

# Counters, Panel Meters, Tachometers and Timers

CS Series Stroke Counter



Eclipse Series Panel Meter



Hour Meter



Fusion Integrated Machine Control



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**Totalizers**



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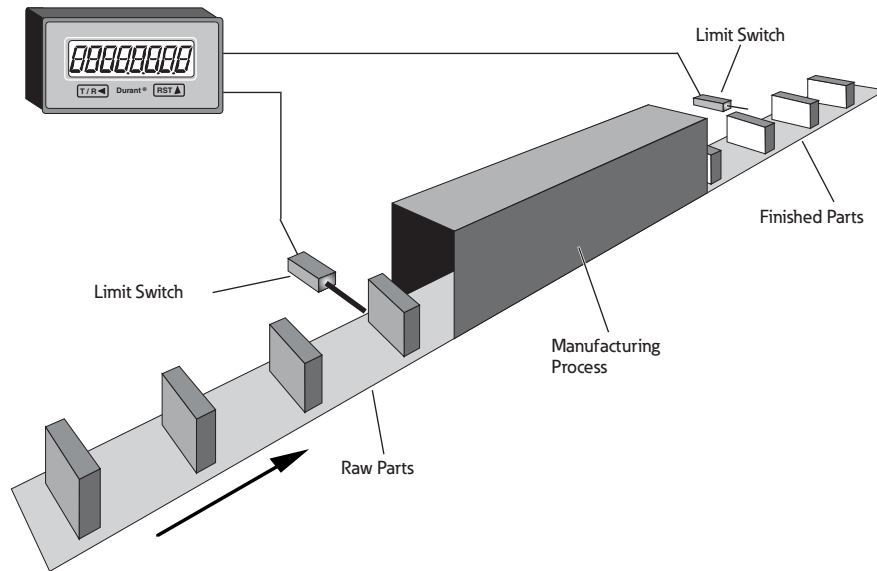
**Product Overview**

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.

**Typical Application**








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 Selection Guide

## Totalizers

	Characteristics	Typical Applications	Panel Cutout in Inches (mm)	Page
<b>Mechanical</b> 	Various size ranges for different duty cycles and environments No power supply needed Long life and always readable display	Winding and spooling equipment Position display Mechanical piece/cycle counting	Various mounting configurations	<b>5</b>
<b>Electromechanical</b> 	Various price, voltage and size ranges for different duty cycles and environments Long life and always readable display	Coin-operated equipment Gaming machines Printing presses Secondary machines (e.g. punch press)	Various mounting configurations	<b>29</b>
<b>E5-024-C</b> 	Non-replaceable battery (min. eight-year life) Compact, low cost and high efficiency Eight-digit LCD totalizers Manual or electrical reset Various counting modes/inputs	Replacement for mechanical counters Transaction counting Parts counting Position indication or measurement	0.870 x 1.772 (22 x 45)	<b>42</b>
<b>E5-24-E</b> 	Compact device with bright, LED display Multiple functions available: count, time, rate, multifunction, double-function 24 Vdc Power	Count, measure, time where small package and easy-to-read display required Position display Motor/pulley RPM	0.870 x 1.772 (22 x 45)	<b>44</b>
<b>Courier</b> 	Replaceable lithium battery Eight-digit, high-visibility LCD display Optional backlighting Various input options available	Portable/mobile/remote flow monitoring (e.g. sewer pumping, pesticide application) Position display, RPM Length measurement (e.g. carpet, cable)	1.299 x 2.677 (33 x 68)	<b>46</b>
<b>E5-496-E</b> 	Economical, multifunction display Large, LED characters AC or DC power options	Large, easy-to-read display Position display Motor/pulley RPM	1.772 x 3.780 (45 x 96)	<b>49</b>
<b>Eclipse</b> 	Six-digit, super bright LED display Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls	Length measurement and control Flow monitoring and control Process monitoring and display Voltage and current monitoring and display	1.772 x 3.780 (45 x 96)	<b>51</b>

## Totalizers, continued

	Characteristics	Typical Applications	Panel Cutout in Inches (mm)	Page
<b>President</b> 	Bright LED display with 14 mm characters Simple configuration with 14-button tactile keypad Many different versions fit almost any application	Cut-to-length machinery with batching Parts batching/palletizing Die press positioning control Applications where parameter changes are required	2.667 x 5.433 (68 x 138)	<b>54</b>
<b>Ambassador</b> 	Eight-digit, high-visibility, two-line LCD display User-configurable control inputs Highly flexible control/display	Flow control where simultaneous total and rate display are required Cut-to-length and other simple processes where flexibility of inputs/outputs required	2.667 x 2.667 (68 x 68)	<b>58</b>
<b>Hour Meter/Counter</b> 	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 UL approved	General counting Service interval for measurement systems (respiratory ventilators, oxygen machines, dialysis machines) Small appliances UV lamps Display panels in cars	1.988 (50.5) dia. or DIN rail	<b>112</b>

**Mechanical Totalizers (Stroke)****Contents****Description****Page**

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**Mechanical Totalizers (Stroke)****Product Overview**

Eaton's mechanical totalizers are available in a variety of heavy-duty configurations for applications when power is unavailable.

**Features**

- Variety of reset methods available
- Accurate counting without need for power

#### 1

### X Series/Pushbutton Desk Tally—Durant®

#### Product Description

##### X Series Counters

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.

#### Product Selection

##### 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

##### X Series Stroke Counter



##### Pushbutton Desk Tally



#### X Series Stroke Counters and Pushbutton Desk Tallies

No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number
4	LH lever	Knob	Base	4-X-1-1-L	40263400
5	LH lever	Knob	Base	5-X-1-1-L	40272401
4	RH lever	Knob	Base	4-X-1-1-R	40263401
5	RH lever	Knob	Base	5-X-1-1-R	40272402
4	LH lever	Knob	Base	4-X-1-1-L-REV ①	40263403
4	RH lever	Knob	Base	4-X-1-1-R-REV ①	40263402
5	LH lever	Knob	Base	5-X-1-1-L-REV ①	40272400
5	RH lever	Knob	Base	5-X-1-1-R-REV ①	40272403
4	Push bar	Knob	Base	4-X-2	21619400
4	Pushbutton	Knob	Base	4-X-2-A	33245400

##### Note

① Reverse stroke.

## Technical Data and Specifications

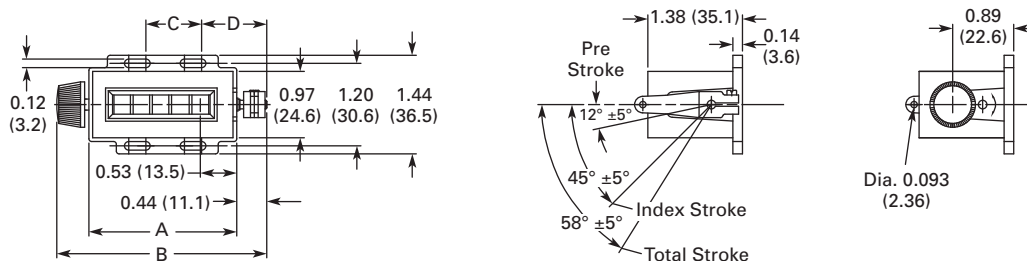
### General Specifications

Description	Specification
Figures	4 or 5
Speed	1000 cpm
Shaft	0.125 in (3.2 mm) diameter stainless steel
Drive	Drive parts of nylon
Bearings	Oil-less, maintenance free
Finish	Black frame and Cyclac black cover
Stroke operation	33° minimum; 58° maximum ①
Figure size	3/16 in (4.8 mm) high, white-on-black background
Reset	Knob

### Dimensions

Approximate Dimensions in Inches (mm)

#### X Series



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)

#### Note

① Operating stroke angles apply to forward stroke counter only. Check factory for angles of reverse stroke counter.

**CS Series—Durant®****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.

**Product Selection****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

**CS Series Stroke Counter**

**CS Series Stroke Counters**

No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number
4	RH lever	Wing nut	Base	<b>4-CS-1-1-R</b>	<b>31062400</b>
5	RH lever	Wing nut	Base	<b>5-CS-1-1-R</b>	<b>31062401</b>
5	LH lever	Wing nut	Base	<b>5-CS-1-1-L</b>	<b>31061401</b>
5	RH lever	Wing nut	Base	<b>5-CS-1-1-R-RP</b> ①	<b>01464400</b>
5	LH lever	Wing nut	Base	<b>5-CS-1-1-L-RP</b> ①	<b>00445400</b>

**Technical Data and Specifications****General Specifications**

Description	Specification
Figures	4 or 5
Speed	600 cpm
Stroke operation	37-1/2° minimum; 75° maximum
Shaft	0.25 in (6.4 mm) diameter stainless steel, rustproof
Drive	Accurately machined, hardened steel parts
Bearings	Oil-less, maintenance free
Figure size	11/32 in (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.

**Note**

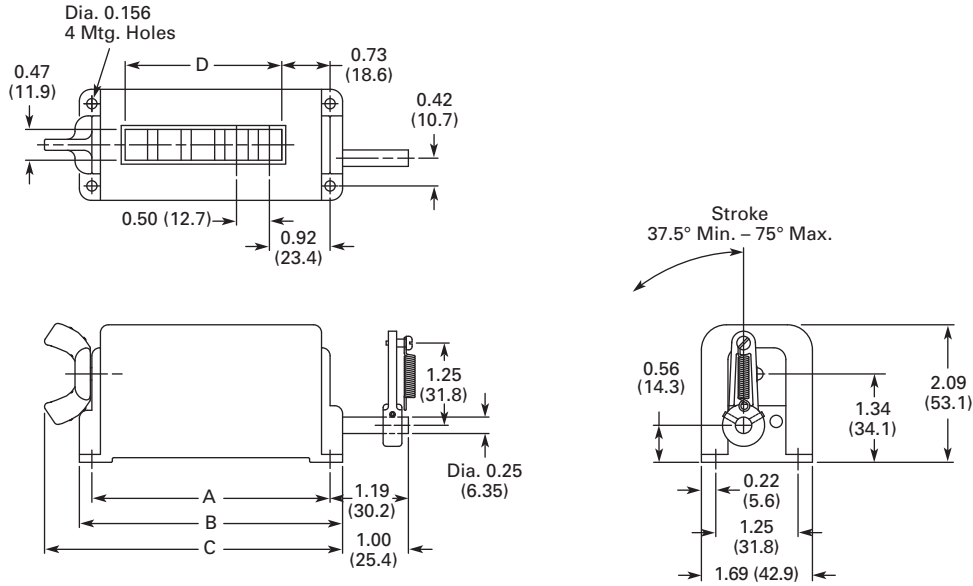
① Special feature: rustproof.



## Dimensions

Approximate Dimensions in Inches (mm)

### CS Series



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)

**H Series—Durant®****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.

**Product Selection****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)

**H Series Stroke Counter****H Series Stroke Counters**

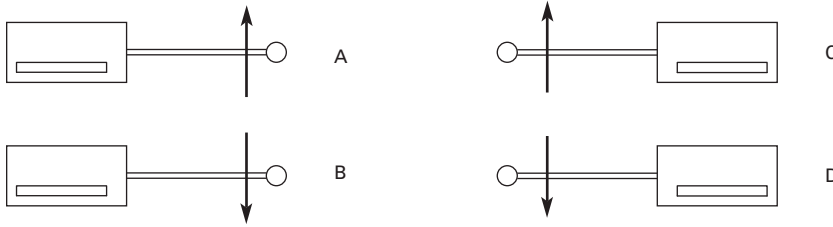
No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number
5	RH lever	Wing nut	Base	<b>5-H-1-1-R</b>	<b>40205400</b>
5	LH lever	Wing nut	Base	<b>5-H-1-1-L</b>	<b>40205401</b>
5	RH lever	Wing nut	Base	<b>5-H-1-1-R-REV</b> ①	<b>00597400</b>
5	LH lever	Wing nut	Base	<b>5-H-1-1-L-REV</b> ①	<b>00598400</b>
5	RH lever	Wing nut	Base	<b>5-H-1-1-R-RP</b> ②	<b>40205404</b>
5	LH lever	Wing nut	Base	<b>5-H-1-1-L-RP</b> ②	<b>40205405</b>
5	RH lever	Lock reset	Base	<b>5-H-1-2-R</b>	<b>40206404</b>
5	LH lever	Lock reset	Base	<b>5-H-1-2-L</b>	<b>40206405</b>
5	RH lever	Lock reset	Base	<b>5-H-1-2-R-RP</b> ②	<b>40206400</b>
5	RH lever	Lock reset	Base	<b>5-H-1-2-L-RP</b> ②	<b>40206401</b>
5	RH lever	Wing nut	Rear	<b>5-H-1-4-R</b>	<b>00507400</b>
5	LH lever	Wing nut	Rear	<b>5-H-1-4-L</b>	<b>00508400</b>
5	RH trip arm	Wing nut	Base	<b>5-H-5-A</b>	<b>31049400</b>
5	RH trip arm	Wing nut	Base	<b>5-H-5-B</b>	<b>31049401</b>
5	LH trip arm	Wing nut	Base	<b>5-H-5-C</b>	<b>31049402</b>
5	LH trip arm	Wing nut	Base	<b>5-H-5-D</b>	<b>31049403</b>
5	RH trip arm	Lock reset	Base	<b>5-H-6-A</b>	<b>01533400</b>
5	RH trip arm	Lock reset	Base	<b>5-H-6-B</b>	<b>01534400</b>
5	LH trip arm	Lock reset	Base	<b>5-H-6-C</b>	<b>01535400</b>
5	LH trip arm	Lock reset	Base	<b>5-H-6-D</b>	<b>01536400</b>

**Notes**

- ① Special feature: Reverse stroke.  
 ② Special feature: Rustproof.

## Technical Data and Specifications

### Direction Location for 5H5 and 5H6



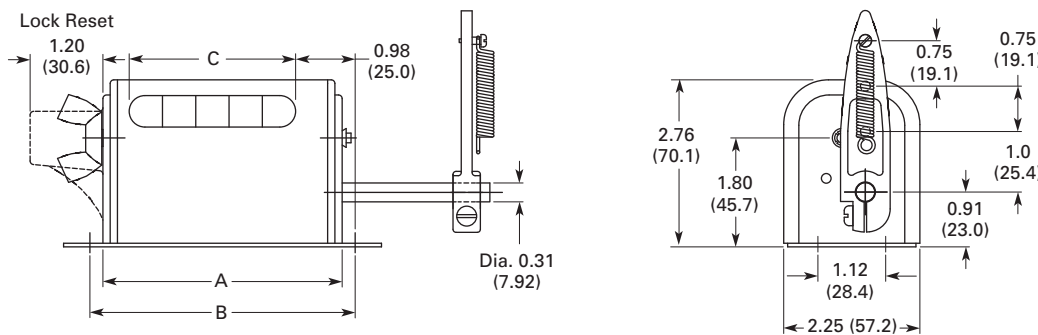
### General Specifications

Description	Specification
Figures	5
Speed	800 cpm
Stroke operation	37° stroke to count; 60° maximum stroke
Shaft	0.31 in (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 in (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.

