available for lineal measurement in Feet.
- ② Special Feature: Measuring wheels and brackets available for lineal measurement in Yards and 1/8ths.
- ③ Special Feature: Measuring wheels and brackets available for lineal measurement in Yards.



**Clockwise Shaft Rotation**



**Anti-clockwise Shaft Rotation**

**Figure 54-17. Top View of Counter**

**Figure 54-18. Top View of Counter**

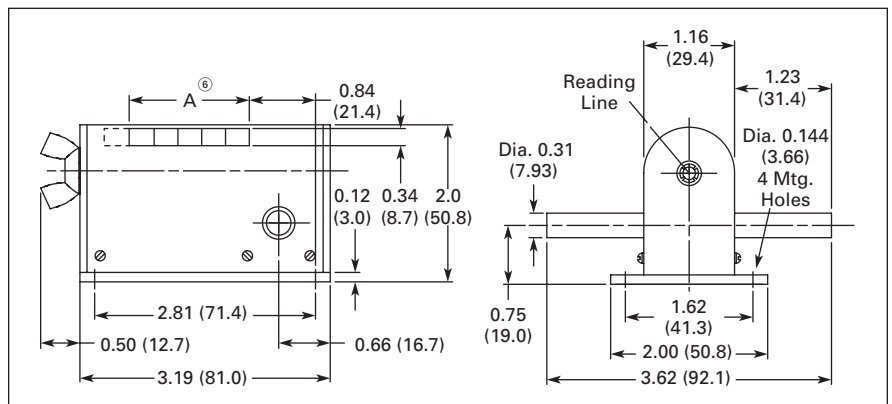
**Note:** When shaft is turned in the reverse direction of rotation, the counter will subtract.

**When Ordering Specify**

To determine a model number from the Product Selection table for Model D-6 Series Revolution Counters, consider:

- Shaft rotation direction

**Dimensions**



**Figure 54-19. D-6 Series — Approximate Dimensions in Inches (mm)**

⑥ A = 1.85 (46.9) for 6 figures and 1.53 (38.9) for 5 figures.



HDW Series Revolution Counter

### Product Selection

Table 54-16. Product Selection — HDW Series Revolution Counters

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
5	R.H.	Clockwise ②	Wing Nut	Base	5-HDW-7-1-R-CL	31050400	
5	R.H.	Anti-Clockwise ③	Wing Nut	Base	5-HDW-7-1-R-AC	31050401	
5	L.H.	Clockwise ④	Wing Nut	Base	5-HDW-7-1-L-CL	31050402	
5	L.H.	Anti-Clockwise ⑤	Wing Nut	Base	5-HDW-7-1-L-AC	31050403	

① Mounting plate is adjustable for base or back mounting.

### Product Description

Model HDW Series are high speed, end drive revolution counters that have the rugged features of all Durant “H” counters, with the addition of double worm drive that produces speeds up to 2000 cpm. Lightweight precision molded wheels reduce centrifugal force and eliminate slipping. They are particularly recommended for quick starting and stopping machines, such as coil winders and wire measuring or reeling equipment and on applications where continuous high speed measuring is required.

### Technical Data and Specifications

- Figures: 5
- Speed: Up to 2000 cpm
- Rotation Direction: Clockwise or anti-clockwise when viewed from right-hand end of counter
- Ratio: 1:1 only
- Shaft: 0.31" (7.9 mm) diameter stainless steel; standard length 2" (50.8 mm)
- Drive: Right- or left-hand drive
- Bearings: Oil-less, maintenance free
- Figure Size: 11/16 inch (17.5 mm) high, white-on-black background
- Reset: Wing nut or tumbler lock reset
- Finish: Black frame and cover

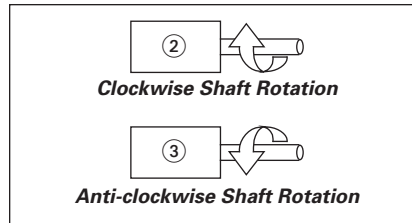


Figure 54-20. Top View — Right-Hand Drive

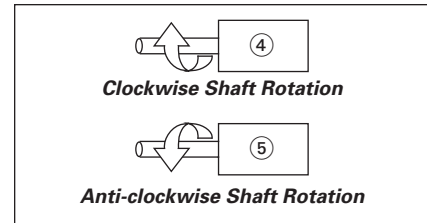


Figure 54-21. Top View — Left-Hand Drive

Note: When shaft is turned in the reverse direction of rotation, the counter will subtract.

#### When Ordering Specify

To determine a model number from the Product Selection table for Model HDW Series Revolution Counters, consider:

- Shaft drive
- Shaft rotation direction

### Dimensions

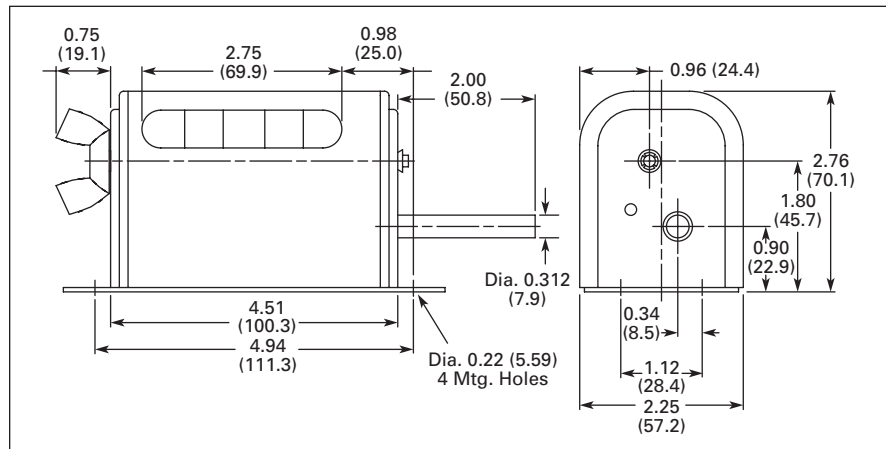


Figure 54-22. HDW Series — Approximate Dimensions in Inches (mm)



*Cat. No. 5T61CL*

**Product Description**

Model T Series worm drive revolution counters are sturdy, high speed instruments used on many heavy machines, engines or motors. Variety of drive permits direct connection. Suitable for panel mounting.

**Technical Data and Specifications**

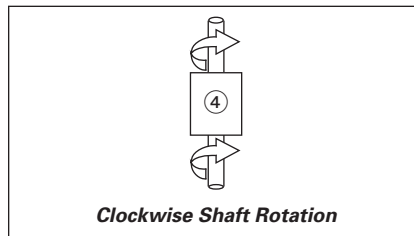
- Figures: 5 standard
- Speed: 1500 cpm in 1:1 ratio
- Rotation Direction: Clockwise or anti-clockwise determined top looking down
- Ratio: 1:1 standard
- Shaft: 0.31" (7.9 mm) diameter stainless steel; standard extends 2" (50.8 mm) top and bottom
- Drive: Hobbed steel and bronze worm gearing; subtracts when reversed
- Bearings: Oil-less, maintenance free
- Figure Size: 11/32 inch (8.7 mm) high, black-on-white background
- Reset: Left-hand wing nut standard
- Finish: Black frame and face plate

**Product Selection**

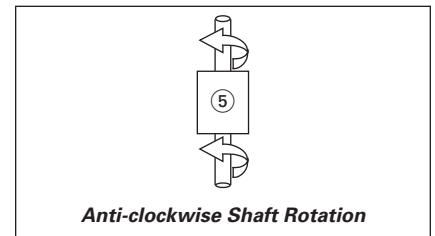
**Table 54-17. Product Selection — T Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
5	Top & Bottom	Clockwise ④	Wing Nut	Back	<b>5T61CL</b>	<b>40342400</b>	
5	Top & Bottom	Anti-Clockwise ⑤	Wing Nut	Back	<b>5T61AC</b>	<b>40342401</b>	
5	Top & Bottom	Clockwise ④	Wing Nut	Back	<b>5T81CL</b> ①	<b>40179402</b>	
5	Top & Bottom	Anti-Clockwise ⑤	Wing Nut	Back	<b>5T81AC</b> ①	<b>40179403</b>	
5	Top & Bottom	Clockwise ④	Wing Nut	Back	<b>5T91CL</b> ②	<b>40179408</b>	
5	Top & Bottom	Anti-Clockwise ⑤	Wing Nut	Back	<b>5T91AC</b> ②	<b>40179409</b>	
5	Top & Bottom	Clockwise ④	Wing Nut	Back	<b>5T901CL</b> ③	<b>40179406</b>	
5	Top & Bottom	Anti-Clockwise ⑤	Wing Nut	Back	<b>5T901AC</b> ③	<b>40179407</b>	

- ① Special Feature: Measuring wheels and brackets available for lineal measurement in Feet.
- ② Special Feature: Measuring wheels and brackets available for lineal measurement in Yards and 1/8ths.
- ③ Special Feature: Measuring wheels and brackets available for lineal measurement in Yards.



**Figure 54-23. Top View of Counter**



**Figure 54-24. Top View of Counter**

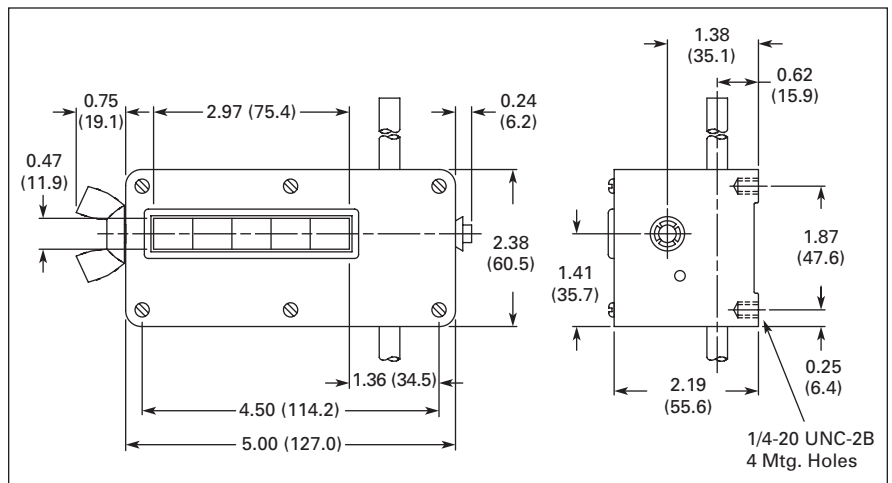
**Note:** When shaft is turned in the reverse direction of rotation, the counter will subtract.

**When Ordering Specify**

To determine a model number from the Product Selection table for Model T Series Revolution Counters, consider:

- Shaft rotation direction

**Dimensions**



**Figure 54-25. T Series — Approximate Dimensions in Inches (mm)**



Cat. No. 5-H-7-1-R-CL

### Product Description

Model H Series are heavy-duty, end drive revolution counters designed for industrial use; suitable for speeds up to 800 cpm. They are available with either right- or left-hand drive, and with wing nut reset.

### Technical Data and Specifications

- Figures: 5
- Speed: Up to 800 cpm
- Rotation Direction: Clockwise or anti-clockwise when viewed from right-hand end of counter
- Shaft: 0.31" (7.9 mm) diameter stainless steel; standard length 2" (50.8 mm)
- Drive: Right- or left-hand drive
- Bearings: Oil-less, maintenance free
- Figure Size: 11/32 inch (8.7 mm) high, white-on-black background
- Reset: Wing nut
- Finish: Black frame and cover
- Mounting Bracket Available: Order number 01465400

### Product Selection

Table 54-18. Product Selection — H Series Revolution Counters

No. of Figures	Drive	Rotation	Reset	Mounting ①	Ratio	Catalog Number	Order Number	Price U.S. \$
5	L.H.	Clockwise ⑦	Wing Nut	Base	1.1	5-H-7-1-L-CL	00509400	
5	L.H.	Anti-Clockwise ⑧	Wing Nut	Base	1.1	5-H-7-1-L-AC	00510400	
5	R.H.	Clockwise ⑤	Wing Nut	Base	1.1	5-H-7-1-R-CL	00513400	
5	R.H.	Anti-Clockwise ⑥	Wing Nut	Base	1.1	5-H-7-1-R-AC	00514400	
5	L.H.	Clockwise ⑨	Wing Nut	Base	3.2	5-H-8-1-L-CL ②	00601400	
5	L.H.	Anti-Clockwise ⑩	Wing Nut	Base	3.2	5-H-8-1-L-AC ②	00602400	
5	R.H.	Clockwise ⑤	Wing Nut	Base	3.2	5-H-8-1-R-CL ②	00605400	
5	R.H.	Anti-Clockwise ⑥	Wing Nut	Base	3.2	5-H-8-1-R-AC ②	00606400	
5	L.H.	Clockwise ⑨	Wing Nut	Base	1.2	5-H-9-1-L-CL ③	00619400	
5	L.H.	Anti-Clockwise ⑩	Wing Nut	Base	1.2	5-H-9-1-L-AC ③	00620400	
5	R.H.	Clockwise ⑤	Wing Nut	Base	1.2	5-H-9-1-R-CL ③	00617400	
5	R.H.	Anti-Clockwise ⑥	Wing Nut	Base	1.2	5-H-9-1-R-AC ③	00618400	
5	L.H.	Clockwise ⑨	Wing Nut	Base	1.2	5-H-9-0-1-L-CL ④	00611400	
5	L.H.	Anti-Clockwise ⑩	Wing Nut	Base	1.2	5-H-9-0-1-L-AC ④	00612400	
5	R.H.	Clockwise ⑤	Wing Nut	Base	1.2	5-H-9-0-1-R-CL ④	00609400	
5	R.H.	Anti-Clockwise ⑥	Wing Nut	Base	1.2	5-H-9-0-1-R-AC ④	00610400	

- ① Mounting plate is adjustable for base or back mounting.
- ② Special Feature: Measuring wheels and brackets available for lineal measurement in Feet.
- ③ Special Feature: Measuring wheels and brackets available for lineal measurement in Yards and 1/8ths.
- ④ Special Feature: Measuring wheels and brackets available for lineal measurement in Yards.

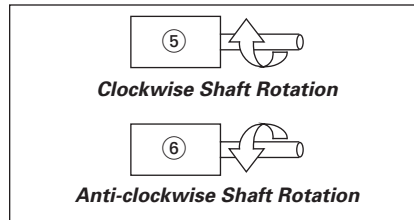


Figure 54-26. Top View — Right-Hand Drive

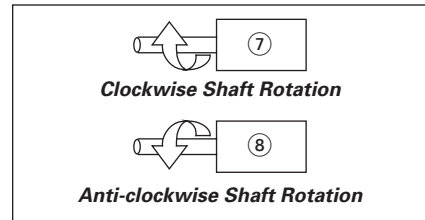


Figure 54-28. Top View — Left-Hand Drive

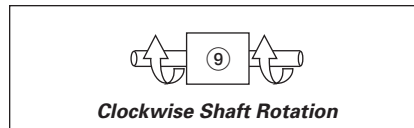


Figure 54-27. Top View — R.H. and L.H. Drive

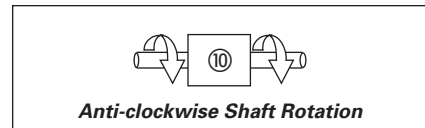


Figure 54-29. Top View — R.H. and L.H. Drive

**Note:** When shaft is turned in the reverse direction of rotation, the counter will subtract.

#### When Ordering Specify

To determine a model number from the Product Selection table for Model H Series Revolution Counters, consider:

- Drive shaft location
- Shaft rotation direction

**Note:** For 5-H-8 and 5-H-9 Series Counters, drive shaft extends from both sides of the counter. Specifying RH or LH drive will determine the location of the reset (i.e. LH drive will have reset on the right-hand side of the counter, and RH drive will have reset on left-hand side of the counter).

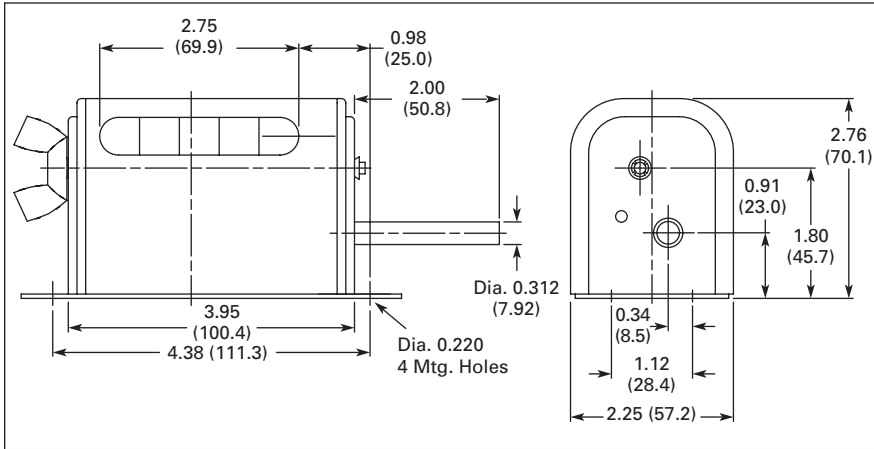
Table 54-19. 18-Inch Measuring Wheel (For Use with 5-H-8 and 5-H-9)

Type	Dimensions in Inches (mm)		Order Number
	Width	Circumference	
Aluminum, Knurled	0.50 (12.7)	18.00 (457.2)	21665300
Aluminum, Rubber Rim	0.50 (12.7)	18.00 (457.2)	21666300
Aluminum, Urethane Rim	0.50 (12.7)	18.00 (457.2)	20148300

Discount Symbol ..... CC-2



**Dimensions**



**Figure 54-30. H Series — Approximate Dimensions**



Cat. No. 6-HF-4-1-R-CL

### Product Description

Model HF Series can counters are designed for use on can filling, labeling and sealing machines and conveyors to count various sizes of cans. Gear box on counter is changeable to any one of four positions, giving great flexibility of installation. Adjustable tension screw prevents spinning and assures peak accuracy.

### Technical Data and Specifications

- Figures: 6
- Figure Sizes: 11/32 inch (8.7 mm) high, white-on-black background
- Reset: Wing nut or key-lock

### Product Selection

Table 54-20. Product Selection — HF Series Can Counters

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
<b>Star Wheel Diameter — 6-pt., 5.25" (133.4 mm)</b>							
6	R.H.	Clockwise	Wing Nut	Back	6-HF-4-1-R-CL ①	40181402	
6	R.H.	Anti-Clockwise	Wing Nut	Back	6-HF-4-1-R-AC ①	40181403	
6	R.H.	Clockwise	Key-Lock	Back	6-HF-4-2-R-CL ①	40181406	
6	R.H.	Anti-Clockwise	Key-Lock	Back	6-HF-4-2-R-AC ①	40181407	
<b>Star Wheel Diameter — 4-pt., 7.375" (187.3 mm)</b>							
6	R.H.	Clockwise	Wing Nut	Back	6-HF-3-1-R-CL ②	40182402	
6	R.H.	Anti-Clockwise	Wing Nut	Back	6-HF-3-1-R-AC ②	40182403	
6	R.H.	Clockwise	Key-Lock	Back	6-HF-3-2-R-CL ②	40182406	
6	R.H.	Anti-Clockwise	Key-Lock	Back	6-HF-3-2-R-AC ②	40182407	

① Special Feature: 6:1 ratio.  
② Special Feature: 4:1 ratio.

#### When Ordering Specify

To determine a model number from the Product Selection table for Model HF Series Can Counters, consider:

- Type of reset
- Rotation direction of star wheel

#### Positions

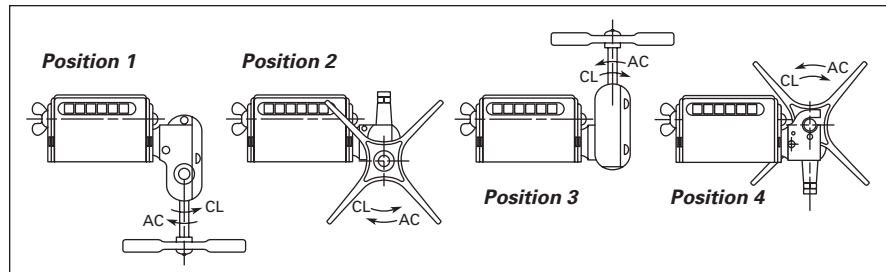


Figure 54-31. HF Series — Can Counter Positions

**Note:** All Model HF Series counters are shipped from the factory in position 1. The instruction sheet that accompanies each counter provides directions for moving the star wheel to position 2, 3 or 4.

#### Dimensions

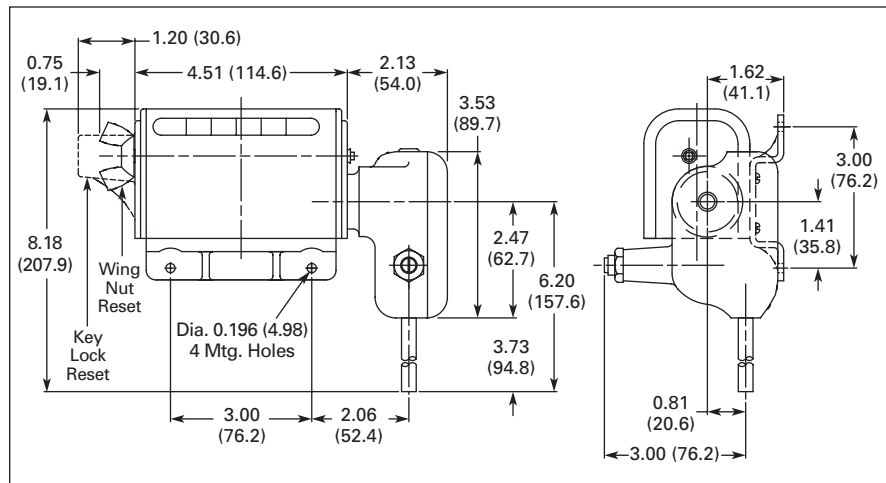


Figure 54-32. HF Series — Approximate Dimensions in Inches (mm)

**Micro Display Counter — Eaton**

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*Cat. No. 7-Y-3013PM-401*

**Features**

- 7-digit micro adding counter
- High shock resistance
- Low power consumption; suitable for battery consumption
- Small dimensions
- Large optical figures
- Different viewing possibilities
- Flush mount with integrated spring clip
- Protection IP65
- Stores value also at power failure
- Long service life

**Standards and Certifications**

- cRU<sup>®</sup>us Certified
- CE Marked

**Technical Data and Specifications**

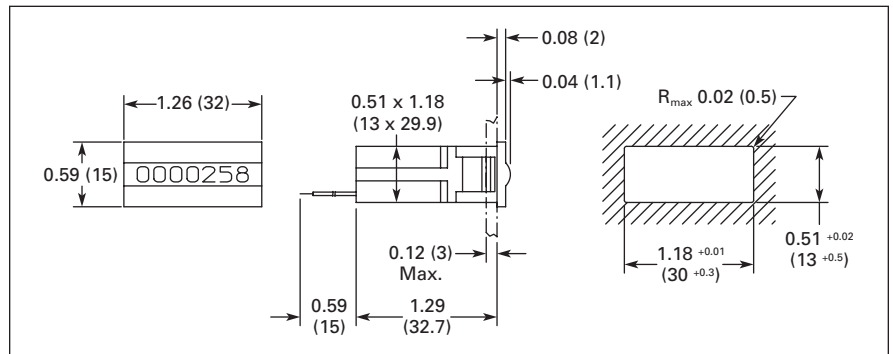
- Electrical Connections: Built-in counter, flying leads, AWG 22, approx. 5.9 Inch (150 mm)
- Power consumption at 68°F (20°C) and nominal voltage —
  - At 25 Imp/s: Approx. 250 mW
- Rated Voltage: 12V DC ±10%
- Counting Frequency: 25 Imp/s
- Pulse Duration: Min. 20 mS
- Pulse Interval: Min. 20 mS
- Cycle Duration Factor: 100%
- Number of Digits: 7
- Counting System: Adding
- Height of Figures: 0.05 x 0.16 Inch (1.2 x 4 mm) Optical
- Color of Figures: White-on-black
- Reset: No reset
- Ambient Temperature: 14 to 140°F (-10 to 60°C)
- Mounting Position: Any
- Operating Life: >50x10<sup>6</sup> pulses
- Protection: IP65 (only front side)
- Housing: Clear plastic
- Weight: 0.53 – 0.71 oz (15 – 18 g)

**Product Selection**

**Table 54-21. Product Selection — Micro Display Counter**

Description	Catalog Number	Price U.S. \$
Micro Display Counter	7-Y-3013PM-401	

**Dimensions**



**Figure 54-33. Micro Display Counter — Approximate Dimensions in Inches (mm)**

SE Series



Cat. No.  
6-Y-41610-401-SE

Features

- Low-cost electromechanical counter
- Multiple voltage ranges for almost any application
- Compact with various mounting options
- Wire leads for electrical connections

Standards and Certifications

- UL Recognized

Technical Data and Specifications

- Figures: 6
- Count Speed: 600 cpm
- Figure Size: 5/32" (4.0 mm)
- Reset: None
- Mounting: Base, bottom, top, panel or snap-in
- Finish: Black, self-extinguishing plastic
- Power Requirements —  
DC: 1.5W, AC: 5.0V

Dimensions

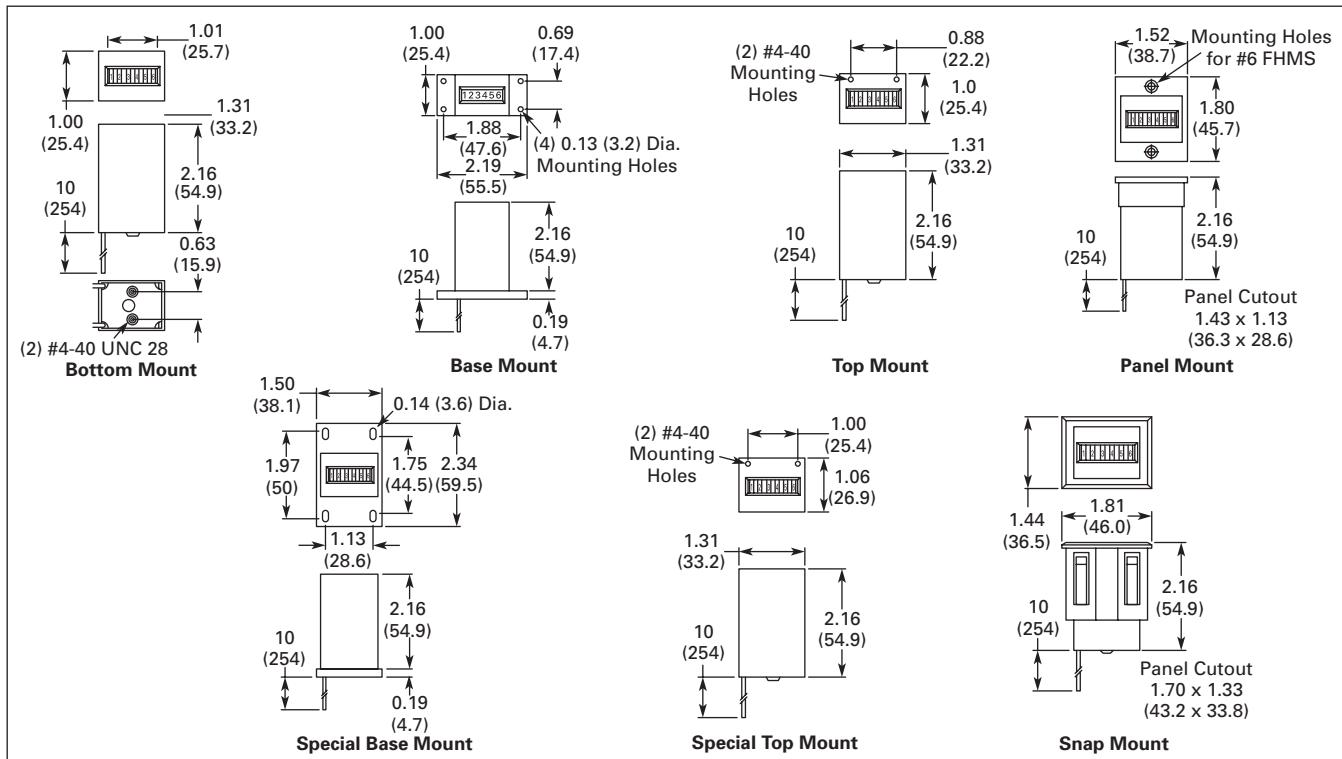


Figure 54-34. SE Series — Approximate Dimensions in Inches (mm)

Product Selection

Table 54-22. Product Selection — SE Series Electromechanical Counters

Description	Catalog Number	Order Number	Price U.S. \$
<b>6-digit Electric Counter</b>			
Bottom Mount Sub-miniature 12V DC	6-Y-41610-401-SE	41610401	
Bottom Mount Sub-miniature 24V DC	6-Y-41610-402-SE	41610402	
Bottom Mount Sub-miniature 120V AC	6-Y-41610-406-SE	41610406	
Bottom Mount Sub-miniature 240V AC	6-Y-41610-407-SE	41610407	
Base Mount Sub-miniature 12V DC	6-Y-41611-401-SE	41611401	
Base Mount Sub-miniature 24V DC	6-Y-41611-402-SE	41611402	
Base Mount Sub-miniature 120V AC	6-Y-41611-406-SE	41611406	
Base Mount Sub-miniature 240V AC	6-Y-41611-407-SE	41611407	
Top Mount Sub-miniature 12V DC	6-Y-41612-401-SE	41612401	
Top Mount Sub-miniature 24V DC	6-Y-41612-402-SE	41612402	
Top Mount Sub-miniature 120V AC	6-Y-41612-406-SE	41612406	
Top Mount Sub-miniature 240V AC	6-Y-41612-407-SE	41612407	
Panel Mount Sub-miniature 12V DC	6-Y-41613-401-SE	41613401	
Panel Mount Sub-miniature 24V DC	6-Y-41613-402-SE	41613402	
Panel Mount Sub-miniature 120V AC	6-Y-41613-406-SE	41613406	
Panel Mount Sub-miniature 240V AC	6-Y-41613-407-SE	41613407	
Special Base Mount Sub-miniature 12V DC	6-Y-41622-401-SE	41622401	
Special Base Mount Sub-miniature 24V DC	6-Y-41622-402-SE	41622402	
Special Base Mount Sub-miniature 120V AC	6-Y-41622-406-SE	41622406	
Special Base Mount Sub-miniature 240V AC	6-Y-41622-407-SE	41622407	
Special Top Mount Sub-miniature 12V DC	6-Y-41623-401-SE	41623401	
Special Top Mount Sub-miniature 24V DC	6-Y-41623-402-SE	41623402	
Special Top Mount Sub-miniature 120V AC	6-Y-41623-406-SE	41623406	
Special Top Mount Sub-miniature 240V AC	6-Y-41623-407-SE	41623407	
Snap-In Mount Sub-miniature 12V DC	6-Y-42613-401-SE	42613401	
Snap-In Mount Sub-miniature 24V DC	6-Y-42613-402-SE	42613402	
Snap-In Mount Sub-miniature 120V AC	6-Y-42613-406-SE	42613406	
Snap-In Mount Sub-miniature 240V AC	6-Y-42613-407-SE	42613407	

**MF Series — Durant®**



Cat. No. 6-Y-1-MF-120A

**Product Description**

Model MF Series are shaded pole electric counters with straight AC operation and feature a non-rectified, shaded pole coil designed to withstand transient, high voltage spikes. This feature, combined with a simplified, hinged escapement drive, also eliminates the possibility of mis-counts and greatly adds to the life of the counter. Tallies at speeds up to 750 cpm.

**Technical Data and Specifications**

- Figures: 6 or 7
- Speed: Up to 750 cpm
- Figure Size: 3/16 inch (4.8 mm) high, white-on-black background
- Reset: Knob, key or non-reset

- Mounting: Base or panel mount
- Finish: Black frame and side covers
- Electrical Connections: 2-wire leads, 9" (229 mm) long, AWG 22 (0.34 mm<sup>2</sup>), stripped 0.38" (9.5 mm)
- Power Requirements: 12 watts
- Coils: Various AC voltages and frequencies can be supplied on special order. Count coils are designed for continuous duty at rated voltage.

**Product Selection**

Table 54-23. Product Selection — MF Series Electric Counters

No. of Figures	Voltage	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
7	120 AC	Knob	Base	7-Y-1-MF-120A ①	32650400	
7	240 AC	Knob	Base	7-Y-1-MF-240A	32650402	
6	120 AC	Knob	Base	6-Y-1-MF-120A ①	32651400	
6	24 AC	Knob	Base	6-Y-1-MF-24A	32651402	
6	240 AC	Knob	Base	6-Y-1-MF-240A	32651403	
6	230 AC/50 Hz	Knob	Base	6-Y-1-MF-230A	32651412	
7	120 AC	Knob	Panel	7-Y-1-MF-PM-120A ①	32652400	
7	120 AC	Non-reset	Panel	7-Y-13-MF-PM-120A ①	32652402	
6	120 AC	Knob	Panel	6-Y-1-MF-PM-120A ①	32653400	
6	24 AC	Knob	Panel	6-Y-1-MF-PM-24A	32653402	
6	240 AC	Knob	Panel	6-Y-1-MF-PM-240A	32653403	
6	120 AC	Non-reset	Panel	6-Y-13-MF-PM-120A ①	32653405	
6	240 AC	Non-reset	Panel	6-Y-13-MF-PM-240A	32653410	
6	120 AC	Keylock reset	Panel	6-Y-12-MF-PM-120A ①	32654400	
6	24 AC	Keylock reset	Panel	6-Y-12-MF-PM-24A	32654403	
6	240 AC	Keylock reset	Panel	6-Y-12-MF-PM-240A	32654404	
7	120 AC	Keylock reset	Panel	7-Y-12-MF-PM-120A ①	32655400	
6	120 AC	Non-reset	Base	6-Y-13-MF-120A ①	32658400	
6	240 AC	Non-reset	Base	6-Y-13-MF-240A	32658402	
7	120 AC	Non-reset	Base	7-Y-13-MF-120A	32659400	

① UL Recognized.

**Dimensions**

Table 54-24. MF Series — Approximate Dimensions in Inches (mm)

Model	A	B	C	D	E	F
6 Figures	1.73 (44.0)	1.58 (40.0)	1.73 (43.9)	2.80 (71.1)	1.73 (44.0)	1.12 (28.6)
7 Figures	2.02 (51.4)	1.29 (32.7)	2.03 (51.6)	2.50 (63.5)	2.02 (51.4)	0.84 (21.2)

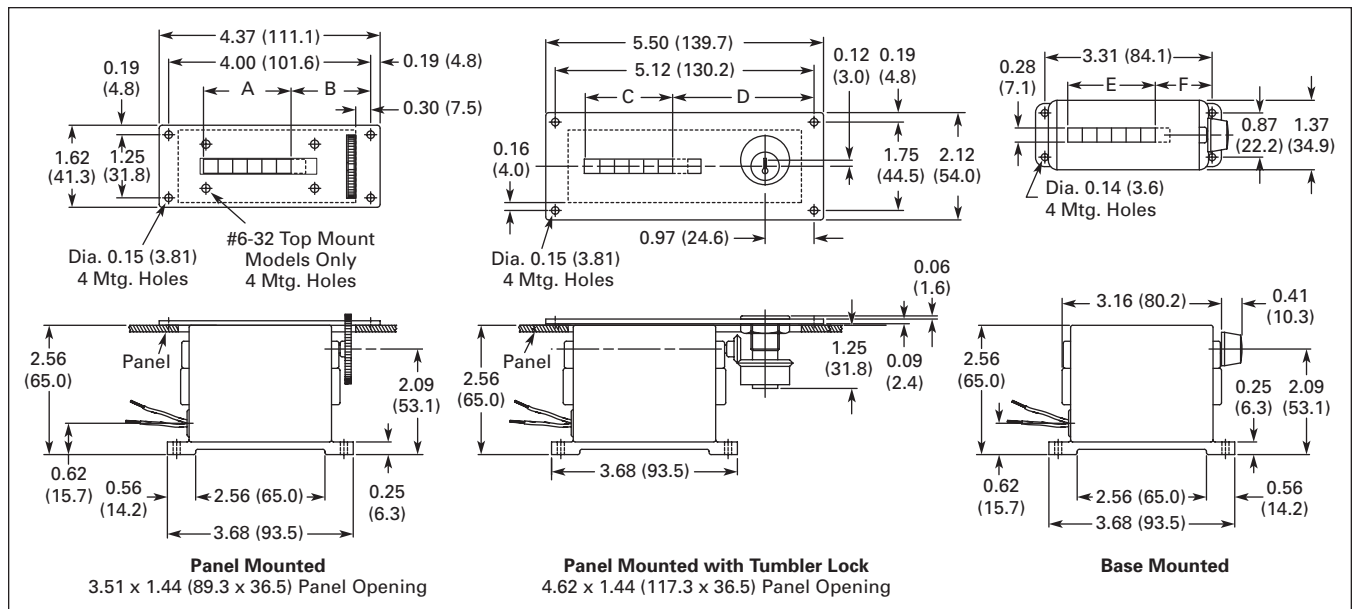


Figure 54-35. MF Series — Approximate Dimensions in Inches (mm)

Discount Symbol ..... CC-2



Cat. No. 6-Y-1-RMF-115A

## Product Description

Model RMF Series of electric counters are designed to give accurate counts through a wide range of speeds up to 1000 cpm. It features a strong, silent, fast operating DC electromagnetic drive with a compact, dependable built-in higher capacity rectifier for AC operation. The counter has a minimum of moving parts that never need lubrication under normal operating conditions. Compact and rigid, it continues to operate dependably even when subject to severe shock and vibrations. Entirely enclosed to prevent damage from moisture and dust. Available in 6 or 7 figures.