### Dimensions

Approximate Dimensions in Inches (mm)

#### H Series



Model	A	B	C
Five figure units	3.95 (100.4)	4.38 (111.3)	2.75 (69.9)

**D Series—Durant®****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.

**Product Selection****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

**D Series Stroke Counter****D Series Stroke Counters**

No. of Figures	Drive	Reset	Mounting	Catalog Number	Order Number
4	RH lever	Wing nut	Base	<b>4-D-1-1-R</b>	<b>34269401</b>
5	RH lever	Wing nut	Base	<b>5-D-1-1-R</b>	<b>34269402</b>
6	RH lever	Wing nut	Base	<b>6-D-1-1-R</b>	<b>34269403</b>
4	LH lever	Wing nut	Base	<b>4-D-1-1-L</b>	<b>34269405</b>
5	LH lever	Wing nut	Base	<b>5-D-1-1-L</b>	<b>34269406</b>
6	LH lever	Wing nut	Base	<b>6-D-1-1-L</b>	<b>34269407</b>

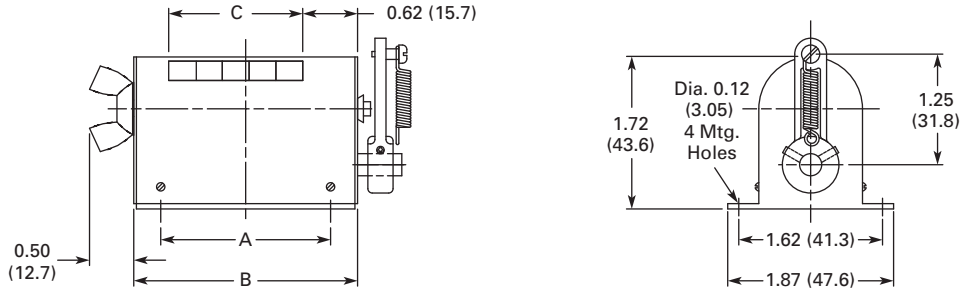
**Technical Data and Specifications****General Specifications**

Description	Specification
Figures	4, 5 and 6
Speed	400 cpm
Shaft	0.25 in (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 in (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

## Dimensions

Approximate Dimensions in Inches (mm)

### D Series



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)

#### Mechanical Totalizers (Revolution)



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#### Mechanical Totalizers (Revolution)

##### Product Overview

Eaton’s mechanical totalizers are available in a variety of heavy-duty configurations for applications when power is unavailable.

##### Features

- Variety of reset configurations available
- Accurate length measurement for application where power is not available

**X Series—Durant®****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.

**Product Selection****When Ordering Specify**

To determine a model number from the Product Selection table for Model X

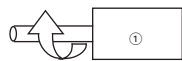
Series Revolution Counters, consider:

- Number of figures

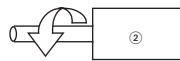
- Ratio
- Drive shaft location
- Shaft rotation direction

**X Series Revolution Counter****X Series Revolution Counters**

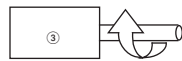
No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number
4	LH	Clockwise ①	Knob	Base	4-X-7-1-L-CL	40270406
5	LH	Clockwise ①	Knob	Base	5-X-7-1-L-CL	40275404
4	LH	Anti-clockwise ②	Knob	Base	4-X-7-1-L-AC	40270404
5	LH	Anti-clockwise ②	Knob	Base	5-X-7-1-L-AC	40275407
4	RH	Clockwise ③	Knob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

**Top View—Left-Hand Drive**

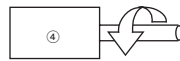
Clockwise Shaft Rotation



Anti-Clockwise Shaft Rotation

**Top View—Right-Hand Drive**

Clockwise Shaft Rotation



Anti-Clockwise Shaft Rotation

**Notes**

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

- ① Top view—left-hand drive with clockwise shaft rotation.
- ② Top view—left-hand drive with anti-clockwise shaft rotation.
- ③ Top view—right-hand drive with clockwise shaft rotation.
- ④ Top view—right-hand drive with anti-clockwise shaft rotation.
- ⑤ Special feature: 10:1 ratio.

## Technical Data and Specifications

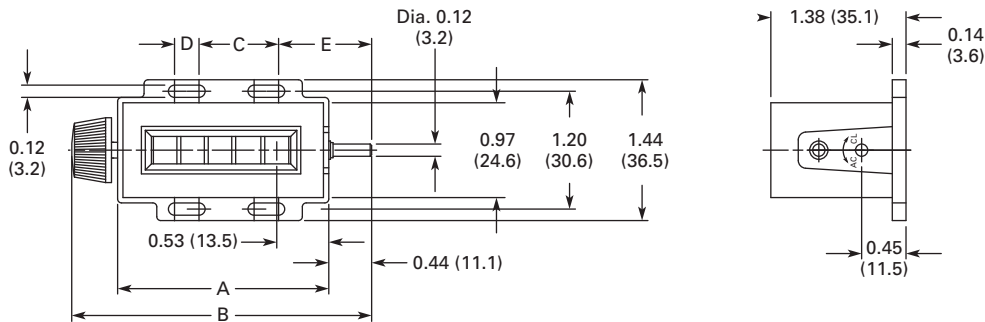
### General Specifications

Description	Specification
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 in (3.2 mm) diameter stainless steel; standard length 0.44 in (11.1 mm)
Bearings	Oil-less, maintenance free
Figure size	3/16 in (4.8 mm) high, white-on-black background
Reset	Knob
Finish	Black frame, Cylolac 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

### Dimensions

Approximate Dimensions in Inches (mm)

#### X Series



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)



**CS Series—Durant®****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.

**Product Selection****When Ordering Specify**

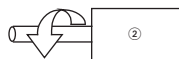
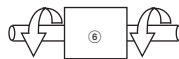
To determine a model number from the Product Selection table for Model CS

Series Revolution Counters, consider:

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

**CS Series Revolution Counter****CS Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number
5	LH	Clockwise	Wing nut	Base	<b>5-CS-7-1-L-CL</b>	<b>31060408</b>
5	RH	Clockwise ①	Wing nut	Base	<b>5-CS-7-1-R-CL</b>	<b>31060409</b>
5	LH	Anti-clockwise	Wing nut	Base	<b>5-CS-7-1-L-AC</b>	<b>31060410</b>
5	RH	Anti-clockwise ②	Wing nut	Base	<b>5-CS-7-1-R-AC</b>	<b>31060411</b>
5	LH	Clockwise	Wing nut	Base	<b>5-CS-7-1-L-CL ③</b>	<b>00440400</b>
4	RH	Clockwise ①	Wing nut	Base	<b>4-CS-7-1-R-CL ③</b>	<b>31057401</b>
5	RH	Clockwise ①	Wing nut	Base	<b>5-CS-7-1-R-CL ③</b>	<b>00441400</b>
5	LH	Anti-clockwise	Wing nut	Base	<b>5-CS-7-1-L-AC ③</b>	<b>00442400</b>
4	RH	Anti-clockwise ②	Wing nut	Base	<b>4-CS-7-1-R-AC ③</b>	<b>31057403</b>
5	RH	Anti-clockwise ②	Wing Nut	Base	<b>5-CS-7-1-R-AC ③</b>	<b>00443400</b>
4	RH and LH	Clockwise ④	None	Base	<b>4-CS-7-3-CL ⑤</b>	<b>31057408</b>
4	RH and LH	Anti-clockwise ⑥	None	Base	<b>4-CS-7-3-AC ⑤</b>	<b>31057409</b>
5	RH and LH	Clockwise ④	None	Base	<b>5-CS-7-3-CL ⑤</b>	<b>31057410</b>
5	RH and LH	Anti-clockwise ⑥	None	Base	<b>5-CS-7-3-AC ⑤</b>	<b>31057411</b>

**Top View—Right-Hand Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Top View—Right- and Left-Hand Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Notes**

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

- ① Top view—right-hand drive with clockwise shaft rotation.
- ② Top view—right-hand drive with anti-clockwise shaft rotation.
- ③ Special feature: 10:1 ratio.
- ④ Top view—right- and left-hand drive with clockwise shaft rotation.
- ⑤ Special feature: 10:1 ratio, non-reset, double shaft.
- ⑥ Top view—right- and left-hand drive with anti-clockwise shaft rotation.

### Technical Data and Specifications

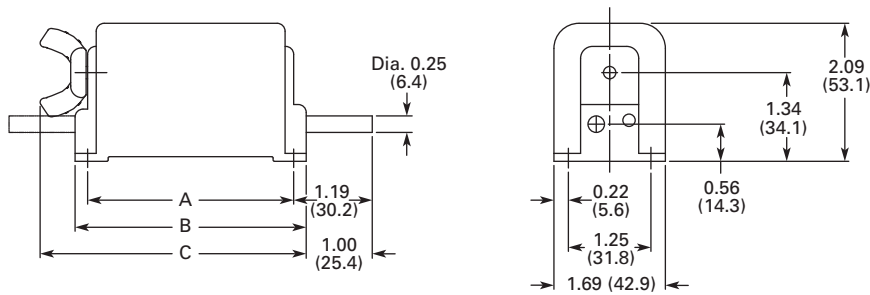
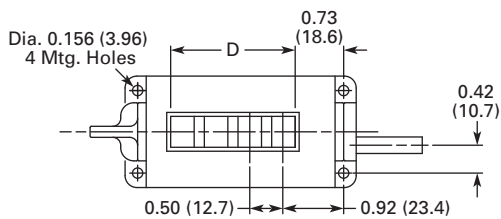
#### General Specifications

Description	Specification
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 in (6.4 mm) diameter stainless steel; standard length 1 in (25.4 mm)
Drive	Spur gear
Bearings	Oil-less, maintenance free
Figure size	11/32 in (8.7 mm) high, black-on-white background
Reset	Contoured wing nut
Finish	Black frame

#### Dimensions

Approximate Dimensions in Inches (mm)

#### CS Series



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)

**D-7 Series—Durant®****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.

**Product Selection****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 drive
- Shaft rotation direction
- Reset or non-reset

**D-7 Series Revolution Counter****D-7 Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number
5	LH	Clockwise ①	Wing nut	Base	5-D-7-1-L-CL	31127408
5	LH	Anti-clockwise ②	Wing nut	Base	5-D-7-1-L-AC	31127405
5	RH	Clockwise ③	Wing nut	Base	5-D-7-1-R-CL	31127431
5	RH	Anti-clockwise ④	Wing nut	Base	5-D-7-1-R-AC	31127400
5	LH	Clockwise ①	None	Base	5-D-7-3-L-CL	31127416
5	LH	Anti-clockwise ②	None	Base	5-D-7-3-L-AC	31127412
5	RH	Clockwise ③	None	Base	5-D-7-3-R-CL	31127438
5	RH	Anti-clockwise ④	None	Base	5-D-7-3-R-AC	31127442

**Top View—Left-Hand Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Top View—Right-Hand Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Notes**

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

- ① Top view—left-hand drive with clockwise shaft rotation.
- ② Top view—left-hand drive with anti-clockwise shaft rotation.
- ③ Top view—right-hand drive with clockwise shaft rotation.
- ④ Top view—right-hand drive with anti-clockwise shaft rotation.

### Technical Data and Specifications

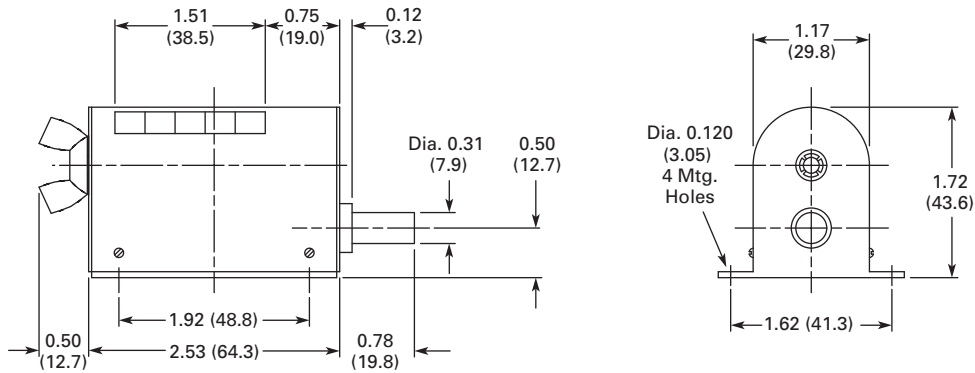
#### General Specifications

Description	Specification
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 in (7.9 mm) diameter stainless steel; 0.66 in (16.7 mm) right-hand drive, 0.63 in (15.9 mm) left-hand drive
Drive	Right- or left-hand spur gear drive
Bearings	Oil-less, maintenance free
Figure size	1/4 in (6.4 mm) high, black-on-white background
Finish	Black frame and cover
Reset	Wing nut or non-reset

#### Dimensions

Approximate Dimensions in Inches (mm)

#### D-7 Series



**D-6 Series—Durant®****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.

**Product Selection****When Ordering Specify**

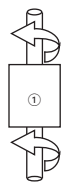
To determine a model number from the Product Selection table for Model D-6

Series Revolution Counters, consider:

- Shaft rotation direction

**D-6 Series Revolution Counter****D-6 Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number
5	Front and rear	Anti-clockwise <sup>①</sup>	Wing nut	Base	<b>5-D-6-1-AC</b>	<b>31052401</b>
6	Front and rear	Anti-clockwise <sup>①</sup>	Wing nut	Base	<b>6-D-6-1-AC</b>	<b>31052402</b>
5	Front and rear	Clockwise <sup>②</sup>	Wing nut	Base	<b>5-D-6-1-CL</b>	<b>31052404</b>
6	Front and rear	Clockwise <sup>②</sup>	Wing nut	Base	<b>6-D-6-1-CL</b>	<b>31052405</b>
5	Front and rear	Anti-clockwise <sup>①</sup>	Wing nut	Base	<b>5-D-8-1-AC</b> <sup>③</sup>	<b>40187401</b>
6	Front and rear	Anti-clockwise <sup>①</sup>	Wing nut	Base	<b>6-D-8-1-AC</b> <sup>③</sup>	<b>40187402</b>
5	Front and rear	Clockwise <sup>②</sup>	Wing nut	Base	<b>5-D-8-1-CL</b> <sup>③</sup>	<b>40187417</b>
6	Front and rear	Clockwise <sup>②</sup>	Wing nut	Base	<b>6-D-8-1-CL</b> <sup>③</sup>	<b>40187418</b>
5	Front and rear	Clockwise <sup>②</sup>	Wing nut	Base	<b>5-D-9-1-CL</b> <sup>④</sup>	<b>40187404</b>
5	Front and rear	Anti-clockwise <sup>①</sup>	Wing nut	Base	<b>5-D-9-1-AC</b> <sup>④</sup>	<b>40187410</b>
5	Front and rear	Clockwise <sup>②</sup>	Wing nut	Base	<b>5-D-90-1-CL</b> <sup>⑤</sup>	<b>40187414</b>
5	Front and rear	Anti-clockwise <sup>①</sup>	Wing nut	Base	<b>5-D-90-1-AC</b> <sup>⑤</sup>	<b>40187408</b>

**Top View of Counter****Anti-Clockwise Shaft Rotation****Clockwise Shaft Rotation****Notes**

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

- ① Top view of counter—anti-clockwise shaft rotation.
- ② Top view of counter—clockwise shaft rotation.
- ③ Special feature: Measuring wheels and brackets available for lineal measurement in feet.
- ④ Special feature: Measuring wheels and brackets available for lineal measurement in yards and 1/8ths.
- ⑤ Special feature: Measuring wheels and brackets available for lineal measurement in yards.