## Technical Data and Specifications

- Figures: 6 or 7
- Speed: Up to 1000 cpm
- Figure Size: 3/16 inch (4.8 mm) high, white-on-black background
- Reset: Knob, key or non-reset
- Mounting: Base or panel mount
- Finish: Black frame and side covers
- Electrical Connections: 2-wire leads, 9" (229 mm) long, AWG 22 (0.34 mm<sup>2</sup>), stripped 0.38" (9.5 mm)
- Power Requirements: 7 watts
- Coils: Various voltages and frequencies can be supplied on special order. Count coils are designed for continuous duty at rated voltage.

## Product Selection

Table 54-25. Product Selection — RMF Series Electric Counters

No. of Figures	Voltage	Reset	Mounting	Catalog Number	Order Number	Price U.S. \$
6	24 DC	Knob	Panel	6-Y-1-RMF-PM-24D	31013400	
6	24 AC	Knob	Panel	6-Y-1-RMF-PM-24A	31013402	
7	24 DC	Knob	Panel	7-Y-1-RMF-PM-24D	31019400	
7	115 AC	Knob	Base	7-Y-1-RMF-115A ①	31025400	
7	230 AC	Knob	Base	7-Y-1-RMF-230A	31025402	
7	115 AC	Non-reset	Base	7-Y-13-RMF-115A ①	31026400	
7	115 AC	Knob	Panel	7-Y-13-RMF-PM-115A ①	31026401	
7	115 AC	Non-reset	Panel	7-Y-13-RMF-PM-115A ①	31026402	
7	230 AC	Knob	Panel	7-Y-1-RMF-PM-230A	31026410	
6	115 AC	Non-reset	Base	6-Y-13-RMF-115A ①	31039400	
6	230 AC	Non-reset	Base	6-Y-13-RMF-230A	31039404	
6	24 AC	Non-reset	Base	6-Y-13-RMF-24A	31039407	
6	230 AC	Knob	Panel	6-Y-1-RMF-PM-230A	31066413	
6	115 AC	Knob	Panel	6-Y-1-RMF-PM-115A ①	31066416	
6	115 AC	Keylock reset	Panel	6-Y-12-RMF-PM-115A ①	31083403	
6	230 AC	Keylock reset	Panel	6-Y-12-RMF-PM-230A	31083405	
7	115 AC	Keylock reset	Panel	7-Y-12-RMF-PM-115A ①	31083409	
6	24 AC	Keylock reset	Panel	6-Y-12-RMF-PM-24A	31083411	
6	24 DC	Keylock reset	Panel	6-Y-12-RMF-PM-24D	31083415	
7	24 DC	Keylock reset	Panel	7-Y-12-RMF-PM-24D	31083421	
7	230 AC	Keylock reset	Panel	7-Y-12-RMF-PM-230A	31083427	
6	24 AC	Knob	Base	6-Y-1-RMF-24A	31155400	
6	240 AC	Knob	Base	6-Y-1-RMF-240A	31155401	
6	115 AC	Knob	Base	6-Y-1-RMF-115A ①	31155402	
6	115 AC	Non-reset	Panel	6-Y-13-RMF-PM-115A ①	31155405	
6	24 DC	Non-reset	Panel	6-Y-13-RMF-PM-24D	31155442	
7	24 AC	Non-reset	Base	7-Y-13-RMF-24A	31573400	
7	24 DC	Non-reset	Base	7-Y-13-RMF-24D	31573401	
7	24 DC	Non-reset	Panel	7-Y-13-RMF-PM-24D	33183400	
6	230 AC	Non-reset	Panel	6-Y-13-RMF-PM-230A	33183404	
6	24 AC	Non-reset	Panel	6-Y-13-RMF-PM-24A	33183405	

① UL Recognized.

### When Ordering Specify

To determine a model number from the Product Selection table for Model RMF Series Electronic Counters, consider:

- Number of figures
- Voltage
- Type of reset
- Type of mounting

## Dimensions

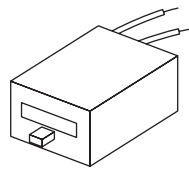
Refer to **Table 54-24** and **Figure 54-35** on **Page 54-19** for information.



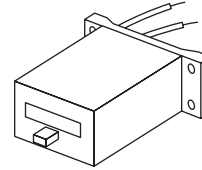


Cat. No. 6-Y-41346-406-ME

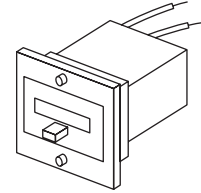
### Product Selection



Bottom Mount  
Wire Leads



Base Mount  
Wire Leads



Panel Mount  
Wire Leads

### Product Description

Small in size and price, but large in design versatility and model variety is the ME Series of miniature electric counters. Models in most popular AC or DC voltages operate on as little as 3 watts, with the non-reset models measuring only 1 x 1.593 x 2.187 inches (25.4 x 40.5 x 55.5 mm) and weighing just three ounces (85 grams).

Available in 4, 6 or 7 figures, the counters feature stainless steel self-lubricating shafts, nylatron pinions and a synchronous electromagnetic drive to assure accurate, reliable, long life operation. Designed for mounting flexibility and aesthetic attractiveness, the miniature electric counters are available with three types of mounting and a glare retarding finish Delrin, with crisp easy-to-read numerals set close to a tamper-proof sealed figure window.

### Standards and Certifications

- UL Recognized

### Technical Data and Specifications

- Figures: 4, 6 and 7
- Speed: Up to 1000 cpm
- Figure Size: 3/16 inch (4.8 mm) high
- Reset: Pushbutton and non-reset
- Reset Force: Pushbutton models only, 20 oz. (568 grams) maximum
- Mounting: Base, bottom, panel and plug-in pin
- Finish: Black self-extinguishing plastic
- Electrical Connections: Wire leads, 10 inches (254 mm) long, AWG 20, stripped 3/8 inch (9.5 mm), and pin terminals
- Power Requirements: 3W
- Coils: Count coils are designed for continuous duty at rated voltage.

Table 54-26. Product Selection — ME Series Miniature Electric Counters

No. of Figures	Voltage	Mounting	Reset	Catalog Number	Order Number	Price U.S. \$
4	12V DC 24V DC 120V AC 240V AC	Bottom	Pushbutton	4-Y-41312-401-MEQ	41312401	
				4-Y-41312-402-MEQ	41312402	
				4-Y-41312-406-MEQ	41312406	
				4-Y-41312-407-MEQ	41312407	
4	12V DC 24V DC 120V AC 240V AC	Base	Pushbutton	4-Y-41313-401-MEQ	41313401	
				4-Y-41313-402-MEQ	41313402	
				4-Y-41313-406-MEQ	41313406	
				4-Y-41313-407-MEQ	41313407	
4	12V DC 24V DC 120V AC 240V AC	Panel	Pushbutton	4-Y-41314-401-MEQ	41314401	
				4-Y-41314-402-MEQ	41314402	
				4-Y-41314-406-MEQ	41314406	
				4-Y-41314-407-MEQ	41314407	
6	12V DC 24V DC 120V AC 240V AC	Bottom	Non-reset	6-Y-41119-401-ME	41119401	
				6-Y-41119-402-ME	41119402	
				6-Y-41119-406-ME	41119406	
				6-Y-41119-407-ME	41119407	
6	12V DC 24V DC 120V AC 240V AC	Base	Non-reset	6-Y-41345-401-ME	41345401	
				6-Y-41345-402-ME	41345402	
				6-Y-41345-406-ME	41345406	
				6-Y-41345-407-ME	41345407	
6	12V DC 24V DC 120V AC 240V AC	Panel	Non-reset	6-Y-41346-401-ME	41346401	
				6-Y-41346-402-ME	41346402	
				6-Y-41346-406-ME	41346406	
				6-Y-41346-407-ME	41346407	
7	12V DC 24V DC 120V AC 240V AC	Bottom	Non-reset	7-Y-41238-401-ME	41238401	
				7-Y-41238-402-ME	41238402	
				7-Y-41238-406-ME	41238406	
				7-Y-41238-407-ME	41238407	
7	12V DC 24V DC 120V AC 240V AC	Base	Non-reset	7-Y-41337-401-ME	41337401	
				7-Y-41337-402-ME	41337402	
				7-Y-41337-406-ME	41337406	
				7-Y-41337-407-ME	41337407	
7	12V DC 24V DC 120V AC 240V AC	Panel	Non-reset	7-Y-41349-401-ME	41349401	
				7-Y-41349-402-ME	41349402	
				7-Y-41349-406-ME	41349406	
				7-Y-41349-407-ME	41349407	

#### When Ordering Specify

When ordering ME Series Miniature Electric Counters, specify Catalog Numbers according to the features selected.

## ME Series — Durant®

## Dimensions

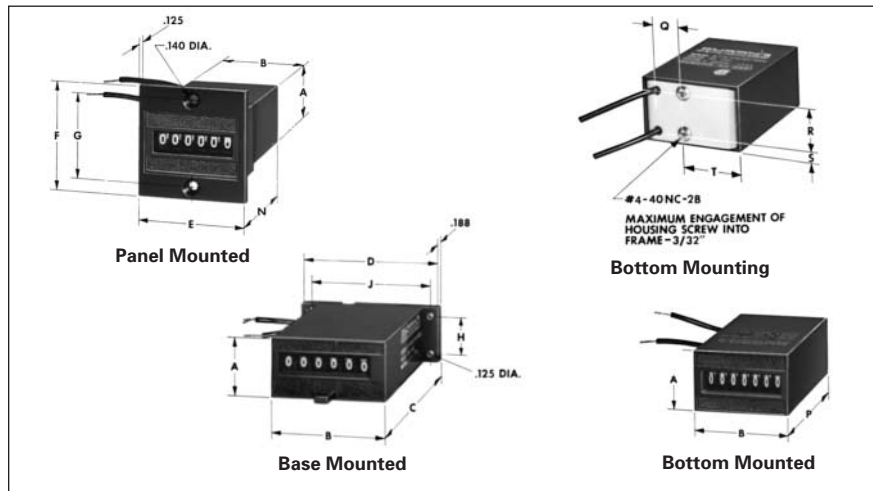


Figure 54-36. ME Series Counter — Approximate Dimensions

Table 54-27. ME Series Counter — Approximate Dimensions in Inches (mm)

4 Figure Pushbutton Reset Counters		6 and 7 Figure Non-reset Counters	
Dimension	Inches (mm)	Dimension	Inches (mm)
A	1.00 (25.4)	A	1.00 (25.4)
B	1.60 (40.6)	B	1.60 (40.6)
C	2.64 (67.1)	C	2.38 (60.5)
D	2.19 (55.6)	D	2.19 (55.6)
E	1.80 (45.7)	E	1.80 (45.7)
F	1.80 (45.7)	F	1.80 (45.7)
G	1.40 (35.6)	G	1.40 (35.6)
H	.69 (17.5)	H	.69 (17.5)
J	1.88 (47.8)	J	1.88 (47.8)
K	.50 (12.7)	K	.50 (12.7)
L	.49 (12.4)	L	.49 (12.4)
M	.94 (23.9)	M	.94 (23.9)
N	2.45 (62.2)	N	2.19 (55.6)
P	2.45 (62.2)	P	2.19 (55.6)
Q	.45 (11.4)	Q	.45 (11.4)
R	.63 (16.0)	R	.63 (16.0)
S	.19 (4.8)	S	.19 (4.8)
T	.68 (17.3)	T	.88 (22.4)

Table 54-28. Recommended Panel Mount Cut-Outs in Inches (mm)

4 Figure Counters	6 and 7 Figure Counters
Pushbutton Reset	Non-reset
1.72 x 1.11 (43.7 x 28.2)	1.72 x 1.11 (43.7 x 28.2)

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Cat. No. E5-024-C0400

**Features**

- Low price and high efficiency
- Large 8-digit LCD display, height of the figures 0.31 Inch (8 mm)
- Various counting modes like up/down differential available
- High voltage input for 10 – 260V AC/DC voltage pulses
- IP65
- Screw terminals, RM 5 mm
- Lifetime of the battery approximately 8 years
- Locking of the reset key
- Operating temperature 14 to 140°F (-10 to 60°C)
- All version of positive or negative counting edge
- Filter function for bounce-free counting with mechanical contacts

**Standards and Certifications**

- UL Recognized
- CE Marked

**Technical Data and Specifications**

- Power Supply: Non-replaceable lithium battery (lifetime approximately 8 years at 68°F (20°C))
- Display: LCD, 8-digits, height of the figures 0.31 Inch (8 mm)
- Mode: Adding or subtracting (selectable), counting direction, differential counting or phase discriminator single or dual evaluation (selectable)
- Display Range: -9999999 – 9999999, with overflow display
- Reset: Manual and electrical
- Interference Emissions: EN 55011 Class B, EN 61 000-6-2, EN 61010 Section 1 (only AC versions)
- Housing: Dark gray RAL 7021
- Operating Temperature: 14 to 131°F (-10 to 55°C)
- Ambient Temperature: 14 to 140°F (-10 to 60°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Protection: IP65 (from front)
- Weight: Approx. 1.76 oz (50 g)
- Counting Inputs —
  - Counting input of the DC version, max. 30V DC
    - Slow counting input, max. 30 Hz (NPN)
    - Fast counting input, max. 12 kHz (PNP)
    - Switching Level —
      - NPN: Low 0 – 0.7V, High 3 – 30V DC
      - PNP: Low 0 – 0.7V, High 4 – 30V DC
  - Counting Input of the High Voltage Versions: 10 – 260V AC/DC
    - Counting Input: Optocoupler input, max. 30 Hz
    - Min. Pulse Time: 16 mS
    - Switching Level—
      - Low: 0 – 2V AC/DC
      - High: 10 – 260V AC/DC
- Counting Direction Switching (only DC versions) —
  - Contact input, open collector NPN (switching at 0V DC)
  - Switching level, NPN —
    - Low, 0 – 0.7V, High 3 – 5V DC
- Reset Input (only DC and High Voltage) —
  - Minimum pulse time, DC: 50 mS; high voltage: 16 mS
  - Contact input NPN —
    - Low: 0 – 0.7V
    - High: 3 – 30V DC
  - High voltage input, 10 – 260V AC/DC
- Electrical Reset Key Locking (for DC and AC) —
  - Contact input, open collector NPN (switching at 0V)
  - Switching level, NPN —
    - Low, 0 – 0.7V, High 3 – 5V DC

1/32 DIN LCD — Totalizers

**Product Selection**

Table 54-29. Product Selection — 1/32 DIN LCD, Totalizers

Description	Catalog Number	Price U.S. \$
<b>8-digit LCD Totalizer, Battery Power</b>		
0.94 x 1.89 Inch (24 x 48 mm) LCD Totalizer	<b>E5-024-C0400</b>	
10 – 260V Input 0.94 x 1.89 Inch (24 x 48 mm) LCD Totalizer	<b>E5-024-C0408</b>	
Count Up/Down 0.94 x 1.89 Inch (24 x 48 mm) LCD Totalizer	<b>E5-024-C0410</b>	

**Dimensions**

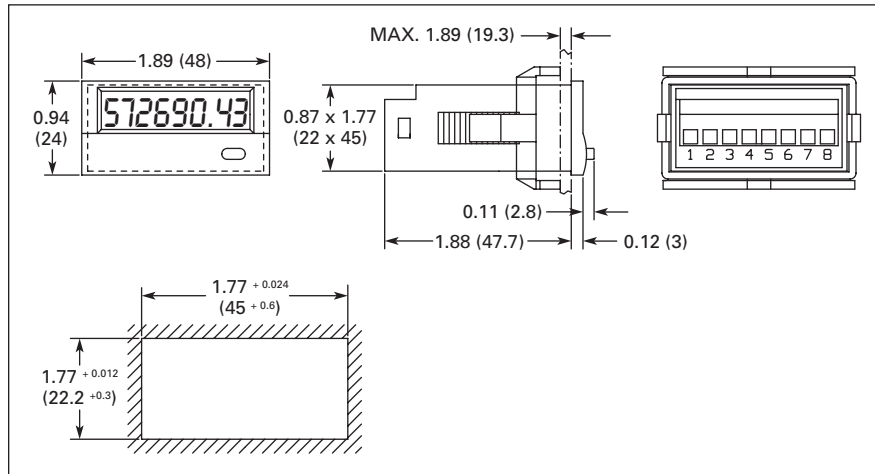


Figure 54-37. 1/32 DIN LCD, Totalizers — Approximate Dimensions in Inches (mm)

### 1/32 DIN LED Multifunction Totalizer/Timer/Ratemeter



Cat. No. E5-024-E0402

- Ambient Temperature: 4 to 131°F (-20 to 55°C)
- Storage Temperature: -13 to 167°F (-25 to 75°C)
- EMC: According to EC EMC directive 89/36/EWG
- Immunity to Interference: EN 61 000-6-4/ EN 55011 Class B
- Emitted Interference: EN 61 000-6-2
- Protection: IP65 (from front)
- Weight: Approx. 5.29 (150 g)

### Product Selection

Table 54-30. Product Selection — 1/32 DIN LED Multifunction Totalizer/Timer/Ratemeter

Description	Catalog Number	Price U.S. \$
LED Single Channel Totalizer, 10 – 30V DC Power 0.94 x 1.89 Inch (24 x 48 mm)	E5-024-E0402	
LED Multifunction Totalizer/Timer/Ratemeter 10 – 30V DC Power 0.94 x 1.89 Inch (24 x 48 mm)	E5-424-E0402	
LED Double-Function Totalizer/Timer/Ratemeter 10 – 30V DC Power 0.94 x 1.89 Inch (24 x 48 mm)	E5-524-E0402	
LED Totalizer with Quadrature, 10 – 30V DC Power 0.94 x 1.89 Inch (24 x 48 mm)	E5-024-E0432	

### Features

- Display counter adding and subtracting
- Position display
- Frequency counter/ratemeter
- Timer
- Display Range: -199.999 – 999.999 with zero blanking
- Screw terminal
- Locking SET-Key

### Standards and Certifications

- UL Recognized
- CE Marked

### Technical Data and Specifications

- Supply Voltage: 10 – 30V DC with reverse polarity protection
- Current Consumption: Max. 55 mA
- Display: 6-digit red, 7-segment LED display; 0.31 Inch (8 mm) high
- Data Backup: EEPROM
- Housing: Dimension 3.78 x 1.89 Inch (48 x 24 mm) according to DIN 43 700; RAL 7021 gray
- Polarity of Inputs: Programmable, NPN or PNP
- Input Resistance: Approx. 10 kΩ
- Counting Frequency: 60 kHz, can be damped to 30 Hz, position display max. 25 kHz
- Resolution: Timer 0.001 sec.
- Reset Time: 5 mS
- Level of Inputs —
  - High:  $0.6 \times U_B - 30V$  DC
  - Low:  $0 - 0.2 \times U_B$  [V DC]
- Error —
  - Tachometer: <0.1%
  - Timer: <50 ppm

### Dimensions

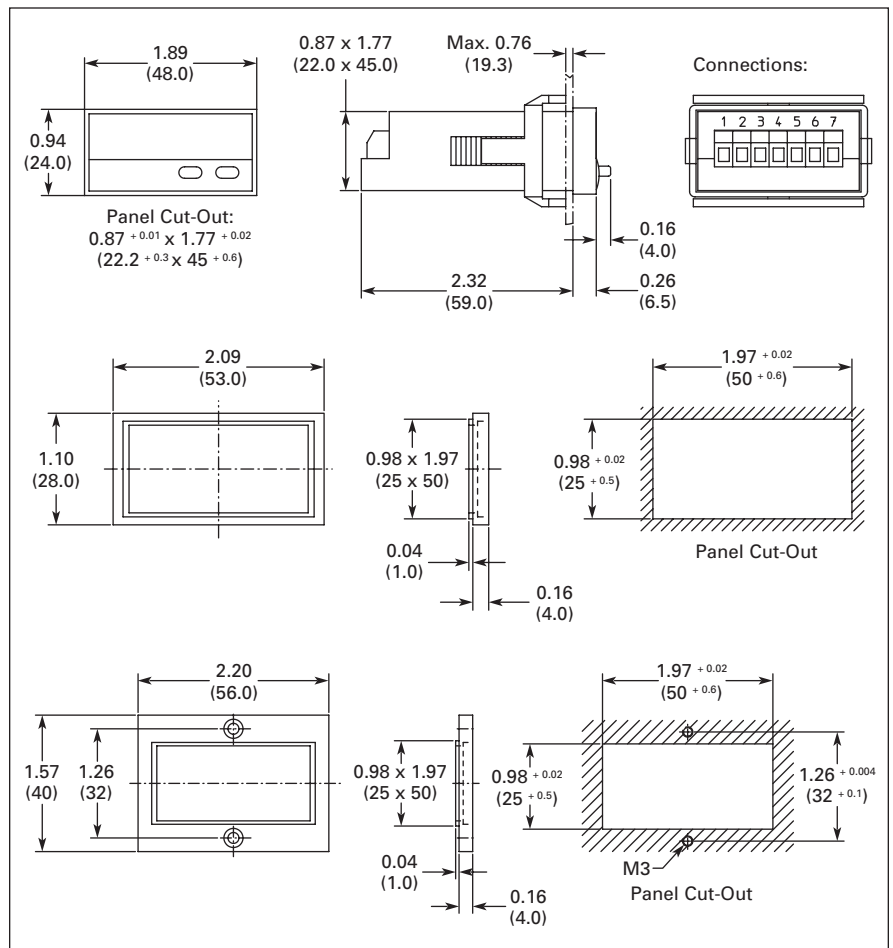


Figure 54-38. 1/32 DIN LED Multifunction Totalizer/Timer/Ratemeter — Approximate Dimensions in Inches (mm)

## Courier Series — Durant®



Courier Series

## Features

- 8-digit totalizer
- 1/Tau ratemeter
- Scaling capabilities
- Remote reset terminal
- 0.43-inch (10.9 mm) display
- Front panel reset
- NEMA 4X

## Standards and Certifications

- CE Marked

## Technical Data and Specifications

## Power

- Internal Battery: 3V, Lithium
- Life expectancy: 5 years +
- Replacement Part: 36367-202

## Backlight

10 – 30V DC @ 30 mA max.

**Note:** Derate operating temperature 1°C/  
Volt above 17V DC.

- Reverse polarity protected

## Physical

- Operating Temperature: -4 to 158°F (-20 to 70°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Operating Humidity: 60% Non-condensing.
- Weight: 2.2 oz. (62 g) net.
- Display Size: 0.43" (10.9 mm) high
- Front Panel Rating: NEMA 4X when mounted with gasket provided
- Case Material: Cycolac X-17

## Totalizer

- Type: UP counting
- Digits: 8

## Count Accuracy

- 100% when operated within specifications

## DC Common (Terminal 1) Count Inputs

- Input B (Terminal 2) Low speed input designed for contact closures to DC common
  - Speed: 0 to 20 Hz
  - Min. Low Time: 10 mS
  - Min. High Time: 40 mS
  - Input Impedance: 101k Ohm
  - Voltage Thresholds —
    - Low: 0 – 0.4V DC
    - High: 2.0 – 28V DC
    - Max. High: 28V DC

- Input A (Terminal 3) High speed input requiring a voltage source such as a current sourcing sensor or a current sinking sensor used with the provided pull up resistors

- Speed: 0 to 10 kHz
- Min. Low Time: 80 mS
- Min. High Time: 20 mS

**Note:** The above times are with a 0 – 5.0V swing.

- Input Impedance: 2k Ohm above 5V DC
- Voltage Thresholds —
  - Low: 0 – 1.2V DC
  - High: 2.0 – 28V DC
  - Max. High: 28V DC

## Reset Input

- Reset Input (Terminal 4) designed for contact closures to DC common
  - Min. Low: 0.25 to 1 sec. (reset is maintained)

**Note:** The required pulse width varies with count speed, scale factor and number of digits displayed.

- Voltage Thresholds —
  - Low: 0 – 0.4V DC
  - High: 2.0 – 28V DC

## Front Panel Reset Enable

- Front Panel Reset Enable (Terminal 5)
  - Operation: Level sensitive (maintained)



**Product Selection**

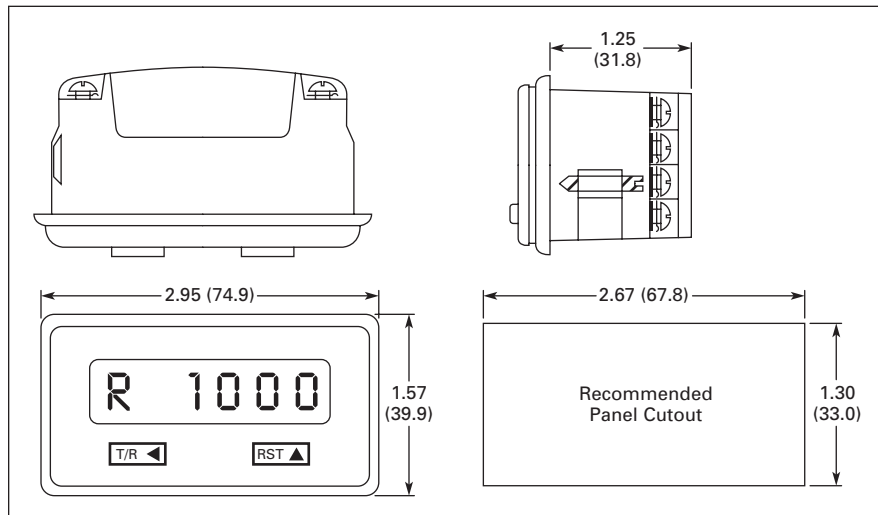
**Table 54-31. Product Selection — Courier Series, 8-digit LCD**

Description	Catalog Number	Price U.S. \$
Totalizer, Battery	53300400	
Add/Subtract (10k Hz, PNP input) Totalizer, Battery	53300401	
Add/Subtract (20 Hz, NPN/Contact input) Totalizer, Battery	53300402	
Quadrature (10k Hz, PNP input) Totalizer, Battery	53300403	
Totalizer/Ratemeter, Battery	53300405	
Totalizer/Ratemeter @ 100 Hz, Battery	53300465	
RMF Panel Mount Totalizer, Key Reset, 60 – 160V AC/DC Count Input	53300800	
RMF Panel Mount Totalizer, Dry Contact Input	53300850	
RMF Panel Mount Totalizer, 60 – 160V AC/DC Count Input	53300851	
Totalizer — Extended Temperature Range, Battery	53301400	
Totalizer — 1/Tau Ratemeter — Extended Temperature Range	53301404	
Totalizer/Ratemeter — Extended Temperature Range, Battery	53301405	
Totalizer/Ratemeter, Mag Pickup, Battery	53301475	
Backlight Totalizer, Battery	53302400	
Backlight Add/Subtract (10k Hz, PNP input) Totalizer, Battery	53302401	
Backlight Add/Subtract (20 Hz, NPN/Contact input) Totalizer, Battery	53302402	
Backlight Quadrature (10k Hz, PNP input) Totalizer, Battery	53302403	
Backlight Totalizer/Ratemeter, Battery	53302405	

**When Ordering Specify**

When ordering Courier series electronic totalizers and ratemeters, specify Order Numbers according to the features selected.

**Dimensions**



**Figure 54-39. Courier Series Totalizers — Approximate Dimensions in Inches (mm)**

## 1/8 DIN LED Multifunction Totalizer/Timer/Ratemeter



Cat. No. E5-496-E0401

## Features

- Display counter adding and subtracting
- Position display
- Frequency counter/ratemeter
- Timer, res. up to 0.001 sec.
- Programmable mode
- Display Range: -199.999 – 999.999 with zero blanking
- Connection with screw terminal
- Locking SET-Key for reset

## Standards and Certifications

- UL Recognized
- CE Marked

## Technical Data and Specifications

- Supply Voltage: 10 – 30V DC with reverse polarity protection; 90 – 260V AC
- Current Consumption: Max. 50 mA 6 VA
- Display: 6-digit red, 7-segment LED display; 0.55 Inch (14 mm) high
- Data Backup: EEPROM
- Housing: Dimension 3.78 x 1.89 Inch (96 x 48 mm) according to DIN 43 700; RAL 7021 gray
- Polarity of Inputs: Programmable, NPN or PNP for all inputs
- Input Resistance: Approx. 10 k $\Omega$
- Counting Frequency: 60 kHz, can be damped to 30 Hz depending on operating mode at position display max. 25 kHz <sup>Ⓢ</sup>
- Reset Time: 5 mS
- Resolution Timer: Up to 0.001 sec.

<sup>Ⓢ</sup> For further specifications, please refer to the user manual.

- Input Switching Level —
  - DC Version (standard version)
    - High:  $0.6 \times U_B - 30V$  DC
    - Low:  $0 - 0.2 \times U_B$  [V DC]
  - AC Version
    - High: 12 – 30V DC
    - Low: 0 – 4V DC
- Voltage Supply for Sensors: 24V DC  $\pm 15\%$ /100 mA at AC versions
- Accuracy —
  - Tachometer: <0.1%
  - Timer: <50 ppm
- Ambient Temperature: -4 to 149°F (-20 to 65°C)
- Storage Temperature: -13 to 167°F (-25 to 75°C)
- EMC: According to EC EMC directive 89/36/EWG
- Immunity to Interference: EN 61 000-6-4/ EN 55011 Class B
- Emitted Interference: EN 61-000-6-2
- Protection: IP65 (from front)
- Weight: Approx. 5.29 oz (150 g)

## Product Selection

Table 54-32. Product Selection — 1/8 DIN LED Multifunction Totalizer/Timer/Ratemeter

Description	Catalog Number	Price U.S. \$
<b>LED Multifunction Counter/Timer/Ratemeter</b>		
90 – 260V AC Power 3.78 x 1.89 Inch (96 x 48 mm)	E5-496-E0401	
10 – 30V DC Power 3.78 x 1.89 Inch (96 x 48 mm)	E5-496-E0402	

## Dimensions

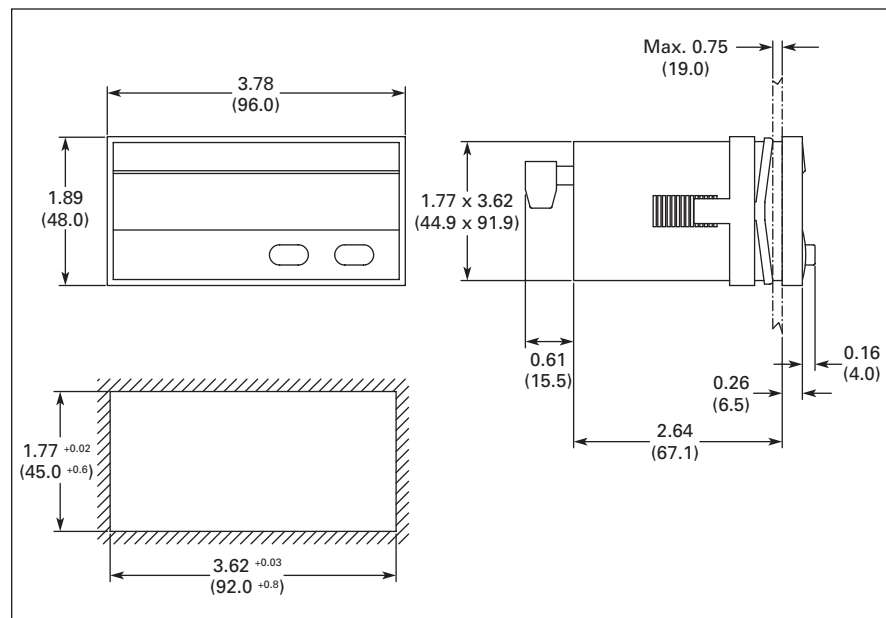


Figure 54-40. 1/8 DIN LED Multifunction Totalizer/Timer/Ratemeter — Approximate Dimensions in Inches (mm)



**Cat. No. 57700480**

**Features**

- 1/8 DIN cutout
- NEMA 4X front panel
- Universal AC power supply (85 – 265V AC)
- DC power models (9 – 30V DC)
- Removable screw terminals
- Short Depth: 3.6 inch (91 mm)
- Front panel programming

**Standards and Certifications**

- UL and cUL Listed, CE Marked

**Technical Data and Specifications**

**Mechanical**

- Cutout Dimensions:  
3.62" W x 1.77" H (92 mm x 45 mm)  
DIN standard
- Outline Dimensions:  
4.04" W x 2.19" H x 3.87" D  
(103 mm x 56 mm x 98 mm)  
3.60" (92 mm) maximum depth in panel
- Enclosure: Plastic with polyester front label
- Connectors: Up to six depluggable terminal blocks

**Environmental**

- Operating Environment: Indoor use to 2000 meters
- Temperature —
  - Operating: 32 to 122°F (0 to 50°C)
  - Storage: -4 to 158°F (-20 to 70°C)
- Humidity: 0 to 85% RH, non-condensing
- Vibration: 2.5 Gs, 30 to 200 Hz
- Shock: 30 Gs, 11 mS half sinewave
- EMC —
  - Immunity to EN 50082-2 (Heavy Industrial)
  - Emissions to EN 50081-2 (Heavy Industrial)
- Front Panel: NEMA 4X when mounted with gasket provided
- CE EMC immunity and emissions requirements were met using shielded wiring on the RS-485, analog output and pulse input/power lines. The shields were connected to earth ground at the Eclipse end of the shields.
- Pollution Degree 2: Overvoltage category II

**Input Power**

- AC Powered Models (57701-4XX) —
  - Input Power: 85 – 295V AC, 47 – 63 Hz, 20 VA
  - External Fuse: 0.2A, 250V AC, Time Delay (T200 mA, 250V)
  - Isolation Dielectric Strength: 2300V AC
- DC Powered Models (57700-4XX) —
  - Input Power: 9 – 30V DC, 12 VA
  - External Fuse: 2.0A, 50V DC, Time Delay (T2A, 50V)
  - Reverse Voltage Protection: Yes
  - Isolation Dielectric Strength: 2300V AC to signal outputs and relays, 500V AC to RS-485 and analog outputs

**Human Interface**

- Display: +6, -5 digits
- Type: 0.56" (14.2 mm) high, seven segment, red LED

**Data Retention**

- Memory Type: EEPROM, no batteries required
- Duration: 100 years

**Count Signal Input**

- Sensor Type: Sink or source, DIP switch selectable
- Input Impedance: 4.75k ohms to +5V DC or 34.9k ohms to ground
- Thresholds —
  - High: 3.5 – 28V DC
  - Low: 0 – 1.9V DC, for single ended signals
- Magnetic Pickup Range: 200 mV p-p to 65 VRMS into 34.9k ohms
- Slow Response: 200 Hz max. (DIP switch 2 and/or 5 ON)
- Fast Response — Count Mode: A or B
  - Add/Add, Add/Subtract, Add w/ Inh: 8250/8250
- Fast Response — Count Mode: A and B
  - Add/Add, Add/Subtract, Add w/ Inh: 3000/3000
  - Quad x1, Quad x2: 3250
  - Quad x4: 2000

**Control Inputs**

- Sensor Type: Sink only
- Input Impedance: 4.75k ohms to +5V DC
- Thresholds —
  - High: 3.5 to 28V DC
  - Low: 0 – 1.9V DC
- Response: 25 mS maximum (5V signal)

**Accessory Power Output**

- Voltage: 12V DC +10%/-13%
- Current: 75 mA max.
- Protection: Short circuit protected

Eclipse Series — Durant®

Product Selection

Table 54-33. Product Selection — Eclipse Series Totalizer, 6-digit LED

Description	Catalog Number	Price U.S. \$
9 – 30V DC Power 85 – 265V AC Power	57700480 57701480	
Analog Out, 9 – 30V DC Power Analog Out, 85 – 265V AC Power	57700482 57701482	
RS-485 Out, 9 – 30V DC Power RS-485 Out, 85 – 265V AC Power	57700484 57701484	
RS-485 Out and Analog Out, 9 – 30V DC Power RS-485 Out and Analog Out, 85 – 265V AC Power	57700486 57701486	

Dimensions

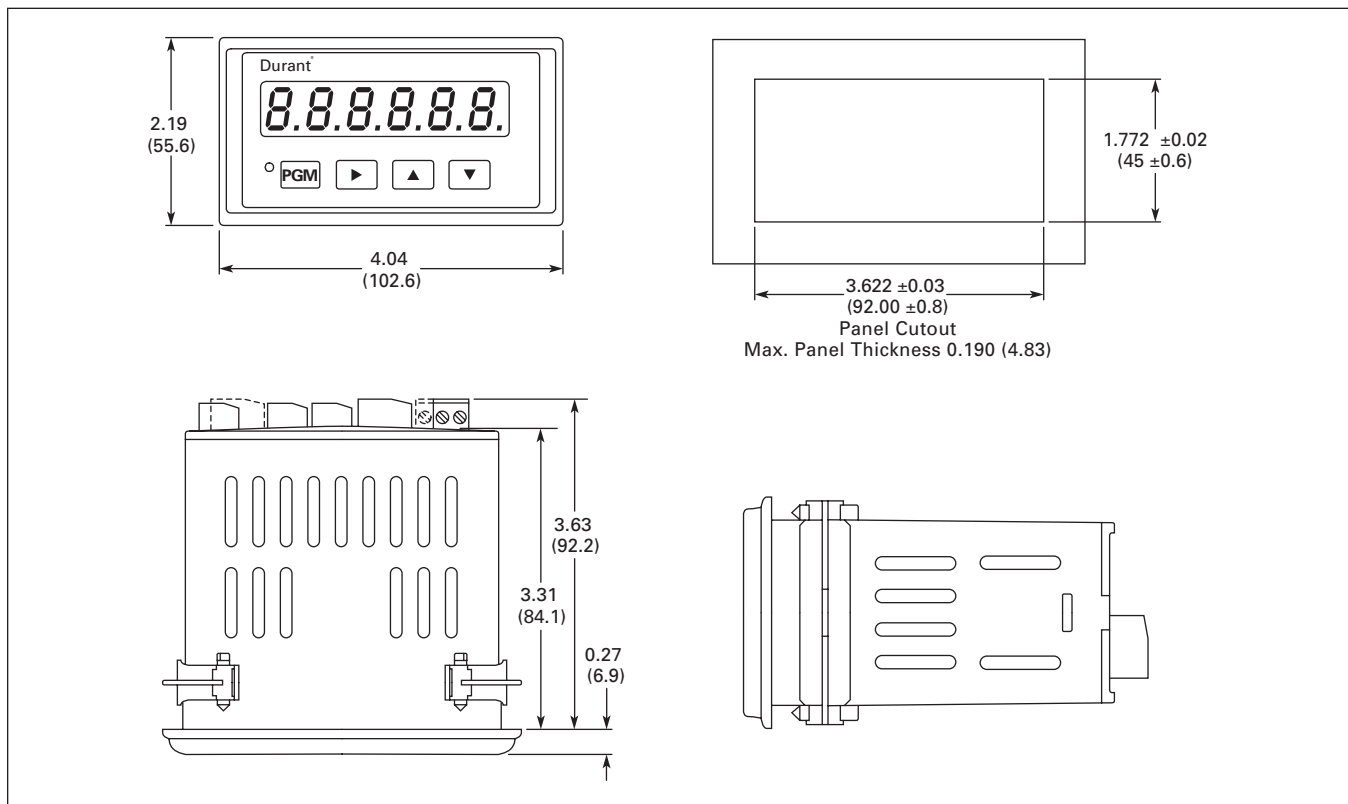


Figure 54-41. Eclipse Series Totalizer — Approximate Dimensions in Inches (mm)



Cat. No. 58811400

### Features

- 8-digit, LED display, 0.56" (14 mm)
- Programmable decimal point and count and rate scaling
- 15V DC @ 100 mA output power
- Rear panel screw terminals
- NEMA 4 front panel

### Standards and Certifications

- UL Listed, CSA marked
- CE Marked

### Technical Data and Specifications

#### Power Requirements

- AC Operation: 115/230V AC (+10%, -20%) 47 – 63 Hz
- DC Operation: 11 – 28V DC
- Power: 18 watts

#### DC Power Output

- 15V DC (+1, -2).
- 150 mA if powered from AC or less than 24V DC
- 100 mA if powered from 24V DC or greater

**Note:** DC power output is only regulated if unit is powered by AC or greater than 18.5V DC.

#### Environment

- Operating Temperature: 32 to 130°F (0 to 55°C)
- Storage Temperature: -40 to 160°F (-40 to 70°C)
- Operating Humidity: 85% non-condensing relative

#### Physical

- Memory Types: PROM, RAM, Non-volatile NVRAM

#### Counter

- Count Range: 8 digits (0 to 99,999,999) with rollover
- Offset Range: 8 digits (0 to 99,999,999) (Offset is used to reset to a non-zero number.)
- Count Modes —
  - Count with Add and Subtract inputs
  - Count with Up/Down direction input (Hardware doubling for above modes is provided)
  - Count with Count Inhibit input
  - Quadrature
  - Doubled Quadrature
- Count Speed (Scale Factor of 1.0000 assumed)
  - 0 to 7,500 counts per second (CPS) with Durant Shaft Encoders or solid-state sensors
  - 0 to 3,750 CPS when hardware doubling is implemented or when quadrature shaft encoders are used
  - 0 to 150 CPS when Low Frequency is selected

#### Count Input Ratings

The count inputs are designed to work with current sinking sensors (open-collector NPN transistor output with or without passive pull-up resistor) or contact closures to DC Common.