## Technical Data and Specifications

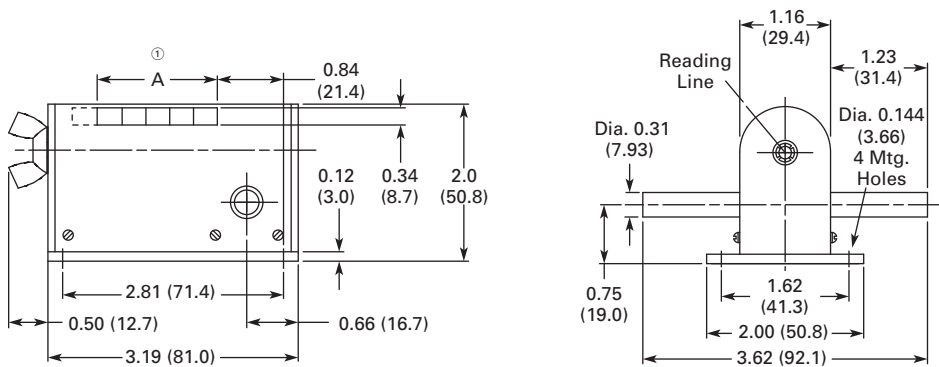
### General Specifications

Description	Specification
Figures	5 or 6
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 in (7.9 mm) diameter stainless steel; 1.25 in (31.8 mm) length standard
Drive	Worm drive
Bearings	Oil-less, maintenance free
Figure size	1/4 in (6.4 mm) high, black-on-white background
Finish	Black frame and cover
Reset	Wing nut

### Dimensions

Approximate Dimensions in Inches (mm)

#### D-6 Series



#### Note

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

**HDW Series—Durant®****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.

**Product Selection****When Ordering Specify**

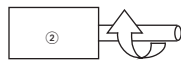
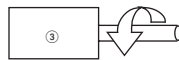
To determine a model number from the Product Selection table for Model

HDW Series Revolution Counters, consider:

- Shaft drive
- Shaft rotation direction

**HDW Series Revolution Counter****HDW Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting <sup>①</sup>	Catalog Number	Order Number
5	RH	Clockwise <sup>②</sup>	Wing nut	Base	5-HDW-7-1-R-CL	31050400
5	RH	Anti-clockwise <sup>③</sup>	Wing nut	Base	5-HDW-7-1-R-AC	31050401
5	LH	Clockwise <sup>④</sup>	Wing nut	Base	5-HDW-7-1-L-CL	31050402
5	LH	Anti-clockwise <sup>⑤</sup>	Wing nut	Base	5-HDW-7-1-L-AC	31050403

**Top View—Right-Hand Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Top View—Left-Hand Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Notes**

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

- ① Mounting plate is adjustable for base or back mounting.
- ② Top view—right-hand drive with clockwise shaft rotation.
- ③ Top view—right-hand drive with anti-clockwise shaft rotation.
- ④ Top view—left-hand drive with clockwise shaft rotation.
- ⑤ Top view—left-hand drive with anti-clockwise shaft rotation.

## Technical Data and Specifications

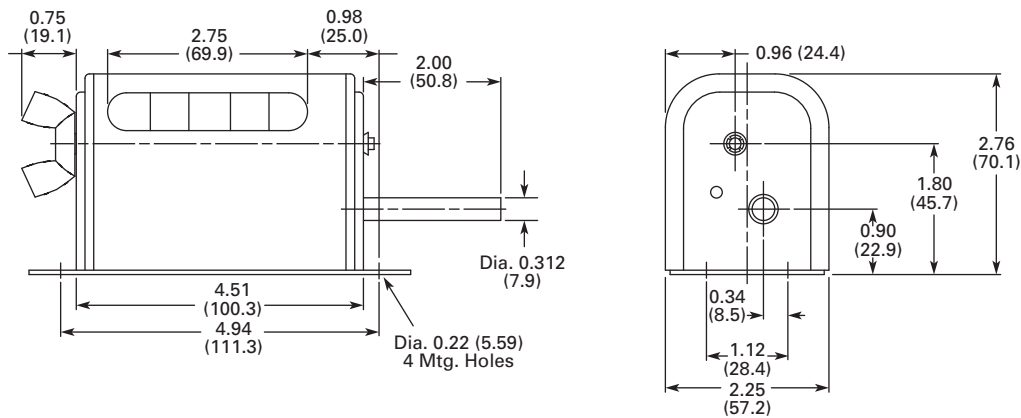
### General Specifications

Description	Specification
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 in (7.9 mm) diameter stainless steel; standard length 2 in (50.8 mm)
Drive	Right- or left-hand drive
Bearings	Oil-less, maintenance free
Figure size	11/16 in (17.5 mm) high, white-on-black background
Reset	Wing nut or tumbler lock reset
Finish	Black frame and cover

### Dimensions

Approximate Dimensions in Inches (mm)

#### HDW Series





**T Series—Durant®****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.

**Product Selection****When Ordering Specify**

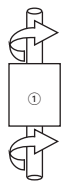
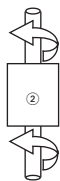
To determine a model number from the Product Selection table for Model T

Series Revolution Counters, consider:

- Shaft rotation direction

**T Series Revolution Counter****T Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting	Catalog Number	Order Number
5	Top and bottom	Clockwise ①	Wing nut	Back	<b>5-T-6-1-CL</b>	<b>40342400</b>
5	Top and bottom	Anti-clockwise ②	Wing nut	Back	<b>5-T-6-1-AC</b>	<b>40342401</b>
5	Top and bottom	Clockwise ①	Wing nut	Back	<b>5-T-8-1-CL</b> ③	<b>40179402</b>
5	Top and bottom	Anti-clockwise ②	Wing nut	Back	<b>5-T-8-1-AC</b> ③	<b>40179403</b>
5	Top and bottom	Clockwise ①	Wing nut	Back	<b>5-T-91-CL</b> ④	<b>40179408</b>
5	Top and bottom	Anti-clockwise ②	Wing nut	Back	<b>5-T-91-AC</b> ④	<b>40179409</b>
5	Top and bottom	Clockwise ①	Wing nut	Back	<b>5-T-90-1-CL</b> ⑤	<b>40179406</b>
5	Top and bottom	Anti-clockwise ②	Wing nut	Back	<b>5-T-90-1-AC</b> ⑤	<b>40179407</b>

**Top View of Counter****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Notes**

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

- ① Top view of counter—clockwise shaft rotation.
- ② Top view of counter—anti-clockwise shaft rotation.
- ③ Special feature: Measuring wheels and brackets available for lineal measurement in feet.
- ④ Special feature: Measuring wheels and brackets available for lineal measurement in yards and 1/8ths.
- ⑤ Special feature: Measuring wheels and brackets available for lineal measurement in yards.

## Technical Data and Specifications

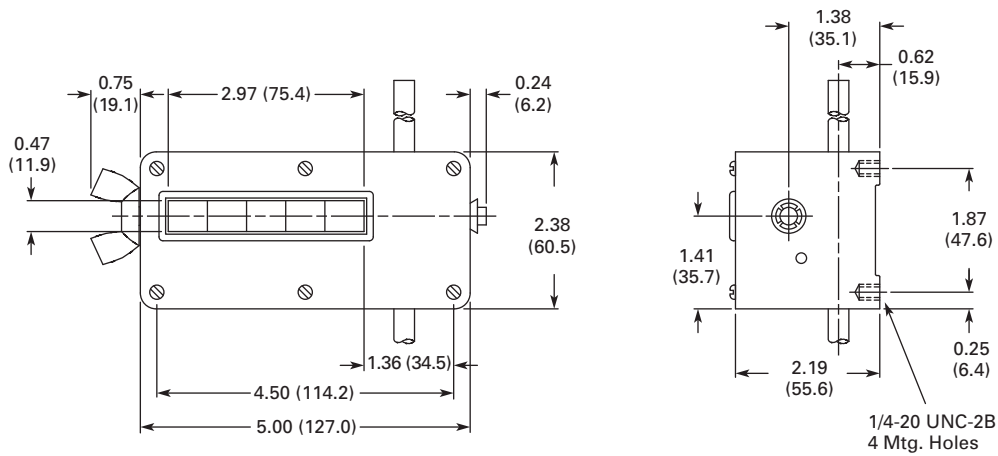
### General Specifications

Description	Specification
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 in (7.9 mm) diameter stainless steel; standard extends 2 in (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 in (8.7 mm) high, black-on-white background
Reset	Left-hand wing nut standard
Finish	Black frame and face plate

### Dimensions

Approximate Dimensions in Inches (mm)

#### T Series



**H Series—Durant®****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.

**Product Selection****When Ordering Specify**

To determine a model number from the Product Selection table for Model H Series Revolution

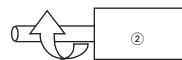
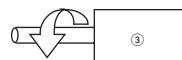
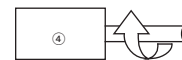
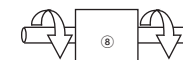
Counters, consider:

- Drive shaft location
- Shaft rotation direction

**H Series Revolution Counter****H Series Revolution Counters**

No. of Figures	Drive	Rotation	Reset	Mounting <sup>①</sup>	Ratio	Catalog Number	Order Number
5	LH	Clockwise <sup>②</sup>	Wing nut	Base	1.1	<b>5-H-7-1-L-CL</b>	<b>00509400</b>
5	LH	Anti-clockwise <sup>③</sup>	Wing nut	Base	1.1	<b>5-H-7-1-L-AC</b>	<b>00510400</b>
5	RH	Clockwise <sup>④</sup>	Wing nut	Base	1.1	<b>5-H-7-1-R-CL</b>	<b>00513400</b>
5	RH	Anti-clockwise <sup>⑤</sup>	Wing nut	Base	1.1	<b>5-H-7-1-R-AC</b>	<b>00514400</b>
5	LH	Clockwise <sup>⑥</sup>	Wing nut	Base	3.2	<b>5-H-8-1-L-CL <sup>⑦</sup></b>	<b>00601400</b>
5	LH	Anti-clockwise <sup>⑧</sup>	Wing nut	Base	3.2	<b>5-H-8-1-L-AC <sup>⑦</sup></b>	<b>00602400</b>
5	RH	Clockwise <sup>⑥</sup>	Wing nut	Base	3.2	<b>5-H-8-1-R-CL <sup>⑦</sup></b>	<b>00605400</b>
5	RH	Anti-clockwise <sup>⑧</sup>	Wing nut	Base	3.2	<b>5-H-8-1-R-AC <sup>⑦</sup></b>	<b>00606400</b>
5	LH	Clockwise <sup>⑥</sup>	Wing nut	Base	1.2	<b>5-H-9-1-L-CL <sup>⑨</sup></b>	<b>00619400</b>
5	LH	Anti-clockwise <sup>⑩</sup>	Wing nut	Base	1.2	<b>5-H-9-1-L-AC <sup>⑨</sup></b>	<b>00620400</b>
5	RH	Clockwise <sup>⑥</sup>	Wing nut	Base	1.2	<b>5-H-9-1-R-CL <sup>⑨</sup></b>	<b>00617400</b>
5	RH	Anti-clockwise <sup>⑩</sup>	Wing nut	Base	1.2	<b>5-H-9-1-R-AC <sup>⑨</sup></b>	<b>00618400</b>
5	LH	Clockwise <sup>⑥</sup>	Wing nut	Base	1.2	<b>5-H-9-0-1-L-CL <sup>⑩</sup></b>	<b>00611400</b>
5	LH	Anti-clockwise <sup>⑩</sup>	Wing nut	Base	1.2	<b>5-H-9-0-1-L-AC <sup>⑩</sup></b>	<b>00612400</b>
5	RH	Clockwise <sup>⑥</sup>	Wing nut	Base	1.2	<b>5-H-9-0-1-R-CL <sup>⑩</sup></b>	<b>00609400</b>
5	RH	Anti-clockwise <sup>⑩</sup>	Wing nut	Base	1.2	<b>5-H-9-0-1-R-AC <sup>⑩</sup></b>	<b>00610400</b>

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).

**Top View—LH Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Top View—RH Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Top View—RH and LH Drive****Clockwise Shaft Rotation****Anti-Clockwise Shaft Rotation****Notes**

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

<sup>①</sup> Mounting plate is adjustable for base or back mounting.

<sup>②</sup> Top view—left-hand drive with clockwise shaft rotation.

<sup>③</sup> Top view—left-hand drive with anti-clockwise shaft rotation.

<sup>④</sup> Top view—right-hand drive with clockwise shaft rotation.

<sup>⑤</sup> Top view—left-hand drive with anti-clockwise shaft rotation.

<sup>⑥</sup> Top view—right-hand and left hand drive with clockwise shaft rotation.

<sup>⑦</sup> Special feature: Measuring wheels and brackets available for lineal measurement in feet.

<sup>⑧</sup> Top view—right-hand and left hand drive with anti-clockwise shaft rotation.

<sup>⑨</sup> Special feature: Measuring wheels and brackets available for lineal measurement in yards and 1/8ths.

<sup>⑩</sup> Special feature: Measuring wheels and brackets available for lineal measurement in yards.

### Technical Data and Specifications

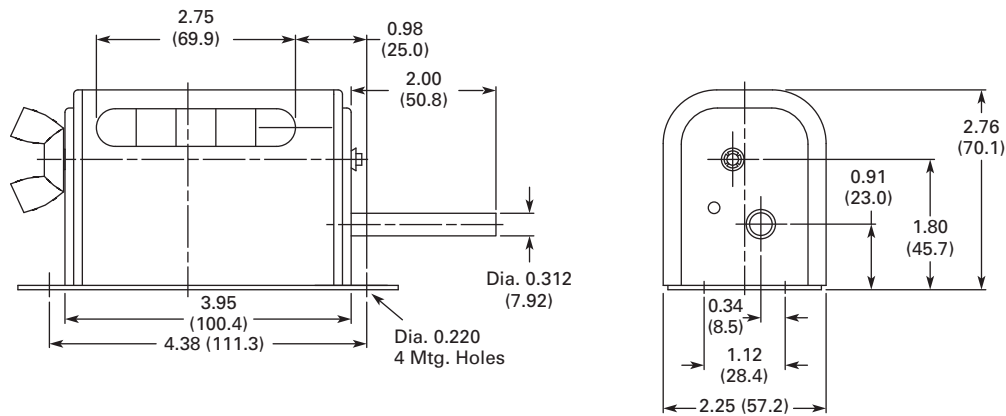
#### General Specifications

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

#### Dimensions

Approximate Dimensions in Inches (mm)

#### H Series



**Electromechanical Totalizers****Contents**

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**Electromechanical Totalizers****Product Overview**

Eaton's electromechanical counters provide accurate counting from a variety of electrical signals and a display that is always readable, even when power is not present.

**Features**

- Available with reset and without
- Always readable display
- Variety of mounting options

**Standards and Certifications**

- UL certifications on some products (see individual product pages for details)



**Micro Display Counter—Eaton®****Product Description**

Eaton's micro display counter is perfect for 12 Vdc applications where small size is important.

**Features**

- Seven-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>us</sup> certified
- CE marked

**Product Selection****Micro Display Counter****Micro Display Counter**

Description	Catalog Number
Micro display counter	7-Y-3013PM-401

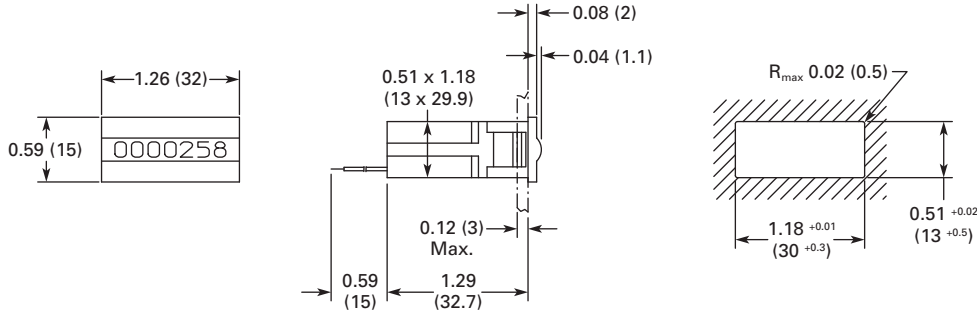
**Technical Data and Specifications****General Specifications**

Description	Specification
Electrical connections	Built-in counter, flying leads, AWG 22, approx. 5.9 in (150 mm)
Power consumption	At 68°F (20°C) and nominal voltage At 25 Imp/s: approx. 250 mW
Rated voltage	12 Vdc ±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
Figure size	0.05 x 0.16 in (1.2 x 4 mm) high 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	>50 x 10 <sup>6</sup> pulses
Protection	IP65 (only front side)
Housing	Clear plastic
Weight	0.53–0.71 oz (15–18g)

**Dimensions**

Approximate Dimensions in Inches (mm)

**Micro Display Counter**



# 1.1

## Counters, Panel Meters, Tachometers and Timers

### Totalizers

1

#### SE Series

##### Product Description

Compact electromechanical counters.