- Input Voltage —
  - High state (Logical "1", sensor off or contact open)
    - 10.5 – 24.5V DC when control is powered by AC line
    - 7.0 – 24.5V DC when control is powered by 11V DC
    - 11.0 – 24.5V DC when control is powered by 16V DC
  - Low state (Logical "0", sensor on or contact closed)
    - 0 – 4.5V DC when control is powered by AC line
    - 0 – 3.3V DC when control is powered by 11V DC
    - 0 – 4.8V DC when control is powered by 16V DC
- Input Impedance —
  - 6800 ohms to 15V DC when control is powered by AC line
  - 6800 ohms to 10V DC when control is powered by DC supply
- Input Current: 20 mA peak, 3 mA steady state

#### Input Response —

- High State (Logical "1", sensor off or contact open)
  - High Speed (Low Speed jumpers not connected)
  - 110  $\mu$ S minimum at 15V DC (6,800 ohms to +DC)
  - 160  $\mu$ S minimum at 13.5V DC (50,000 ohms to +DC)
- High State (Logical "1", sensor off or contact open)
  - Low Speed (Low Speed jumpers connected)
  - 5.5 mS minimum at 15V DC (6,800 ohms to +DC)
  - 7.5 mS minimum at 13.5V DC (50,000 ohms to +DC)
- Low State (Logical "0", sensor on or contact closed)
  - High Speed (Low Speed jumpers not connected)
  - 20  $\mu$ S minimum at 0.1V DC (0 ohms to DC Common)
  - 45  $\mu$ S minimum at 1.5V DC (500 ohms to DC Common)
- Low State (Logical "0", sensor on or contact closed)
  - Low Speed (Low Speed jumpers connected)
  - 1.0 mS minimum at 0.1V DC (0 ohms to DC Common)
  - 2.0 mS minimum at 1.5V DC (500 ohms to DC Common)

#### Scale Factor

- Range: 5 digits (0.0001 to 9.9999)

#### Control Inputs

- Input Voltage —
  - High State (Logical "1", contact open) 15V DC maximum
  - Low State (Logical "0", contact closed) 1.2V DC maximum
- Input Impedance: 4.75K ohms to +5V DC.
- Threshold —
  - High: +3.5 to +22V DC
  - Low: +0.0 to +1.0V DC
- Response Time —
  - Min. High: 5.3 mS
  - Min. Low: 3.9 mS

**Note:** The reset and unlatch signals will both occur in less than 200 microseconds after the input signal is detected. The start of the print will occur within 2 milliseconds after the input is detected if the unit is not counting.

**Diagnostic Modes**

- ROM Checksum
- RAM Bit Test
- NVRAM Read/Write Test
- NVRAM Store Test
- NVRAM Checksum
- Watchdog Timer
- Display and LED Indicator Test

**Communications**

- Interface Type: Dual port 20 mA current loop
- Speed: 110, 300 and 1200 Baud, user selectable
- Data Type: Standard ASCII code
- Format: Start bit, 7 ASCII data bits, Parity bit, one or two Stop bits (Even parity for Serial Data Output, no parity for Serial Data Input)
- Information Transmitted —
  - Count value
  - Offset value
  - Scale Factor
- Information Received —
  - Print request
  - Offset value
  - Scale Factor

**Product Selection**

Table 54-34. Product Selection — President Series Totalizers

Description	Catalog Number	Price U.S. \$
115/230V AC, LED Red Display	58811400	
115/230V AC, LED Red Display, 1/Tau Ratemeter	58815400	

**Dimensions**

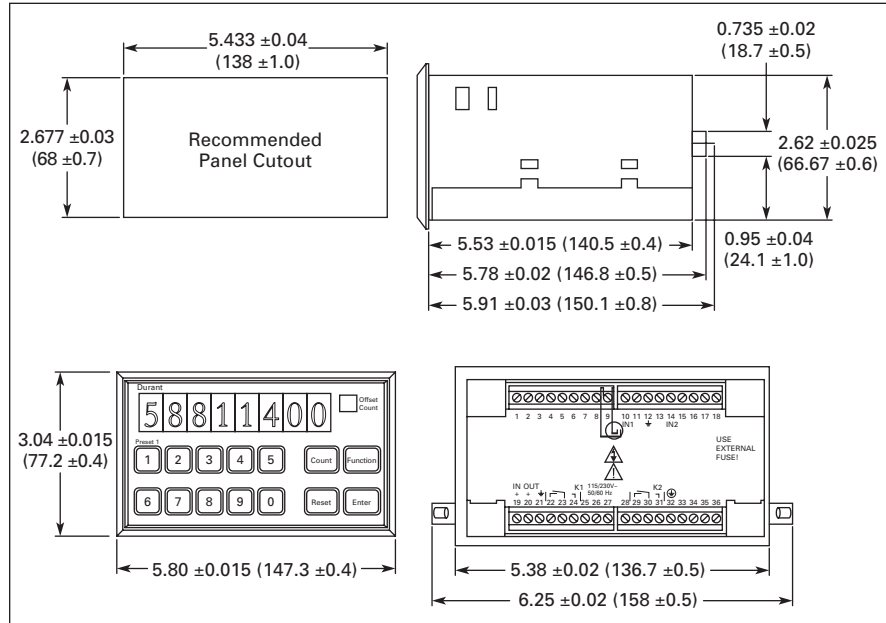


Figure 54-42. President Series Totalizers — Approximate Dimensions in Inches (mm)





Cat. No. 58810400

### Features

- 8-digit, LED display, 0.56" (14 mm)
- 15V DC @ 100 mA output power
- Rear panel screw terminals
- NEMA 4 front panel

### Standards and Certifications

- UL Listed, CSA marked
- CE Marked

### Technical Data and Specifications

#### Power Requirements

- AC Operation: 115/230V AC (+10%, -20%) 47 – 63 Hz
- DC Operation: 11 – 28V DC
- Power: 18 watts

#### DC Power Output

- 15V DC (+1, -2)
- 150 mA if powered from AC or less than 24V DC
- 100 mA if powered from 24V DC or greater

**Note:** DC power output is only regulated if unit is powered by AC or greater than 18.5V DC.

#### Environment

- Operating Temperature: 32 to 130°F (0 to 55°C)
- Storage Temperature: -40 to 160°F (-40 to 70°C)
- Operating Humidity: 85% non-condensing relative

#### Physical

- Memory Types: PROM, RAM, Non-volatile NVRAM

#### Counter

- Count Range: 8 digits (0 to 99,999,999) with rollover
- Offset Range: 8 digits (0 to 99,999,999) (Offset is entered through serial communication only. It is used to reset to a non-zero number.)
- Count Modes —
  - Count with Add and Subtract inputs
  - Count with Up/Down direction input (Hardware doubling for above modes is provided)
  - Count with Count Inhibit input
  - Quadrature
  - Doubled Quadrature
- Count Speed
  - 0 to 10,000 counts per second (CPS) with Durant Shaft Encoders or solid-state sensors with internal pull-up resistor
  - 0 to 7,500 CPS minimum for sensors with open collector transistor output
  - 0 to 5,000 CPS when hardware doubling is implemented
  - 0 to 150 CPS when Low Frequency is selected

#### Count Input Ratings

The count inputs are designed to work with current sinking sensors (open-collector NPN transistor output with or without passive pull-up resistor) or contact closures to DC Common.

- Input Voltage —
  - High state (Logical "1", sensor off or contact open)
    - 10.5 – 24.5V DC when control is powered by AC line
    - 7.0 – 24.5V DC when control is powered by 11V DC
    - 11.0 – 24.5V DC when control is powered by 16V DC
  - Low state (Logical "0", sensor on or contact closed)
    - 0 – 4.5V DC when control is powered by AC line
    - 0 – 3.3V DC when control is powered by 11V DC
    - 0 – 4.8V DC when control is powered by 16V DC
- Input Impedance —
  - 6800 ohms to 15V DC when control is powered by AC line
  - 6800 ohms to 10V DC when control is powered by DC supply

- Input Current: 20 mA peak, 3 mA steady state
- Input Response —
  - High State (Logical "1", sensor off or contact open)
    - High Speed (Low Speed jumpers not connected)
    - 110 μS minimum at 15V DC (6,800 ohms to +DC)
    - 160 μS minimum at 13.5V DC (50,000 ohms to +DC)
  - High State (Logical "1", sensor off or contact open)
    - Low Speed (Low Speed jumpers connected)
    - 5.5 mS minimum at 15V DC (6,800 ohms to +DC)
    - 7.5 mS minimum at 13.5V DC (50,000 ohms to +DC)
  - Low State (Logical "0", sensor on or contact closed)
    - High Speed (Low Speed jumpers not connected)
    - 20 μS minimum at 0.1V DC (0 ohms to DC Common)
    - 45 μS minimum at 1.5V DC (500 ohms to DC Common)
  - Low State (Logical "0", sensor on or contact closed)
    - Low Speed (Low Speed jumpers connected)
    - 1.0 mS minimum at 0.1V DC (0 ohms to DC Common)
    - 2.0 mS minimum at 1.5V DC (500 ohms to DC Common)

#### Control Inputs

- Impedance: 4.75k ohms to +5V DC
- Threshold —
  - High: +3.5 to +22V DC
  - Low: +0.0 to +1.0V DC

#### Response Time —

- Min. High: 5.3 mS
- Min. Low: 3.9 mS

**Note:** The reset and unlatch signals will both occur in less than 200 microseconds after the input signal is detected. The start of the print will occur within 2 milliseconds after the input is detected if the unit is not counting.

#### Counter Operating Modes

- Reset —
  - Reset to zero
  - Reset to offset value
- Maintained Reset
- Momentary Reset

President Series — Durant®

**Communications**

- Interface Type: Dual port 20 MA current loop
- Speed: 110, 300 and 1200 Baud, user selectable
- Data Type: Standard ASCII code
- Format: Start bit, 7 ASCII data bits, Parity bit, one or two Stop bits (Even parity for Serial Data Output, no parity for Serial Data Input)
- Information Transmitted —
  - Count value
  - Offset value
- Information Received —
  - Print request
  - Offset value
  - Print offset enable or disable

**Product Selection**

Table 54-35. Product Selection — President Series Totalizers

Description	Catalog Number	Price U.S. \$
115V AC, 7-digit LED Red Display, Basic Pulse Count	57810400	
115/230V AC, LED Red Display	58810400	
Feet/Inches Totalizer	57810402	

**Dimensions**

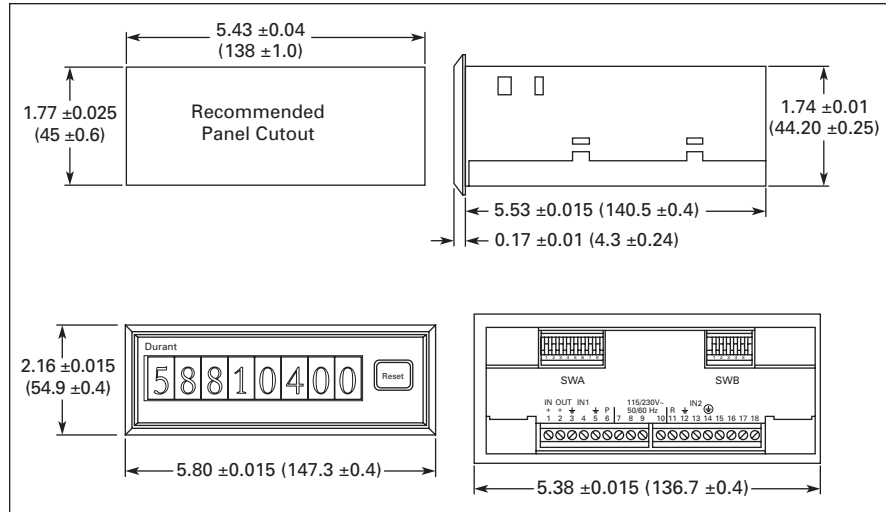


Figure 54-43. President Series Totalizers — Approximate Dimensions in Inches (mm)



Cat. No. 57600400

## Features

- AC/DC powered, 2-line LCD display
- 8-digit totalizer
- 1/Tau ratemeter
- Totalizer and ratemeter scaling
- Four user-configurable control inputs
- Two solid-state outputs
- RS-485 Serial communications

## Standards and Certifications

- UL Listed
- CE Marked

## Technical Data and Specifications

### Power Input

- AC Operation —
  - 115V AC ( $\pm 15\%$ ) std., 50 to 60 Hz, 7W
  - 230V AC ( $\pm 15\%$ ) opt., 50 to 60 Hz, 7W
- DC Operation: 10 – 15V DC opt., 300 mA maximum

### DC Power Output

- 12V DC ( $\pm 25\%$ ), 100 mA maximum (includes all line and load variations)

### Environmental

- Operating Temperature: 32 to 131°F (0 to 55°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Operating Humidity: 85% Relative, non-condensing
- NEMA 4 rating when mounted with gasket provided

### Totalizer

- Type: Bi-directional
- Digits: 8
- Scaler Range: 0.00001 to 9.99999
- Decimal Point: 5 positions, programmable

### Totalizer Count Speeds

The maximum count speed depends on the selected count mode. All maximum speeds are shown with square waves (50% duty cycle) input.

- Maximum Speed — Solid-State (High Speed)
  - Mode Input A/ Input B — Add/Sub: 20 kHz
  - Add/Add: 20 kHz
  - Count/Direction: 15 kHz
  - Count x 2/Direction: 7.5 kHz
  - Quadrature: 6.5 kHz
  - Quadrature x 2: 6.5 kHz
- Maximum Speed — Contact (Low Speed)
  - Mode Input A/ Input B — Add/Sub: 40 kHz
  - Add/Add: 40 kHz
  - Count/Direction: 40 kHz

### Count Inputs

- Sink —
  - Impedance: 4.6k ohms to +5V DC
  - Voltage — High: 3.5 to 34.0V DC
  - Low: 0.0 to 1.9V DC
- Source (high) —
  - Impedance: 2.3k ohms to common
  - Voltage — High: 3.5 to 17.0V DC (100% duty cycle)
  - Low: 0.0 to 1.9V DC
- Source (low) —
  - Impedance: 2.3k ohms to common
  - DC Voltage — High: 0.6 to 17.0V DC
  - Low: -17.0 to -0.6V DC
  - AC Voltage: 17V AC (48V Peak-Peak) maximum

### Control Inputs

- Impedance: 4.7k ohms to +5V DC
- Voltage —
  - High: +3.7 to +24V DC
  - Low: 0.0 to 0.9V DC
- Response: Minimum low 15 mS, minimum high 15 mS

### Transistor Outputs (2)

- Type: NPN open collector with transient protection
- Maximum Voltage (OFF state): 30V DC
- Maximum Current (ON state): 200 mA @ 1.3V DC

### Communication

- Type: RS-485
- Format: 1 start bit, 7 data bits (ASCII), 1 parity bit, 1 stop bit
- Protocol: Opto-22 compatible
- Speed: 300, 1200, 2400, 4800, 9600 and 19200 baud
- Parity: Odd, Even, None (space transmitted, ignore received)

### Count Accuracy

- 100% when operated within the specified count speeds and count signal high and low times

### Rate Indicator

- Type: 1/Tau
- Digits: 6
- Scaler Range: 0.00001 to 99999
- Decimal Point: 5 positions, programmable
- Accuracy:  $\pm 0.015\%$  of reading
- Update Time: 1 second, fixed
- Zero Time: 10 seconds, fixed

### Connections

- Type: Dual depluggable screw terminal strips
- Conductor Size: 14 – 22 AWG (2.1 – 0.38 mm<sup>2</sup>), 600V, solid, stranded or fused (preferred)

**Product Selection**

Table 54-36. Product Selection — Ambassador Series Totalizers

Description	Catalog Number	Price U.S. \$
10 – 15V DC LCD	57600400	
115V AC LCD	57601400	
230V AC LCD	57602400	

**Dimensions**

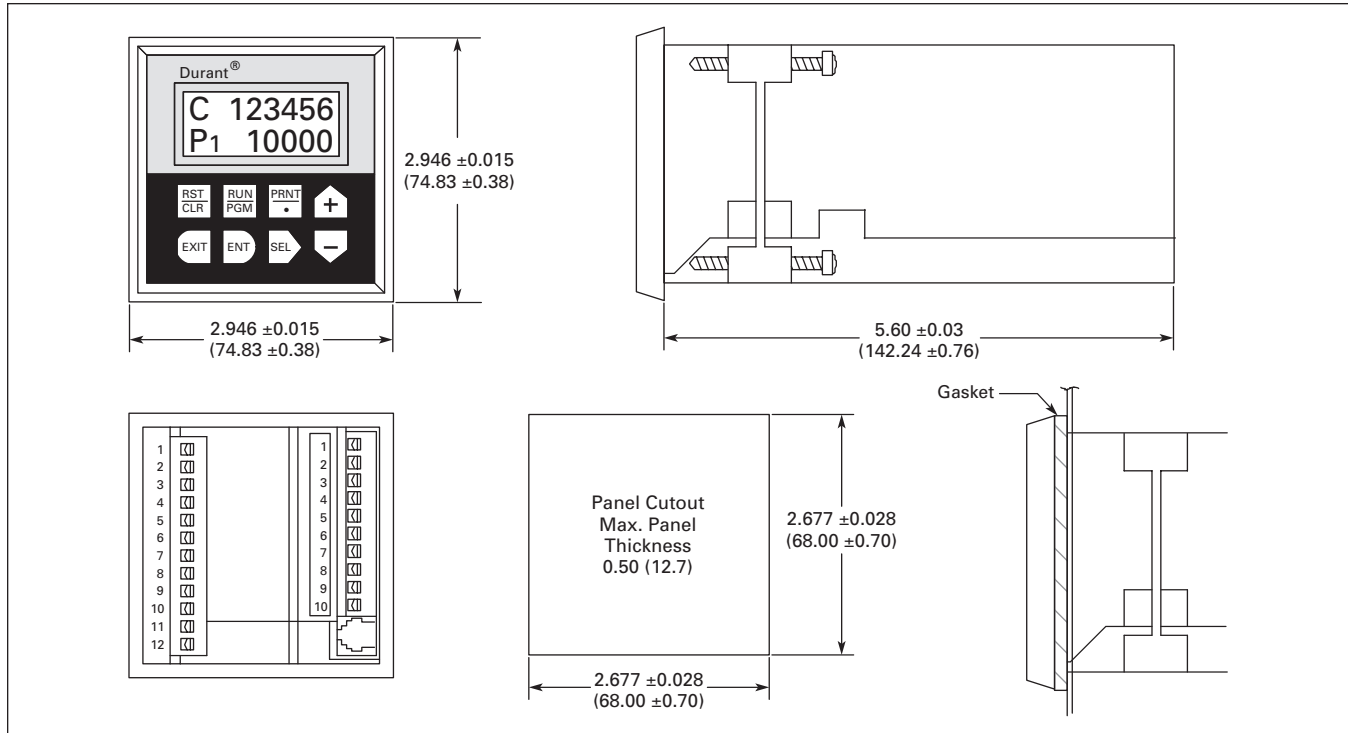


Figure 54-44. Ambassador Series Totalizers — Approximate Dimensions in Inches (mm)

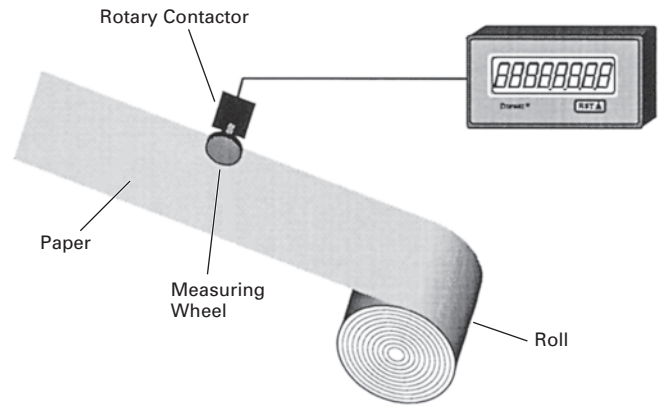
**Product Family Overview**

**Introduction**

Count controls are counters that provide output signal(s) at preset count value(s). Typical applications include cut-to-length, batching, filling, mixing and dispensing. Available from Eaton are a variety of count controls in different sizes, display types and feature sets.

**Application Example**







The illustration shows a simple cut-to-length application. The roll of paper is measured using a measuring wheel and rotary contactor (or encoder). Once the desired length is reached, an output signal may be directed to a shear for activation. Following the cut-off, the count control will reset to zero and begin measurement of the next piece. Options such as batch counting, where the number of cut pieces is counted, are also typical of this application.



**Application Example**

**Count Control Product Family Overview**

**Table 54-37. Product Family Overview**

Product Family	Characteristics	Panel Cutout in Inches (mm)	Catalog Page
 <b>E5-148-C</b>	<ul style="list-style-type: none"> <li>Low cost, simple count control</li> <li>Various power options: battery, AC, DC</li> <li>Easy-to-change preset values</li> <li>2-line display: input and preset values</li> </ul>	1.772 x 1.772 (45 x 45)	54-38
 <b>Eclipse</b>	<ul style="list-style-type: none"> <li>6-digit, super bright LED display</li> <li>Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls</li> </ul>	1.772 x 1.622 (45 x 92)	54-42
 <b>Ambassador</b>	<ul style="list-style-type: none"> <li>6-digit, high-visibility, 2-line LCD display</li> <li>User-configurable control inputs</li> <li>Highly flexible control/display</li> </ul>	2.667 x 2.667 (68 x 68)	54-44
 <b>President</b>	<ul style="list-style-type: none"> <li>Bright LED display w/14 mm characters</li> <li>Simple configuration with 14-button tactile keypad</li> <li>Many different versions fit almost any application</li> </ul>	2.667 x 5.433 (68 x 138)	54-47
 <b>Fusion</b>	<ul style="list-style-type: none"> <li>Integrated controller combines operator interface, ladder logic and high-speed counting</li> </ul>	2.667 x 5.433 (68 x 138)	54-81
 <b>Electromechanical</b>	<ul style="list-style-type: none"> <li>Various price, voltage and size ranges for different duty cycles and environments</li> <li>Long life and always readable display</li> </ul>	Various Mounting Configurations	54-51

## 1/16 DIN Battery Powered LCD Count Control

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Cat. No. E5-148-C1400

## Features

- Replacement for electromechanical preset counters
- No power supply necessary (battery operated)
- Count and reset input electrically separated from counter through optocoupler input range 12 – 250V AC/DC
- 2-line LC display count, preset and level of the output
- Screw terminal
- Data security, through two exchangeable lithium batteries, lifetime minimum 8 years
- Easy programming
- Counter presets easily via presetting keys allocated to each decade
- Output: Potential free relay, programmable normally open or normally closed contact

## Standards and Certifications

- cRU<sup>us</sup> Approval
- CE Marked

## Technical Data and Specifications

- Power Supply: 2 pcs user exchangeable lithium batteries, Type 1/2 AA lithium 3.6V
- Display: 2-line LCD display, 6 digits; 999999, height of figure 0.28 Inch (7 mm) or 0.18 Inch (4.5 mm)
- Input: Reset, count and key lock inputs
- Polarity of the Inputs: Bidirectional optocoupler input for the reset count inputs; reset, count and keyboard lock is connected to 3V DC
- Min. pulse duration of the Inputs: Reset input 50 mS; keyboard lock input 15 mS
- Switching Levels of the Inputs —
  - Low: <3V AC/DC
  - High: 12 – 250V AC/DC
- Input Frequency: Max. 25 Hz
- Input Resistance: 110 kΩ
- Output: Bistable relay with potential free contact (programmable as normally closed or normally open contact)
- Max. Switching Voltage: 250V AC/220V DC
- Max. Switching Current: 2A
- Max. Switching Capacity: 60 VA/30W
- Output Response Time: <20 mS, max. 4 Hz
- Data Retention: Via 2 batteries, 8 years or 5x10<sup>6</sup> power operations of the output relay and an ambient temperature of 77°F (25°C)
- Ambient Temperature: 14 to 122°F (-10 to 50°C)
- Storage Temperature: -13 to 140°F (-25 to 60°C)
- EMC: According to EC EMC directive 89/36/EWG, EN 61 000-6-4/ EN 55011 Class B, EN 61 000-6-2
- Protection: IP65 (front)
- Weight: Approx. 2.82 oz (80 g)

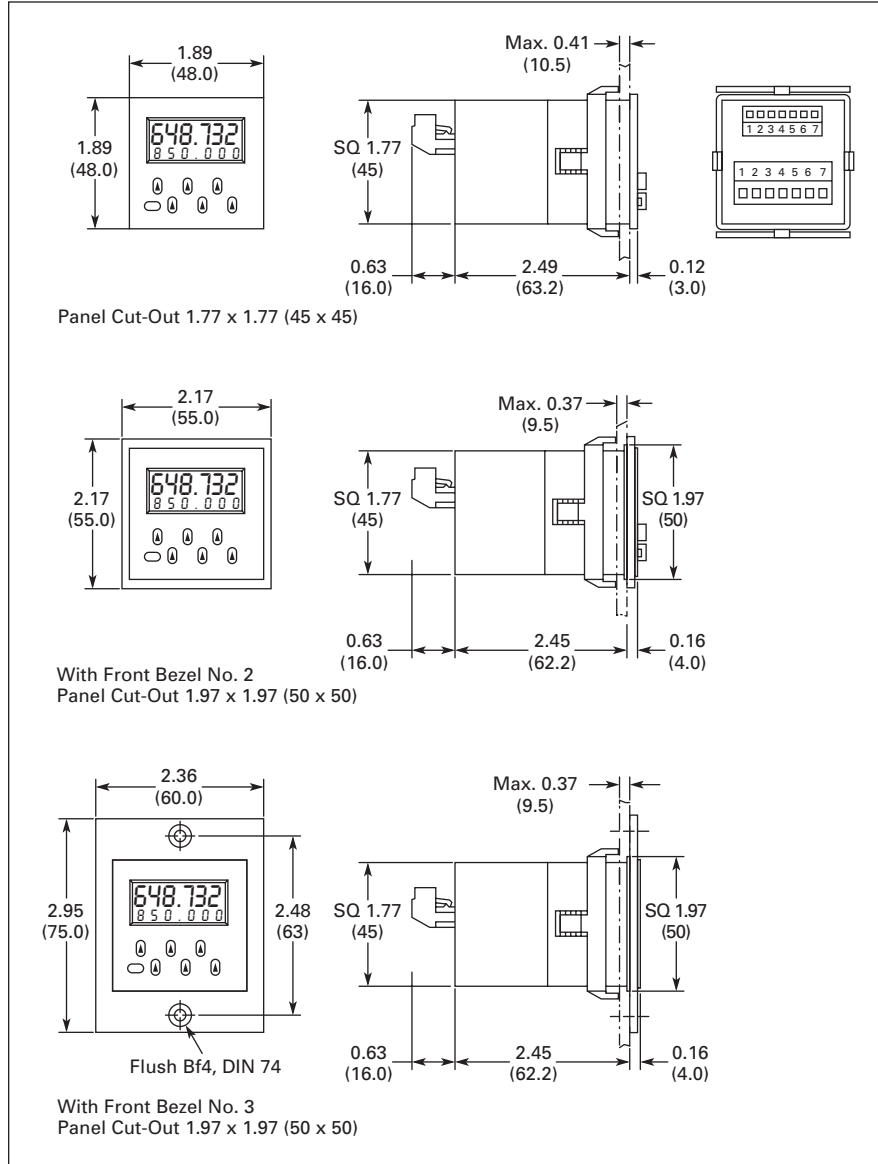


**Product Selection**

**Table 54-38. Product Selection — 1/16 DIN Battery Powered LCD Count Control**

Description	Catalog Number	Price U.S. \$
<b>1 Preset Count Control</b>		
Battery Power 1.89 x 1.89 Inch (48 x 48 mm)	<b>E5-148-C1400</b>	

**Dimensions**



**Figure 54-45. 1/16 DIN Battery Powered LCD Count Control — Approximate Dimensions in Inches (mm)**



Cat. No. E5-148-C2421

## Features

- 2-Line LCD display
- Programmable as impulse counter, frequency meter or time meter with sign and zero blanking
- Power Supply: 90 – 260V AC or 10 – 30V DC
- Batch mode
- Display range -199.999 – 999.999 with zero blanking
- Easy to operate and set the preset values via 4 keys
- Relay or octocoupler-output
- Scaling factor 0.0001 – 9.9999
  - 1 preset value, 1 output
  - 2 preset values, 2 outputs

## Standards and Certifications

- cRU<sup>®</sup>us Approval
- CE Marked

## Technical Data and Specifications

- Supply Voltage: 10 – 30V DC with reverse polarity protection; 90 – 260V AC max. 4 VA
- Display: 2-line LCD display, 6-digits
- Count Inputs: 2 count inputs, 4 input modes are programmable
- Polarity of the Inputs: Programmable for all inputs in common
- Input Resistance: Approx. 10 k $\Omega$
- Count Frequency: 10 kHz via DIP-switches reducible for INP A and INP B to 30 Hz (0.7 kHz for quadrature modes), automatic repeat at 900 Hz without losing counts (500 Hz for quadrature doubling modes)
- Min. Pulse Duration of the Inputs: 5 mS
- Input Sensitivity —
  - DC Supply Voltages
    - High:  $0.6 \times U_B - 30V$  DC
    - Low:  $0 - 0.2 \times U_B$  [VDC]
  - AC Supply Voltages
    - High: 12 – 30V DC
    - Low: 0 – 4V DC
- Pulse Shape: Variable (Schmitt-Trigger characteristics)
- Output 1: Relay —
  - With potential free contact, programmable as normally open or normally closed
  - Switching voltage max.: 250V AC/125V DC
  - Switching current max.: 3A
  - Switching current at DC min.: 30 mA
  - Switching power at DC: 90W
  - Switching power at AC max.: 750 VA
- OR
- Output 2: Relay —
  - With potential free contact, programmable as normally open or normally closed
  - Switching voltage max.: 250V AC/125V DC
  - Switching current max.: 3A
  - Switching current at DC min.: 30 mA
  - Switching power at DC: 90W
  - Switching power at AC max.: 750 VA
- OR
- NPN Optocoupler —
  - With open collector and emitter switching power 30V DC/15 mA
- Reaction Time of the Inputs —
  - Relay: Approx. 7 mS
  - Optocoupler: Approx. 1 mS
- Data Retention: Min. 10 years or  $1 \times 10^6$  memory cycles
- Transmitter Voltage: 24V DC -40%/±15%. 100 mA at 90 – 250V AC
  - With optional backlight —
    - 24V DC -40% ±15%. 60 mA at 90 – 260V AC
- Ambient Temperature: 32 to 122°F (0 to 50°C)
- Storage Temperature: -13 to 158°F (-25 to 70°C)
- EMC: According to EC EMC directive 89/36/EWG, EN 61 000-6-4/ EN 55011 Class B, EN 61 000-6-2
- Protection: IP65 (front)
- Weight: Approx. 8.47 oz (240 g), AC version with relay