##### 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



#### Product Selection

SE Series Counter—  
Electromechanical



#### SE Series Electromechanical Counters

Description	Catalog Number	Order Number
<b>Six-Digit Electric Counter</b>		
Bottom mount sub-miniature 12 Vdc	6-Y-41610-401-SE	41610401
Bottom mount sub-miniature 24 Vdc	6-Y-41610-402-SE	41610402
Bottom mount sub-miniature 120 Vac	6-Y-41610-406-SE	41610406
Bottom mount sub-miniature 240 Vac	6-Y-41610-407-SE	41610407
Base mount sub-miniature 12 Vdc	6-Y-41611-401-SE	41611401
Base mount sub-miniature 24 Vdc	6-Y-41611-402-SE	41611402
Base mount sub-miniature 120 Vac	6-Y-41611-406-SE	41611406
Base mount sub-miniature 240 Vac	6-Y-41611-407-SE	41611407
Top mount sub-miniature 12 Vdc	6-Y-41612-401-SE	41612401
Top mount sub-miniature 24 Vdc	6-Y-41612-402-SE	41612402
Top mount sub-miniature 120 Vac	6-Y-41612-406-SE	41612406
Top mount sub-miniature 240 Vac	6-Y-41612-407-SE	41612407
Panel mount sub-miniature 12 Vdc	6-Y-41613-401-SE	41613401
Panel mount sub-miniature 24 Vdc	6-Y-41613-402-SE	41613402
Panel mount sub-miniature 120 Vac	6-Y-41613-406-SE	41613406
Panel mount sub-miniature 240 Vac	6-Y-41613-407-SE	41613407
Special base mount sub-miniature 12 Vdc	6-Y-41622-401-SE	41622401
Special base mount sub-miniature 24 Vdc	6-Y-41622-402-SE;	41622402
Special base mount sub-miniature 120 Vac	6-Y-41622-406-SE	41622406
Special base mount sub-miniature 240 Vac	6-Y-41622-407-SE	41622407
Special top mount sub-miniature 12 Vdc	6-Y-41623-401-SE	41623401
Special top mount sub-miniature 24 Vdc	6-Y-41623-402-SE	41623402
Special top mount sub-miniature 120 Vac	6-Y-41623-406-SE	41623406
Special top mount sub-miniature 240 Vac	6-Y-41623-407-SE	41623407
Snap-in mount sub-miniature 12 Vdc	6-Y-42613-401-SE	42613401
Snap-in mount sub-miniature 24 Vdc	6-Y-42613-402-SE	42613402
Snap-in mount sub-miniature 120 Vac	6-Y-42613-406-SE	42613406
Snap-in mount sub-miniature 240 Vac	6-Y-42613-407-SE	42613407



## Technical Data and Specifications

### General Specifications

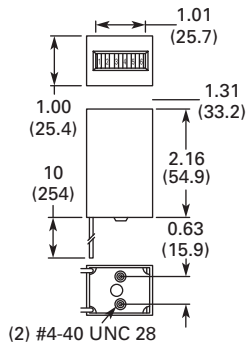
Description	Specification
Figures	6
Count speed	600 cpm
Figure size	5/32 in (4.0 mm)
Reset	None
Mounting	Base, bottom, top, panel or snap-in
Finish	Black, self-extinguishing plastic
Power requirements	DC: 1.5W, AC: 5.0V

### Dimensions

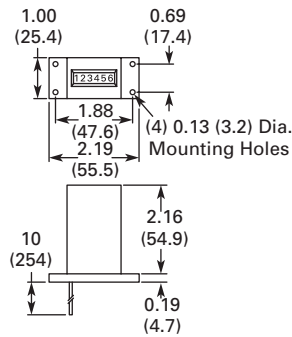
Approximate Dimensions in Inches (mm)

#### SE Series

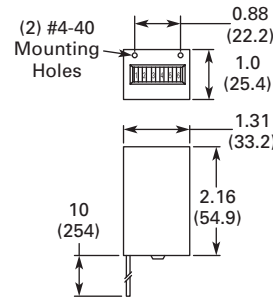
#### Bottom Mount



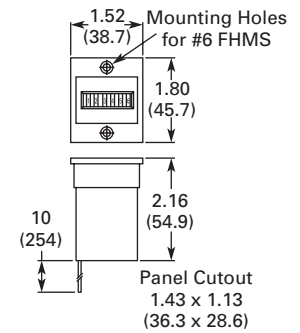
#### Base Mount



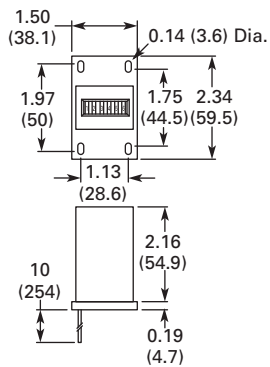
#### Top Mount



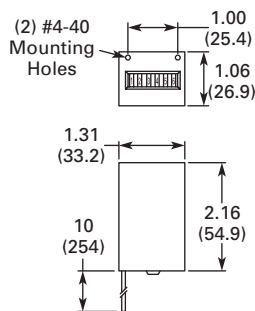
#### Panel Mount



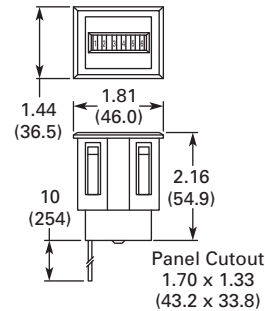
#### Special Base Mount



#### Special Top Mount



#### Snap Mount



**MF Series—Durant®****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 miscounts and greatly adds to the life of the counter. Tallies at speeds up to 750 cpm.

**Product Selection****MF Series Electric Counter****MF Series Electric Counters**

No. of Figures	Voltage	Reset	Mounting	Catalog Number	Order Number
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

**Technical Data and Specifications****General Specifications**

Description	Specification
Figures	6 or 7
Speed	Up to 750 cpm
Figure size	3/16 in (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	Two-wire leads, 9 in (229 mm) long, AWG 22 (0.34 mm <sup>2</sup> ), stripped 0.38 in (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.

**Note**

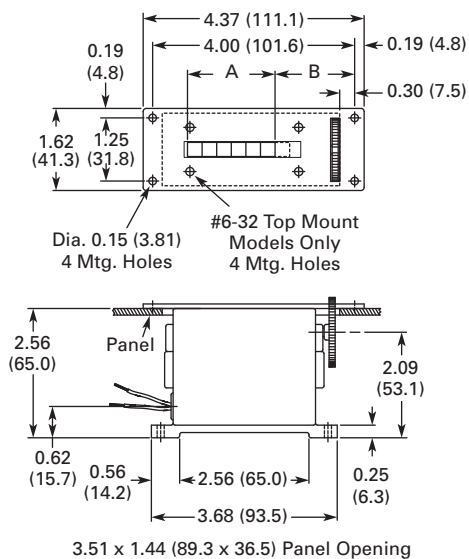
① UL Recognized.

### Dimensions

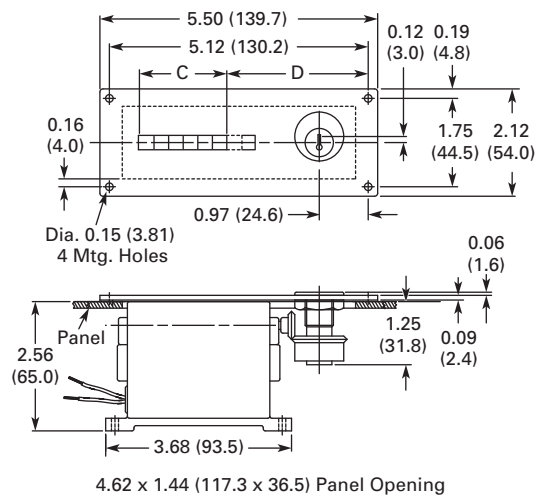
Approximate Dimensions in Inches (mm)

#### MF Series

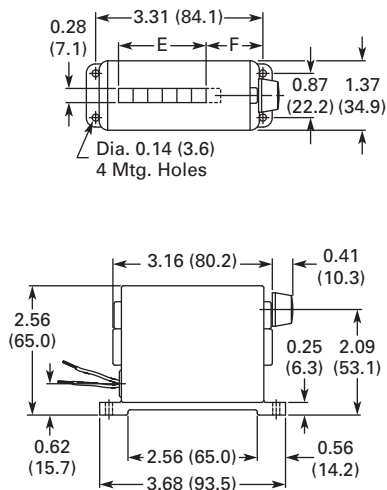
#### Panel Mounted



#### Panel Mounted with Tumbler Lock



#### Base Mounted



Model	A	B	C	D	E	F
Six 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)
Seven 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)

### RMF Series—Durant®

#### 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.

#### Product Selection

##### 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

RMF Series Counter—  
Electromechanical



#### RMF Series Electromechanical Counters

No. of Figures	Voltage	Reset	Mounting	Catalog Number	Order Number
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-1-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

**Note**

① UL recognized.

**Technical Data and Specifications****General Specifications**

<b>Description</b>	<b>Specification</b>
Figures	6 or 7
Speed	Up to 1000 cpm
Figure size	3/16 in (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	Two-wire leads, 9 in (229 mm) long, AWG 22 (0.34 mm <sup>2</sup> ), stripped 0.38 in (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

**Dimensions**

Refer to table and illustrations on **Page 35** for information.

# 1.1

## Counters, Panel Meters, Tachometers and Timers

### Totalizers

1

#### ME Series—Durant®

##### 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 in (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

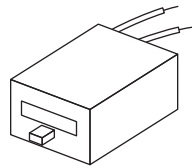


##### Product Selection

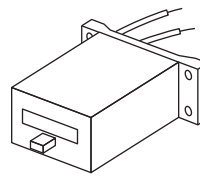
##### When Ordering Specify

When ordering ME Series Miniature Electric Counters, specify catalog numbers according to the features selected.

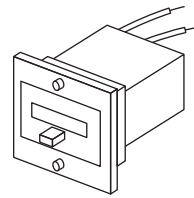
##### Bottom Mount Wire Leads



##### Base Mount Wire Leads



##### Panel Mount Wire Leads



ME Series Miniature Electric Counter



##### ME Series Miniature Electric Counters

No. of Figures	Voltage	Reset	Mounting	Catalog Number	Order Number
4	12 Vdc	Pushbutton	Bottom	4-Y-41312-401-MEQ	41312401
4	24 Vdc	Pushbutton	Bottom	4-Y-41312-402-MEQ	41312402
4	120 Vac	Pushbutton	Bottom	4-Y-41312-406-MEQ	41312406
4	240 Vac	Pushbutton	Bottom	4-Y-41312-407-MEQ	41312407
4	12 Vdc	Pushbutton	Base	4-Y-41313-401-MEQ	41313401
4	24 Vdc	Pushbutton	Base	4-Y-41313-402-MEQ	41313402
4	120 Vac	Pushbutton	Base	4-Y-41313-406-MEQ	41313406
4	240 Vac	Pushbutton	Base	4-Y-41313-407-MEQ	41313407
4	12 Vdc	Pushbutton	Panel	4-Y-41314-401-MEQ	41314401
4	24 Vdc	Pushbutton	Panel	4-Y-41314-402-MEQ	41314402
4	120 Vac	Pushbutton	Panel	4-Y-41314-406-MEQ	41314406
4	240 Vac	Pushbutton	Panel	4-Y-41314-407-MEQ	41314407

ME Series Miniature  
Electric Counter

## ME Series Miniature Electric Counters, continued

No. of Figures	Voltage	Reset	Mounting	Catalog Number	Order Number
6	12 Vdc	Non-reset	Bottom	6-Y-41119-401-ME	41119401
6	24 Vdc	Non-reset	Bottom	6-Y-41119-402-ME	41119402
6	120 Vac	Non-reset	Bottom	6-Y-41119-406-ME	41119406
6	240 Vac	Non-reset	Bottom	6-Y-41119-407-ME	41119407
6	12 Vdc	Non-reset	Base	6-Y-41345-401-ME	41345401
6	24 Vdc	Non-reset	Base	6-Y-41345-402-ME	41345402
6	120 Vac	Non-reset	Base	6-Y-41345-406-ME	41345406
6	240 Vac	Non-reset	Base	6-Y-41345-407-ME	41345407
6	12 Vdc	Non-reset	Panel	6-Y-41346-401-ME	41346401
6	24 Vdc	Non-reset	Panel	6-Y-41346-402-ME	41346402
6	120 Vac	Non-reset	Panel	6-Y-41346-406-ME	41346406
6	240 Vac	Non-reset	Panel	6-Y-41346-407-ME	41346407
7	12 Vdc	Non-reset	Bottom	7-Y-41238-401-ME	41238401
7	24 Vdc	Non-reset	Bottom	7-Y-41238-402-ME	41238402
7	120 Vac	Non-reset	Bottom	7-Y-41238-406-ME	41238406
7	240 Vac	Non-reset	Bottom	7-Y-41238-407-ME	41238407
7	12 Vdc	Non-reset	Base	7-Y-41337-401-ME	41337401
7	24 Vdc	Non-reset	Base	7-Y-41337-402-ME	41337402
7	120 Vac	Non-reset	Base	7-Y-41337-406-ME	41337406
7	240 Vac	Non-reset	Base	7-Y-41337-407-ME	41337407
7	12 Vdc	Non-reset	Panel	7-Y-41349-401-ME	41349401
7	24 Vdc	Non-reset	Panel	7-Y-41349-402-ME	41349402
7	120 Vac	Non-reset	Panel	7-Y-41349-406-ME	41349406
7	240 Vac	Non-reset	Panel	7-Y-41349-407-ME	41349407

## Technical Data and Specifications

## General Specifications

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

# 1.1

## Counters, Panel Meters, Tachometers and Timers

### Totalizers

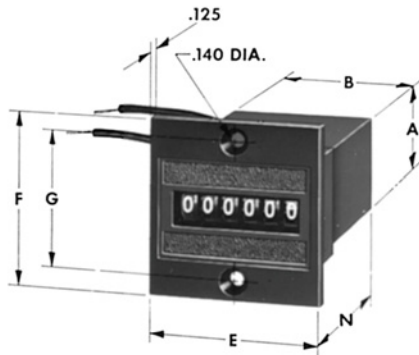
#### 1

#### Dimensions

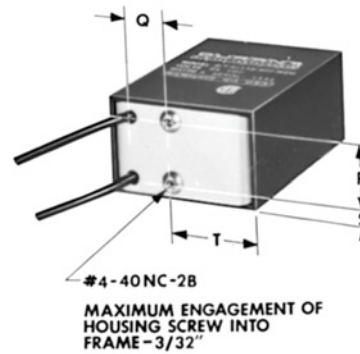
Approximate Dimensions in Inches (mm)

#### ME Series Counters

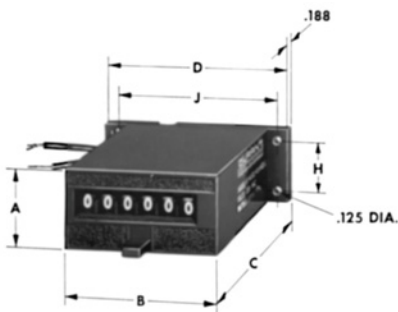
##### Panel Mounted



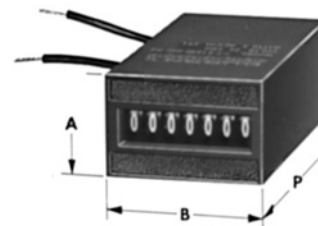
##### Bottom Mounted



##### Base Mounted



##### Bottom Mounted



#### ME Series Counters

##### 4 Figure Pushbutton Reset Counters

Dimension	Inches (mm)
A	1.00 (25.4)
B	1.60 (40.6)
C	2.64 (67.1)
D	2.19 (55.6)
E	1.80 (45.7)
F	1.80 (45.7)
G	1.40 (35.6)
H	0.69 (17.5)
J	1.88 (47.8)
K	0.50 (12.7)
L	0.49 (12.4)
M	0.94 (23.9)
N	2.45 (62.2)
P	2.45 (62.2)
Q	0.45 (11.4)
R	0.63 (16.0)
S	0.19 (4.8)
T	0.68 (17.3)

##### 6 and 7 Figure Non-Reset Counters

Dimension	Inches (mm)
A	1.00 (25.4)
B	1.60 (40.6)
C	2.38 (60.5)
D	2.19 (55.6)
E	1.80 (45.7)
F	1.80 (45.7)
G	1.40 (35.6)
H	0.69 (17.5)
J	1.88 (47.8)
K	0.50 (12.7)
L	0.49 (12.4)
M	0.94 (23.9)
N	2.19 (55.6)
P	2.19 (55.6)
Q	0.45 (11.4)
R	0.63 (16.0)
S	0.19 (4.8)
T	0.88 (22.4)

#### Recommended Panel Mount Cut-Outs

##### 4 Figure Counters Pushbutton Reset

1.72 x 1.11 (43.7 x 28.2)

##### 6 and 7 Figure Counters Non-Reset

1.72 x 1.11 (43.7 x 28.2)



## Electronic Totalizers



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## Electronic Totalizers

## Product Overview

Eaton's electric totalizers provide a flexible and accurate method of displaying count and measurement data in an easily readable format.