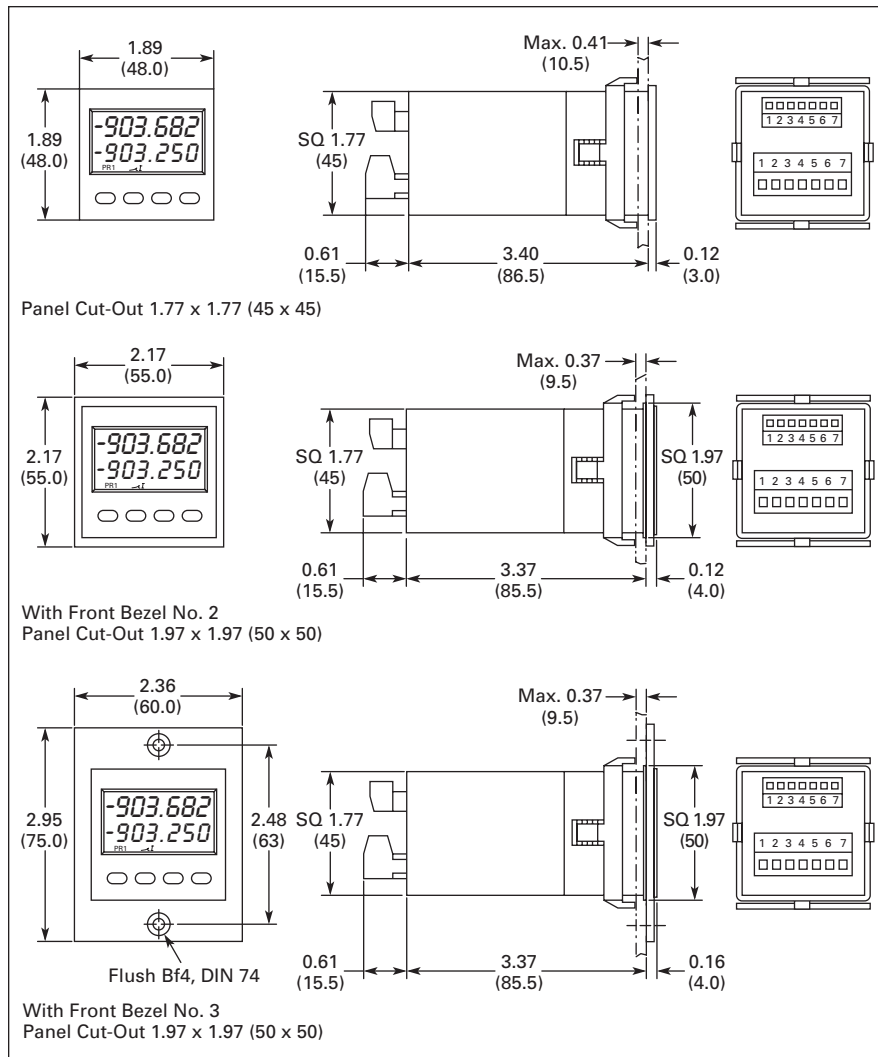
**1/16 DIN LCD Count Control**

**Product Selection**

**Table 54-39. Product Selection — 1/16 DIN LCD Count Control**

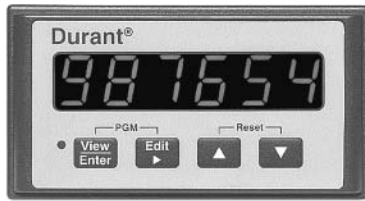
Description	Catalog Number	Price U.S. \$
<b>1 Preset LCD Count Control</b>		
90 – 260V AC Power 1.89 x 1.89 Inch (48 x 48 mm)	<b>E5-148-C1421</b>	
10 – 30V DC Power 1.89 x 1.89 Inch (48 x 48 mm)	<b>E5-148-C1422</b>	
<b>2 Preset LCD Count Control</b>		
90 – 260V AC Power 1.89 x 1.89 Inch (48 x 48 mm)	<b>E5-148-C2421</b>	
10 – 30V DC Power 1.89 x 1.89 Inch (48 x 48 mm)	<b>E5-148-C2422</b>	

**Dimensions**



**Figure 54-46. 1/16 DIN LCD Count Control — Approximate Dimensions in Inches (mm)**

## Eclipse Series — Durant®



Cat. No. 57700481

## Features

- 1/8 DIN cutout
- NEMA 4X front panel
- Universal AC power supply (85 – 265V AC)
- DC power models (9 – 30V DC)
- Removable screw terminals
- Short Depth: 3.6 inch (91 mm)
- Front panel programming

## Standards and Certifications

- UL and cUL Listed, CE Marked

## Technical Data and Specifications

### Mechanical

- Cutout Dimensions: 3.62" W x 1.77" H (92 mm x 45 mm) DIN standard
- Outline Dimensions: 4.04" W x 2.19" H x 3.87" D (103 mm x 56 mm x 98 mm) 3.60" (92 mm) maximum depth in panel
- Enclosure: Plastic with polyester front label
- Connectors: Up to six depluggable terminal blocks

### Environmental

- Operating Environment: Indoor use to 2000 meters
- Temperature —
  - Operating: 32 to 122°F (0 to 50°C)
  - Storage: -4 to 158°F (-20 to 70°C)
- Humidity: 0 to 85% RH, non-condensing
- Vibration: 2.5 Gs, 30 to 200 Hz
- Shock: 30 Gs, 11 mS half sinewave
- EMC —
  - Immunity to EN 50082-2 (Heavy Industrial)
  - Emissions to EN 50081-2 (Heavy Industrial)
- Front Panel: NEMA 4X when mounted with gasket provided
- CE EMC immunity and emissions requirements were met using shielded wiring on the RS-485, analog output and pulse input/power lines. The shields were connected to earth ground at the Eclipse end of the shields.
- Pollution Degree 2: Overvoltage category II

### Input Power

- AC Powered Models (57701-4XX) —
  - Input Power: 85 – 295V AC, 47 – 63 Hz, 20V A
  - External Fuse: 0.2A, 250V AC, Time Delay (T200 mA, 250V)
  - Isolation Dielectric Strength: 2300V AC
- DC Powered Models (57700-4XX) —
  - Input Power: 9 – 30V DC, 12V A
  - External Fuse: 2.0A, 50V DC, Time Delay (T2A, 50V)
  - Reverse Voltage Protection: Yes
  - Isolation Dielectric Strength: 2300V AC to signal outputs and relays, 500V AC to RS-485 and analog outputs

### Human Interface

- Display: +6, -5 digits
- Type: 0.56" (14.2 mm) high, seven segment, red LED

### Data Retention

- Memory Type: EEPROM, no batteries required
- Duration: 100 years

### Count Signal Input

- Sensor Type: Sink or source, DIP switch selectable
- Input Impedance: 4.75k ohms to +5V DC or 34.9k ohms to ground
- Thresholds —
  - High: 3.5 – 28V DC
  - Low: 0 – 1.9V DC, for single ended signals
- Magnetic Pickup Range: 200 mV p-p to 65 VRMS into 34.9k ohms
- Slow Response: 200 Hz max. (DIP switch 2 and/or 5 ON)
- Fast Response — Count Mode: A or B
  - Add/Add, Add/Subtract, Add w/ Inh: 8250/8250
- Fast Response — Count Mode: A and B
  - Add/Add, Add/Subtract, Add w/ Inh: 3000/3000
  - Quad x1, Quad x2: 3250
  - Quad x4: 2000

### Control Inputs

- Sensor Type: Sink only
- Input Impedance: 4.75k ohms to +5V DC
- Thresholds —
  - High: 3.5 to 28V DC
  - Low: 0 – 1.9V DC
- Response: 25 mS maximum (5V signal)

### Accessory Power Output

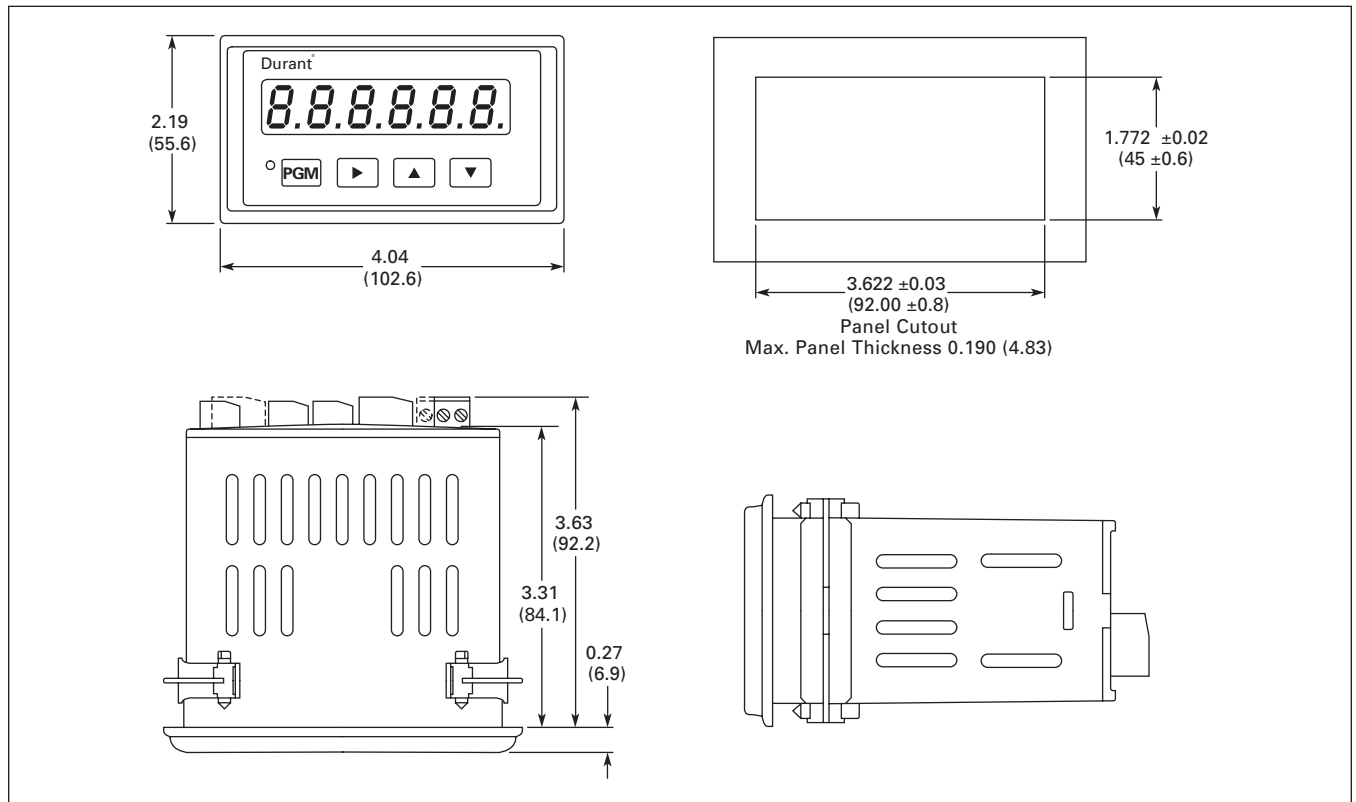
- Voltage: 12V DC +10%/-13%
- Current: 75 mA max.
- Protection: Short circuit protected

**Product Selection**

**Table 54-40. Product Selection — LED Count Control, 6-digit**

Description	Catalog Number	Price U.S. \$
Relay Out, 9 – 30V DC Power Relay Out, 85 – 265V AC Power	57700481 57701481	
Relay & Analog Out, 9 – 30V DC Power Relay & Analog Out, 85 – 265V AC Power	57700483 57701483	
Relay & RS-485 Out, 9 – 30V DC Power Relay & RS-485 Out, 85 – 265V AC Power	57700485 57701485	
Relay, Analog & RS-485 Out, 9 – 30V DC Power Relay, Analog & RS-485 Out, 85 – 265V AC Power	57700487 57701487	

**Dimensions**



**Figure 54-47. Eclipse Series Count Control — Approximate Dimensions in Inches (mm)**



Cat. No. 57601401

## Features

- AC/DC powered, 2-line LCD display
- 8-digit totalizer
- 1/Tau ratemeter
- Totalizer and ratemeter scaling
- Four user-configurable control inputs
- Up to two output relays
- Two solid-state outputs
- RS-485 Serial communications
- Feet/Inches control available

## Standards and Certifications

- UL Listed
- CE Marked

## Technical Data and Specifications

### Power Input

- AC Operation —
  - 115V AC ( $\pm 15\%$ ) std., 50 to 60 Hz, 7W
  - 230V AC ( $\pm 15\%$ ) opt., 50 to 60 Hz, 7W
- DC Operation: 10 – 15V DC opt., 300 mA maximum

### DC Power Output

- 12V DC ( $\pm 25\%$ ), 100 mA maximum (includes all line and load variations)

### Environmental

- Operating Temperature: 32 to 131°F (0 to 55°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Operating Humidity: 85% Relative, non-condensing
- NEMA 4 rating when mounted with gasket provided

### Main Counter

- Type: Bi-directional
- Digits: 6
- Presets: Varies by Model
- Reset modes: Auto or manual reset to zero or preset
- Scaler Range: 0.00001 to 9.99999
- Decimal Point: 5 positions, (6 on 4-preset models)
- Output Latency: See **Table 54-41**

### Batch Counter

- Type: Increment with main counter recycle or final preset signal
- Digits: 6
- Presets: 1
- Output Latency: < 1 mS

### Totalizer

- Type: Bi-directional, same or opposite of main counter
- Digits: 8
- Scaler: Shared with main counter
- Decimal Point: Tracks main counter

### Count Input Speeds

- See **Tables 54-43** and **54-44**

### Count Inputs

- Sink —
  - Impedance: 4.6k ohms to +5V DC
  - Voltage —
    - High: 3.5 to 34.0
    - Low: 0.0 to 1.9V DC
- Source (high) —
  - Impedance: 2.3k ohms to common
  - Voltage —
    - High: 3.5 to 17.0V DC (100% duty cycle)
    - Low: 0.0 to 1.9V DC
- Source (low) —
  - Impedance: 2.3k ohms to common
  - DC Voltage —
    - High: 0.6 to 17.0V DC
    - Low: -17.0 to -0.6V DC
  - AC Voltage: 17V AC (48V Peak-Peak) maximum

### Control Inputs

- Impedance: 4.7k ohms to +5V DC
- Voltage —
  - High: +3.7 to +24V DC
  - Low: 0.0 to 0.9V DC
  - Response: Minimum low 15 mS, minimum high 15 mS

### Relay Outputs

- Type: SPDT contacts
- UL Ratings: 250V AC, 360V A Pilot Duty

### Transistor Outputs (2)

- Type: NPN open collector with transient protection
- Maximum Voltage (OFF state): 30V DC
- Maximum Current (ON state): 200 mA @ 1.3V DC

### Communication

- Type: RS-485
- Format: 1 start bit, 7 data bits (ASCII), 1 parity bit, 1 stop bit
- Protocol: Opto-22 compatible
- Speed: 300, 1200, 2400, 4800, 9600 and 19200 baud
- Parity: Odd, Even, None (space transmitted, ignore received)

### Rate Indicator (Not available on models 57601-415 and 57601-485)

- Type: 1/Tau
- Digits: 6
- Presets: 2
- Scaler Range: 0.00001 to 99999
- Decimal Point: 5 positions, programmable
- Accuracy:  $\pm 0.015\%$  of reading
- Update Time: See **Table 54-42**
- Zero Time: See **Table 54-42**

### Connections

- Type: Dual depluggable screw terminal strips
- Conductor Size: 14 – 22 AWG (2.1 – 0.38 mm<sup>2</sup>), 600V, solid, stranded, or fused (preferred)



**Ambassador Series — Durant®**

**Table 54-41. Output Latency for Ambassador Control**

Style Number	Output Latency
5760X401	0.7 to 2 mS
5760X402	0.7 to 2 mS
5760X403	0.7 to 2.7 mS
5760X404	0.7 to 2.7 mS
5760X405	< 1 mS
5760X415	< 1 mS

**Table 54-42. Rate Indicator Specs for Ambassador Control**

Style Number	Update Time	Zero Time
5760X401	1 second, fixed	10 seconds, fixed
5760X402	1 second, fixed	10 seconds, fixed
5760X403	1 second, fixed	10 seconds, fixed
5760X404	1 second, fixed	10 seconds, fixed
5760X405	0.1 to 99.9 sec, programmable	0.1 to 99.9 sec, programmable
5760X415	0.1 to 999.9 sec, programmable	0.1 to 999.9 sec, programmable

**Table 54-43. Ambassador Count Input Speeds — 5760X405, 5760X415 ①**

Solid-State	A or B	A and B
A - B	8250/8250	3000/3000
A + B	8250/8250	4000/4000
-A + B	8000/8000	3000/3000
A, B Dir	8000/40	—
2A, B Dir	4500/40	—
A, B Rst	8250	—
Quad x 1	—	3250
Quad x 2	—	3250
Quad x 4	—	2000
Tot A/Cnt B	14000/9000	6500/6500
Tot + Cnt B	16000/8500	6500/6500

① Contact inputs = 40 Hz; B Direction inputs = 40 Hz and B Reset input = 10 μS Min. Low. Input A not active on Feet/Inches control.

**Table 54-44. Ambassador Count Input Speeds — 5760X401, 5760X402, 5760X403, 5760X404**

Mode Input A/B	Maximum Speed ②	
	Solid-State (High Speed)	Contact (Low Speed)
Add/Sub	20 kHz	40 kHz
Add/Add	20 kHz	40 kHz
Count/Direction	15 kHz	40 kHz
Count x 2/Direction	7.5 kHz	—
Quadrature	6.5 kHz	—
Quadrature x 2	6.5 kHz	—

② The maximum count speed depends on the selected count mode. All maximum speeds are shown with square waves (50% duty cycle) input.

### Product Selection

Table 54-45. Product Selection — Ambassador Series Count Control

Description	Catalog Number	Price U.S. \$
Single Preset with Rate, 115V AC	57601401	
Single Preset with Rate, Batch and Totalizer, 115V AC	57601402	
Dual Preset with Rate, 115V AC	57601403	
Dual Preset with Rate, Batch and Totalizer, 115V AC	57601404	
Four Preset with Rate, Batch and Totalizer, 10 – 15V DC	57600405	
Four Preset with Rate, Batch and Totalizer, 115V AC	57601405	
Four Preset with Rate, Batch and Totalizer, 230V AC	57602405	
Feet/Inches Control, 115V AC	57601415	
Feet/Inches Control, 230V AC	57602415	

### Dimensions

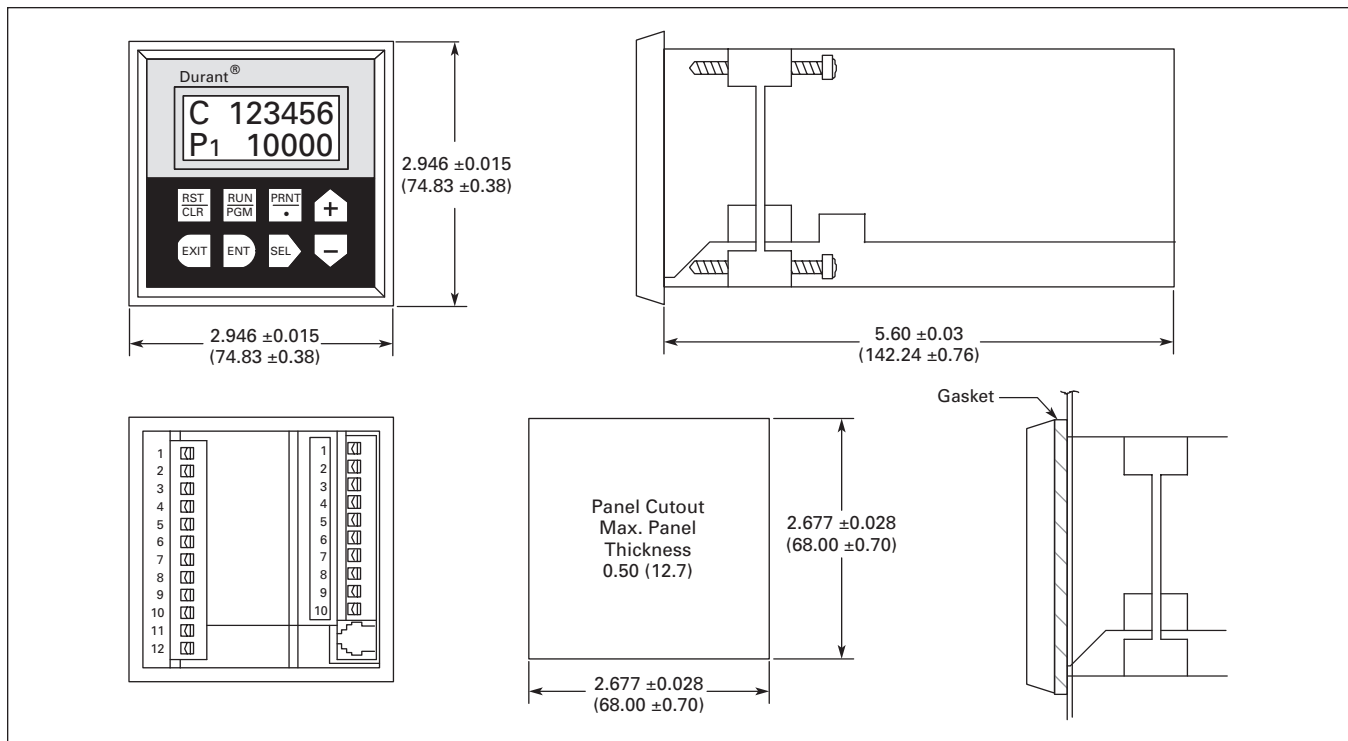


Figure 54-48. Ambassador Series Count Control — Approximate Dimensions in Inches (mm)



Cat. No. 58831400

### Features

- 5- or 6-digit, LED display, 0.56" (14 mm)
- 1, 2 or 3 presets
- 15V DC @ 100 mA output power
- Rear panel screw terminals
- 20 mA current loop communications
- 2 Form C relays
- Tactile keypad NEMA 4 front panel

### Standards and Certifications

- UL Listed, CSA marked
- CE Marked

## Technical Data and Specifications

Table 54-46. President Series — Count Control Specifications

Description	Model				
	57820400	57820401	58821400	58825400	58831400
AC Power Requirements	120V ±10%	240V ±10%	120V/240V +10%/-20%, 47 – 63 Hz		
DC Power Requirements	11 – 30V DC		11 – 28V DC		
Power Consumption	8 Watts max.		18 Watts maximum		
DC Power Output ①	15V DC +1/-2 @ 85 mA max.		15V DC +1/-2; 150 mA if powered from AC or less than 24V DC, 100 mA if powered from 24V DC or greater		
Operating Temperature	32 to 130°F (0 to 55°C)				
Operating Humidity	85% relative, non-condensing				
Storage Temperature	-10 to 160°F (-40 to 71°C)				
Front Panel Rating	NEMA 4 rating when mounted with gasket provided				
Main Counter Scaler Range	N/A		5 Digits (0.0001 to 9.9999)		
Count Input Frequency	10 kHz (5 kHz in Quadrature)		See Table 54-47	See Table 54-53	See Table 54-48
Count Input Impedance	6.8 kΩ to 15V DC when control is powered by AC line; 6.8 kΩ to 10V DC when control is powered by DC line				
Control Input Threshold	High 10.5 to 24.5V DC; Low 0.0 to 4.5V DC when powered by AC				
Control Input Impedance	4.5 kΩ to +5V DC				
Control Input Response Time	Min. High 5.3 mS; Min. Low 3.9 mS				
Relay Contact Output Ratings	SPDT Form C; 10 amps resistive @ 24V DC or 230V AC; 1/3 hp @ 115V AC or 230V AC; 150V DC max switched voltage; 5,000,000 operations mechanical life, 100,000 operations at resistive rating				
Transistor Output Ratings	Open collector NPN transistor with Zener diode transient surge protection; 30V DC max. load; 300 mA max. per transistor; 480 mA total for all transistors. Use 5 mA per relay coil when calculating total transistor current				
Communications	N/A		Dual Port 20 mA current loop, Standard ASCII code		

① DC power output is only regulated if unit is powered by AC or greater than 18.5V DC.

## President Series — Durant®

Table 54-46. President Series — Count Control Specifications (Continued)

Description	Model				
	58841400	58851400	58827400	58827410	58867400
AC Power Requirements	120V/240V +10%/-20%, 47 – 63 Hz				
DC Power Requirements	11 – 28V DC				
Power Consumption	18 Watts max.				
DC Power Output ①	15V DC +1/-2; 150 mA if powered from AC or less than 24V DC, 100 mA if powered from 24V DC or greater				
Operating Temperature	32 to 130°F (0 to 55°C)				
Operating Humidity	85% relative, non-condensing				
Storage Temperature	-10 to 160°F (-40 to 71°C)				
Front Panel Rating	NEMA 4 rating when mounted with gasket provided				
Main Counter Scaler Range	5 Digits (0.0001 to 9.9999)				6 Digits (0.00001 to 9.99999)
Count Input Frequency	See Table 54-48	See Table 54-49	See Table 54-50	See Table 54-52	See Table 54-51
Count Input Impedance	6.8 kΩ to 15V DC when control is powered by AC line; 6.8 kΩ to 10V DC when control is powered by DC line				
Control Input Threshold	High 10.5 to 24.5V DC; Low 0.0 to 4.5V DC when powered by AC				
Control Input Impedance	4.5 kΩ to +5V DC				
Control Input Response Time	Min. High 5.3 mS; Min. Low 3.9 mS				
Relay Contact Output Ratings	SPDT Form C; 10 amps resistive @ 24V DC or 230V AC; 1/3 hp @ 115V AC or 230V AC; 150V DC max switched voltage; 5,000,000 operations mechanical life, 100,000 operations at resistive rating				
Transistor Output Ratings	Open collector NPN transistor with Zener diode transient surge protection; 30V DC max. load; 300 mA max. per transistor; 480 mA total for all transistors. Use 5 mA per relay coil when calculating total transistor current				
Communications	Dual Port 20 mA current loop, Standard ASCII code				

① DC power output is only regulated if unit is powered by AC or greater than 18.5V DC.

Table 54-47. 58821400 Count Frequency

Scale Factor	Count Speed (Pulses per Second)	
	Nominal Count	Quadrature and/or Doubled Count
< 1.0000	6,250	3,125
1.0000	7,500	3,750
1.9999	5,000	2,500
2.0000	6,250	3,125
9.0000	2,500	1,250
9.9999	2,000	1,000

Table 54-48. 58831400, 58841400, 58861400 Count Frequency

Scale Factor	Count Speed (Pulses per Second)	
	Nominal Count	Quadrature and/or Doubled Count
< 1.0000	5,000	2,500
1.0000	7,500	3,750
1.9999	4,000	2,000
2.0000	6,000	3,000
9.0000	2,000	1,000
9.9999	1,500	750

Table 54-49. 58851400 Count Frequency

Scale Factor	Count Speed (Pulses per Second)			
	Function 61 value = "0"		Function 61 value = "1"	
	Nominal Count	Quadrature and/or Doubled Count	Nominal Count	Quadrature and/or Doubled Count
< 1.0000	5,000	2,500	3,500	1,750
1.0000	7,500	3,750	4,500	2,250
1.9999	4,000	2,000	2,400	1,200
2.0000	6,000	3,000	3,600	1,800
9.0000	2,000	1,000	1,100	550
9.9999	1,500	750	1,000	500

**Table 54-50. 58827400 Count Frequency**

Scale Factor	Count Speed (Pulses per Second)		
	Count Up	Count Down	Quadrature
0.999	4,000	2,250	2,000
1.000	5,000	3,500	3,500
1.999	3,500	2,000	1,250
2.000	4,000	3,000	2,750
9.000	1,500	1,500	1,500
9.999	1,250	1,000	1,000

**Table 54-51. 58867400 Count Frequency**

Count Mode	Count Speed (Pulses per Second)		
	X1	X2	X3
High Speed	30,000	15,000	7,500
Low Speed	200	200	200

**Note:** The maximum count input frequency depends only on the selected count mode (doubled or quadrature x4). The maximum input frequencies shown are with square wave (50% duty cycle) input.

**Table 54-52. 58827410 Count Frequency**

Sample Scale Factor	Count Speed (Pulses per Second)				
	Typical Combinations of Features <sup>①</sup>				
	C1 = ON C2 = OFF C3 = OFF RM = OFF	C1 = ON C2 = ON C3 = OFF RM = OFF	C1 = ON C2 = ON C3 = ON RM = OFF	C1 = ON C2 = ON C3 = OFF RM = ON	C1 = ON C2 = ON C3 = ON RM = ON
0.0001 – 0.9999	6,000	3,000	2,300	2,600	2,000
1.0000	9,000	4,500	3,500	4,000	3,000
5.0000	4,500	2,250	1,000	2,000	750
9.9999	1,500	1,000	500	750	550

<sup>①</sup> C1: Counter #1; C2: Counter #2; C3: Counter #3; RM: Ratemeter.

**Table 54-53. 58825400 Count Frequency**

Scale Factor	Count Speed (Pulses per Second)	
	Nominal Count	Quadrature and/or Doubled Count
< 1.0000	4,200	2,100
1.0000	7,500	3,750
1.9999	3,450	1,720
2.0000	6,250	3,120
9.0000	2,500	1,250
9.9999	1,800	900

### Product Selection

Table 54-54. Product Selection — President Series Count Control

Description	Features								Catalog Number	Price U.S. \$
	Totalizer	Batch Counter	Rate	Scaler	Crop-Cut	Main Counter	Presets	Digits		
120V AC, No Communications	—	—	✓	—	—	1	1	5	57820400	
240V AC, No Communications	—	—	✓	—	—	1	1	5	57820401	
Single Preset	—	—	—	✓	—	1	1	5	58821400	
Single Preset with Rate	—	—	✓	✓	—	1	1	5	58825400	
Dual Preset	—	—	—	✓	—	1	2	5	58831400	
Dual Preset with Batch	—	✓	—	✓	✓	1	2	6	58841400	
Dual Preset with Totalizer or Batch Counter	①	①	—	✓	✓	1	2	6	58851400	
Three Preset with Floating Pre-Warn	—	—	—	✓	—	1	3	6	58861400	
Main Counter, Batch and Totalizer Presets	②	②	✓	✓	—	3	1 ea.	6	58827400	
Two Independent Count Registers	③	③	✓	✓	—	3	1 ea.	6	58827410	
High-Speed Count Control — 30 kHz Max.	—	✓	✓	✓	—	1	2	6	58867400	

- ① These models have, in addition to the main count register, a register that may be configured to be used as either a totalizer or single preset batch counter. These two functions are mutually exclusive.
- ② The Model 58827-400 has both a totalizer and a batch counter, each with a single preset. In addition, the batch counter may be configured as an additional totalizer with control instead of batch counter.
- ③ The Model 58827-410 has two completely independent count input channels feeding two independent, single preset count registers. In addition, a third single preset register may be used as either a totalizer or a batch counter for one or both of the two main counters.

### Dimensions

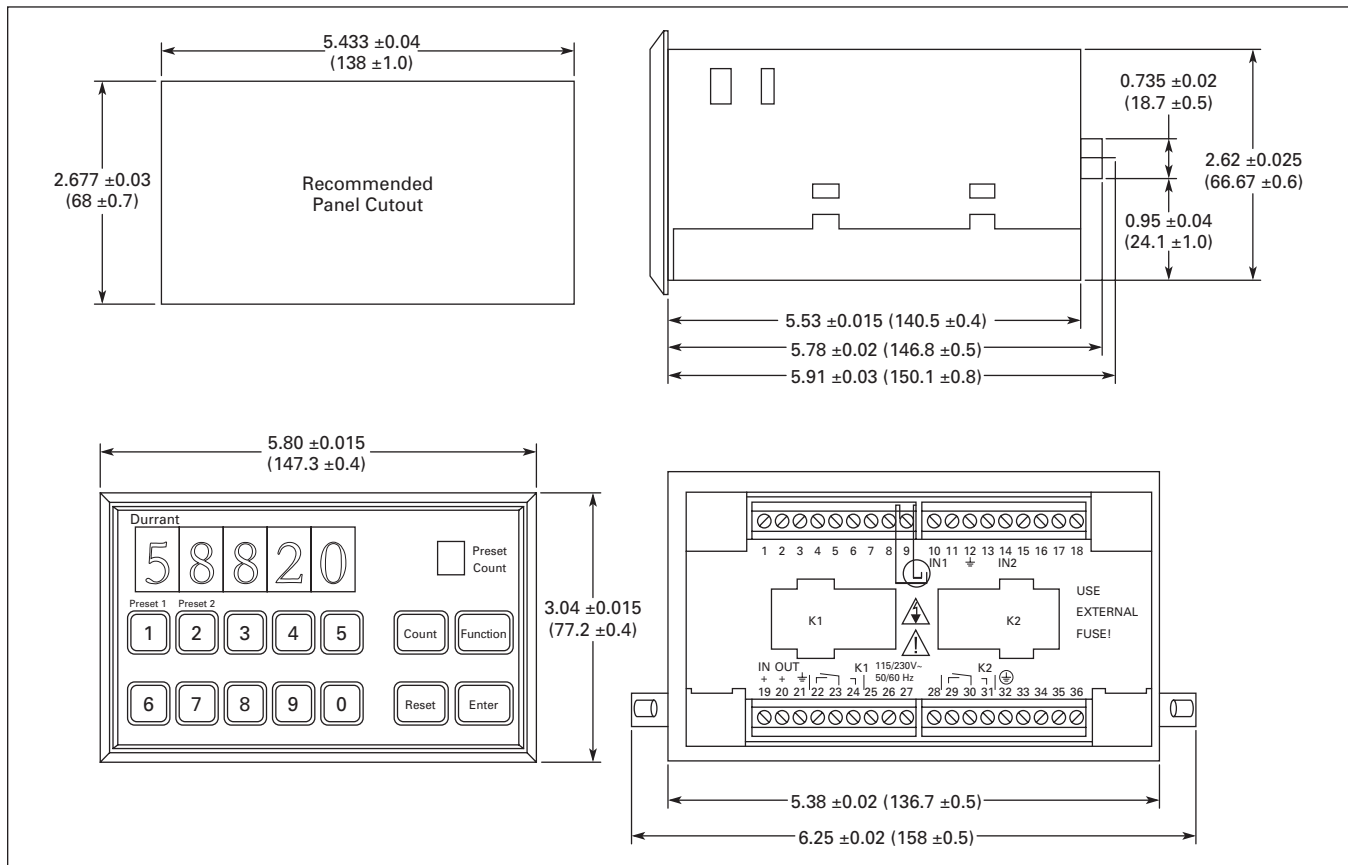
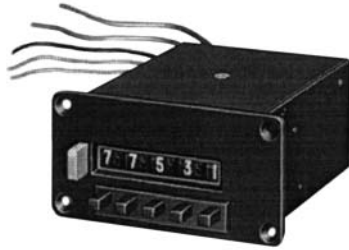


Figure 54-49. President Series Count Control — Approximate Dimensions in Inches (mm)





*Cat. No. 5-Y-41433-\*PD-Q*

**Product Description**

The PD-Q Series is a five-digit, true subtracting electric predetermined counter that features pushbutton operation of both predetermined count settings and reset. The predetermined count is set by holding the RESET button in and then depressing the easy to operate pushbutton selectors under each digit. The unit subtracts, one count for each contact closure or impulse and actuates a 4 ampere, 250V AC switch when zero is reached. The output signal from this switch can be used to halt or change the flow of items being counted, and/or operate other electrical apparatus. The counter returns to the predetermined number when the RESET button is depressed and it is immediately ready to control the next lot or batch.

The PD-ER Series is identical to the PD-Q Series, except that it has electric reset (ER) for remote operation, allowing either local or remote use.

**Technical Data and Specifications**

- Number of Digits: 5
- Speed: 1000 cpm
- Window: Acrylic
- Shaft: Stainless Steel
- Frame: Zinc Alloy Die Cast
- Digit Size: 3/16 inch high by 7/64 inch wide (4.8 x 2.8 mm)
- Weight —
  - Series PD-Q: 0.53 Lb. (0.24 kg)
  - Series PD-ER: 1.06 Lb. (0.48 kg)
- Finish: Dull Instrument Black with Red RESET Button
- Power Consumption —
  - Series PD-Q: 9 Watts
  - Series PD-ER: Count Coil 9 Watts, Reset Coil 20 Watts
- Switch Rating: SPDT, 4 amperes at 250V AC

**Product Selection**

**Table 54-55. Product Selection — PD-Q and PD-ER Series Predetermined Counters**

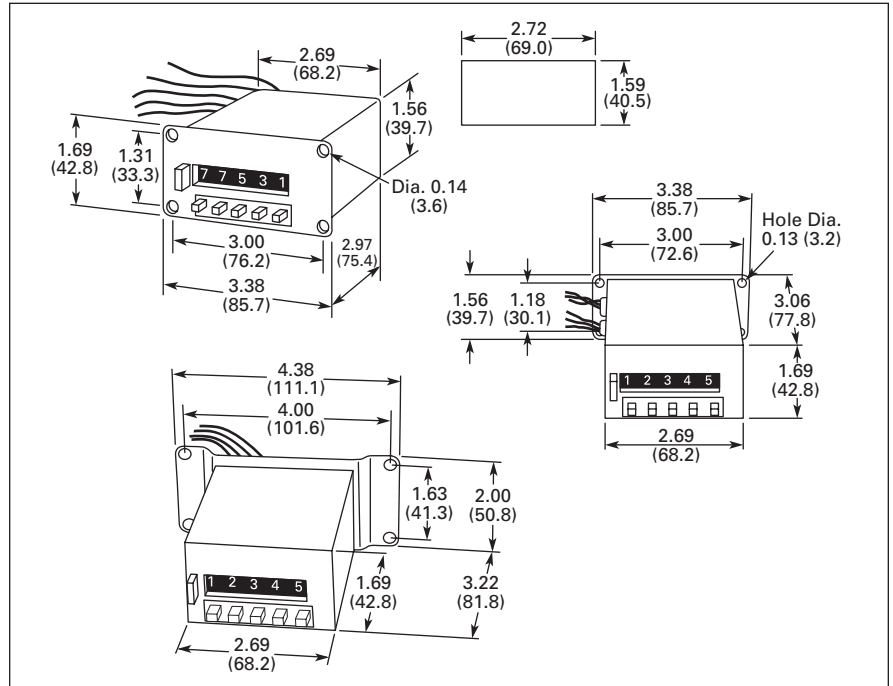
Voltage	Mounting	Wire Leads	Catalog Number	Order Number	Price U.S. \$
12 DC	Panel	Rear	5-Y-41433-401-PD-Q	41433401	
24 DC	Panel	Rear	5-Y-41433-402-PD-Q	41433402 ①	
120 AC	Panel	Rear	5-Y-41433-406-PD-Q	41433406 ①	
240 AC	Panel	Rear	5-Y-41433-407-PD-Q	41433407	
24 AC	Panel	Rear	5-Y-41433-408-PD-Q	41433408	
12 DC	Base	Rear	5-Y-41469-401-PD-Q	41469401	
24 DC	Base	Rear	5-Y-41469-402-PD-Q	41469402 ①	
120 AC	Base	Rear	5-Y-41469-406-PD-Q	41469406 ①	
240 AC	Base	Rear	5-Y-41469-407-PD-Q	41469407	
24 AC	Base	Rear	5-Y-41469-408-PD-Q	41469408	
12 DC	Base	Side	5-Y-41470-401-PD-Q	41470401	
24 DC	Base	Side	5-Y-41470-402-PD-Q	41470402 ①	
120 AC	Base	Side	5-Y-41470-406-PD-Q	41470406 ①	
240 AC	Base	Side	5-Y-41470-407-PD-Q	41470407	
24 AC	Base	Side	5-Y-41470-408-PD-Q	41470408	
12 DC	Panel	Rear	5-Y-41625-401-PD-ER	41625401	
24 DC	Panel	Rear	5-Y-41625-402-PD-ER	41625402 ①	
120 AC	Panel	Rear	5-Y-41625-406-PD-ER	41625406 ①	
240 AC	Panel	Rear	5-Y-41625-407-PD-ER	41625407	
24 AC	Panel	Rear	5-Y-41625-408-PD-ER	41625408	

① UL Recognized.

**When Ordering Specify**

When ordering PD-Q and PD-ER Series Predetermined Counters, specify Catalog Numbers according to the features selected.

**Dimensions**



**Figure 54-50. PD-Q and PD-ER Series — Approximate Dimensions in Inches (mm)**

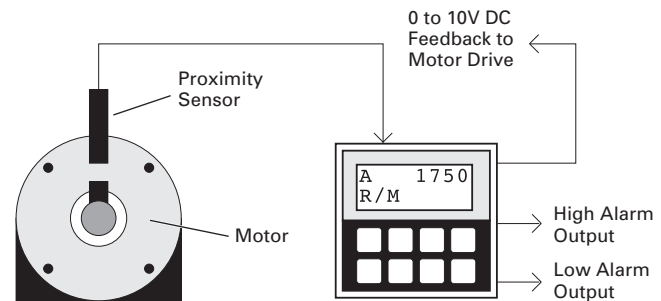
## Product Family Overview

## Introduction

Ratemeters are used in a variety of applications where it is necessary to monitor the speed of a process. Conveyors, baking ovens, material flow and motor speed are typical uses for ratemeters. Eaton/Durant models with alarm outputs can be used to detect high or low rates. Rate indicators are often included as a standard feature on totalizers and count controls.

## Application Example









One of the most common ratemeter applications is a tachometer. A tachometer displays motor or shaft RPM. The inductive proximity sensor detects the key on the shaft and the meter calculates the rate at which the shaft is turning based on a user-defined scaling factor. Signals from encoders, mag pick-ups, Hall effect sensors, etc. may also be used as inputs.



Application Example

## Ratemeter Product Family Overview

Table 54-56. Product Family Overview

Product Family	Characteristics	Panel Cutout in Inches (mm)	Catalog Page
 E5-24-E	<ul style="list-style-type: none"> <li>■ Compact device with bright, LED display</li> <li>■ Multiple functions available: count, time, rate, multifunction, double-function</li> <li>■ 24V DC Power</li> </ul>	0.870 x 1.772 (22 x 44)	54-25
 E5-148-C	<ul style="list-style-type: none"> <li>■ Low cost, simple count control</li> <li>■ Various power options: battery, AC, DC</li> <li>■ Easy-to-change preset values</li> <li>■ 2-line display: input and preset values</li> </ul>	1.772 x 1.772 (45 x 45)	54-38
 E5-496-C	<ul style="list-style-type: none"> <li>■ Economical, multifunction display</li> <li>■ Large, LED characters</li> <li>■ AC or DC power options</li> </ul>	1.772 x 1.622 (45 x 92)	54-28
 Courier	<ul style="list-style-type: none"> <li>■ Replaceable lithium battery</li> <li>■ 8-digit, high-visibility LCD display</li> <li>■ Optional backlighting</li> <li>■ Various input options available</li> </ul>	1.299 x 2.677 (33 x 68)	54-53
 Eclipse	<ul style="list-style-type: none"> <li>■ 6-digit, super bright LED display</li> <li>■ Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls</li> </ul>	1.772 x 1.622 (45 x 92)	54-54
 Ambassador	<ul style="list-style-type: none"> <li>■ 6-digit, high-visibility, 2-line LCD display</li> <li>■ User-configurable control inputs</li> <li>■ Highly flexible control/display</li> </ul>	2.667 x 2.667 (68 x 68)	54-56
 President	<ul style="list-style-type: none"> <li>■ Bright LED display w/14 mm characters</li> <li>■ Simple configuration with 14-button tactile keypad</li> <li>■ Many different versions fit almost any application</li> </ul>	2.667 x 5.433 (68 x 138)	54-31
 Fusion	<ul style="list-style-type: none"> <li>■ Integrated controller combines operator interface, ladder logic and high-speed counting</li> </ul>	2.667 x 5.433 (68 x 138)	54-81

### Courier Series — Durant®

### Contents

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*Courier Series*

### Features

- 1/Tau ratemeter
- Scaling capabilities
- Remote reset terminal
- 0.43 inch (10.9 mm) display
- Front panel reset
- NEMA 4X

### Standards and Certifications

- CE Marked

### Technical Data and Specifications

#### Power

- Internal Battery: 3V, Lithium
- Life Expectancy: 5 years +
- Replacement Part: 35367-202

#### Backlight

- 10 – 30V DC @ 30 mA max.

**Note:** Derate operating temperature 1°C/ Volt above 17V DC.

- Reverse polarity protected

#### Physical

- Operating Temperature —
  - Model 53300-404: 32 to 131°F (0 to 55°C)
  - Model 53301-404: -4 to 158°F (-20 to 70°C)
  - Model 53302-404: 32 to 131°F (0 to 55°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)

- Operating Humidity: 60% R.H. (non-condensing)
- Weight: 2.2 oz. (62 g) net
- Display Size: 0.43" (10.9 mm) high
- Front Panel Rating: NEMA 4X when mounted with gasket provided
- Case Material: Cyclocac X-17

#### Rate Indicator

- Type: 1/Tau
- Digits: 4/5 (4 calculated, 5 displayed with fixed 0 in LSD)
- Scaler Range: 0.001 to 9999.
- Decimal Point: 5 positions, programmable
- Accuracy: ± 0.2%
- Update Time: 0.7 seconds
- Zero Time: 10 seconds

#### DC Common (Terminal 1) Rate Inputs

- Input B (Terminal 2) Low speed input designed for contact closures to DC common
  - Speed: 0 to 20 Hz
  - Min. Low Time: 10 mS
  - Min. High Time: 40 mS
  - Input Impedance: 101k Ohm

- Voltage Thresholds —
  - Low: 0 – 0.4V DC
  - High: 2.0 – 28V DC
  - Max. High: 28V DC

- Input A (Terminal 3) High speed input requiring a voltage source such as a current sourcing sensor or a current sinking sensor used with the provided pull up resistors
  - Speed: 0 to 10 Hz
  - Min. Low Time: 80 mS
  - Min. High Time: 20 mS

**Note:** The above times are with a 0 – 5.0V swing.

- Input Impedance: 2k Ohm above 5V DC
- Voltage Thresholds —
  - Low: 0 – 1.2V DC
  - High: 2.0 – 28V DC
  - Max. High: 28V DC

#### Programmable Enable Input (Terminal 5)

- Operation: Level sensitive (maintained)

#### Count Accuracy

- 100% when operated within

### Product Selection

Table 54-57. Product Selection — LCD 1/Tau Ratemeter

Description	Order Number	Price U.S. \$
Battery	53300404	
Extended Temperature Range, Battery	53301404	
Backlight, Battery	53302404	

**Note:** For units with Rate and Total, see Totalizers.

### Dimensions

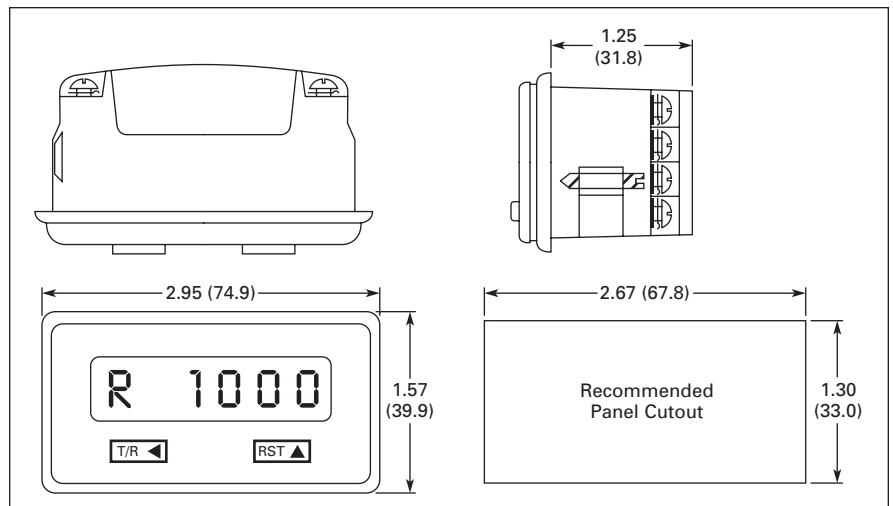


Figure 54-51. Courier Series Ratemeter — Approximate Dimensions in Inches (mm)

## Eclipse Series — Durant®



Cat. No. 57700470

## Features

- 1/8 DIN Cutout
- NEMA 4X Front Panel
- Universal AC Power Supply (85 – 265V AC)
- DC Power Modules (9 – 30V DC)
- Removable Screw Terminals
- Short Depth: 3.6 inch (91 mm)
- Front Panel Programming

## Standards and Certifications

- UL and cUL Listed, CE Marked

## Technical Data and Specifications

## Input Power

- AC Powered Models (57701-4XX) —
  - Input Power: 85 – 265V AC, 47 – 63 Hz, 20V A
  - External Fuse: 0.2A, 250V AC, Time Delay (T200 mA, 250V)
  - Isolation Dielectric Strength: 2300V AC
- DC Powered Models (57700-4XX)—
  - Input Power: 9 – 30V DC, 12 VA
  - External Fuse: 2.0A, 50V DC, Time Delay, (T2A, 50V)
  - Reverse Voltage Protection: Yes
  - Isolation Dielectric Strength: 2300V AC to signal inputs and relays, 500V AC to RS-485 and analog outputs

## Human Interface

- Display: 5 digits
- Type: 0.56" high, seven segment, red LED
- Indicator: One red LED program/calibration indicator
- Update Time: 0.1 to 99.9 seconds minimum

## Data Retention

- Memory Type: EEPROM, no batteries required
- Duration: 100 years

## Signal Input

- Rate/Process Time: Signal In
- Sensor Type: Sink or source, DIP switch selectable
- Input Impedance: 4.75 k ohms to +5V DC or 34.9 k Ohms to ground
- Thresholds —
  - High 3.5 to 28V DC
  - Low 0 to 1.9V DC, for single ended signals
- Magnetic Pickup Range: 200 mV p-p to 65 VRMS into 34.9 k Ohms
- Frequency Response: 200 Hz max. or 10 kHz max. (5V signals), DIP switch selectable

## Program Enable Input

- Sensor Type: Sink only
- Input Impedance: 4.75 k Ohms to +5V DC
- Thresholds —
  - High 3.5 to 28V DC
  - Low 0 to 1.9V DC
- Response: 25 mS max. (5V signal)

## Accessory Power Output

- Voltage: 12V DC  $\pm$  12%
- Current: 75 mA max.
- Protection: Short circuit protected

## Optional Outputs

- Relay Board —
  - Number of relays: 2
  - Contact type: 1 set form C per relay
  - Contact rating: 5A, 250V AC or 30V DC
  - Isolation dielectric strength: 2300V AC
- Analog Retransmission —
  - Output signals: 4 – 20 mA (<750  $\Omega$ ) and 0 – 10V (>2500  $\Omega$ )
  - Accuracy: 0.13% full scale and 100 PPM / $^{\circ}$ C (and 0.07% full scale change over 4 – 20 mA load ranges)
  - Isolation dielectric strength: 2300V AC to signal inputs, relays and AC power inputs; 500V AC to RS-485 and DC power inputs
- RS-485 Serial Communications —
  - Baud Rate: 1200, 2400, 4800, 9600, or 19,200, programmable
  - Parity: Even, odd or no parity
  - Address Range: 00 to 99 decimal
  - Protocol: Opto 22® compatible
  - Isolation Dielectric Strength: 2300V AC to signal inputs, relays and AC power inputs; 500V AC to analog outputs and DC power inputs

## Environmental

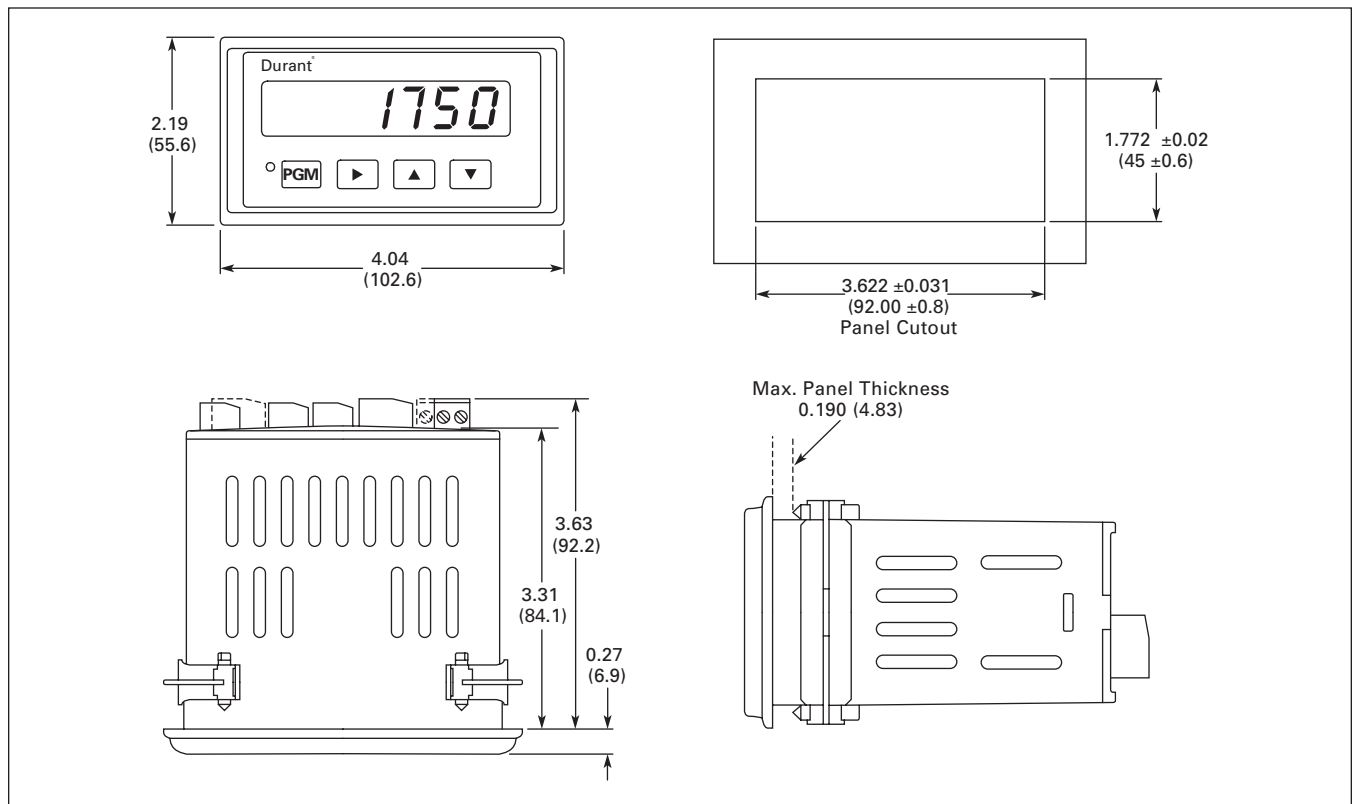
- Operating Environment: Indoor use to 2000 meters
- Temperature —
  - Operating: 32 to 122°F (0 to 50°C)
  - Storage: -4 to 158°F (-20 to 70°C)
- Humidity: 0 to 85% RH, non-condensing
- Vibration: 2.5 Gs, 30 to 200 Hz
- Shock: 30 Gs, 11 mS half sinewave
- EMC —
  - Immunity to EN 50082-2 (Heavy Industrial)
  - Emissions to EN 50081-2 (Heavy Industrial)
- Front Panel: NEMA 4X when mounted with gasket provided
- CE EMC immunity and emissions requirements were met using shielded wiring on the RS-485, analog output and pulse input/power lines. The shields were connected to earth ground at the Eclipse end of the shields.
- Pollution Degree 2: Overvoltage category II

**Product Selection**

**Table 54-58. Product Selection — Eclipse Series 5-digit LED Ratemeter**

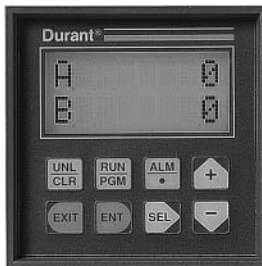
Description	Catalog Number	Price U.S. \$
9 – 30V DC	57700470	
9 – 30V DC, Alarms	57700471	
9 – 30V DC, Analog Out	57700472	
9 – 30V DC, Alarms, Analog Out	57700473	
9 – 30V DC, RS-485	57700474	
9 – 30V DC, Alarms, RS-485	57700475	
9 – 30V DC, Analog Out, RS-485	57700476	
9 – 30V DC, Alarms, Analog Out, RS-485	57700477	
85 – 265V AC	57701470	
85 – 265V AC, Alarms	57701471	
85 – 265V AC, Analog Out	57701472	
85 – 265V AC, Alarms, Analog Out	57701473	
85 – 265V AC, RS-485	57701474	
85 – 265V AC, Alarms, RS-485	57701475	
85 – 265V AC, Analog Out, RS-485	57701476	
85 – 265V AC, Alarms, Analog Out, RS-485	57701477	

**Dimensions**



**Figure 54-52. Eclipse Series Ratemeters — Approximate Dimensions in Inches (mm)**

## Ambassador Series — Durant®



Cat. No. 57150400

## Features

- AC/DC powered, 2-line LCD display
- 2-Line, 5-digit, high visibility, 0.3" (7.5 mm) characters, backlit display
- 1 or 2 rate inputs
- 2 rate alarms
- Dual rate unit ratio calculations — A/B, A-B or draw
- Programmable average and zero times
- Programmable decimal point
- 12V DC, 100 mA max. output power
- Removable screw terminals
- RS-485 communications
- NEMA 4 front panel

## Standards and Certifications

- UL and cUL Listed, CE Marked

## Technical Data and Specifications

### Power Input

- Model 57150-40X: 10 to 15V DC, 300 mA maximum
- Model 57151-40X: 115V AC ( $\pm 15\%$ ) 50 – 60 Hz, 7W
- Model 57152-40X: 230V AC ( $\pm 15\%$ ) 50 – 60 Hz, 7W

### DC Power Output (AC Models Only)

- 12V DC ( $\pm 25\%$ ), 100 mA maximum (includes all line and load variations)

### Environment

- Operating Temperature: 32 to 131°F (0 to 55°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Operating Humidity: 85% Relative, non-condensing
- NEMA 4 rating when mounted with gasket provided

### Ratemeter

- Type: 1/Tau
- Digits: 5 with overrange indication
- Scaler Range: 0.00001 to 99999
- Decimal Point: 5 positions, programmable
- Average Time: 0.1 to 99.9 seconds, programmable
- Zero Time: 0.1 to 99.9 seconds, programmable
- Accuracy:  $\pm 0.015\%$  of reading

### Maximum Rate Input Frequencies

- All maximum frequencies listed are with a square wave input (50-50 duty cycle).

### Contact Input

- 40 Hz

### Solid-State Input

- Sinking Sensor (All DIPs off): 7.3 kHz
- Sourcing Sensor (Push-Pull Output) —
  - High Threshold (DIPs 1 and 2 on, 3 and 4 off) —
    - 0 – 5V, single input 50 kHz
    - 0 – 5V, two inputs 30 kHz (each input)
    - 0.5 – 4.5V, single input 40 kHz
    - 0.5 – 4.5V, two inputs 30 kHz (each input)
    - 0 – 15V, two inputs 22 kHz (each input)
  - Low Threshold (All DIPs on) —
    - -1 to +1V, single input 27 kHz
    - -2 to +2V, single input 43 kHz
    - $\leq -3$  to  $\geq +3$ V, single input 60 kHz
    - $\leq -2$  to  $\geq +2$ V, two inputs 30 kHz (each input)

### Rate Inputs

- Sink —
  - Impedance: 4.6k ohms to +5V DC
  - Voltage: High 3.5 to 34.0, low 0.0 to 1.9V DC

- Source (High) —
  - Impedance: 2.3k ohms to common
  - Voltage: High 3.5 to 17.0V DC, low 0.0 to 1.9V DC
- Source (Low) —
  - Impedance: 2.3k ohms to common
  - DC Voltage: High 0.63 to 17.0V DC, low -17.0 to -0.6V DC
  - AC Voltage: 17V AC (48V Peak-Peak) maximum

### Control Inputs

- Impedance: 4.7k ohms to +5V DC
- Voltage: High +3.7 to +24V DC, low 0.0 to 0.9V DC
- Response: Min Low 15 mS, Min High 15 mS

### Transistor Outputs (x2 for 5715X-401; x4 for 5715X-405)

- Type: NPN open collector with transient protection
- Max. Voltage (OFF state): 30V DC
- Max. Current (ON state): 200 mA @ 1.3V DC

### Communication

- Type: RS-485
- Format: 1 start bit, 7 data bits (ASCII), 1 parity bit, 1 stop bit
- Protocol: Opto-22 compatible
- Speed: 300, 1200, 2400, 4800, 9600, 19200 Baud
- Parity: Odd, Even, None (space transmitted, ignore received)

### Analog Output (Models 5715X-401 Only)

- Range: 0 – 10V DC  $\pm 0.2\%$  at 5 mA
- DAC Resolution: 12 bit

### Connections

- Type: Dual depluggable screw terminal strips
- Conductor Size: 14 – 22 AWG (2.1 – 0.38 mm<sup>2</sup>), 600V, solid, stranded or fused (preferred)



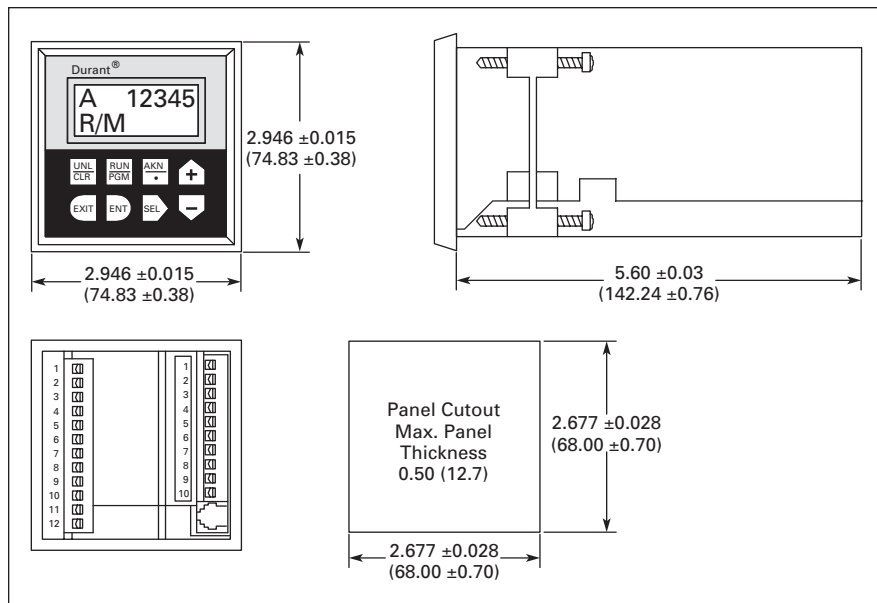
**Product Selection**

**Table 54-59. Product Selection — Ambassador Series Ratemeters**

Description	Catalog Number	Price U.S. \$
<b>Single Input</b>		
LCD Rate indicator, 2 Rate Alarms, 10 – 15V DC	57150400	
LCD Rate indicator, 2 Rate Alarms, 115V AC	57151400	
LCD Rate indicator, 2 Rate Alarms, 230V AC	57152400	
<b>Dual Input ①</b>		
Rate/Ratio/Draw with Alarms & Analog Out, 10 – 15V DC	57150405	
Rate/Ratio/Draw with Alarms & Analog Out, 115V AC	57151405	
Rate/Ratio/Draw with Alarms & Analog Out, 230V AC	57152405	

① The accuracy of the ratio calculation is dependent upon the resolution of the displayed rates, which are calculated as rounded integers. The ratio calculation treats the displayed rate as integers and the result is displayed as a rounded integer. A and B scalars should be adjusted for maximum resolution.

**Dimensions**



**Figure 54-53. Ambassador Series Ratemeters — Approximate Dimensions in Inches (mm)**



## Product Family Overview

## Introduction



Digital Panel Meters are found anywhere a process variable needs to be indicated. Volts, current, pressure, volume, temperature and frequency are typical applications. The product's short depth makes it flexible and accommodating to panel builder needs. A variety of input and output options allows Eaton/Durant DPMs to be used virtually anywhere.

## Application Examples

- Monitor current draw from motor to identify potential failures
- Display pressure reading from transducer with high-pressure alarm
- Display system voltage and detect under voltage or over voltage conditions

## Digital Panel Meters Product Family Overview

Table 54-60. Product Family Overview

Product Family	Characteristics	Panel Cutout in Inches (mm)	Catalog Page
 <p><i>E5-324-E</i></p>	<ul style="list-style-type: none"> <li>■ Bright, easy-to-read LED in 1/32 DIN package</li> <li>■ Programmable scaling of inputs</li> <li>■ Input for Display-Hold</li> <li>■ 24V DC power</li> </ul>	0.870 x 1.772 (22 x 44)	54-59
 <p><i>Eclipse</i></p>	<ul style="list-style-type: none"> <li>■ 6-digit, super bright LED display</li> <li>■ Multiple models available: DC Voltage, AC Voltage, DC Current, AC Current, 5A AC Current, 4 – 20 mA / 0 – 10V Process Meter</li> <li>■ Various output options including Relay, Analog and RS-485</li> </ul>	1.772 x 1.622 (45 x 92)	54-60

**E5-324-E Series**

**Contents**

<i>Description</i>	<i>Page</i>
<b>Digital Panel Meters</b>	
E5-324-E Series . . . . .	54-59
Eclipse Series . . . . .	54-60



*Cat. No. E5-324-E0402*

**Features**

- Galvanic isolation with protection against incorrect polarity
- Automatic MIN/MAX value detection
- Freely programmable characteristic curve end points
- Input Range —
  - 1 current measuring input (0/4 – 20 mA)
  - 1 voltage measuring input (0/2 – 10V)
- Compact display for analog standard signals
- Display range -19.999 to 99.999 with zero blanking
- Modern industrial design
- Input for Display-Hold

**Standards and Certifications**

- UL Recognized
- CE Marked

**Technical Data and Specifications**

- Supply Voltage: 10 – 30V DC, galvanically isolated with integrated protection against incorrect polarity
- Current Consumption: Max. 50 mA
- Display: 5-digit display, red 7-segment LEDs; 0.31 Inch (8 mm) high
- Measuring Rate: 2 measurements/second
- Data Backup: EEPROM
- Housing: Housing for control panel 1.898 x 0.94 Inch (48 x 24 mm); Acc. to DIN 43 700, RAL 7021, dark gray

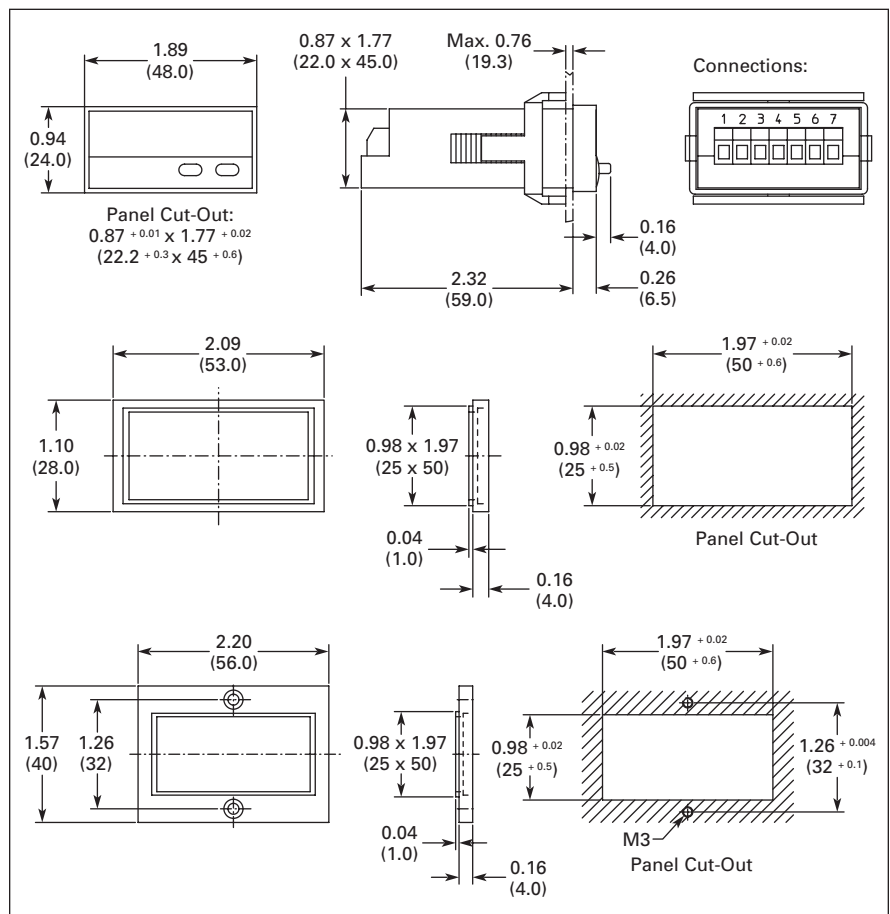
- Ambient Temperature: 14 to 122° F (-10 to 50°C)
- EMC: According to EC EMC directive 89/36/EEC
- Interference Emissions: EN 61 000-6-4/ EN 55011 Class B
- Interference Resistance: EN 61 000-6-2
- Protection: IP65 (front)
- Input Current Measurement: 0 – 20 mA, 4 – 20 mA, voltage drop max. 1.5V DC
- Input Voltage Measurement: 0 – 10V, 2 – 10V
  - Input resistance approx.: 1 MΩ
  - Max. input signal level: 30V DC
- Control Inputs —
  - High: 4 – 30V DC
  - Low: 0 – 2V DC
- Resolution: 14 bits
- Error: <0.1% For the whole measuring range at an ambient temperature of 68°F (20°C)
- Weight: Approx. 1.76 oz (50 g)
- Connection Technique: Screw terminal, pitch 0.2 Inch (5.08 mm), 7 poles

**Product Selection**

**Table 54-61. Product Selection — E5-324-E0402**

Description	Catalog Number	Price U.S. \$
LED Digital Panel Meter, 24 x 48 mm	<b>E5-324-E0402</b>	

**Dimensions**



**Figure 54-54. E5-324-E Series — Approximate Dimensions in Inches (mm)**

## Eclipse Series — Durant®



Cat. No. 57700400

## Features

- 4 Full digits
- 1/8 DIN Size
- Red, LED display
- 0.56" (14 mm) high characters
- Scalable display
- Flashing alarms
- Maximum/minimum data hold
- Optional analog, relay and RS-485 outputs
- NEMA 4X
- Depluggable terminal blocks

## Standards and Certifications

- UL and cUL Listed, CE Marked

## Technical Data and Specifications

## Input Power

- AC Powered Models (57751-4XX)
  - Input Power: 85 – 265V AC, 47 – 63 Hz, 20 VA
  - External Fuse: 0.2A, 250V AC, Time Delay (T200mA, 250V)
  - Isolation Dielectric Strength: 2300V AC
- DC Powered Models (57750-4XX)
  - Input Power: 9-30V DC, 12 VA
  - External Fuse: 2.0A, 50V DC, Time Delay (T2A, 50V)
  - Reverse Voltage Protection: Yes
  - Isolation Dielectric Strength: 2300V AC to signal inputs and relays, 500V AC to RS-485 and analog outputs

## Human Interface

- Display:  $\pm 4$  full digits
- Type: 0.56" (14 mm) high, seven segment, red LED
- Update Time: 0.4 seconds
- Alarm: Flashing display
- Indicator: One red LED program/calibration indicator with max./min. capture and hold

## Data Retention

- Memory Type: EEPROM, no batteries required
- Duration: 100 years

## Signal Input

- DC Voltage Models (5770X-40X) —
  - Range:  $\pm 199.9$  mV DC,  $\pm 1.999$  V DC,  $\pm 19.99$  V DC,  $\pm 199.9$  V DC, DIP Switch Selectable
  - Impedance: 1 M  $\Omega$  (ohms)
  - Overrange: 750V DC/530V AC except 220V DC/AC on 199.9 mV range
  - Accuracy:  $\pm 0.1\%$  of reading,  $\pm 0.03\%$  FS,  $\pm 0.5$  digit, and  $\pm 80$  PPM/ $^{\circ}$ C
- AC Voltage Models (5770X-41X) —
  - Range: 199.9 mV AC, 1.999V AC, 19.99V AC, 199.9V AC, DIP Switch Selectable, all ranges true RMS
  - Frequency: 40 to 1000 Hz
  - Impedance: 1 M  $\Omega$  (capacity coupled)
  - Overrange: 750V DC/530V AC except 220V DC/AC on 199.9 mV range
  - Accuracy:  $\pm 0.5\%$  of reading,  $\pm 0.13\%$  FS,  $\pm 0.5$  digit,  $\pm 180$  PPM/ $^{\circ}$ C for crest factor = 1; plus  $\pm 0.7\%$  for crest factor = 1 to 3; and  $\pm 2.5\%$  for crest factor = 5

## DC Current Models (5770X-42X) —

- Range:  $\pm 199.9$   $\mu$ A DC,  $\pm 1.999$  mA DC,  $\pm 19.99$  mA DC,  $\pm 199.9$  mA DC, DIP Switch Selectable
- Impedance: 199.9 mV/selected range
- Overrange: 30 mA (1 99.9  $\mu$ A range), 100 mA (1.999 mA range), 300 mA (19.99 mA range), 1 A (199.9 mA range)
- Accuracy:  $\pm 0.1\%$  of reading,  $\pm 0.03\%$  FS,  $\pm 0.5$  digit, and  $\pm 120$  PPM/ $^{\circ}$ C

## AC Current Models (5770X-43X)

- Range: 199.9  $\mu$ A AC, 1.999 mA AC, 19.99 mA AC, 199.9 mA AC, DIP Switch Selectable, all ranges true RMS
- Frequency: 40 to 1000 Hz
- Impedance: 199.9 mV/selected range (shunt output capacitive coupled)
- Overrange: 30 mA (11 99.9  $\mu$ A range), 100 mA (1.999 mA range), 300 mA (19.99 mA range), 1A (199.9 mA range)

- Accuracy:  $\pm 0.5\%$  of reading,  $\pm 0.13\%$  FS,  $\pm 0.5$  digit, and  $\pm 200$  PPM/ $^{\circ}$ C for crest factor = 1; plus  $\pm 0.7\%$  for crest factor = 1 to 3; and  $\pm 2.5\%$  for crest factor = 5

## 5A AC Models (5770X-44X) —

- Range: 5A AC, true RMS
- Frequency: 40 to 1000 Hz
- Impedance: 0.02 ohms (shunt output capacitive coupled)
- Overrange: 10A Maximum
- Accuracy:  $\pm 0.4\%$  of reading,  $\pm 0.13\%$  FS,  $\pm 0.5$  digit, and  $\pm 200$  PPM/ $^{\circ}$ C for crest factor = 1; plus  $\pm 0.7\%$  for crest factor = 1 to 3; and  $\pm 2.5\%$  for crest factor = 5

## Process Models (5770X-45X) —

- Range: 4 – 20 mA DC, 0 – 10V DC, 1 – 5V DC; separate input terminals for voltage and current signals
- Impedance: 100  $\Omega$  (current input) and 1.27 M  $\Omega$  (voltage input)
- Overrange: 50 mA maximum (current input) and 100V maximum (voltage input)
- Power Output: 24V DC  $\pm 10\%$ , 90 mA max, short circuit protected
- Accuracy:  $\pm 0.1\%$  of reading,  $\pm 0.03\%$  FS,  $\pm 0.5$  digit, and  $\pm 80$  PPM/ $^{\circ}$ C

## Optional Outputs

## Relay Board —

- Dual relay: 1 set of form C contacts each
- Contact rating; 5A, 250V AC or 30V DC
- Isolation dielectric strength: 2300V AC
- Analog Retransmission —
  - Output Signals: 4 – 20 mA (<750  $\Omega$ ) and 0 – 10V (>2500  $\Omega$ )
  - Accuracy: 0.13% FS, 100 PPM/ $^{\circ}$ C, 0.07% FS change with 4 – 20 mA load,  $\pm 0.3\%$  FS for 4 – 20 mA output, only after exposure to 85% relative humidity
  - Isolation dielectric strength: 2300V AC to signal inputs, relays and AC power input; 500V AC to RS-485 and DC power inputs

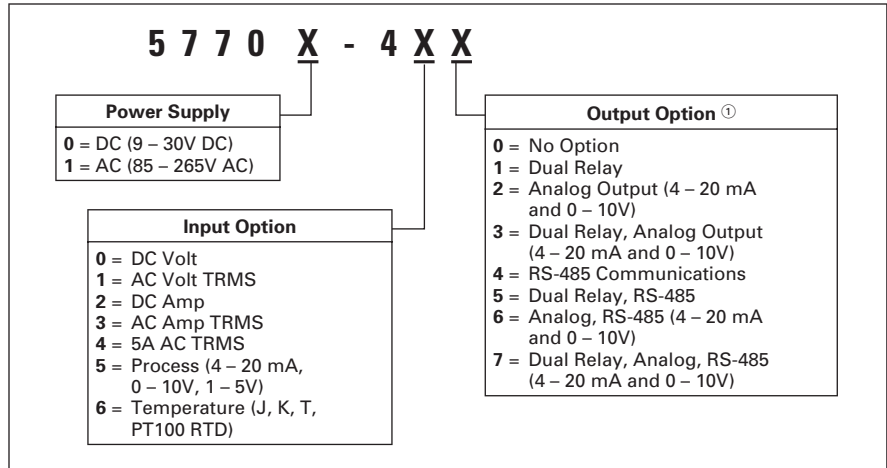
- RS-485 Serial Communication —
  - Baud Rate: 1200, 2400, 4800, 9600 or 19,200, programmable
  - Parity: Even, odd or no parity
  - Address Range: 00 to 99 decimal
  - Protocol: Opto 22® compatible
  - Isolation Dielectric Strength: 2300V AC to signal inputs, relays, and AC power input; 500V AC to analog outputs and DC power inputs

**Environmental**

- Operating Env.: Indoor use to 2000 meters
- Temperature —
  - Operating: 32 to 122°F (0 to 50°C)
  - Storage: -4 to 158°F (-20 to 70°C)
- Humidity: 0 to 85% RH, non-condensing
- Vibration: 2.5 Gs, 30 to 200 Hz
- Shock: 30 Gs, 11 mS half sinewave
- EMC/EMI: Per EN 61326-1 Industrial
- Front Panel: NEMA 4X when mounted with gasket provided
- Agency Approval:
  - CE EMC immunity and emissions requirements were met using shielded wiring on the RS-485, analog output and signal input lines. The shields were connected to earth ground at the Eclipse end of the shields.
  - Conducted emissions requirements were met assuming that the AC signal input would not be connected directly to the AC Mains.
  - The measurement error during RF immunity testing was less than ±5% of full scale. In addition, models with an AC signal input had measurement error of less than +25% of full scale during RF immunity testing of the RS-485 at frequencies below 1 MHz.
- Pollution Deg. 2: Overvoltage Category II

**Catalog Number Selection**

**Table 54-62. Eclipse Series Digital Panel Meters Numbering System**



① Output Options 0, 2, 4 are not available for models -41X and -43X.