## Features

- LED and LCD readouts
- Variety of sizes and packages
- Programmable inputs and displays available

## Standards and Certifications

- Most products are UL certified (see individual product pages for details)
- CE



**1/32 DIN LCD Totalizers****Product Description**

Compact battery powered totalizers where AC power is unavailable.

**Features**

- Low price and high efficiency
- Large eight-digit LCD display, height of the figures 0.31 in (8 mm)
- Various counting modes like up/down differential available
- High voltage input for 10–260 Vac/Vdc voltage pulses
- IP65
- Screw terminals, RM 5 mm
- Lifetime of the battery approximately eight 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

**Product Selection**

E5-024-C04\_

**1/32 DIN LCD Totalizers**

Description	Catalog Number
<b>Eight-Digit LCD Totalizer, Battery Power</b>	
4–30 Vdc powered, NPN/PNP 0.94 x 1.89 in (24 x 48 mm)	<b>E5-024-C0400</b>
10–120V input AC/DC powered, NPN only 0.94 x 1.89 in (24 x 48 mm)	<b>E5-024-C0408</b>
Count up/down 4–30 Vdc powered, NPN only, 0.94 x 1.89 in (24 x 48 mm)	<b>E5-024-C0410</b>

**Technical Data and Specifications****1/32 DIN LCD Totalizers**

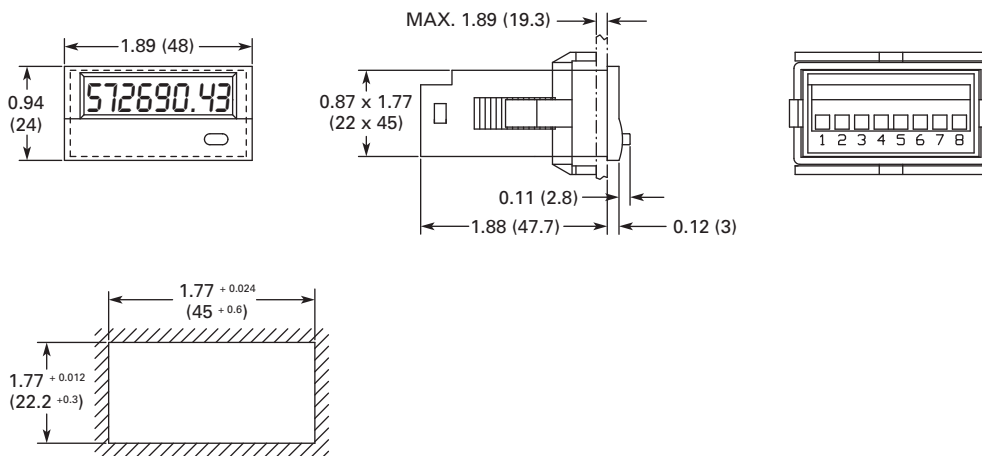
Description	Specification
Power supply	Non-replaceable lithium battery (lifetime approximately eight years at 68°F (20°C))
Display	LCD, eight-digits
Figure size	0.31 in (8 mm) high
Mode	Adding or subtracting (selectable), counting direction, differential counting or phase discriminator single or dual evaluation (selectable)
Display range	–9999999 to 99999999, 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 (50g)

**1/32 DIN LCD Totalizers, continued**

Description	Specification
Counting inputs:	
Counting input of the DC version	Max. 30 Vdc
Slow counting input	Max. 30 Hz (NPN)
Fast counting input	Max. 12 kHz (PNP)
Switching level	NPN: Low 0–0.7V, High 3–30 Vdc PNP: Low 0–0.7V, High 3–30 Vdc
Counting Input of the high voltage versions	10–260 Vac/Vdc
Counting input	Optocoupler input, max. 30 Hz
Min. pulse time	16 ms
Switching level	Low: 0–2 Vac/Vdc High: 10–260 Vac/Vdc
Counting direction switching (only DC versions)	Contact input, open collector NPN (switching at 0 Vdc) Switching level, NPN—Low, 0–0.7V, High 3–5 Vdc
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: 3–30 Vdc
High voltage input	10–260 Vac/Vdc
Electrical reset key locking (for DC and AC)	Contact input, open collector NPN (switching at 0V) Switching level, NPN—Low, 0–0.7V, High 3–5 Vdc

**Dimensions**

Approximate Dimensions in Inches (mm)

**1/32 DIN LCD Totalizers**

1 **1/32 DIN LED Multifunction Totalizer/Timer/Ratemeter****Product Description**

Compact LED display for a variety of input signals.

**Features**

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

**Standards and Certifications**

- UL recognized
- CE marked

**Product Selection**

E5-024-C04

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

Description	Catalog Number
LED Single channel totalizer, 10–30 Vdc power 0.94 x 1.89 in (24 x 48 mm)	<b>E5-024-E0402</b>
LED multifunction totalizer/timer/ratemeter 10–30 Vdc power 0.94 x 1.89 in (24 x 48 mm)	<b>E5-424-E0402</b>
LED double-function totalizer/timer/ratemeter 10–30 Vdc power 0.94 x 1.89 in (24 x 48 mm)	<b>E5-524-E0402</b>
LED totalizer with quadrature, 10–30 Vdc power 0.94 x 1.89 in (24 x 48 mm)	<b>E5-024-E0432</b>

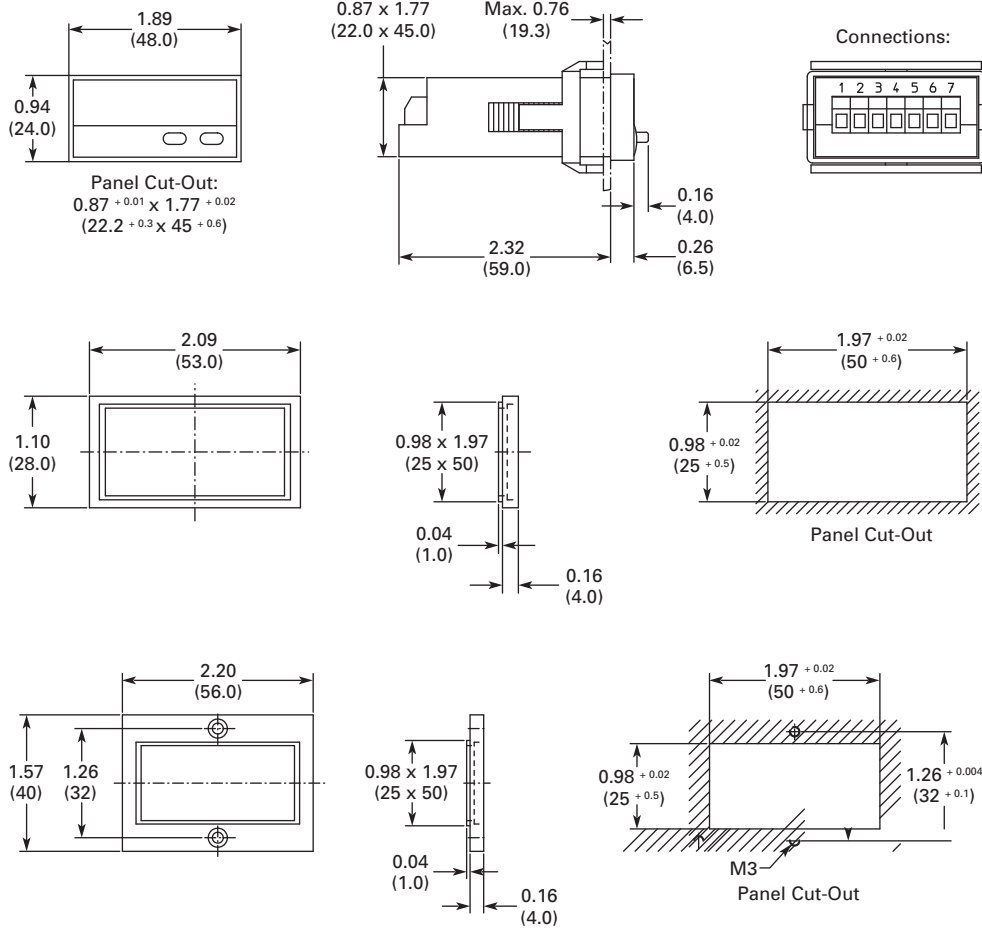
**Technical Data and Specifications****General Specifications**

Description	Specification
Supply voltage	10–30 Vdc with reverse polarity protection
Current consumption	Max. 55 mA
Display	Six-digit red, seven-segment LED display
Figure size	0.31 in (8 mm) high
Data backup	EEPROM
Housing	Dimension 3.78 x 1.89 in (48 x 24 mm) according to DIN 43 700; RAL 7021 gray
Polarity of inputs	Programmable, NPN or PNP
Input resistance	Approx. 10k ohms
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 x U <sub>B</sub> –30 Vdc
Low	0–0.2 x U <sub>B</sub> (Vdc)
Error	
Tachometer	<0.1%
Timer	<50 ppm
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 oz (150g)

## Dimensions

Approximate Dimensions in Inches (mm)

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



**Courier Series—Durant®****Product Description**

Eaton's Courier Series is a high quality totalizer powered by a replaceable lithium battery.

**Features**

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

**Standards and Certifications**

- CE marked

**Product Selection****When Ordering Specify**

When ordering Courier Series Electronic Totalizers and Ratemeters, specify order numbers according to the features selected.

**Courier Series****Courier Series, Eight-Digit LCD**

Description	Catalog Number
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 at 100 Hz, battery	53300465
RMF panel mount totalizer, key reset, 60–160 Vac/Vdc count input	53300800
RMF panel mount totalizer, dry contact input	53300-850
RMF panel mount totalizer, 60–160 Vac/Vdc count input	53300-851
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

## Technical Data and Specifications

### General Specifications

Description	Specification
<b>Power</b>	
Internal battery	3V, lithium
Life expectancy	5 years +
Replacement part	36367-202
<b>Backlight</b>	
Backlight	10–30 Vdc at 30 mA max. ① Reverse polarity protected
<b>Physical</b>	
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 (62g) net
Figure size	0.43 in (10.9 mm) high
Front panel rating	NEMA 4X when mounted with gasket provided
Case material	Cyclocac X-17
<b>Totalizer</b>	
Type	UP counting
Digits	Eight
<b>Count Accuracy</b>	
Operated within specifications	100%
<b>DC Common (Terminal 1) Count Inputs</b>	
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 ohms
Voltage thresholds	
Low	0–0.4 Vdc
High	2.0–28 Vdc
Max. high	28 Vdc
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 ②	80 ms
Min. high time ②	20 ms
Input impedance	2k ohms above 5 Vdc
Voltage thresholds	
Low	0–1.2 Vdc
High	2.0–28 Vdc
Max. high	28 Vdc
<b>Reset Input</b>	
Reset input (terminal 4) designed for contact closures to DC common	
Min. low ③	0.25 to 1 sec. (reset is maintained)
Voltage thresholds	
Low	0–0.4 Vdc
High	2.0–28 Vdc
<b>Front Panel Reset Enable</b>	
Front panel reset enable (terminal 5)	
Operation	Level sensitive (maintained)

#### Notes

- ① Derate operating temperature 1°C/volt above 17 Vdc.
- ② The times are with a 0–5.0V swing.
- ③ The required pulse width varies with count speed, scale factor and number of digits displayed.

# 1.1

## Counters, Panel Meters, Tachometers and Timers

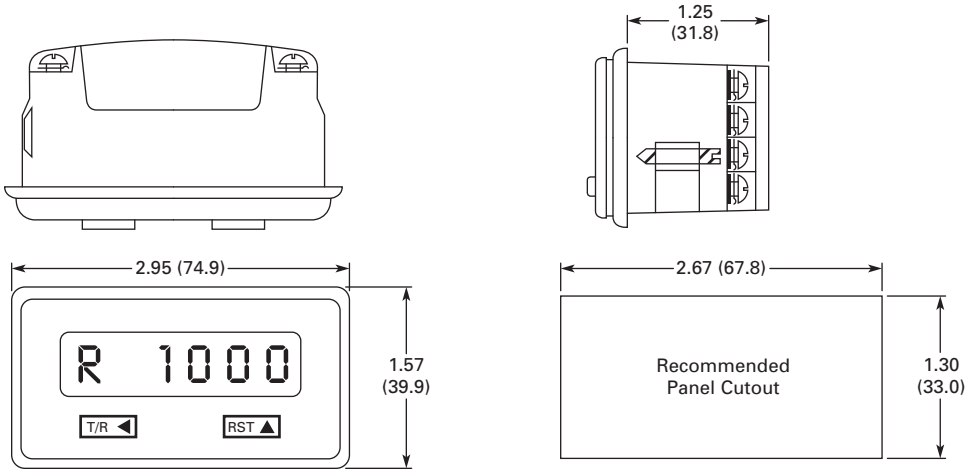
### Totalizers

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Courier Series





**1/8 DIN LED Multifunction Totalizer/Timer/Ratemeter****Product Description**

LED display for a variety of input signals.

**Features**

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

**Standards and Certifications**

- UL recognized
- CE marked

**Product Selection**

E5-496-E040

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

Description	Catalog Number
<b>LED Multifunction Counter/Timer/Ratemeter</b>	
90–260 Vac power 3.78 x 1.89 in (96 x 48 mm)	E5-496-E0401
10–30 Vdc power 3.78 x 1.89 in (96 x 48 mm)	E5-496-E0402

**Technical Data and Specifications****General Specifications**

Description	Specification
Supply voltage	10–30 Vdc with reverse polarity protection; 90–260 Vac
Current consumption	Max. 50 mA 6 VA
Display	Six-digit red, seven-segment LED display
Figure size	0.55 in (14 mm) high
Data backup	EEPROM
Housing	Dimension 3.78 x 1.89 in (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. 10k ohms
Counting frequency	60 kHz, can be damped to 30 Hz depending on operating mode at position display max. 25 kHz <sup>①</sup>
Reset time	5 ms
Resolution timer	Up to 0.001 second
Input switching level	
DC version (standard version)	High: 0.6 x U <sub>B</sub> –30 Vdc Low: 0–0.2 x U <sub>B</sub> (Vdc)
AC version	High: 12–30 Vdc Low: 0–4 Vdc
Voltage supply for sensors	24 Vdc ±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 (150g)

**Note**

<sup>①</sup> For further specifications, please refer to the user manual.

# 1.1

## Counters, Panel Meters, Tachometers and Timers

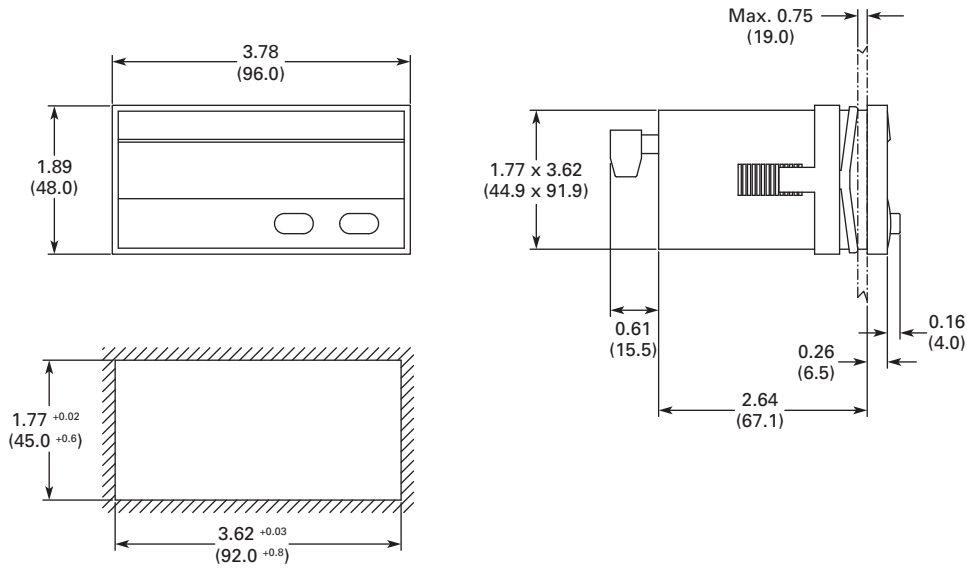
### Totalizers

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

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



**Eclipse Series—Durant®****Product Description**

High visibility LED readout with a variety of output options.

**Features**

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

**Standards and Certifications**

- UL and cUL listed
- CE marked

**Product Selection****Eclipse Series****Eclipse Series Totalizer, Six-Digit LED**

Description	Catalog Number
9–30 Vdc power	57700480
85–265 Vac power	57701480
Analog out, 9–30 Vdc power	57700482
Analog out, 85–265 Vac power	57701482
RS-485 out, 9–30 Vdc power	57700484
RS-485 out, 85–265 Vac power	57701484
RS-485 out and analog out, 9–30 Vdc power	57700486
RS-485 out and analog out, 85–265 Vac power	57701486

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Mechanical</b>	
Cutout dimensions	3.62 in W x 1.77 in H (92 mm x 45 mm) DIN standard
Outline dimensions	4.04 in W x 2.19 in H x 3.87 in D (103 mm x 56 mm x 98 mm) 3.60 in (92 mm) maximum depth in panel
Enclosure	Plastic with polyester front label
Connectors	Up to six depluggable terminal blocks
<b>Environmental</b>	
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
<b>Input Power</b>	
AC powered models (57701-4XX)	
Input power	85–295 Vac, 47–63 Hz, 20 VA
External fuse	0.2A, 250 Vac, time delay (T200 mA, 250V)
Isolation dielectric strength	2300 Vac
DC powered models (57700-4XX)	
Input power	9–30 Vdc, 12 VA
External fuse	2.0A, 50 Vdc, time delay (T2A, 50V)
Reverse voltage protection	Yes
Isolation dielectric strength	2300 Vac to signal outputs and relays, 500 Vac to RS-485 and analog outputs

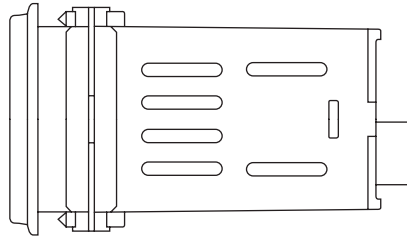
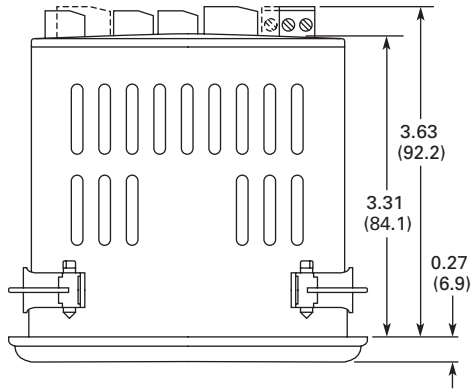
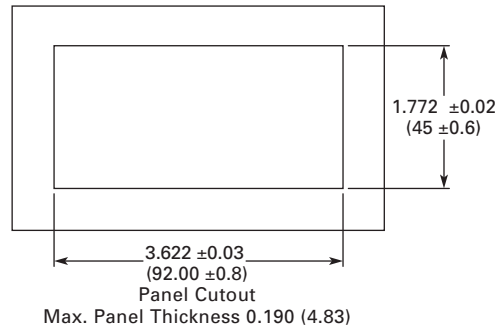
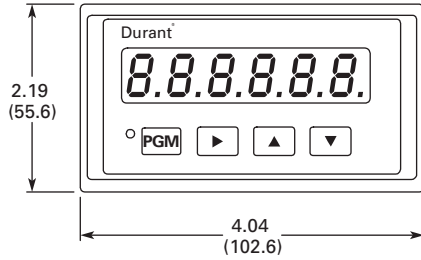
## General Specifications, continued

Description	Specification
<b>Human Interface</b>	
Display	+6, -5 digits
Type	0.56 in (14.2 mm) high, seven segment, red LED
<b>Data Retention</b>	
Memory type	EEPROM, no batteries required
Duration	100 years
<b>Count Signal Input</b>	
Sensor type	Sink or source, DIP switch selectable
Input impedance	4.75k ohms to +5 Vdc or 34.9k ohms to ground
Thresholds	
High	3.5–28 Vdc
Low	0–1.9 Vdc, for single ended signals
Magnetic pickup range	200 mV p-p to 65V rms 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
<b>Control Inputs</b>	
Sensor type	Sink only
Input impedance	4.75k ohms to +5 Vdc
Thresholds	
High	3.5 to 28 Vdc
Low	0–1.9 Vdc
Response	25 ms maximum (5V signal)
<b>Accessory Power Output</b>	
Voltage	12 Vdc +10%/–13%
Current	75 mA max.
Protection	Short-circuit protected

## Dimensions

Approximate Dimensions in Inches (mm)

### Eclipse Series Totalizer



**President Series—Durant®****Product Description**

Eaton's President Series totalizers are heavy-duty electronic totalizers with two available sizes.

**Features**

- Eight-digit, LED display, 0.56 in (14 mm)
- Programmable decimal point and count and rate scaling
- 15 Vdc at 100 mA output power
- Rear panel screw terminals
- NEMA 4 front panel

**Standards and Certifications**

- UL listed
- CSA marked
- CE marked

**Product Selection****President Series President Series Totalizers**

Description	Catalog Number
115/230 Vac, LED red display	<b>58811400</b>
115/230 Vac, LED red display, 1/Tau ratemeter	<b>58815400</b>
115 Vac, seven-digit LED red display, basic pulse count	<b>57810400</b>
115/230 Vac, LED red display	<b>58810400</b>
Feet/inches totalizer	<b>57810-402</b>

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Power Requirements</b>	
AC operation	115/230 Vac (+10%, -20%) 47–63 Hz
DC operation	11–28 Vdc
Power	18 watts
DC power output <sup>①</sup>	15 Vdc (+1, -2). 150 mA if powered from AC or less than 24 Vdc 100 mA if powered from 24 Vdc or greater
<b>Environment</b>	
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
<b>Physical</b>	
Memory types	PROM, RAM, non-volatile NVRAM

**Note**

<sup>①</sup> DC power output is only regulated if unit is powered by AC or greater than 18.5 Vdc.

## General Specifications, continued

Description	Specification
<b>Counter</b>	
Count range	Eight digits (0 to 99,999,999) with rollover
Offset range	Eight 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) 58811400 and 58815400	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
57810400, 58810400 and 57810-402	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
<b>Count Input Ratings</b> <sup>①</sup>	
Input voltage	
High state (logical "1", sensor off or contact open)	10.5–24.5 Vdc when control is powered by AC line
	7.0–24.5 Vdc when control is powered by 11 Vdc
	11.0–24.5 Vdc when control is powered by 16 Vdc
Low state (logical "0", sensor on or contact closed)	0–4.5 Vdc when control is powered by AC line
	0–3.3 Vdc when control is powered by 11 Vdc
	0–4.8 Vdc when control is powered by 16 Vdc
Input impedance	
	6800 ohms to 15 Vdc when control is powered by AC line
	6800 ohms to 10 Vdc 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 15 Vdc (6,800 ohms to +DC)
	160 $\mu$ S minimum at 13.5 Vdc (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 15 Vdc (6,800 ohms to +DC)
	7.5 ms minimum at 13.5 Vdc (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 0.1 Vdc (0 ohms to DC common)
	45 $\mu$ S minimum at 1.5 Vdc (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 0.1 Vdc (0 ohms to DC common)
	2.0 ms minimum at 1.5 Vdc (500 ohms to DC common)

**Note**

<sup>①</sup> 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.

## General Specifications, continued

Description	Specification
<b>Scale Factor</b>	
Range	Five digits (0.0001 to 9.9999)
<b>Control Inputs</b>	
Input voltage	
High state (logical "1", contact open)	15 Vdc maximum
Low state (logical "0", contact closed)	1.2 Vdc maximum
Input impedance	4.75k ohms to +5 Vdc
Threshold	
High	+3.5 to +22 Vdc
Low	+0.0 to +1.0 Vdc
Response time <sup>①</sup>	
Min. high	5.3 ms
Min. low	3.9 ms
<b>Diagnostic Modes</b>	
Diagnostic modes	ROM checksum
	RAM bit test
	NVRAM read/write test
	NVRAM store test
	NVRAM checksum
	Watchdog timer
	Display and LED indicator test
<b>Counter Operating Modes</b>	
Reset	Reset to zero
	Reset to offset value
Maintained	Reset
Momentary	Reset
<b>Communications</b>	
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

**Note**

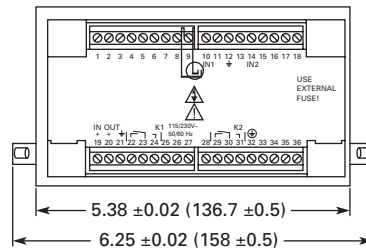
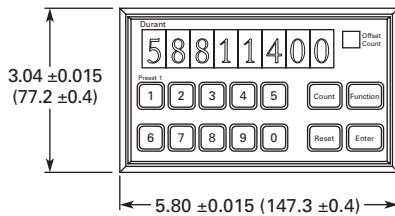
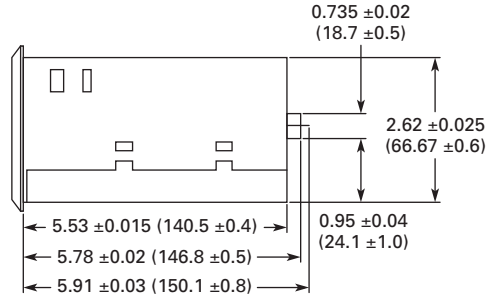
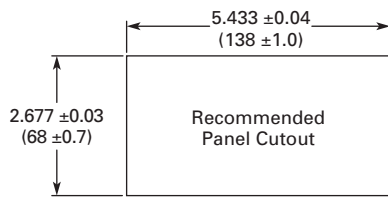
- <sup>①</sup> The reset and unlatch signals will both occur in less than 200 microseconds after the input signal is detected. The start of the print will occur within 2 milliseconds after the input is detected if the unit is not counting.



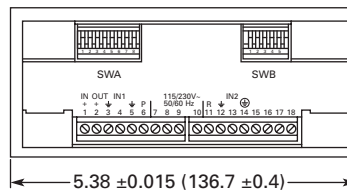
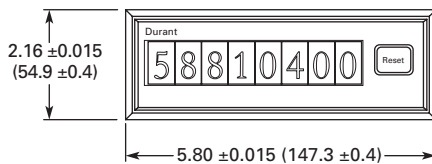
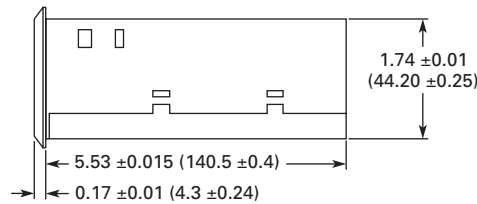
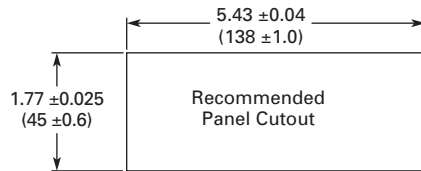
## Dimensions

Approximate Dimensions in Inches (mm)

### Standard President Size



### Compact President Size



**Ambassador Series—Durant®****Product Description**

Eaton's Ambassador Series is our most noise-immune totalizer available. Various counting modes can be set by the user.

**Features**

- AC/DC powered, two-line LCD display
- Eight-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

**Product Selection****Ambassador Series** **Ambassador Series Totalizers**

Description	Catalog Number
10–15 Vdc LCD	<b>57600400</b>
115 Vac LCD	<b>57601400</b>
230 Vac LCD	<b>57602400</b>

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Power Input</b>	
AC operation	115 Vac ( $\pm 15\%$ ) std., 50 to 60 Hz, 7W 230 Vac ( $\pm 15\%$ ) opt., 50 to 60 Hz, 7W
DC operation	10–15 Vdc opt., 300 mA maximum
DC power output	12 Vdc ( $\pm 25\%$ ), 100 mA maximum (includes all line and load variations)
<b>Environmental</b>	
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
Rating	NEMA 4 when mounted with gasket provided
<b>Totalizer</b>	
Type	Bi-directional
Digits	Eight
Scaler range	0.00001 to 9.99999
Decimal point	Five positions, programmable
<b>Totalizer Count Speeds</b> <sup>①</sup>	
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	0 kHz

**Note**

① The maximum count speed depends on the selected count mode. All maximum speeds are shown with square waves (50% duty cycle) input.