## Dimensions

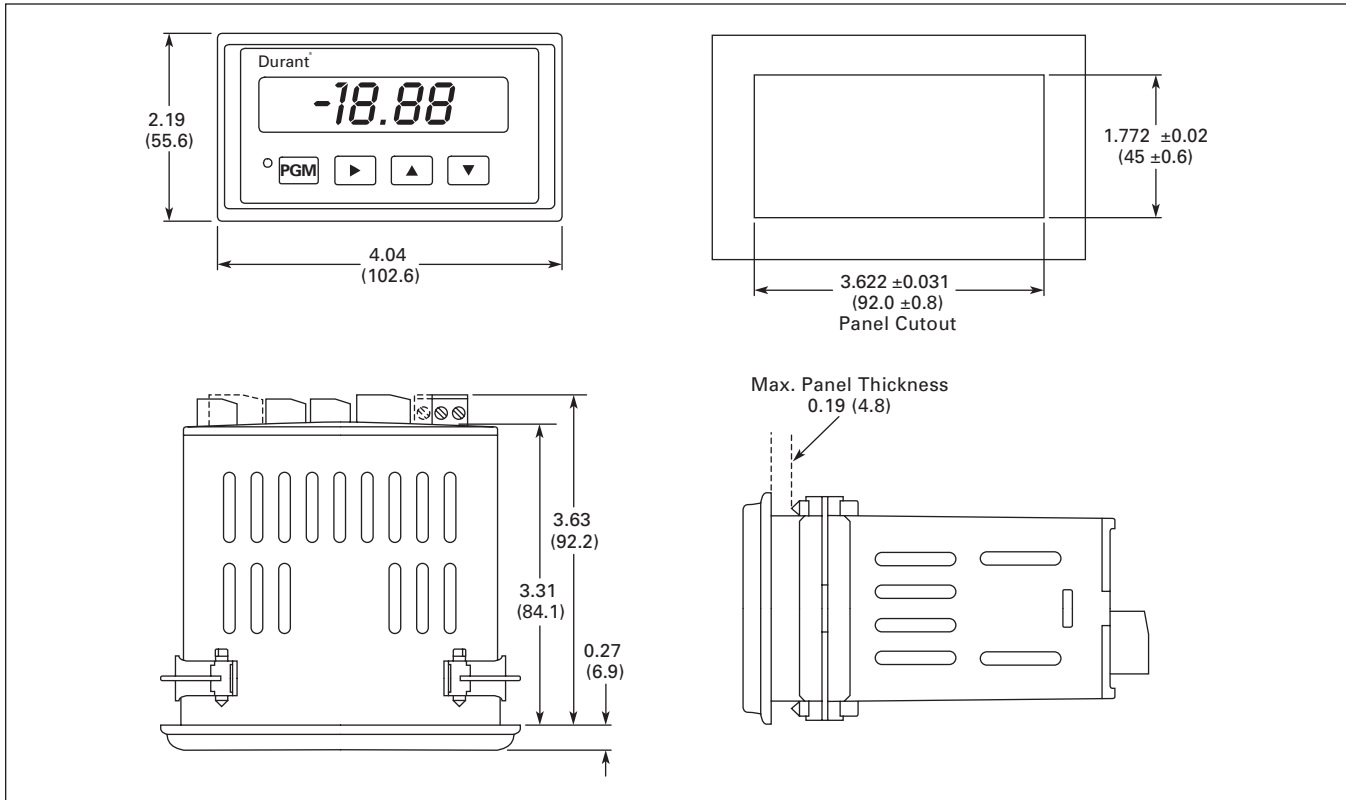


Figure 54-55. Eclipse Series Digital Panel Meters — Approximate Dimensions in Inches (mm)

**Introduction**








Timers are used in applications where time itself is the main focus. These include simple knowledge of how long a machine has been running to determine machine maintenance, for example, (elapsed time) to knowing when to change an elevator cable (cable life and safety). Timers generally have the ability to stop and then to continue on from the point at which they stopped. Timer Relays are used in applications where an output is required to make something happen at a predetermined point in time (to stop or start the process).

**Application Examples**

- Elapsed time indication for interval maintenance of construction and agricultural equipment
- Usage metering for determining charges on rental equipment
- Controlled process timing for adhesive application/curing equipment

**Timers/Hour Meters Product Family Overview**

**Table 54-63. Product Family Overview**

Product Family	Characteristics	Panel Cutout in Inches (mm)	Catalog Page
 <b>E5-224-C</b>	<ul style="list-style-type: none"> <li>■ Non-replaceable battery (min. 8-yr. life)</li> <li>■ Compact, low cost and high efficiency</li> <li>■ 8-Digit LCD timer</li> <li>■ Manual or electrical reset</li> <li>■ Various timing modes (Hr/Min/Sec)</li> </ul>	0.870 x 1.772 (22 x 44)	<b>54-64</b>
 <b>E5-24-E</b>	<ul style="list-style-type: none"> <li>■ Compact device with bright, LED display</li> <li>■ Multiple functions available: count, time, rate, multifunction, double-function</li> <li>■ 24V DC Power</li> </ul>	0.870 x 1.772 (22 x 44)	<b>54-25</b>
 <b>E5-248-C</b>	<ul style="list-style-type: none"> <li>■ Panel-mount, battery powered time relay</li> <li>■ 8 timing modes, 9 time ranges</li> <li>■ 3 programmable activation modes</li> <li>■ 8A relay contacts (N.O. or N.C.)</li> </ul>	1.772 x 1.772 (45 x 45)	<b>54-70</b>
 <b>E5-496-E</b>	<ul style="list-style-type: none"> <li>■ Economical, multifunction display</li> <li>■ Large, LED characters</li> <li>■ AC or DC power options</li> </ul>	1.772 x 3.622 (45 x 92)	<b>54-28</b>
 <b>Hour Meters</b>	<ul style="list-style-type: none"> <li>■ Compact, low-cost LCD and electromechanical elapsed time meters</li> <li>■ Various power options for almost any power supply</li> </ul>	Various	<b>54-66</b>
 <b>Hour Meter/Counter</b>	<ul style="list-style-type: none"> <li>■ Combination counter consists of time meter and adding counter in one</li> <li>■ Without reset</li> <li>■ High shock resistance</li> <li>■ Magnified figures</li> <li>■ Protection IP52 (front)</li> <li>■ Data retention if power is lost</li> <li>■ Long service life</li> <li>■ UL Approved</li> </ul>	1.988 (50.5) dia. or DIN Rail	<b>54-69</b>
 <b>E42DP55</b>	<ul style="list-style-type: none"> <li>■ DIN Rail-mount, battery-powered time relay</li> <li>■ 8 timing modes</li> <li>■ 1 million operations or 10 years</li> <li>■ 10A contact rating</li> </ul>	N/A	<b>54-72</b>

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<b>Timers/Hour Meters — Electromechanical</b>	
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<b>Time Controls</b>	
Battery-Powered LCD . . . . .	54-70
E42DP55 Battery Powered . . . . .	54-72



Cat. No. E5-224-C0440

**Features**

- Low price and high efficiency
- Large 8-digit LCD display, height of the figures 0.31 Inch (8 mm)
- Different time ranges from 0.1 second to 100,000 hours
- 0.1 second synchronization makes it suitable for very short activation times
- High voltage input for 10 – 260V AC/DC voltage pulses
- IP65
- Screw terminals, RM 5 mm
- Lifetime of the battery approximately 8 years
- Locking of the reset key
- Operating temperature 14 to 140°F (-10 to 60°C)

**Standards and Certifications**

- UL Recognized
- CE Marked

**Technical Data and Specifications**

- Power Supply: Non-replaceable lithium battery (lifetime approximately 8 years at 68°F (20°C))
- Display: LCD, 8-digits, height of the figures 0.31 Inch (8 mm)
- Counting Direction: Adding
- Display Range —

- Time Range: 99999 h 59 m (134)

Display:  
99999 - 59

- Time Range: 99999.99 h (134)

Display:  
99999 - 99

- Time Range: 9999 h 59 m 59 s (135)

Display:  
9999.59.59

- Time Range: 9999999.9 s (135)

Display:  
9999999.9

- Reset: Manual and electrical
- Timer Inputs, DC versions (max. 30V DC) —
  - Timer input: NPN or PNP depending on the type
  - Switching level —
    - NPN Low: 0 – 0.7V
    - NPN High: 3 – 30V DC
    - PNP Low: 0 – 0.7V
    - PNP High: 4 – 30V DC
  - Counting start —
    - NPN: For low signal at the timer input
    - PNP: For high signal at the timer input

- Timer Inputs, High voltage version (10 – 260V DC/V AC) —
  - Timer input: Optocoupler input max. 30 Hz
  - Min. pulse time: 16 mS
  - Switching level —
    - Low: 0 – 2V DC/V AC
    - High: 10 – 260V DC/V AC
  - Counting start: For high signal at the timer input
- Time Range Change (Mode) —
  - Contact input —
    - Open collector (switching at 0V)
    - NPN Low: 0 – 0.7V
    - NPN High: 3 – 5V DC
  - Time Range: Depending on the circuit
- Reset Input (Only DC and High Voltage) —
  - Minimum pulse time—
    - DC: 50 mS
    - High Voltage: 10 mS
  - Contact input (DC) —
    - NPN Low: 0 – 0.7V
    - NPN High: 3 – 30V DC
  - High voltage input:
    - 10 – 260V DC/V AC
- Reset Locking Input (For DC and AC), Electrical Reset Key Locking —
  - Input not active: Reset key locked
  - Contact input: Open collector NPN (switching at 0V)
  - Switching level —
    - NPN Low: 0 – 0.7V
    - NPN High: 3 – 5V DC
- Interference Emissions: EN 55011 Class B, EN 61 000-6-2, EN 61010 Section 1 (only AC versions)
- Housing: Dark gray RAL 7021
- Operating Temperature: 14 to 131°F (-10 to 55°C)
- Ambient Temperature: 14 to 140°F (-10 to 60°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Protection: IP65 (from front)
- Weight: Approx. 1.76 oz (50 g)

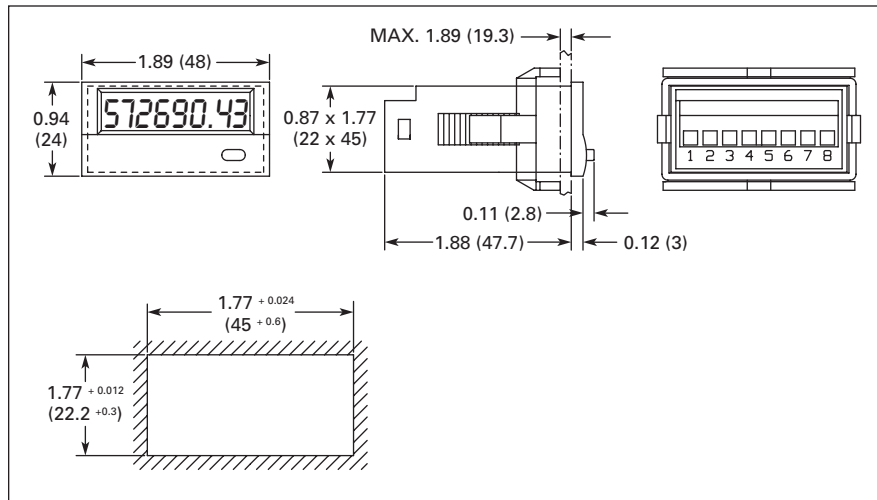


**Product Selection**

**Table 54-64. Product Selection — 1/32 DIN LCD, Timers**

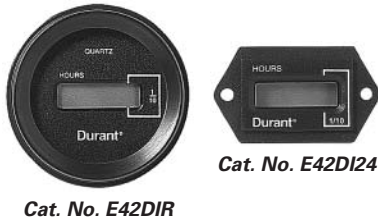
Description	Catalog Number	Price U.S. \$
<b>8-digit LCD Timer, Battery Power</b>		
Hours/Minutes, 0.94 x 1.89 Inch (24 x 48 mm)	<b>E5-224-C0440</b>	
Hours/Minutes, 10 – 260V Input, 0.94 x 1.89 Inch (24 x 48 mm)	<b>E5-224-C0448</b>	
Minutes/Seconds, 0.94 x 1.89 Inch (24 x 48 mm)	<b>E5-224-C0450</b>	
Minutes/Seconds, 10 – 260V Input 0.94 x 1.89 Inch (24 x 48 mm)	<b>E5-224-C0458</b>	

**Dimensions**



**Figure 54-56. 1/32 DIN LCD, Timers — Approximate Dimensions in Inches (mm)**

E42DI24/E42DIR Series — Durant®



- Input Impedance Minimum (Pins 3 and 4) —
  - E42DIXX1260X: 70k ohms
  - E42DIXX48230X: 480k ohms
- Operating Temperature: -40 to 185°F (-40 to 85°C)
- Storage Temperature: -58 to 194°F (-50 to 90°C)
- Weight —
  - E42DIRXXXXXX: 1.94 oz (55 g)
  - E42DI24XXXXXX: 0.78 oz (22 g)

**Product Selection**

Table 54-65. Product Selection — E42DI24/E42DIR Series Elapsed Time Meters

Description	Catalog Number	Price U.S. \$
<b>Round LCD</b>		
Elapsed Hour Meter, 48 – 150V DC/100 – 230V AC	E42DIR48230	
Elapsed Hour Meter w/Reset, 48 – 150V DC/100 – 230V AC	E42DIR48230R	
Elapsed Hour Meter, 12 – 48V DC/20 – 60V AC	E42DIR1260	
<b>Rectangular LCD</b>		
Elapsed Hour Meter, 48 – 150V DC/100 – 230V AC	E42DI2448230	
Elapsed Hour Meter, w/Reset, 48 – 150V DC/100 – 230V AC	E42DI2448230R	
Elapsed Hour Meter, 12 – 48V DC/20 – 60V AC	E42DI241260	

**Features**

- Solid-state hour meters
- Record and display up to 99,999.9 hours, rollover and continue timing
- EEPROM memory can retain data for 25+ years
- Time accumulation indicated by flashing hourglass icon
- Memory will arm only when power has been applied for 5 seconds

**Standards and Certifications**

- UL recognized
- CE compliant

**Technical Data and Specifications**

- Function: Solid-state hour meter
- Power Supply —
  - E42DIXX1260X: 12 – 48V DC ±25%/ 20 – 60V AC ±25%
  - E42DIXX48230X: 48 – 150V DC +23% -25%/ 100 – 230V AC +17% -25%
- Frequency Range: 48 – 440 Hz
- Display: 6-digit LCD, 0.20" (5 mm)
- Accuracy: ±0.1%
- Recording/Display Capacity: 99,999.9 hours
- Resolution: 0.1 hour (6 minutes)
- Current Consumption Max. @ Nominal Voltage
  - E42DIXX1260X: 0.8 mA @ 12V DC, 5.0 mA @ 48V DC, 0.5 mA @ 20V AC, 2.5 mA @ 60V AC
  - E42DIXX48230X: 0.8 mA @ 48V DC, 2.5 mA @ 150V DC, 0.9 mA @ 100V AC, 2.0 mA @ 230V AC

**Dimensions**

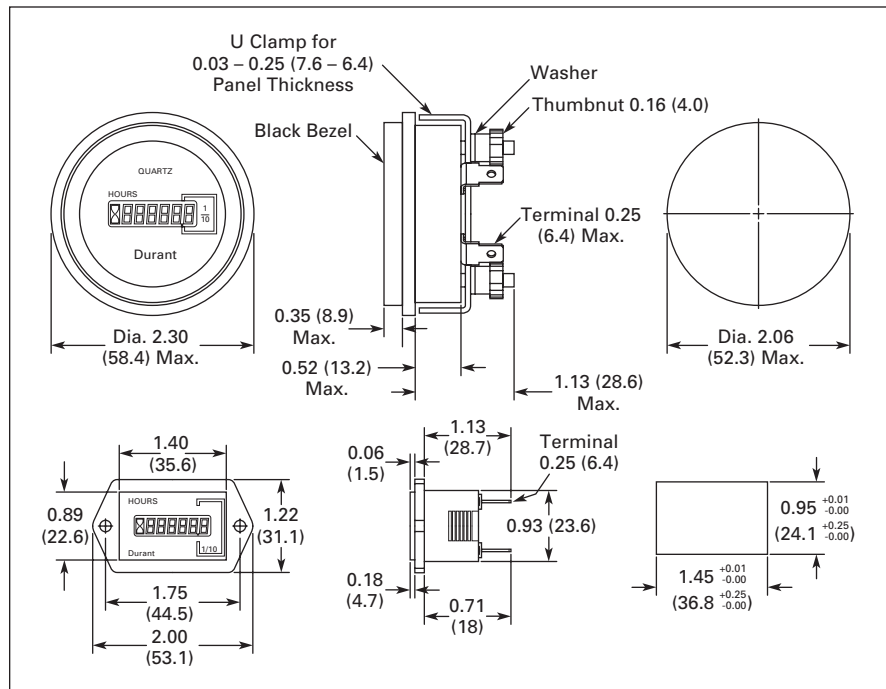


Figure 54-57. E42DI24/E42DIR Series — Approximate Dimensions in Inches (mm)

**1/16th DIN Hour Meters — Eaton**



**Cat. No. 7-T-65-4848PM-406**

**Features**

- High shock resistance
- Without reset
- Small dimension
- Magnified figures
- Protection IP65
- Data retention if power is lost
- Long service life
- Optional mounting position

**Applications**

- General elapsed time
- Service interval for measurement systems —
  - Respiratory ventilators
  - Oxygen machines
  - Dialysis machines
- Small appliances
- UV lamps
- Display panels in cars

**Standards and Certifications**

- UL Recognized

**Technical Data and Specifications**

- Electrical Connection: Clamp terminal for cable diameter up to 14 AWG (2.5 mm<sup>2</sup>), tightening torque max. 0.59 lb-ft (0.8 Nm)
- Power Consumption —
  - 10 – 30V DC: Approx. 500 mW
  - 100 – 130V DC: Approx. 750 mW
- Rated Voltages
  - 100 – 130V AC, 50 or 60 Hz
  - 10 – 30V DC
- On Time: 100%
- Display —
  - 7 at AC: 99999.99
  - 8 at DC: 999999.99
- Accuracy —
  - AC: Supply frequency + 30 mS
  - DC: <0.003% (24 h)
- Count Mode: Adding
- Height of Figures: 0.16 Inch (4 mm)

- Color of Figures: White and Red-on-Black
- Ambient Temperature: 5 to 122°F (-15 to 50°C)
- Mounting Position: Any
- Protection: IP65
- Housing: Plastic
- Weight: 1.7 oz (48 g)
- Operating Indicator of the Running Time Meter —
  - AC: Fast rotating wheel with red dashes
  - DC: 1/100 h display turns continuously by 1-digit in 36 sec.
- Test voltage: 2000V AC, 50 Hz for AC counters
- Options: Further voltages on request
- Color of Housing: Gray

**Product Selection**

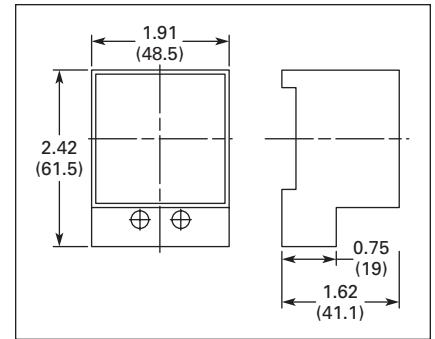
**Table 54-66. Product Selection — 1/16th DIN Hour Meters**

Description	Catalog Number	Price U.S. \$
<b>Electromechanical Hour Meters</b>		
10 – 30V DC, 1.89 x 1.89 Inch (48 x 48 mm)	<b>8-T-65-4848PM-402</b>	
10 – 30V DC, 1.89 x 1.89 Inch (48 x 48 mm), 50 pc. package	<b>8-T-65-4848PM-40284</b>	
100 – 130V AC, 1.89 x 1.89 Inch (48 x 48 mm)	<b>7-T-65-4848PM-406</b>	
100 – 130V AC, 1.89 x 1.89 Inch (48 x 48 mm), 50 pc. package	<b>7-T-65-4848PM-40684</b>	

**Accessory**



**Cat. No. T4848DINADAPT**

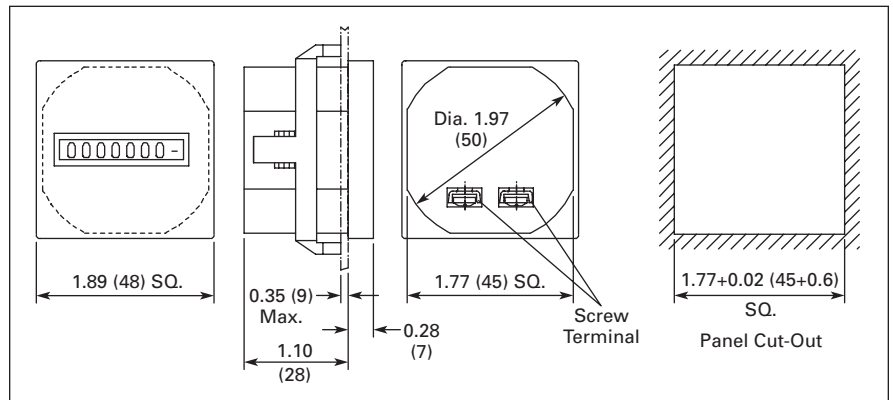


**Figure 54-58. DIN Rail Adapter — Approximate Dimensions in Inches (mm)**

**Table 54-67. Product Selection — DIN Rail Adapter**

Description	Catalog Number	Price U.S. \$
DIN Rail Adapter for DIN Electromechanical Hour Meter	<b>T4848DINADAPT</b>	

**Dimensions**



**Figure 54-59. 1/16th DIN Hour Meters — Approximate Dimensions in Inches (mm)**

Discount Symbol ..... **CC-2**

71.1 Round Hour Meters — Eaton



Cat. No. 6-T-3H-508RPM-406

Technical Data and Specifications

- Electrical Connection: Flat pins 0.8 x 6.3
- Power Consumption —
  - AC: Max., 0.4 VA
  - 12V DC: Max., 0.08W
  - 48V DC: Max., 0.7W
- Rated Voltages: 115V AC ±10%, 50/60 Hz, 10 – 80V DC
- On Time: 100%
- Display: 6-digits, 99999.9 h
- Count Mode: Adding
- Height of Figures: 0.14 Inch (3.5 mm)
- Reset: None
- Ambient Temperature: -22 to 149°F (-30 to 65°C)
- Mounting Position: Any
- Protection: IP65
- Housing: Plastic
- Error: <0.02% over the full range

Features

- 6-digit hour meter for round panel cut-out
- Low cost
- High shock resistance
- Low power consumption
- Small dimension
- Magnified figures
- Waterproof
- NEMA Type 4X Rating
- Data retention if power is lost
- Available in 50 pc. bulk package

Applications

- General elapsed time
- Utility vehicles
- Construction machines
- Generators
- Fork-lift trucks
- Car washes
- Outside areas

Product Selection

Table 54-68. Product Selection — 71.1 Round Hour Meters

Description	Catalog Number	Price U.S. \$
<b>Electric Hour Meters</b>		
115V AC, 2.80 Inch (71.1 mm) Round	<b>6-T-3H-508RPM-406</b>	
115V AC, 2.80 Inch (71.1 mm) Round — 48-piece Package	<b>6-T-3H-508RPM-40684</b>	
10 – 80V DC, 2.80 Inch (71.1 mm) Round	<b>6-T-3H-508RPM-402</b>	
10 – 80V DC, 2.80 Inch (71.1 mm) Round — 48-piece Package	<b>6-T-3H-508RPM-40284</b>	

Dimensions

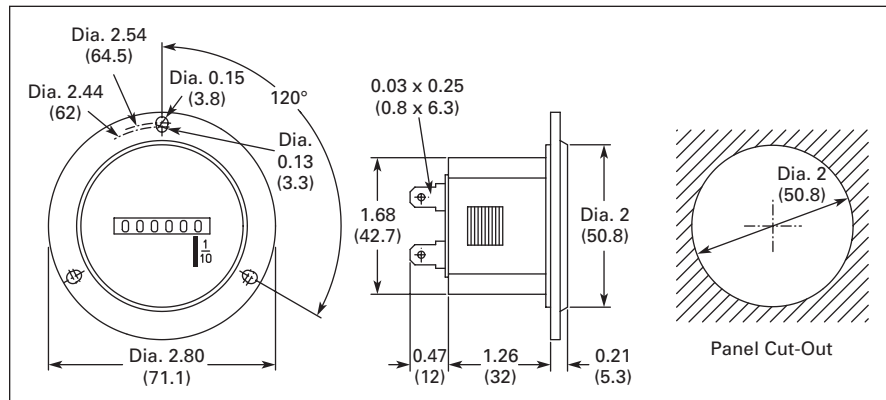


Figure 54-60. 71.1 Round Hour Meters — Approximate Dimensions in Inches (mm)

**Hour Meter/Counter**



Cat. No. CEC-55PM-406



**Features**

- Combination counter consists of time meter and adding counter in one
- Without reset
- High shock resistance
- Magnified figures
- Protection IP52 (front)
- Data retention if power is lost
- Long service life

**Applications**

- General counting
- Pump control panels
- Service interval for measurement systems (respiratory ventilators, oxygen machines, dialysis machines)
- Small appliances
- UV lamps
- Display panels in cars

**Standards and Certifications**

- cURus, CE

**Technical Data and Specifications**

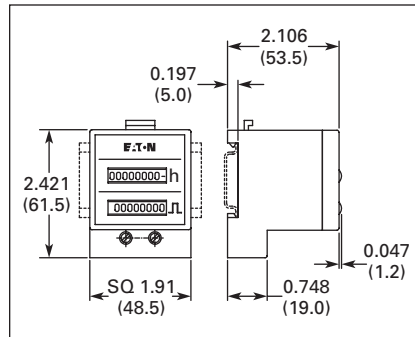
- Electrical Connection: Flat pin 0.8 x 6.3 mm with screw terminal, tightening torque max. 0.8 Nm
- Power Consumption —
  - 100 – 130V AC: 60 Hz, approx. 1.43 VA
- Count Mode: Adding
- Height of Figures: 0.16 x 0.07 Inch (4 x 1.7 mm)
- Color of Figures:
  - Hour: White on Black
  - Decimal: Red on Black
- Operating Indicator of the Running Time Meter: Fast rotating wheel with red dashes; 99999.99 hour
- Accuracy AC: Supply Frequency ±30 mS
- Reset: None
- Ambient Temperature: 5 to 122°F (-15 to 50°C)
- Mounting Position: Any
- Color of Housing: Black

**Product Selection**

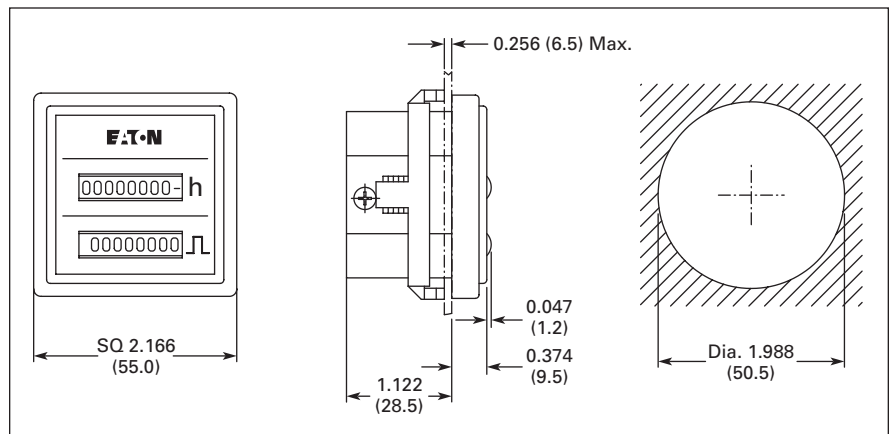
**Table 54-69. Product Selection — Hour Meter/Counters**

Description	Catalog Number	Price U.S. \$
<b>Electric Hour Meters</b>		
Combination Hour Meter/Counter, 55 mm square front panel mount, 100 – 130V AC, 60 Hz	<b>CEC-55PM-406</b>	
Combination Hour Meter/Counter, 48 mm DIN Rail mount, 100 – 130V AC, 60 Hz	<b>CEC-48DR-406</b>	

**Dimensions**



**Figure 54-61. DIN Rail Mount Hour Meter/Counters — Approximate Dimensions in Inches (mm)**



**Figure 54-62. Front Panel Mount Hour Meter/Counters — Approximate Dimensions in Inches (mm)**

Discount Symbol ..... **CC-2**



Cat. No. E5-248-C1420

## Features

- No external voltage supply, because of internal replaceable lithium battery
- High contrast, 2-line LCD display, 5-digit with many symbols for easy operation and reading
- 9 programmable time ranges from 0.20 seconds up to 99.999 hours
- Resolution up to 0.01 seconds
- Inputs for start and reset; universal inputs for 12 – 260V AC/DC
- 8 timing modes —
  - ON Delay, OFF Delay, One Shot and Single Shot
  - Repeat cycle modes: Delay, Cycle, Symmetrical delay
- 3 programmable activation modes
- Relay contacts rated at 8A programmable to NO or NC
- Protection IP65
- Plug-in connector

## Standards and Certifications

- CE Marked

## Technical Data and Specifications

- Voltage Supply: 2 x 3V, 1/2AA replaceable lithium battery, service life > 10 years or 500,000 relay charges
- Timing and Reset Inputs: 12 – 260V AC/DC, impedance 180 kΩ, min. impulse 20 mS (optocoupler)
- Display —
  - Time: 5-digit LCD display, 0.26 Inch (6.5 mm) high
  - Set Time Mode: 5-digit LCD display, 0.14 Inch (3.5 mm) high
- Accuracy: +50/-20 mS respectively 0.5% of setting time (higher value counts)
- 0.3% of setting time
- Operating Temperature: 14 to 122°F (-10 to 50°C)
- Storage Temperature: -4 to 158°F (-20 to 70°C)
- Relative Humidity: 80% max. up to 89°F (31°C); decreasing to max., 50% to 104°F (40°C)
- Protection: IP65 with delivered seal
- Output Relays —
  - Contact connection: SPTST voltage free contacts programmable as NO or NC
  - Contact rating:
    - 250V AC at 8A;  $\cos \phi = 1$
    - 250V AC at 5A;  $\cos \phi = 0.4$
    - 30V DC at 8A;  $\cos \phi = 1$
- Reaction Time: < 20 mS
- Expected Life: 2A ohm's load 1,000,000 switching cycles
- EMC: CE-conform to EC-guideline 89/36/EWG
- Electromagnetic Radiation: EN 61000-6-4/EN 55011 Class B
- Electromagnetic Immunity: EN 61-000-6-2
- Weight: Approx. 2.8 oz (80 g)
- Time Ranges —
  - 1 – 99999 sec; 0.2 – 9999.9 sec; 0.02 – 999.99 sec
  - 1 – 99999 min; 0.1 – 9999.9 min; 0.01 – 999.99 min
  - 1 – 99999 hour; 0.1 – 9999.9 hour; 0.01 – 999.99 hour

## Timing Modes

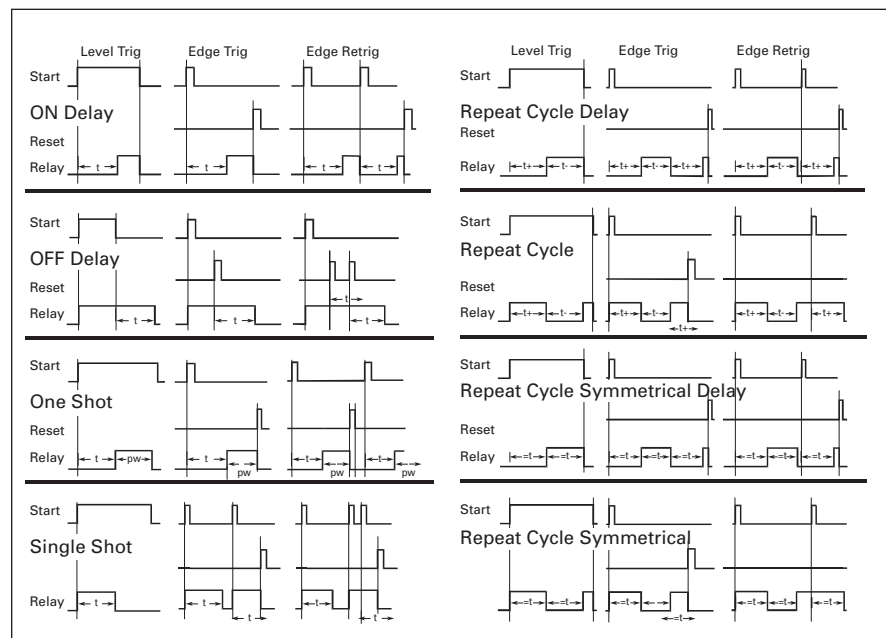


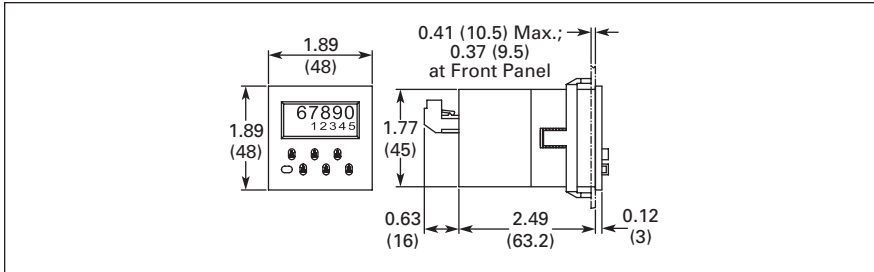
Figure 54-63. Timing Modes

**Product Selection**

**Table 54-70. Product Selection — Battery-Powered Time Control**

Description	Catalog Number	Price U.S. \$
Battery-Powered LCD Time Control, 1.89 x 1.89 Inch (48 x 48 mm)	<b>E5-248-C1420</b>	

**Dimensions**



**Figure 54-64. Battery-Powered LCD Time Control, 48 x 48 mm — Approximate Dimensions in Inches (mm)**

**Note:** Panel Cut-Out is 177 + 0.02 Inch Sq. (45 +0.6 mm Sq.).



## E42DP55 Battery Powered, DIN Rail Mounted



Cat. No. E42DP55

**Display**

- 2 rows of 3 digits, black on silver LCD
- Upper row 0.275" (7 mm) indicates time
- Lower row 0.157" (4 mm) indicates set point

**Power Supply**

- Two 1/2AA 3V lithium batteries
- 10 year expected life (the built-in batteries are sealed for life and are not replaceable)

**Timing Input**

- 12 – 260V opto-isolated inputs
- Selectable sink (NPN) or source (PNP) if using DC input device
- Input Impedance: 220k ohm
- Level or edge triggered
- Minimum pulse width of 20 mS

**Output Relays**

- Contacts: SPDT voltage free contacts
- Contact Rating: 10A 380V or 220V
- Power Rating: 2000VA/150W
- Reaction Time: <20 mS
- Mechanical Life: 10,000,000 operations
- Electrical Life —
  - 100,000 operations @ 8A (resistive load)
  - 1,000,000 operations @ 2A (resistive load)

**Repeat Accuracy**

- 0.3% of set time

**Setting Accuracy**

- +50 -20 mS or 0.5% of set time (whichever is greater)

**Temperature —**

- Operating: 14 to 140°F (-10 to 60°C)
- Storage: -4 to 158°F (-20 to 70°C)

**Features**

- Digital time control with 8 timing modes
- Battery powered — 1 million operations or 10 years
- Battery included
- DIN Rail mounted
- 0.2 Seconds to 999.99 hours
- Easy-to-read LCD display with mode annunciators

**Technical Data and Specifications****Operating Modes**

- ON Delay
- OFF Delay
- Cycle One-Shot
- Single-Shot
- Repeat Cycle Delay
- Repeat Cycle

**Time Setting Ranges**

- 1 – 999, 1 – 99.9 sec.
- 1 – 999, 0.1 – 99.9, 0.01 – 9.99 min.
- 1 – 999, 0.1 – 99.9, 0.01 – 9.99 hrs.