**General Specifications, continued**

Description	Specification
<b>Count Inputs</b>	
Sink	
Impedance	4.6k ohms to +5 Vdc
Voltage	
High	3.5 to 34.0 Vdc
Low	0.0 to 1.9 Vdc
Source (high)	
Impedance	2.3k ohms to common
Voltage	
High	3.5 to 17.0 Vdc (100% duty cycle)
Low	0.0 to 1.9 Vdc
Source (low)	
Impedance	2.3k ohms to common
DC voltage	
High	0.6 to 17.0 Vdc
Low	-17.0 to -0.6 Vdc
AC voltage	17 Vac (48V peak-peak) maximum
<b>Control Inputs</b>	
Impedance	4.7k ohms to +5 Vdc
Voltage	
High	+3.7 to +24 Vdc
Low	0.0 to 0.9 Vdc
Response	Minimum low 15 ms, minimum high 15 ms
<b>Transistor Outputs (2)</b>	
Type	NPN open collector with transient protection
Maximum voltage (OFF state)	30 Vdc
Maximum current (ON state)	200 mA at 1.3 Vdc
<b>Communication</b>	
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)
<b>Count Accuracy</b>	
Operating within specifications	100% when operated within the specified count speeds and count signal high and low times
<b>Rate Indicator</b>	
Type	1/Tau
Digits	Six
Scaler range	0.00001 to 99999
Decimal point	Five positions, programmable
Accuracy	±0.015% of reading
Update time	1 second, fixed
Zero time	10 seconds, fixed
<b>Connections</b>	
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)

# 1.1

## Counters, Panel Meters, Tachometers and Timers

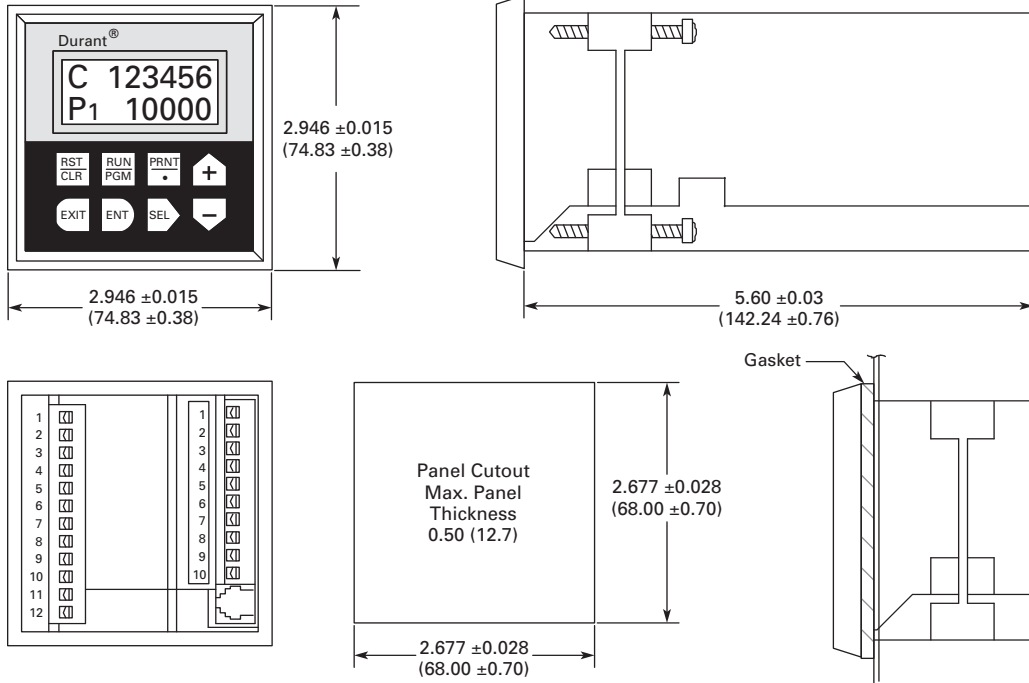
### Totalizers

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Ambassador Series Totalizer



## Count Controls/Preset Counters



## Contents

## Description

## Page

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Online

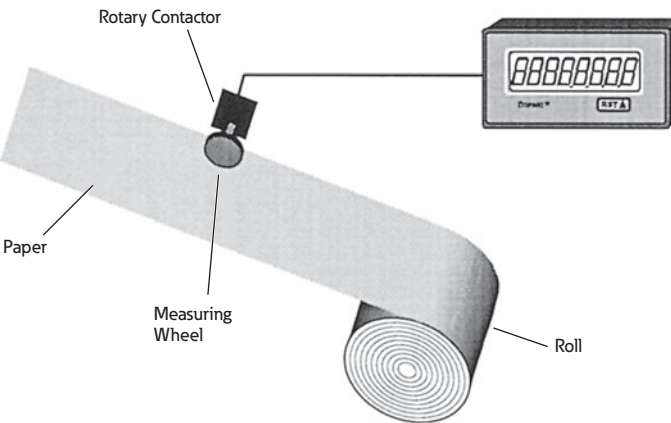
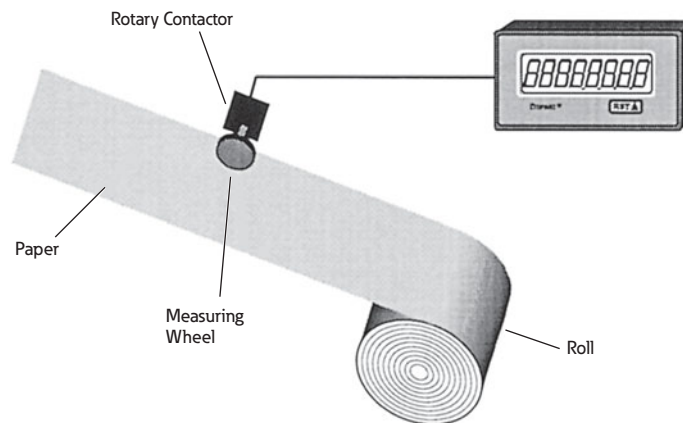
## Product Overview

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. A variety of count controls in different sizes, display types and feature sets are available from Eaton.

## Application Description




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



## Product Selection Guide

### Count Controls/Preset Counters

	Characteristics	Panel Cutout in Inches (mm)	Page
<b>E5-148-C</b> 	Low cost, simple count control Battery operated Easy-to-change preset values Two-line display: input and preset values	1.772 x 1.772 (45 x 45)	<b>63</b>
<b>E5-648-C</b> 	Two-line display: counter, timer or tachometer AC or DC power options Wide choice of count modes for pulse inputs, time or frequency Two or four presets	1.772 x 1.772 (45 x 45)	<b>65</b>
<b>Eclipse</b> 	Six-digit, super bright LED display Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls	1.772 x 3.780 (45 x 96)	<b>67</b>
<b>Ambassador</b> 	Six-digit, high-visibility, two-line LCD display User-configurable control inputs Highly flexible control/display	2.667 x 2.667 (68 x 68)	<b>70</b>
<b>President</b> 	Bright LED display with 14 mm characters Simple configuration with 14-button tactile keypad Many different versions fit almost any application	2.667 x 5.433 (68 x 138)	<b>74</b>
<b>PD-Q and PD-ER</b> 	Electromechanical pre-set counter Easy setpoint adjustment using pushbuttons Base mount or panel mount	272 x 1.59 (69 x 40.5) (panel mount model)	<b>79</b>
<b>Fusion</b> 	Integrated controller combines operator interface, ladder logic and high-speed counting	2.667 x 5.433 (68 x 138)	<b>120</b>

**1/16 DIN Battery Powered LCD Count Control****Product Description**

Battery-powered electronic preset counter.

**Features**

- Replacement for electromechanical preset counters
- No power supply necessary (battery operated)
- Count and reset input electrically separated from counter through optocoupler input range 12–250 Vac/Vdc
- Two-line LC display count, preset and level of the output
- Screw terminal
- Data security, through two exchangeable lithium batteries, lifetime minimum eight 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>®</sup>us approval
- CE marked

**Product Selection**

E5-148-C1400

**1/16 DIN Battery Powered LCD Count Control**

Description	Catalog Number
<b>Single Preset Count Control</b>	
Battery power 1.89 x 1.89 in (48 x 48 mm)	<b>E5-148-C1400</b>

**Technical Data and Specifications****General Specifications**

Description	Specification
Power supply	2 pcs user exchangeable lithium batteries, type 1/2 AA lithium 3.6V
Display	Two-line LCD display, six digits; 999999
Figure size	0.28 in (7 mm) or 0.18 in (4.5 mm) high
Input	Reset, count and keylock inputs
Input polarity	Bi-directional optocoupler input for the reset count inputs; reset, count and keyboard lock is connected to 3 Vdc
Input min. pulse duration	Reset input 50 ms; keyboard lock input 15 ms
Input switching levels	
Low	<3 Vac/Vdc
High	12–250 Vac/Vdc
Input frequency	Max. 25 Hz
Input resistance	110k ohms
Output	Bistable relay with potential free contact (programmable as normally closed or normally open contact)
Max. switching voltage	250 Vac/220 Vdc
Max. switching current	2A
Max. switching capacity	60 VA/30W
Output response time	<20 ms, max. 4 Hz
Data retention	Via two batteries, eight 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 (80g)

# 1.2

## Counters, Panel Meters, Tachometers and Timers

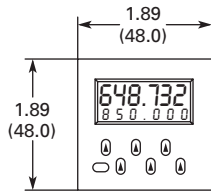
### Count Controls/Preset Counters

#### 1

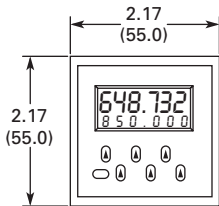
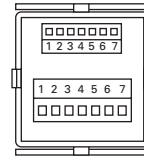
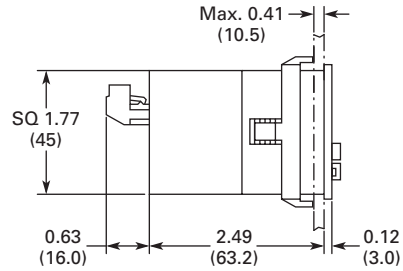
#### Dimensions

Approximate Dimensions in Inches (mm)

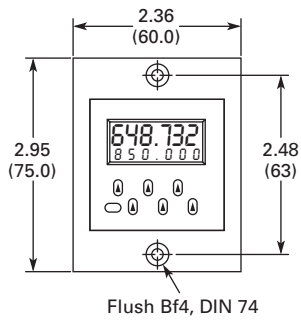
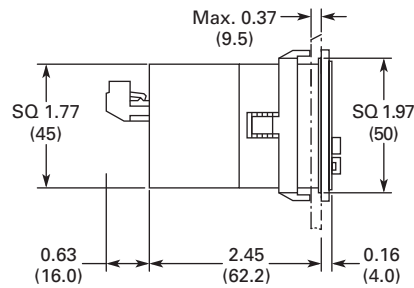
#### 1/16 DIN Battery Powered LCD Count Control



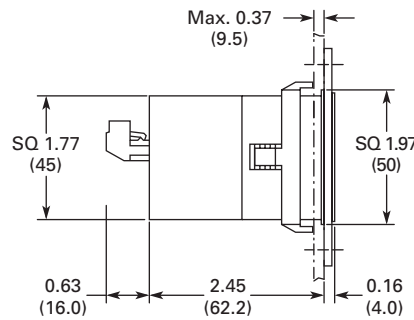
Panel Cut-Out 1.77 x 1.77 (45 x 45)



With Front Bezel No. 2  
Panel Cut-Out 1.97 x 1.97 (50 x 50)



With Front Bezel No. 3  
Panel Cut-Out 1.97 x 1.97 (50 x 50)





**1/16 DIN LCD Preset Counters with Rate and Time****Product Description**

AC or DC powered preset counters that can function as timer or tachometer/ratemeter.

**Features**

- Two-line display with green backlight (E5-648-C2421 and E5-648-C2422) or multi-color red/green LED backlighting (E5-648-C4461 and E5-648-C4462)
- Programmable as preset counter, batch counter or totalizer
- Power supply: 90–260 Vac or 10–30 Vdc
- Direct input of the presets via front keys or Teach-In input
- Relay outputs
- Scaling by multiplication and division factors 0.0001 to 99.999
  - Two preset values, two outputs
  - Four preset values, four outputs

**Standards and Certifications**

- cRU<sup>®</sup>us approval
- CE marked

**Product Selection**

E5-648-C\_

**1/16 DIN Two-Line LCD Count Control**

Description	Catalog Number
<b>Two Preset LCD Count Control with Backlighting</b>	
90–260 Vac power 1.89 x 1.89 in (48 x 48 mm)	<b>E5-648-C2421</b>
10–30 Vdc power 1.89 x 1.89 in (48 x 48 mm)	<b>E5-648-C2422</b>
<b>Four Preset LCD Count Control with Multi-Color Display</b>	
90–260 Vac power 1.89 x 1.89 in (48 x 48 mm)	<b>E5-648-C4461</b>
10–30 Vdc power 1.89 x 1.89 in (48 x 48 mm)	<b>E5-648-C4462</b> <sup>①</sup>

**Technical Data and Specifications****General Specifications**

Description	Specification
Power supply	10–30 Vdc external fuse protection
	90–260 Vac max. 8 VA external fuse protection
Display	Two-line LCD display, six digits with programmable decimal point
Figure size	0.35 in (9 mm) high upper line
	0.28 in (7 mm) high lower line
Count inputs	Two count inputs (A and B), programmable for count/count direction, up/up, up/down, quadrature, quad2, quad4, A/B or (A-B)/A x 100%
Input polarity	Programmable for all inputs in common NPN/PNP
Input resistance	Approx. 5k ohms
Count frequency	Max. 55 kHz with programmable filter for 30 Hz (see manual for details)
Input min. pulse duration	10 ms for control inputs/1 ms for reset input
Switching levels	
DC supply voltage	
High	0.6 x UB–30 Vdc
Low	0–0.2 x UB (Vdc)
AC supply voltage	
High	12–30 Vdc
Low	0–4 Vdc
Pulse shape	Variable (Schmitt-Trigger characteristics)

**Note**

① Not a stocked product, contact Eaton Care for assistance.

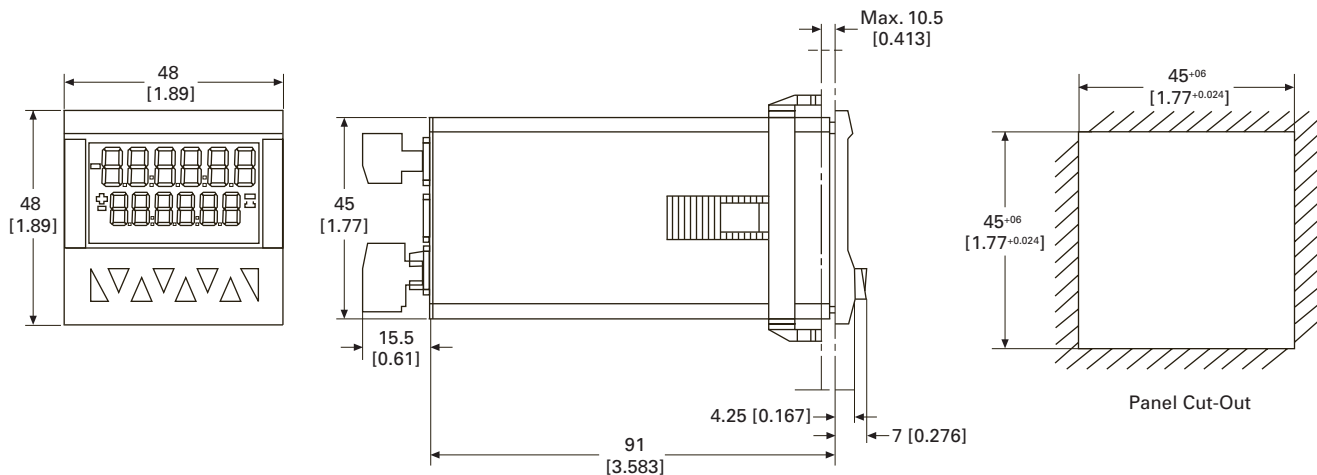
### General Specifications, continued

Description	Specification
<b>Output 1</b>	
Relay	Programmable as normally open or normally closed
Switching voltage max.	250 Vac/110 Vdc
Switching current max.	3A AC/3A DC
Switching current at DC min.	30 mA DC
Switching power at DC	90W
Switching power at AC max.	750 VA
<b>Output 2</b>	
Relay	Relay with changeover/Form C contact
Switching voltage max.	250 Vac/110 Vdc
Switching current max.	3A AC/3A DC
Switching current at DC min.	30 mA DC
Switching power at DC	90W
Switching power at AC max.	750 VA
Reaction time of the outputs	Approximately 10 ms
Data retention	Min. 10 years or 1 million memory cycles
<b>Sensor supply voltage</b>	
AC powered unit	24 Vdc $\pm$ 15%, 80 mA
DC powered unit	Max. 80 mA, DC voltage is connected through
Ambient operating temperature	-4° to 149°F (-20° to +65°C)
Storage temperature	-13° to 167°F (-25° to 75°C)
<b>EMC</b>	
Emitted interference	EN 55011 Class B
Immunity to interference	EN 61000-6-2
Protection	IP65 (front)
Weight	Approx. 4.4 oz (125g)