**Product Selection**

Table 54-71. Product Selection — E42DP55 Battery-Powered Time Control

Description	Catalog Number	Price U.S. \$
Battery-Powered Time Control, DIN Rail Mounted	E42DP55	

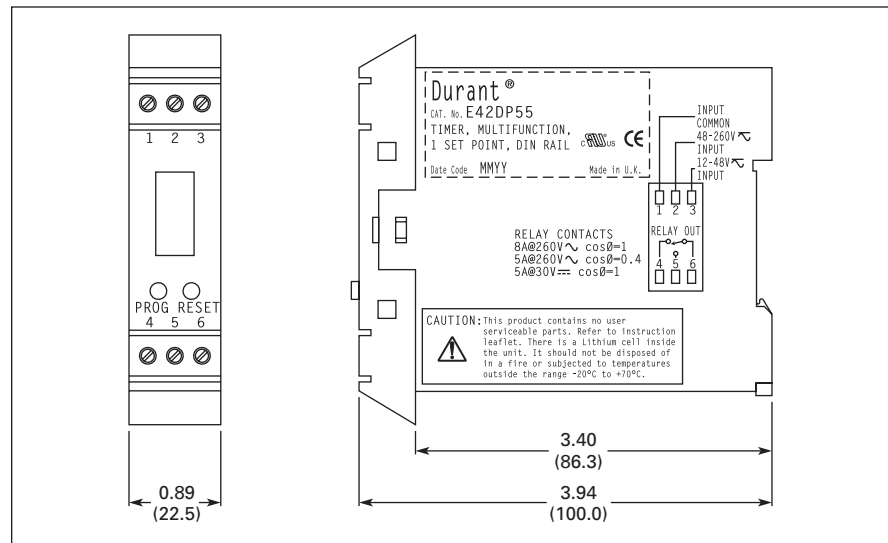
**Dimensions**

Figure 54-65. E42DP55 Time Control — Approximate Dimensions in Inches (mm)

Note: The E42DP55 is designed to snap mount to any standard 35 mm DIN Rail.

**Product Family Overview**

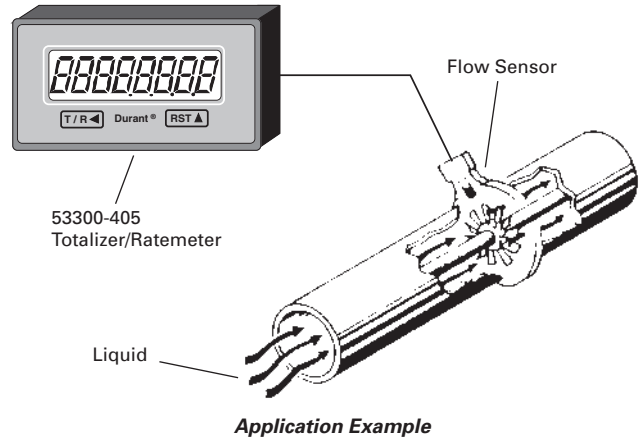
**Introduction**

Flow products are used in a variety of applications where liquid gas flow needs to be monitored or controlled. Eaton offers models for flow total, flow rate and flow batch control. Several optional outputs allow great flexibility to meet most application needs.

**Application Example**



In many processes, it is desirable to know both the total quantity of product being produced and the rate at which the product is being produced.

In the illustration at right, the output of a turbine flow sensor is connected to a totalizer/ratemeter. The flow sensor produces a known number of pulses per gallon (or other unit of measure). The instrument scales these pulses into the desired units of flow volume (gallons, liters, barrels, etc.), and flow rate (gallons/minute, barrels/hour, etc.).



**Flow Totalizers/Controls Product Family Overview**

**Table 54-72. Product Family Overview**

Product Family	Characteristics	Typical Applications	Panel Cutout in Inches (mm)	Catalog Page
 <b>Courier</b>	<ul style="list-style-type: none"> <li>■ Replaceable lithium battery</li> <li>■ 8-digit, high-visibility LCD display</li> <li>■ Optional backlighting</li> <li>■ Various input options available</li> </ul>	<ul style="list-style-type: none"> <li>■ Portable/mobile/remote flow monitoring (e.g. sewer pumping, pesticide application)</li> </ul>	1.299 x 2.677 (33 x 68)	<b>54-26</b>
 <b>Eclipse</b>	<ul style="list-style-type: none"> <li>■ 6-digit, super bright LED display</li> <li>■ Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls</li> </ul>	<ul style="list-style-type: none"> <li>■ Length measurement and control</li> <li>■ Flow monitoring and control</li> <li>■ Process monitoring and display</li> <li>■ Voltage and current monitoring and display</li> </ul>	1.772 x 1.622 (45 x 92)	<b>54-74</b>

## Eclipse Series — Durant®



Cat. No. 57750-400

## Features

- 6- or 10-digit display
- 1/8 DIN Size
- Red, LED display
- 0.56" (14 mm) high characters
- Scalable display
- Analog or pulse input versions
- Accessory power output
- 15-point linearization available
- Dual valve pre-warn available
- Optional analog, relay and RS-485 outputs
- NEMA 4X
- Depluggable terminal blocks

## Standards and Certifications

- UL and cUL Listed
- CE Marked

## Technical Data and Specifications

### Input Power

- AC Powered Models (57751-4XX)
  - Input Power: 85 – 265V AC, 47 – 63 Hz, 20 VA
  - External Fuse: 0.2A, 250V AC, Time Delay (T200mA, 250V)
  - Isolation Dielectric Strength: 2300V AC
- DC Powered Models (57750-4XX)
  - Input Power: 9 – 30V DC, 12 VA
  - External Fuse: 2.0A, 50V DC, Time Delay (T2A, 50V)
  - Reverse Voltage Protection: Yes
  - Isolation Dielectric Strength: 2300V AC to signal inputs and relays, 500V AC to RS-485 and analog outputs

### Human Interface

- Display: 6 digits
- Type: 0.56" high, seven segment, red LED

### Data Retention

- Memory Type: EEPROM, no batteries required
- Duration: 100 years

### Count Signal Input/Count Inhibit Signal Input

- Sensor Type: Sink or source, DIP switch selectable
- Input Impedance: 4.75k ohms to +5V DC or 34.9 k Ohms to ground
- Thresholds —
  - High 3.5 to 28V DC
  - Low 0 to 1.9V DC, for single ended signals
- Magnetic Pickup Range: 50 mV p-p to 65 VRMS into 34.9 k Ohms
- Slow Response: 50 Hz max. (DIP switch 2 and/or 5 ON)
- Flat Response: 10 kHz

### Flow Signal Input (Analog Input Models)

- Types: 4 – 20 mA and 0 – 10V DC
- Input Impedance: 100 ohms (current input), 1.27M ohms (voltage input)
- Overrange: 50 mA max (current input), 100V max (voltage input)
- Accuracy:  $\pm 0.1\%$  of reading,  $\pm 1$  digit, and  $\pm 80$  PPM/ $^{\circ}$ C

### Control Inputs

- Sensor Type: Sink only
- Input Impedance: 4.75k ohms to +5V DC
- Thresholds —
  - High 3.5 to 28V DC
  - Low 0 to 1.0V DC
- Response: 25 mS maximum (5V signal)

### Accessory Power Output (Pulse Input Models)

- Voltage: 12V DC  $\pm 10\%$ /-13%
- Current: 75 mA max.
- Protection: Short circuit protected

### Accessory Power Output (Analog Input Models)

- Voltage: 24V DC  $\pm 10\%$
- Current: 90 mA max.
- Protection: Short circuit protected

### Relay/Transistor Outputs (standard on batch controls, optional on totalizers)

- Number: 2 relays or 1 relay and 1 transistor
- Relay Contact Type: 1 set form C per relay
- Relay Contact Rating: 5A, 250V AC or 30V DC
- Transistor Type: NPN, Opto Isolated

- OFF State Block: 30V DC max., 0.1 mA max. leakage current
- ON State Conduct: 50 mA max., 1.2V DC max. C-E drop
- Max. Switching Frequency: 4 kHz (50-50 duty cycle)
- Isolation dielectric strength: 2300V AC

### Optional Outputs

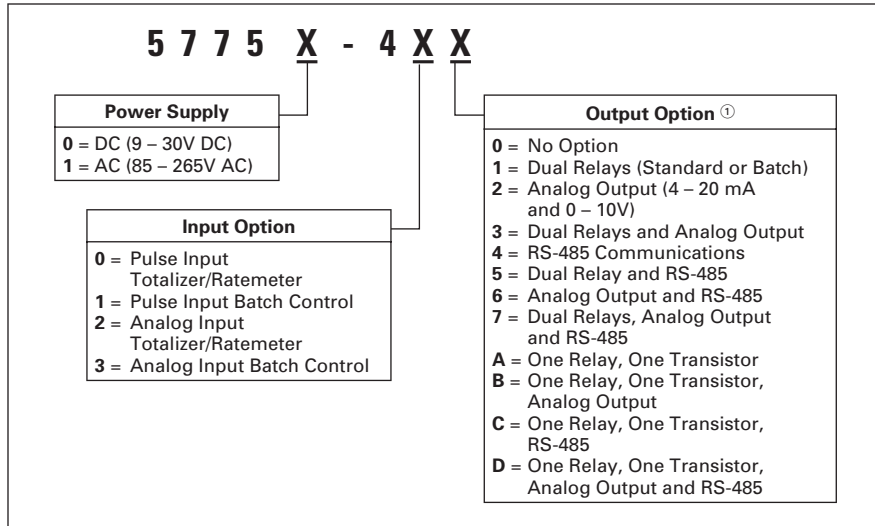
- Analog Retransmission —
  - Output signals: 4 – 20 mA (<750  $\Omega$ ) and 0 – 10V (>2500  $\Omega$ )
  - Accuracy: 0.13% full scale and 100 PPM/ $^{\circ}$ C (and 0.07% full scale change over 4 – 20 mA load ranges)
  - Isolation dielectric strength: 2300V AC to signal inputs, relays and AC power inputs; 500V AC to analog outputs and DC power inputs
- RS-485 Serial Communications
  - Baud Rate: 1200, 2400, 4800, 9600, or 19,200, programmable
  - Parity: Even, odd or no parity
  - Address Range: 00 to 99 decimal (00 indicates off line)
  - Protocol: Opto 22® compatible
  - Isolation Dielectric Strength: 2300V AC to signal inputs, relays and AC power inputs; 500V AC to analog outputs and DC power inputs

### Environmental

- Operating Environment: Indoor use to 2000 meters
- Temperature —
  - Operating: 32 to 122 $^{\circ}$ F (0 to 50 $^{\circ}$ C)
  - Storage: -4 to 158 $^{\circ}$ F (20 to 70 $^{\circ}$ C)
  - Humidity: 0 to 85% RH, non-condensing
- Vibration: 2.5 Gs, 30 to 200 Hz
- Shock: 30 Gs, 11 mS half sinewave
- EMC —
  - Immunity to EN 50082-2 (Heavy Industrial)
  - Emissions to EN 50081-2 (Heavy Industrial)
- Front Panel: NEMA 4X when mounted with gasket provided
- Agency Approval —
  - CE EMC immunity and emissions requirements were met using shielded wiring on the RS-485, analog output and pulse input/power lines. The shields were connected to earth ground at the Eclipse end of the shields.
- Pollution Degree 2: Overvoltage Category II

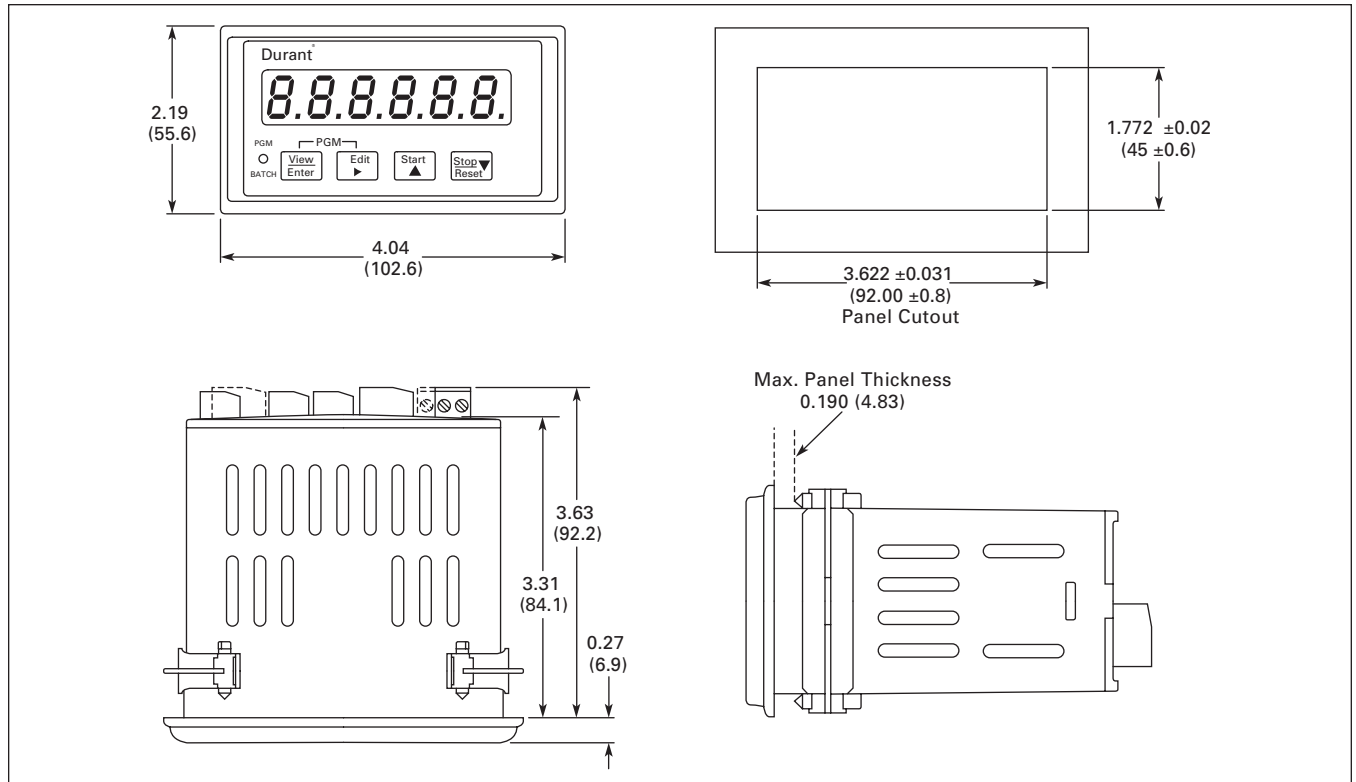
**Catalog Number Selection**

**Table 54-73. Eclipse Flow Model Numbering System**



① Output Options 0, 2, 4 are not available for models -41X and -43X.

**Dimensions**



**Figure 54-66. Eclipse Flow Models — Approximate Dimensions in Inches (mm)**

## Basic Monitor Control

## Contents

Description	Page
<b>Special Function Controls</b>	
Basic Monitor Control . . . .	54-76
Position Control . . . . .	54-77
Ambassador Series	
Closed-Loop Speed Control . . . . .	54-79



Cat. No. 54420400



Cat. No. 56460400

## Product Description

The BASIC monitor control (BMC) has two count inputs. Eight other rear terminal inputs and the fourteen front panel keys are user definable. The same is true for the two relay and five transistor outputs. Configuration is done through a BASIC language program entered by the user, putting the BMC in specialized control applications where dedicated count controls are not as well suited.

The 6460 sequential control can be thought of as a counter and/or timer with 500 presets. Most users load a number of programs or "recipes" into the 6460 and have the operator select one recipe at a time to run. The 6460 is often found in roll forming and coil winding applications and is used on induction heat treating scanners.

## Application Description

## Cut-to-Length Application

In a "typical" cut-to-length application, raw stock is pulled from a coil through straightening rollers, and fed past a pneumatic shear. A quadrature encoder riding on the stock sends pulses to a counter that "measures" the amount of stock fed. The primary counter function

is to supply an output signal to the shear to cut the stock at a certain "preset" length, then reset itself and start measuring the next piece, and continue to do so until the desired number of pieces have been cut.

Modern counters provide two other functions. The first is the slowdown, or "prewarn" output. The motor that drives the stock through the machine usually is run at a high speed until just before the cutoff occurs. A prewarn output from the counter to the drive drops the motor speed so that the feed rate for the stock slows to a "creep" speed that is maintained until the final cutoff preset is reached. Due to variations in feed speed and shear response, this creep speed is necessary for achieving a consistent cut length.

The second additional function of the counter is to count the number of pieces that are cut and stop the machine when a preset number of pieces is reached. This is done by a second count register, called the batch counter, inside the counter.

## Features

## BASIC Monitor Control

- 6-digit, LED display
- 0.56" (14.2 mm) high characters
- User defined operation
- Utilizes BASIC language
- Outputs
  - 4 NPN transistors
  - 2 form-C relays
  - 1 pulse-width modulated

- 8 input lines
- 8k bytes of programmable memory
- 15V DC, 100 mA maximum output power
- 20 mA current loop communication
- Accepts 115/230V AC and 11 – 16V DC input power
- NEMA 4 front panel

## 500 Level Sequence Controller

- 500 programming levels
- 32-character 2 line LCD display 0.315" (8 mm) high characters
- 17 programmable count modes
- 4 programmable jump inputs
- Millisecond timing
- Count scaling
- Rate, total and batch count

- 16 NPN outputs
- 24V DC @ 800 mA and 15V DC @ 200 mA output power
- RS-232 communications
- 85 – 265V AC and 24V DC input power models
- Optional configuration software available
- NEMA 4 accessory kit

## Standards and Certifications

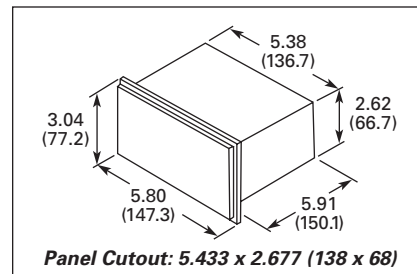
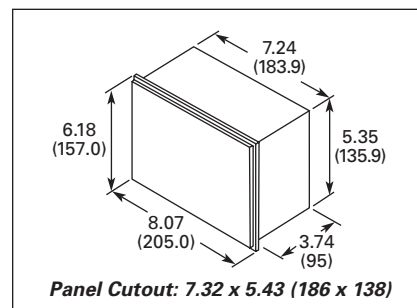
- UL and cUL Listed, CE Marked

## Product Selection

Table 54-74. Product Selection — Basic Monitor Control

Description	Catalog Number	Price U.S. \$
Basic Monitor Control	54420400	
500 Level Sequence Controller	56460400	

## Dimensions

Figure 54-67. Dimensions — 54420400  
Approximate Dimensions in Inches (mm)Figure 54-68. Dimensions — 56460400  
Approximate Dimensions in Inches (mm)

Discount Symbol . . . . . CC-1



*Cat. No. 58868400*

**Product Description**

The 58868400 closed-loop position control provides digital output signals (run, direction and fast/slow) to a drive to cause a motor-driven tool to be positioned along a single axis. These signals can also be used to control values in a hydraulic positioning system. Typically, a quadrature encoder, coupled to the drive mechanism, provides the feedback signal to the position control. Up to five destinations can be automatically sequenced through in a move-and-dwell process, or the operator can select a single destination for move-and-stop positioning.

**Features**

- 6-digit, LED display, 14 mm (0.56") high characters
- 4 move registers plus home
- 2 Form C relays and 5 NPN transistor outputs
- 28 kHz count speed
- 5 dwell time settings
- 15V DC @ 100 mA power output
- Manual or automatic operation
- Programmable offset, prewarn and kerf values
- Backlash compensation
- Programmable high/low limits
- 20 mA current loop communications
- NEMA 4X front panel

**Standards and Certifications**

- UL Listed

**Technical Data and Specifications**

**Power Input**

- AC Operation: 120/240V AC ± 10%, -20%), 47 to 63 Hz
- DC Operation: 11 to 16V DC (0.7 Amp max.)
- Power Consumption: 18 Watts maximum

**DC Power Output**

- 15V DC (+1, -2), 100 mA maximum

**Environment**

- Operating Temperature: 32 to 130°F (0 to 55°C)
- Storage Temperature: -40 to 160°F (-40 to 71°C)
- Operating Humidity: 85% relative, non-condensing.
- NEMA 4 rating when mounted with gasket provided

**Control Input Response**

- Start/Stop: 1 mS
- Go home input: 5 mS
- Load Position: 5 mS
- Reference Input: 1.7 mS

**Input Voltage**

- Count Inputs —
  - High: 10.5 to 24.5V DC
  - Low: 0 to 4.5V DC
- Control Inputs —
  - High: 3.8 to 15.0V DC
  - Low: 0 to 1.2V DC

**Input Impedances**

- Count Inputs: 6.8 kΩ to +15V DC (2.2 mA at 0V DC)
- Control Inputs: 2.2 kΩ to +5V DC (2.3 mA at 0V DC)

**Relay Outputs (2)**

- Type: Form C contacts
- Load Voltage: up to 240V AC or 280V DC
- Load Current: 5A resistive, 1.5A at 80% PF

**Transistor Outputs (5)**

- Type: NPN open collector with surge protection
- Load Voltage: 30V DC maximum
- Load Current: 300 mA maximum
- Saturation: 1.5V max. @ 300 mA
- Latency: 150 + 5 μS/1 kHz input speed ± 10 μS

**Communication**

- Type: 20 mA loop (active transmit, passive receive)
- Speed: 110, 300 or 1200 Baud
- Parity: Odd, even, space
- Format: 1 start bit, 7 data bits (ASCII), 1 parity bit, 1 stop bit (110 baud uses 2 stop bits)
- Load Voltage: 30V DC maximum
- Load Current: 300 mA maximum
- Saturation: 1.5V max. @ 300 mA
- Latency: 150 + 5 μS/1 kHz input speed ± 10

**Input Frequency**

- The maximum input frequency only on the selected quadrature operation

**Quadrature Selection**

	X1	X2	X4
High Speed	28 kHz	14 kHz	7 kHz
Low Speed	150 Hz	150 Hz	150 Hz

Low speed jumper installed.

**Note:** Only function 60 and the double jumper affect the maximum input speed. The scale factor does not affect the input speed.

**Position Control Features**

- Setpoints: Four move setpoints plus one home setpoint
- Range for all setpoints is -99999 to 999999
- Decimal Point: Four positions, programmable
- Dwell Times: Five, one for each setpoint. Dwell time range is 00.01 to 99.98 seconds.
- Scale Factor: Scale factor range is 0.00100 to 9.999999.
- Accuracy: 100% when the position control is operated within the specified speeds and input voltages



Position Control

Product Selection

Table 54-75. Product Selection — Position Control

Description	Catalog Number	Price U.S. \$
Single-Axis Position Control	58868400	

Dimensions

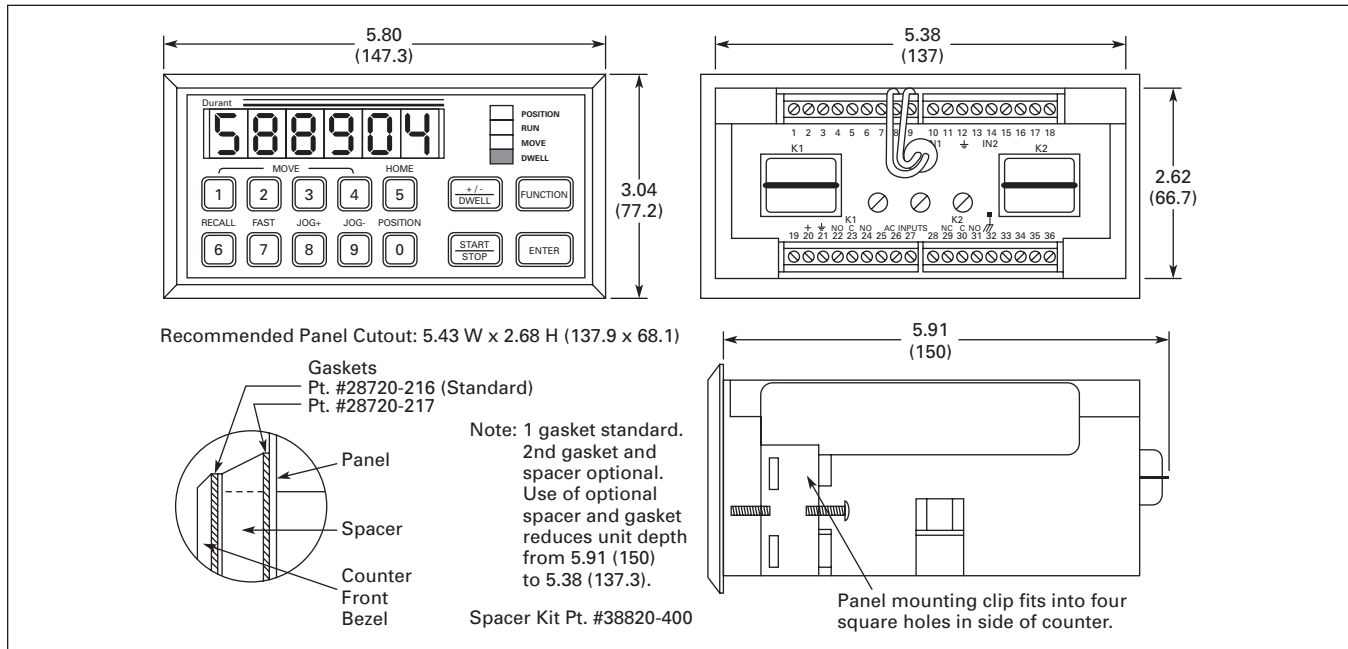


Figure 54-69. President Series Position Control — Approximate Dimensions in Inches (mm)




**Cat. No. 57401400**

## Product Description

The Ambassador speed control provides a tightly regulated, isolated, 0 – 10V speed reference signal to a drive. It is most often used in follower mode applications, such as conveyor speed matching/mis-matching, cable production lay control, cable take-up reel traversing mechanism speed control and many others. In master mode, it is most commonly used for constant web speed take-up roll control, where the increasing roll diameter requires constant motor slowing over the course of filling a roll. Also, where feedback scaling and presets are required in units other than RPM or Hz. For instance, using a flowmeter as the feedback sensor, control the speed of a motor-driven pump in units of gallons/minute.

The two preset version offers additional features, such as reversing, and remote preset adjustments by “bumping” external pushbuttons.

## Features

- 2-line, 16-character, alphanumeric, high visibility, LCD backlit, 7.5 mm [0.3"] high character display
- 1 or 2 speed presets
- Isolated 1 – 10V DC analog out
- Selectable master/slave/jog modes
- Proportional integral error correction
- 35 kHz frequency inputs
- $\pm 0.015\%$  speed regulation
- 12V DC @ 125 mA power output
- 12-Bit DAC resolution
- RS-485 serial communications
- NEMA 4X front panel

## Standards and Certifications

- UL Listed

## Technical Data and Specifications

### Power Input

- 57401-40X: 115V AC ( $\pm 15\%$ ) std., 50 to 60 Hz, 0.2A
- 57402-40X: 230V AC ( $\pm 15\%$ ) opt., 50 to 60 Hz, 0. 1A

### DC Power Output

- 12V DC ( $\pm 10\%$ ), 125 mA maximum (includes all line and load variations)

### Environment

- Operating Temperature: 32 to 131°F (0 to 55°C).
- Storage Temperature: -4 to 158°F (-20 to 70°C).
- Operating Humidity: 85% Relative, non-condensing
- NEMA 4X rated when mounted with gasket provided

### Speed Regulation (Closed Loop)

- Accuracy:  $\pm 0.015\%$
- Update Time: 5 mS

### Frequency Inputs

- Current Sinking —
  - Impedance: 4.75K
  - Voltage Maximum: 24V DC
  - High threshold: 3.5V DC
  - Low threshold: 1.9V DC
  - Pulse Rate: 1 Hz – 35 kHz
- Magnetic —
  - Impedance: 16 k min.
  - Voltage —
    - Maximum: 65V AC rms
    - Maximum: 200 mV p-p
  - Pulse Rate: 1 Hz – 35 kHz

### Control Inputs

- Impedance: 4.75k ohms to +5V DC
- Voltage —
  - High: +3.7 to +24V DC
  - Low: 0.0 to 0.9V DC
- Response: 40 Hz maximum

### Control Outputs

- Type: NPN open-collector with transient protection
- Max. Voltage (OFF state): 30V DC
- Max. Current (ON state): 200 mA at 1.3V DC

### Drive Signal

- Separate power supply with 1500V AC isolation
  - 5740X-400:
    - Resolution: 12 bits
    - Full Scale Voltage: 10V DC minimum into 5 mA
  - 5740X-401:
    - Resolution: 12 bits
    - Full Scale Voltage:  $\pm 10V$  DC minimum into 5 mA; Drive Reference potentiometer allows full scale voltage to be reduced to less than  $\pm 3V$  DC

### Communication

- Type: RS-485
- Format: 1 start bit, 1 parity bit, 1 stop bit, seven-bit ASCII characters
- Protocol: Opto-22 compatible
- Speed: 300, 1200, 2400, 4800, 9600 and 19200 baud
- Parity: None

### Connections

- Type: Unpluggable screw terminal strips
- Conductor Size: 14 – 22 AWG (2.1 – 0.38 mm<sup>2</sup>) 600V solid, stranded or fused (preferred)

Ambassador Series Closed-Loop Speed Control

Product Selection

Table 54-76. Product Selection — Closed Loop Speed Control

Description	Catalog Number	Price U.S. \$
1 Preset, 115V AC	57401400	
2 Presets, 115V AC	57401401	
1 Preset, 230V AC	57402400	
2 Presets, 230V AC	57402401	

Dimensions

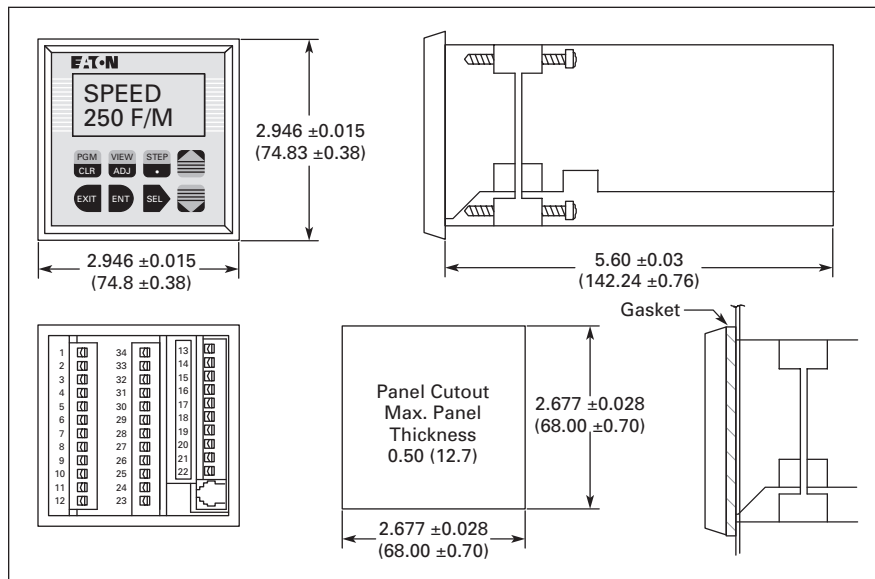


Figure 54-70. Closed Loop Speed Control — Approximate Dimensions in Inches (mm)

**Features and Benefits**



Cat. No. 57550400

**Product Description**

The Fusion Integrated Machine Control has advanced features, including a five-preset high speed counter with prewarn, a totalizer with preset, a batch counter with preset and a rate-meter with high and low setpoints. Unique to the count control world, the Fusion has five output relays (rather than two), along with two transistors and two analog setpoint or follower outputs. Its ten available parameter sets of pre-loaded values are useful as recipes, for job-stacking or for a variety of application-specific purposes.

The Fusion has a multi-line alphanumeric display which can be programmed to show text messages, logic-generated prompts, alarms and machine status. Up to eight screens can be shown or optionally locked out. Count and time presets can be made view-only or editable. Preset entry is achieved with simple 0-9 keys on the front panel rather than complicated scrolling methods. The Fusion's real time clock/calendar may be displayed and/or used to time and date stamp printouts.

With its ladder logic, the Fusion is actually a 26 I/O controller, making it a complete control for many machines and processes, integrating the functions of external timers, pushbuttons, power supplies, indicating lights, control relays and other components in the same box.

**Features**

- User-configurable operator interface with back-lit LCD display and 18-button tactile feedback keypad
- High speed counter with 5 presets and prewarn, totalizer, batch counter and ratemeter
- 10 parameter sets
- 13 digital inputs
- (2) 4 – 20 mA inputs
- (2) 0 – 10V input
- (3) Form C, 2 Form A, 2 NPN transistor, (1) 4 – 20 mA, & (1) 0 – 10V outputs
- RS-232 and RS-485 serial communications
- 100-line ladder logic processor for ultimate flexibility
- Configuration software included
- NEMA 4X enclosure

**Table 54-77. Features and Benefits**

Feature	Customer Benefit
High speed count functions; including scaling, main counter, five presets, prewarn, totalizer, batch and rate	“Canned” count functions offer flexibility and ease of setup in the desired units of measure.
High speed counting independent of ladder scan time	Precise and repeatable output response for high performance applications.
Flexible display with selectable character sizes (large, medium, small), run screens and ladder triggered messages.	Minimizes confusion and operator errors as information can be tailored to what they need and in their language. Maintenance/management data can be separated. Different character sizes allow optimization of information displayed. Machine status information can be displayed allowing operators to take action.
Simple front panel layout and keypad. Four soft keys & six function keys can be used as inputs.	Ease of use for operator. Numeric keypad allows for ease of preset and machine parameter entry. Function keys and soft keys allow easy and quick access to information and/or parameters needed by the operator and don't require using additional inputs. Eliminates cost associated with external pushbuttons and inputs.
Parameter sets	Allows for predefined recipes/jobs to be preloaded for the operator. Simplifies operator interaction and minimizes errors.
Programmable relay logic	Well understood programming method that allows flexibility in control functionality. Easy to tailor the control to various applications.
26 I/O (digital & analog)	Provides application flexibility. Analog inputs allow monitoring key process parameters. Analog outputs allow interfacing to drives and other control products.
Integrated solution	Reduced overall control costs, installation and commissioning. More flexible and capable than traditional count/control solutions but less complex than many PLC solutions.
Windows® and front panel programming	Ease of programming and configuration control.
RS-232 and RS-485 serial communication ports	Allow for direct connection to PC for programming, connection to Modbus® networks, interface to serial printer.
Robust type 4X package. DIN cutout and short depth 2.82 Inches (71.6 mm).	Suited for wet applications. Same cutout as the President Series — easing the migration. Short depth minimizes the cost and size of the machine panel or control enclosure.
Input power: 85 – 265V AC 50/60 Hz or 10 – 30V DC models	Greatly reduces models required for different control voltages.
Output power: 12V DC @75 mA, 24V DC @100 mA	Eliminates the need for an external power supply for encoders, analog transducers, etc.
Depluggable screw terminals	Allows for ease of wiring and removal of control. Terminals are different sizes to error-proof installation.
Non-volatile memory and capacitor backed real time clock	Don't have to worry about a battery failing down the road.
Real time clock	Allows for control functions to be performed on day/time and allows for date/time stamping on printouts.
UL, cUL and CE Marked	Ease of meeting machine agency requirements and robust EMC performance.

## Technical Data and Specifications

## Standards and Certifications

- UL and cUL Listed; CE Marked

## Technical Data and Specifications

## Environmental

- Operation: Indoor use to 2000m
- Temperature:
  - 32 to 122°F (0 to 50°C) operating
  - -4 to 158°F (-20 to 70°C) storage
- Humidity: 0 to 85% RH, non-condensing
- Vibration: 2.5 Gs, 30 – 200 Hz
- Shock: 30 Gs, 11 mS half sine wave
- EMC:
  - EN61326:1997
  - All I/O lines except RS-485 <30m
- Front Panel:
  - Type 4X indoor use only, when mounted with gasket provided
- Safety: UL and cUL Listed, CE Compliant

## Input Power

- AC Model: 85 – 265V AC, 47 – 63 Hz, 20 VA; Isolation 2300V AC
- DC Model: 10 – 30V DC, 15 VA

## Inputs

- Control:
  - Number: 10
  - Impedance: 4.75k Ohms to +5V DC
  - Thresholds:
    - High 3.5 – 30V DC
    - Low 0 – 1.0V DC
- Counter:
  - Number: 3 (including reset)
  - Impedance: 4.75k Ohms to +5V DC or 26.9k Ohms to ground
  - Thresholds:
    - High 3.5 – 30V
    - Low 0 – 1.5V, or 200 mV p-p to 50V rms @ 26.9k Ohms (mag pickup)

- Response:
  - 140 Hz or 14 kHz for sinking, push-pull or mag pickup inputs
  - 60 Hz or 6 kHz for sourcing only inputs
  - All frequencies based on 50-50 duty cycle
  - 6 kHz maximum sustained count speed

## ■ Analog:

- Number: 4
- Type: 4 – 20 mA and two 0 – 10V DC
- Accuracy: ± 0.5% FS and ± 200 PPM/°C
- Impedance: 100 Ohms (current input), 1.27M Ohms (voltage input)
- Overrange: 45 mA max. (current input), 20V max. (voltage input)

## Outputs

- Power (AC input model only):
  - 24V DC ± 15%, 100 mA max., short circuit protected
  - 12V DC ± 10%, 75 mA max., short circuit protected

## ■ Relays:

- Number: 3 (Form C), 2 (Form A)
- Contacts: 5A, 250V AC, 30V DC
- Isolation: 2300V AC

## ■ Transistors:

- Number: 2
- Type: NPN Darlington
- Ratings: 150 mA max. ON current, 30V DC max. OFF voltage

## ■ Analog:

- Number: 2, short circuit protected
- Type: 4 – 20 mA (<450 Ohms), 0 – 10V (>2500 Ohms)
- Accuracy: ± 0.5% FS and ± 200 PPM/°C
- Common Mode Voltage Rating: 250V AC
- Isolation: 2300V AC

## ■ RS-232:

- Connector: DB-9S
- Polarity: DCE
- Baud Rate: 1200 – 19200

## ■ RS-485:

- Connector: 6 wire RJ-12 phonejack
- Baud Rate: 1200 – 19200

## Data Retention

## ■ Program Data:

- Type: Non-volatile
- Duration: 100 Years, no batteries

## ■ Real Time Clock:

- Type: Capacitor
- Charge Time: 3 Minutes
- Retention: 1 – 5 Days

## Human Interface

## ■ Display:

- Type: 128 x 64 pixel graphic LCD with LED backlight
- Character Size:
  - 0.12" (3 mm) high, 21 characters per line, 6 lines maximum
  - 0.24" (6 mm) high, 10 characters per line, 3 lines maximum
  - 0.35" (9 mm) high, 7 characters per line, 2 lines maximum

## ■ Keys:

- Number: 18
- Type: membrane switches with tactile feedback
- Real Time Clock Format: Seconds, minutes, hours, day and date

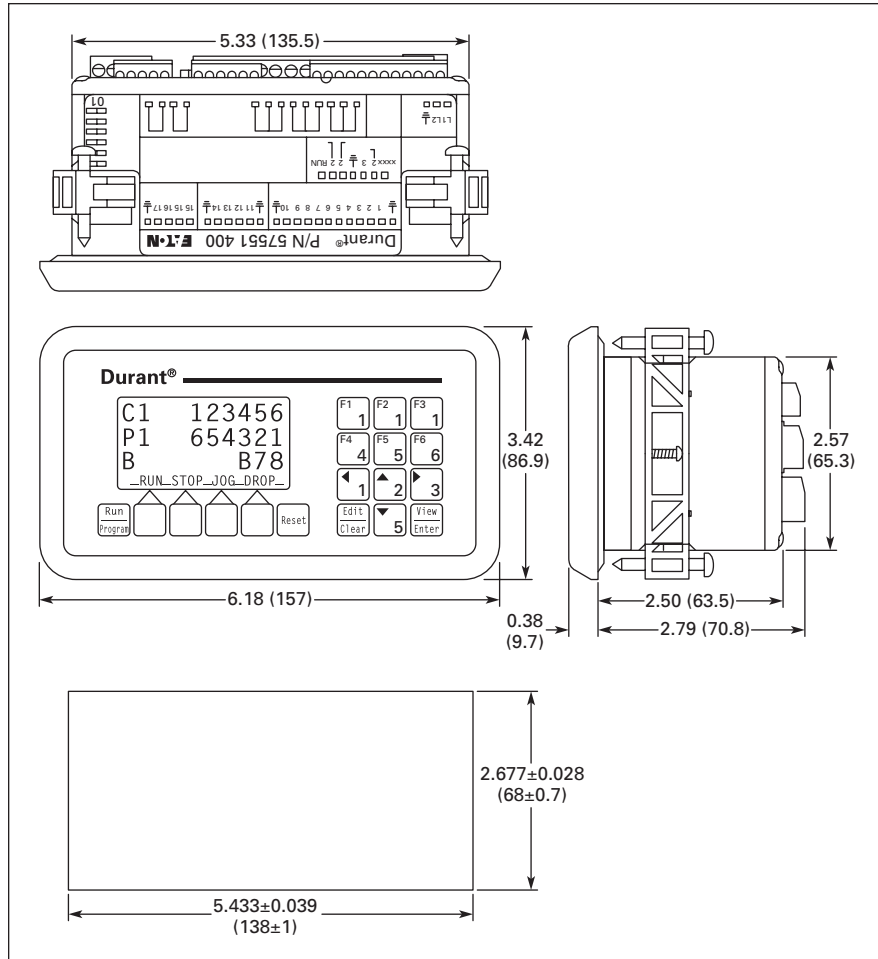
**Product Selection**

**Product Selection**

**Table 54-78. Product Selection — Fusion Integrated Machine Control**

Description	Catalog Number	Price U.S. \$
Fusion Integrated Machine Control — 10 – 30V DC Power	<b>57550400</b>	
Fusion Integrated Machine Control — 85 – 265V AC Power	<b>57551400</b>	
Fusion Configuration Software	<b>57590400</b>	

**Dimensions**



**Figure 54-71. Fusion Integrated Machine Control — Approximate Dimensions in Inches (mm)**

**Note:** Recommended Panel Cutout is 0.375 Inch (9.5 mm) max. panel thickness.

## TC Series



Cat. No. TC964110100

Cat. No. TC24411100

## Features and Benefits

- Universal temperature inputs allow user to select from PT100 or J, K, T, E, B, R, S, N, L thermocouples without modification to the unit
- Advanced fuzzy modified PID technology minimizes overshoot/undershoot and allows quick and accurate responses
- Fast sampling rate of up to 5 times per second ensures accuracy in fast processes
- Standard IP65 front panel (TC48) provides protection in wash-down and other challenging environments

## Standards and Certifications

- UL Recognized
- CSA Certified
- CE Marked
- RoHS Compliant

## Technical Data and Specifications

## Power

- 90 – 250V AC, 47 – 63 Hz, 10 VA (TC24), 12 VA (TC48/TC96), 5W maximum (TCxx4)
- 11 – 26V AC/DC, 10 VA (TC24), 12 VA (TC48/TC96), 5W maximum (TCxx5)

## Input

- Resolution: 18 bits
- Sampling Rate: 5 times/sec.
- Temperature Effect:
  - $\pm 1.5\mu\text{V}/^\circ\text{C}$  for all inputs except mV input
  - $\pm 3.0\mu\text{V}/^\circ\text{C}$  for mV input
- Sensor Lead Resistance Effect:
  - T/C:  $0.2\mu\text{V}/\text{Ohm}$
  - 3-Wire RTD:  $2.6^\circ\text{C}/\text{Ohm}$  of resistance difference of 2 leads
  - 2-Wire RTD:  $2.6^\circ\text{C}/\text{Ohm}$  of resistance sum of 2 leads
- Burn-out Current: 200nA
- Common Mode Rejection Ratio (CMRR): 120dB
- Normal Mode Rejection Ratio (NMRR): 55dB
- Sensor Break Detection:
  - Sensor open for TC, RTD and mV inputs, sensor short for RTD input, below 1 mA for 4-20 mA, below 0.25V for 1 – 5V input
- Sensor Break Response Time:
  - Within 4 seconds for TC, RTD, and mV inputs; 0.1 second for 4 – 20 mA and 1 – 5V inputs

Table 54-79. Characteristics

Type	Range	Accuracy @ 25 °C	Input Impedance
J	-120°C – 1000°C (-184°F – 1832°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
K	-200°C – 1370°C (-328°F – 2498°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
T	-250°C – 400°C (-418°F – 752°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
E	-100°C – 900°C (-148°F – 1652°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
B	0°C – 1800°C (32°F – 3272°F)	$\pm 2^\circ\text{C}$ (-200°C – 1800°C)	2.2 M $\Omega$
R	0°C – 1767.8°C (32°F – 3214°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
S	0°C – 1767.8°C (32°F – 3214°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
N	-250°C – 1300°C (-418°F – 2372°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
L	-200°C – 900°C (-328°F – 1652°F)	$\pm 2^\circ\text{C}$	2.2 M $\Omega$
PT100 (DIN)	-210°C – 700°C (-346°F – 1292°F)	$\pm 0.4^\circ\text{C}$	1.3 k $\Omega$
PT100 (JIS)	-200°C – 600°C (-328°F – 1112°F)	$\pm 0.4^\circ\text{C}$	1.3 k $\Omega$
mV	-8mV – 70mV	$\pm 0.05\%$	2.2 M $\Omega$
mA	-3mA – 27mA	$\pm 0.05\%$	70.5 $\Omega$
V	-1.3V – 11.5V	$\pm 0.05\%$	650 k $\Omega$

## Outputs

- Relay Rating: 2A/240V AC; 200,000 life cycles for resistive load
- Pulsed Voltage: source voltage 5V, current limiting resistance of 66 Ohms
- Linear Output
  - Resolution: 15 bits
  - Output regulation: 0.02% for full load change
  - Output setting time: 0.1 sec. (stable to 99.9%)
  - Isolation breakdown voltage: 1000V AC
  - Temperature effect:  $\pm 0.01\%$  of SPAN/ $^\circ\text{C}$

## Alarm

- Alarm Relay: Form C rating; 2A/240V AC; 200,000 life cycles for resistive load
- Alarm Functions: Dwell timer, Deviation High/Low alarm, Deviation Band High/Low alarm, PV High/Low alarm
- Alarm Mode: Normal, latching, hold, latching/hold
- Dwell Timer: 0.1 to 4553.6 minutes

## Environmental and Physical

- Operating Temperature: 14 to 122°F (-10 to 50°C)
- Storage Temperature: -40 to 140°F (-40 to 60°C)
- Humidity: 0 – 90% RH (non-condensing)
- Altitude: 2000m max.
- Pollution: Degree 2
- Insulation resistance: 20 M $\Omega$  min. (@ 500V DC)
- Dielectric Strength: 2000V AC, 50/60 Hz for 1 minute
- Vibration Resistance: 10 – 55 Hz, 10 m/s<sup>2</sup> for 1 minute
- Moldings: Flame resistant polycarbonate
- Dimensions:
  - TC96 = 1.88" (48 mm) (W) x 3.77" (96 mm) (H) x 3.15" (80 mm) (D)
  - TC48 = 1.88" (48 mm) (W) x 1.88" (48 mm) (H) x 4.56" (116 mm) (D)
  - TC24 = 1.96" (50 mm) (W) x 1.04" (26.5 mm) (H) x 4.35" (110.5 mm) (D)

**Product Selection**

**Table 54-80. Product Selection — TC Series**

Description	Normally Stocked Item	Catalog Number	Price U.S. \$
Temp Ctrl, 24 x 48mm, 2 Relay Out, 90 – 250V AC	X	TC24411100	
Temp Ctrl, 24 x 48mm, SSR Driver/Relay Out, 90 – 250V AC	X	TC24412100	
Temp Ctrl, 48 x 48mm, 1 Relay Out, Relay Alarm, 90 – 250V AC	X	TC484110101	
Temp Ctrl, 48 x 48mm, SSR Driver Out, 90 – 250V AC	X	TC484120001	
Temp Ctrl, 48 x 48mm, SSR Driver Out, Relay Alarm, 90 – 250V AC	X	TC484120101	
Temp Ctrl, 48 x 48mm, Analog Out, Relay Alarm, 90 – 250V AC	X	TC484130101	
Temp Ctrl, 96 x 48mm, 1 Relay Out, Relay Alarm, 90 – 250V AC	X	TC964110100	
Temp Ctrl, 24 x 48mm, 2 Relay Out, 11 – 26V AC/DC	—	TC24511100	
Temp Ctrl, 48 x 48mm, 1 Relay Out, Relay Alarm, 11 – 26V AC/DC	—	TC485110101	
Process Cntrl, 24 x 48mm, Analog/Relay Out, 90 – 250V AC	—	PC24463100	
Temp Ctrl, 48 x 48mm, Analog Out, Relay Alarm, 90 – 250V AC	—	TC24413100	



DIN Rail Adapter

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Cat. No. A2448DINADAPT

**Features**

- For panel-mounting all DIN size counters, timers and process indicators 0.94 x 1.89 Inch (24 x 48 mm) or 1.97 x 0.98 Inch (50 x 25 mm)
- Cut-out: 0.98 x 1.97 Inch (25 x 50 mm)
- For snap-on fitting to 35 mm top hat DIN rails
- Construction —
  - Mounting panel for counter: Chrome-plated sheet steel
  - Top hat DIN rail adapter: Glass fiber reinforced polyimide

**Product Selection**

Table 54-81. Product Selection — DIN Rail Adapter

Description	Catalog Number	Price U.S. \$
DIN Rail Adapter for 1/32 DIN Panel Mount Devices	A2448DINADAPT	

**Dimensions**

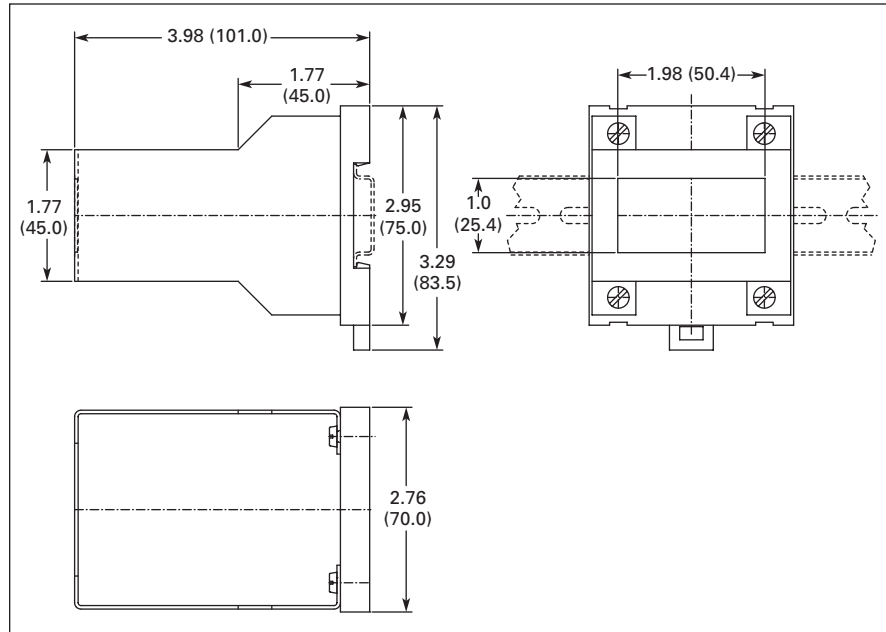


Figure 54-72. DIN Rail Adapter — Approximate Dimensions in Inches (mm)

**Vane Pickup Sensor**



*Cat. No. 39400400*

**Features**

- 10 – 15V DC input power
- 35 mA current draw
- 10-foot (3m) shielded cable
- Environmentally sealed
- 3000 Hz maximum speed

**Table 54-82. Product Selection — Vane Pickup Sensor**

Description	Catalog Number	Price U.S. \$
Vane Pickup Sensor with 10-foot (3m) Cable	<b>39400400</b>	

**C-Face Ring Tachometer**



*Cat. No. 47007056*

**Features**

- 5 – 16V DC input power
- NPN transistor output, 20 mA sinking capacity
- 60 pulses per resolution
- Zero speed pickup
- Variety of motor C-face sizes: 56, 184, 254, 256
- 39 to 225°F (4 to 107°C) operating temperature

**Table 54-83. Product Selection — C-Face Ring Tachometer**

Description	Catalog Number	Price U.S. \$
<b>C-Face Sensor</b>		
Motor Size 56C	<b>47007056</b>	
Motor Size 143TC, 145TC, 182C, 184C	<b>47007184</b>	
Motor Size 184TC, 213C, 215C, 254C	<b>47007215</b>	

**Magnetic Pickup Sensor and Gear**



*Cat. No. 47004400 and 28433400*

**Features**

**Magnetic Pickup**

- 0.25" (6.4 mm) diameter
- Ideal for tachometer and rate control applications
- -40 to 298°F (-40 to 148°C) operating temperature
- Output is AC signal, amplitude proportional to speed of target
- 10-foot (3m) cable attached
- L-Mounting bracket included

**30-Tooth Gear Accessory**

- 1.6" (41 mm) diameter
- 0.275" (7 mm) bore diameter
- Mounting set screw included

**Table 54-84. Product Selection — Magnetic Pickup Sensor and Gear**

Description	Catalog Number	Price U.S. \$
Magnetic Pickup	<b>47004400</b>	
30-Tooth Gear for Magnetic Pickup	<b>28433400</b>	

Accessories

**Rotary Contactor**



*Cat. No. 39100400*

**Features**

- No power required
- Reed switch output models for electronic counters
- Contact closure output
- Leaf switch output models for electromechanical counters
- 5/16" (7.9 mm) double shaft, 2400 rpm max. at 1:1 ratio
- 12" (304.8 mm) wire leads

**Table 54-85. Product Selection — Rotary Contactor**

Description	Catalog Number	Price U.S. \$
<b>Rotary Contactor</b>		
12:1 Ratio Reed Switch Output	39100400	
10:1 Ratio Reed Switch Output	39100401	
1:1 Ratio Reed Switch Output	41100400	
1:3 Ratio Reed Switch Output	41100401	
1:3.28 Ratio Reed Switch Output	41100402	
1:10 Ratio Reed Switch Output	41100403	
1:10 Ratio Leaf Switch Output	40892400	
1:1 Ratio Leaf Switch Output	40891400	
1:3 Ratio Leaf Switch Output	40892401	

**Measuring Wheels**



*Measuring Wheel*

**Features**

- For use with shaft encoders and rotary contactors
- 12-inch (304.8 mm) meter circumference
- Urethane, rubber and knurled edges available

**Table 54-86. Product Selection — Measuring Wheels**

Description	Catalog Number	Price U.S. \$
<b>1-Foot Circumference Measuring Wheel</b>		
5/16" Bore, Urethane Rim	20144300	
3/8" Bore, Urethane Rim	20144303	
5/16" Bore, Rubber Rim	20154300	
3/8" Bore, Rubber Rim	20154301	
5/16" Bore, Knurled Rim	20156300	
3/8" Bore, Knurled Rim	20156301	



Cat. No. 38150600

### Features

- 5 – 28V DC input power
- 80 mA current draw
- NPN transistor output, 250 mA sinking capacity
- Square wave output (50-50 duty cycle)
- Single channel and quadrature models
- Up to 600 pulses per revolution
- 3/8" (9.5 mm) double ended shaft
- ABEC 3 double sealed ball bearings
- Tapped holes for face or base mounting
- Military style connector

### Technical Data and Specifications

#### Electrical

- Input (38150) —
  - Voltage: 9 to 16V DC
  - Current: 60 mA max. @ 16V DC
  - Ripple: 2%
- Input (38151) —
  - Voltage: 5 to 28V DC
  - Current: 60 mA nom., 100 mA max.
  - Ripple: ≤ 2%
- Output —
  - Type: Current sinking transistor with 1.5 kΩ pull-up
    - Sinking current: 100 mA max.
    - Max. voltage @ 100 mA: 1.3V DC
    - Blocking voltage: 40V DC max.
  - Polarity: Positive
  - Wave Shape: Square wave
  - Pulse Rate —
    - 38150: 1 to 20,000 pulse per second
    - 38151: 1 to 10,000 pulse per second
  - Rise Time: < 1 μS
  - Pulses per Rev.: 1 to 1270
  - Accuracy: Within ± 0.1°

#### Environmental

- Operating Temperature: 32 to 167°F (0 to 75°C)
- Vibration: 3 Gs at 5 to 1000 cps
- Shock: 20 Gs, 10 ms

#### Mechanical

- Shaft Speed: 6000 RPM max.
- Shaft Rotation: CW or CCW
- Bearings: Sealed ball bearings
- Starting Torque: 0.1 oz-in
- Moment of Inertia: 0.0025 ounce inch-sec<sup>2</sup>
- Radial Loading: 50 pounds operating
- Axial Loading: 10 pounds operating
- Shaft: 3/8" (9.5 mm) dia.
- Operating Life: Up to 100,000 hours, depending on speed
- Housing: Aluminum with black anodized finish. Sealed against dust, oil, vapor and moisture.
- Mounting: Bottom or front face
- Weight: 1 lb. (0.5 kg) max.
- Connector: MS-3102E-14S-6P
- Mating Connector: MS-3106A-14S-6S with 10' (3m) shielded cable and termination for electronic controls

Shaft Encoders — Cube Style

Product Selection

Table 54-87. Product Selection — Cube Shaft Encoders

Description	Catalog Number	Price U.S. \$
<b>Single Channel</b>		
60 Pulses per Revolution	38150060	
100 Pulses per Revolution	38150100	
120 Pulses per Revolution	38150120	
600 Pulses per Revolution	38150600	
<b>Quadrature</b>		
60 Pulses per Revolution	38151060	
100 Pulses per Revolution	38151100	
120 Pulses per Revolution	38151120	
600 Pulses per Revolution	38151600	

Dimensions

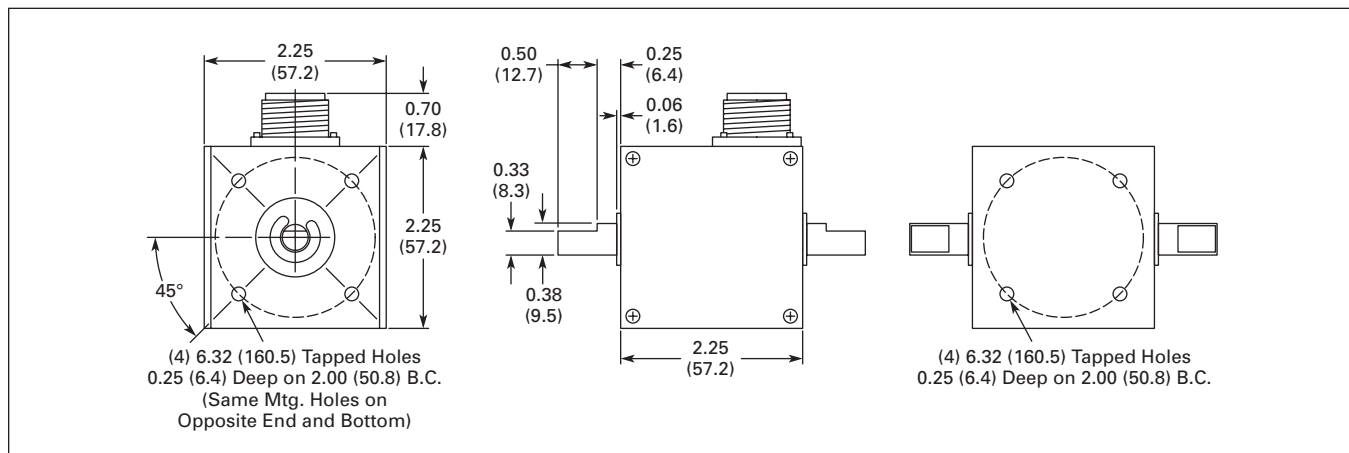


Figure 54-73. Cube Shaft Encoders — Approximate Dimensions in Inches (mm)



**Cat. No. 48370060**

**Features**

- 5 – 28V DC input power
- 80 mA current draw
- NPN transistor output, 250 mA sinking capacity
- Square wave output
- Single channel and quadrature models
- 3/8" (9.5 mm) single ended shaft
- ABEC 3 double sealed ball bearings
- Tapped holes for face or base mounting
- Military style connector

**Technical Data and Specifications**

**Electrical**

- Input —
  - Voltage: 5 to 28V DC
  - Current: 60 mA nom., 100 mA max.
  - Ripple: -2%
- Output —
  - Type: Current sinking transistor with 1.5 kΩ pull-up
    - Sinking current: 100 mA max.
    - Max. voltage @ 100 mA: 1.3V DC
    - Blocking voltage: 40V DC max.
  - Polarity: Positive
  - Wave Shape: Square wave (50-50 duty)
  - Pulse Rate: 0 to 20,000 pulse per second
  - Rise Time: < 1 μS
  - Pulses per Rev.: 1 to 1270
  - Accuracy: Within ± 0.1° or 6 arc minutes

**Environmental**

- Operating Temperature: 32 to 167°F (0 to 75°C)
- Vibration: 3 Gs at 58 to 500 cps
- Shock: 50 Gs, 11 mS duration

**Mechanical**

- Shaft Speed: 6000 RPM max.
- Shaft Rotation: CW or CCW
- Bearings: Sealed ball bearings
- Starting Torque: 1.0 oz-in
- Radial Loading: 50 pounds operating
- Axial Loading: 35 pounds operating
- Shaft: 3/8" (9.5 mm) dia.
- Housing: Aluminum with black painted finish. Sealed against dust, oil, vapor and moisture.
- Mounting: Provisions for bottom or front face
- Weight: 3.25 lbs. (1.47 kg) max.
- Connector: MS-3102E-14S-6P
- Mating Connector —
  - MS-3106A-14S-6S with 10' (3m) shielded cable and termination for electronic controls (Part No. 29665-300)
  - Connector, clamp and bushing only (Part No. 29729-300)

Shaft Encoders — Heavy Duty

**Product Selection**

Table 54-88. Product Selection — Heavy Duty Encoder

Description	Catalog Number	Price U.S. \$
<b>Single Channel</b>		
60 Pulses per Revolution	48370060	
100 Pulses per Revolution	48370100	
120 Pulses per Revolution	48370120	
600 Pulses per Revolution	48370600	
<b>Quadrature</b>		
60 Pulses per Revolution	48371060	
100 Pulses per Revolution	48371100	
100 Pulses per Revolution	48371120	
600 Pulses per Revolution	48371600	

**Dimensions**

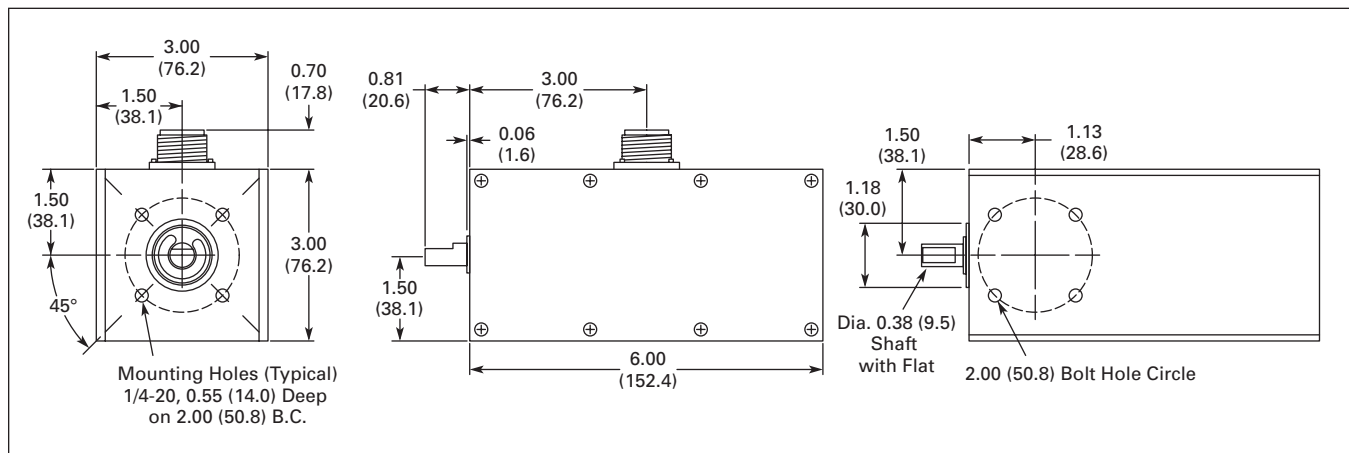


Figure 54-74. Heavy Duty Encoder — Approximate Dimensions in Inches (mm)





*Cat. No. 38159100*

**Features**

- 5 – 28V DC input power
- 100 mA current draw
- NPN transistor output, 100 mA sinking capacity
- Quadrature output, 2 square waves
- Up to 1800 pulses per revolution
- Flange mounting
- 3/8" (9.5 mm) shaft diameter
- Double shielded ball bearings
- Military style connector

**Technical Data and Specifications**

**Electrical**

- **Input**
  - Voltage: 5 to 28V DC (4.75 min., 28.0 max.)
  - Current: 100 mA max. with no output load
  - Ripple: -2% peak to peak at 5V DC
- **Output**
  - Type: Quadrature current sinking transistors with 2.2 kΩ pull-up
  - Sinking current: 100 mA max.
  - Max. voltage @ 100 mA: 1.3V DC
  - Blocking voltage: 40V DC max.
  - Polarity: Positive
  - Wave Shape: Square wave (50-50 duty cycle)
  - Pulse Rate: 0 to 100,000 pulses per second
  - Noise Immunity: Tested to BS EN6100-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option)
  - Symmetry: 180 electrical degrees ± 18
  - Quadrature Phasing: 90 electrical degrees ± 36
  - Minimum Edge Separation: 54 electrical degrees
  - Rise Time: < 1 μS
  - Pulses per Rev.: 1 to 1270
  - Accuracy: Within ± 0.1°

**Environmental**

- Operating Temperature: 32 to 158°F (0 to 70°C)
- Vibration: 20 Gs at 50 to 500 cps
- Shock: 75 Gs, 11 mS

**Mechanical**

- Shaft Speed: 8000 RPM max.
- Shaft Rotation: CW or CCW
- Bearings: Double shielded ball bearings
- Starting Torque: 1.0 oz-in typical
- Moment of Inertia: 5.2 x 10<sup>4</sup> ounce inch-sec<sup>2</sup>
- Radial & Axial Loading: (80 lbs max.) 20 – 40 lbs for bearing life of 1.5x10<sup>9</sup> revolutions
- Maximum Acceleration: 1x10<sup>5</sup> Radians/second<sup>2</sup>
- Shaft: 0.375" (9.5 mm) dia.
- Housing: Black non-corrosive finish. Sealed against dust, oil, vapor and moisture.
- Mounting: Flange mount
- Weight: 11 oz (312 g)
- Connector: MS-3102E-14S-6P
- Mating Connector —
  - MS-3106A-14S-6S with 10' (3m) shielded cable and termination for electronic controls (Part No. 29665-300)
  - Connector, clamp and bushing only (Part No. 29729-300)

Shaft Encoders — Right Angle, Size 20

**Product Selection**

Table 54-89. Product Selection — Right-Angle Shaft Encoder, Size 20

Description	Catalog Number	Price U.S. \$
100 Pulses per Revolution	38159100	
120 Pulses per Revolution	38159120	
600 Pulses per Revolution	38159600	
1000 Pulses per Revolution	381591000	
1800 Pulses per Revolution	381591800	

**Dimensions**

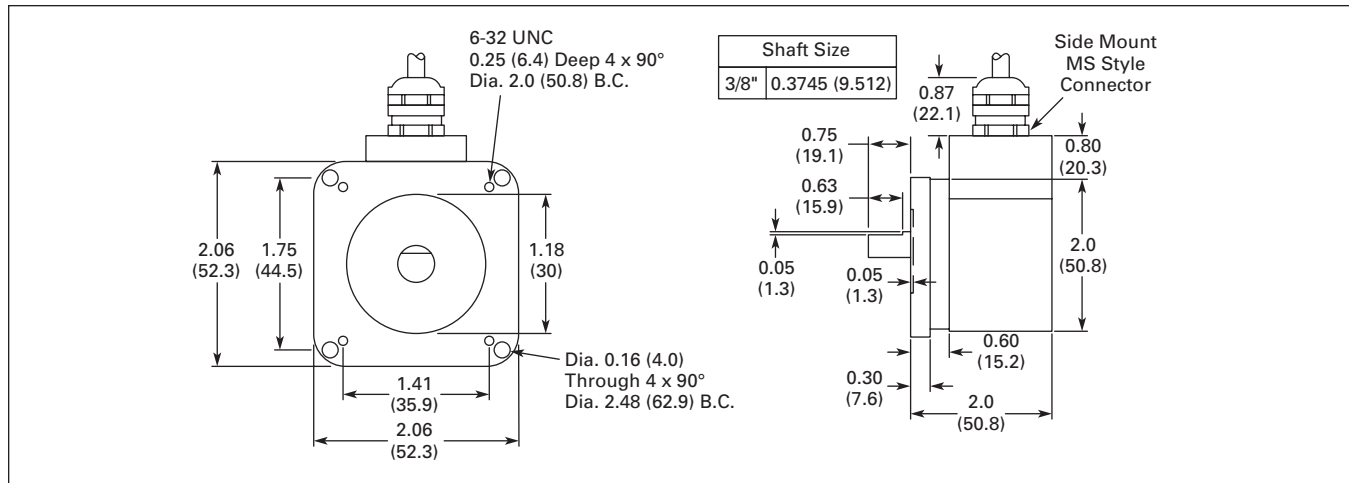


Figure 54-75. Right-Angle Shaft Encoder — Approximate Dimensions in Inches (mm)