### Dimensions

Approximate Dimensions in mm [Inches]

#### 1/16 DIN Two-Line LCD Count Control



**Eclipse Series—Durant®****Product Description**

High visibility LED interface available with a variety of output options

**Features**

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

**Standards and Certifications**

- UL and cUL listed
- CE marked

**Product Selection**

57700481

**LED Count Control, Six-digit**

Description	Catalog Number
Relay out, 9–30 Vdc power	57700481
Relay out, 85–265 Vac power	57701481
Relay and analog out, 9–30 Vdc power	57700483
Relay and analog out, 85–265 Vac power	57701483
Relay and RS-485 out, 9–30 Vdc power	57700485
Relay and RS-485 out, 85–265 Vac power	57701485
Relay, analog and RS-485 out, 9–30 Vdc power	57700487
Relay, analog and RS-485 out, 85–265 Vac power	57701487

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Mechanical</b>	
Cutout dimensions	3.62 in W x 1.77 in H (92 mm x 45 mm) DIN standard
Outline dimensions	4.04 in W x 2.19 in H x 3.87 in D (103 mm x 56 mm x 98 mm) 3.60 in (92 mm) maximum depth in panel
Enclosure	Plastic with polyester front label
Connectors	Up to six depluggable terminal blocks
<b>Environmental</b>	
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	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

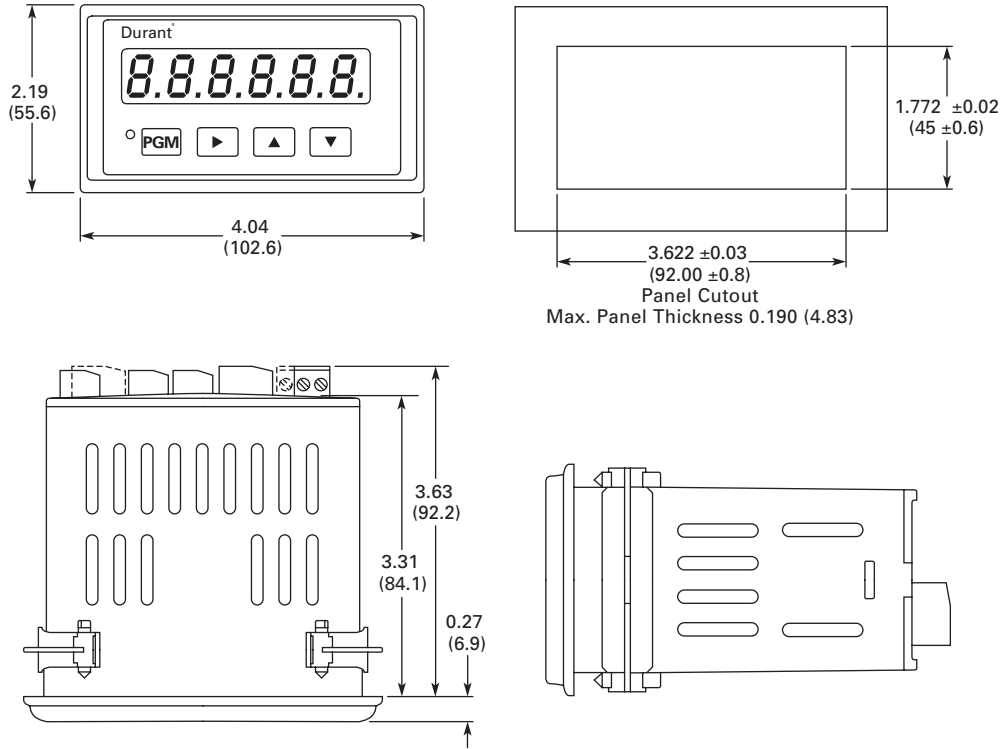
## General Specifications, continued

Description	Specification
<b>Input Power</b>	
AC powered models (57701-4XX)	
Input power	85–295 Vac, 47–63 Hz, 20V A
External fuse	0.2A, 250 Vac, time delay (T200 mA, 250V)
Isolation dielectric strength	2300 Vac
DC powered models (57700-4XX)	
Input power	9–30 Vdc, 12V A
External fuse	2.0A, 50 Vdc, time delay (T2A, 50V)
Reverse voltage protection	Yes
Isolation dielectric strength	2300 Vac to signal outputs and relays, 500 Vac to RS-485 and analog outputs
<b>Human Interface</b>	
Display	+6, –5 digits
Type	0.56 in (14.2 mm) high, seven segment, red LED
<b>Data Retention</b>	
Memory type	EEPROM, no batteries required
Duration	100 years
<b>Count Signal Input</b>	
Sensor type	Sink or source, DIP switch selectable
Input impedance	4.75k ohms to +5 Vdc or 34.9k ohms to ground
Thresholds	
High	3.5–28 Vdc
Low	0–1.9 Vdc, for single ended signals
Magnetic pickup range	200 mV p-p to 65V rms 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/lnh	8250/8250
Fast response	
Count mode	A and B
Add/add, add/subtract, add w/lnh	3000/3000
Quad x1, quad x2	3250
Quad x4	2000
<b>Control Inputs</b>	
Sensor type	Sink only
Input impedance	4.75k ohms to +5 Vdc
Thresholds	
High	3.5 to 28 Vdc
Low	0–1.9 Vdc
Response	25 ms maximum (5V signal)
<b>Accessory Power Output</b>	
Voltage	12 Vdc +10%/–13%
Current	75 mA max.
Protection	Short-circuit protected

### Dimensions

Approximate Dimensions in Inches (mm)

#### Eclipse Series



**Ambassador Series—Durant®****Product Description**

Eaton's Ambassador Series provides up to four presets in one of the most noise-immune packages available.

**Features**

- AC/DC powered, two-line LCD display
- Eight-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

**Product Selection**

57601401

**Ambassador Series Count Control**

Description	Catalog Number
Single preset with rate, 115 Vac	57601401
Single preset with rate, batch and totalizer, 115 Vac	57601402
Dual preset with rate, 115 Vac	57601403
Dual preset with rate, batch and totalizer, 115 Vac	57601404
Four preset with rate, batch and totalizer, 10–15 Vdc	57600405
Four preset with rate, batch and totalizer, 115 Vac	57601405
Four preset with rate, batch and totalizer, 230 Vac	57602405
Feet/inches control, 115 Vac	57601415
Feet/inches control, 230 Vac	57602415

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Power Input</b>	
AC operation	115 Vac ( $\pm 15\%$ ) std., 50 to 60 Hz, 7W 230 Vac ( $\pm 15\%$ ) opt., 50 to 60 Hz, 7W
DC operation	10–15 Vdc opt., 300 mA maximum
<b>Power Output</b>	
DC operation	12 Vdc ( $\pm 25\%$ ), 100 mA maximum (includes all line and load variations)
<b>Environmental</b>	
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
<b>Main Counter</b>	
Type	Bi-directional
Digits	Six
Presets	Varies by model
Reset modes	Auto or manual reset to zero or preset
Scaler range	0.00001 to 9.99999
Decimal point	Five positions (six on four-preset models)
Output latency	See table on <b>Page 72</b>
<b>Batch Counter</b>	
Type	Increment with main counter recycle or final preset signal
Digits	Six
Presets	One
Output latency	<1 ms

## General Specifications, continued

Description	Specification
<b>Totalizer</b>	
Type	Bi-directional, same or opposite of main counter
Digits	Eight
Scaler	Shared with main counter
Decimal point	Tracks main counter
<b>Count Input Speeds</b>	
See tables on <b>Page 72</b>	
<b>Count Inputs</b>	
Sink	
Impedance	4.6k ohms to +5 Vdc
Voltage	
High	3.5 to 34.0 Vdc
Low	0.0 to 1.9 Vdc
Source (high)	
Impedance	2.3k ohms to common
Voltage	
High	3.5 to 17.0 Vdc (100% duty cycle)
Low	0.0 to 1.9 Vdc
Source (low)	
Impedance	2.3k ohms to common
DC voltage	
High	0.6 to 17.0 Vdc
Low	-17.0 to -0.6 Vdc
AC voltage	
	17 Vac (48V peak-peak) maximum
<b>Control Inputs</b>	
Impedance	4.7k ohms to +5 Vdc
Voltage	
High	+3.7 to +24 Vdc
Low	0.0 to 0.9 Vdc
Response	Minimum low 15 ms, minimum high 15 ms
<b>Relay Outputs</b>	
Type	SPDT contacts
UL ratings	250 Vac, 360V A pilot duty
<b>Transistor Outputs (2)</b>	
Type	NPN open collector with transient protection
Maximum voltage (OFF state)	30 Vdc
Maximum current (ON state)	200 mA at 1.3 Vdc
<b>Communication</b>	
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)
<b>Rate Indicator (Not available on models 57601-415 and 57601-485)</b>	
Type	1/Tau
Digits	Six
Presets	Two
Scaler range	0.00001 to 99999
Decimal point	Five positions, programmable
Accuracy	±0.015% of reading
Update time	See table on <b>Page 72</b>
Zero time	See table on <b>Page 72</b>
<b>Connections</b>	
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)

**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

**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 seconds, programmable	0.1 to 99.9 seconds, programmable
5760X415	0.1 to 999.9 seconds, programmable	0.1 to 999.9 seconds, programmable

**Ambassador Count Input Speeds—5760X405, 5760X415** <sup>①</sup>

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

**Ambassador Count Input Speeds—5760X401, 5760X402, 5760X403, 5760X404**

Mode Input A/B	Maximum Speed <sup>②</sup>	
	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	—

**Notes**

<sup>①</sup> Contact inputs = 40 Hz; B direction inputs = 40 Hz and B reset input = 10  $\mu$ S min. low. Input A not active on ft/in control.

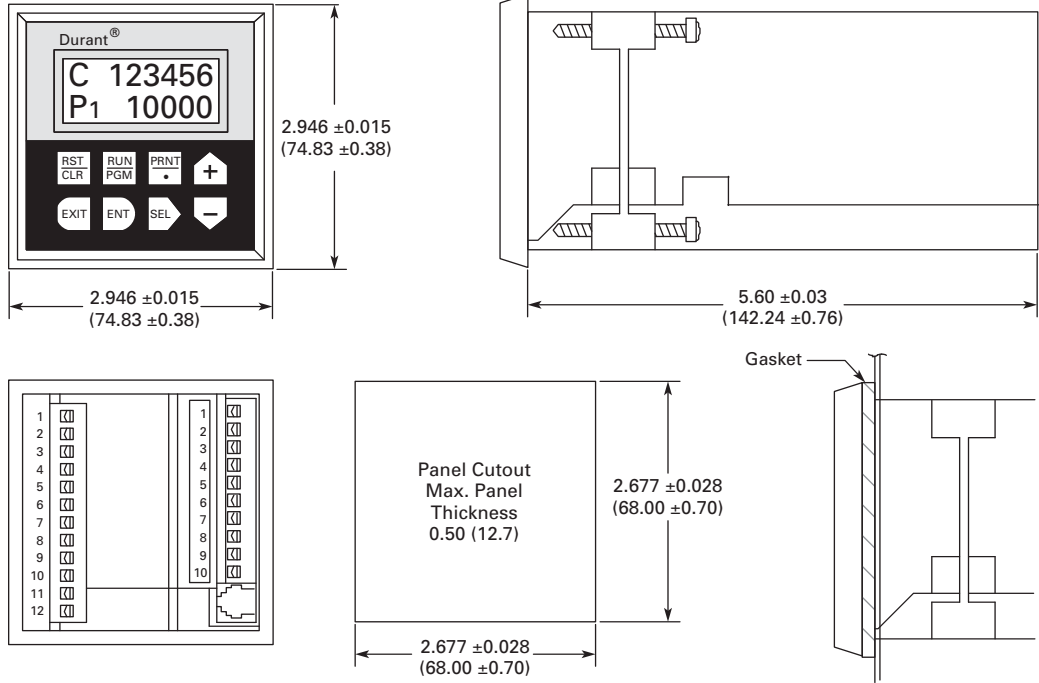
<sup>②</sup> The maximum count speed depends on the selected count mode. All maximum speeds are shown with square waves (50% duty cycle) input.



### Dimensions

Approximate Dimensions in Inches (mm)

#### Ambassador Series



1

**President Series—Durant®****Product Description**

Eaton's President Series features an easy-to-read LED and a simple preset input by means of the large keypad.

**Features**

- Five- or six-digit, LED display, 0.56 in (14 mm)
- 1, 2 or 3 presets
- 15 Vdc at 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

**Product Selection**

58831400

**President Series Count Control**

Description	Features					Main Counter	Presets	Digits	Catalog Number
	Totalizer	Batch Counter	Rate	Scaler	Crop-Cut				
120 Vac, no communications	—	—	✓	—	—	1	1	5	57820400
240 Vac, 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 presets 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

**Notes**

- 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.

## Technical Data and Specifications

## President Series—Count Control

Description	Model				
	57820400	57820401	58821400	58825400	58831400
AC power requirements	120V ±10%	240V ±10%	120V/240V +10%/-20%, 47–63 Hz		
DC power requirements	11–30 Vdc	11–30 Vdc	11–28 Vdc	11–28 Vdc	11–28 Vdc
Power consumption	8 watts max.	8 watts max.	18 watts max.	18 watts max.	18 watts max.
DC power output <sup>①</sup>	15 Vdc +1/-2 at 85 mA max.		15 Vdc +1/-2; 150 mA if powered from AC or less than 24 Vdc, 100 mA if powered from 24 Vdc or greater		
Operating temperature	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)
Operating humidity	85% relative, non-condensing	85% relative, non-condensing	85% relative, non-condensing	85% relative, non-condensing	85% relative, non-condensing
Storage temperature	-10° to 160°F (-40° to 71°C)	-10° to 160°F (-40° to 71°C)	-10° to 160°F (-40° to 71°C)	-10° to 160°F (-40° to 71°C)	-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	N/A	5 Digits (0.0001 to 9.9999)	5 Digits (0.0001 to 9.9999)	5 Digits (0.0001 to 9.9999)
Count input frequency	10 kHz (5 kHz in quadrature)	10 kHz (5 kHz in quadrature)	See table on <b>Page 76</b>	See table on <b>Page 77</b>	See table on <b>Page 76</b>
Count input impedance	6.8k ohms to 15 Vdc when control is powered by AC line; 6.8k ohms to 10 Vdc when control is powered by DC line				
Control input threshold	High 10.5 to 24.5 Vdc; Low 0.0 to 4.5 Vdc when powered by AC				
Control input impedance	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc
Control input response time	Min. high 5.3 ms; min. low 3.9 ms				
Relay contact output ratings	SPDT Form C; 10 amps resistive at 24 Vdc or 230 Vac; 1/3 hp at 115 Vac or 230 Vac; 150 Vdc 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; 30 Vdc 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	N/A	Dual port 20 mA current loop, standard ASCII code		

## President Series—Count Control, continued

Description	Model				
	58841400	58851400	58827400	58827410	58867400
AC power requirements	120V/240V +10%/-20%, 47–63 Hz				
DC power requirements	11–28 Vdc	11–28 Vdc	11–28 Vdc	11–28 Vdc	11–28 Vdc
Power consumption	18 watts max.	18 watts max.	18 watts max.	18 watts max.	18 watts max.
DC power output <sup>①</sup>	15 Vdc +1/-2; 150 mA if powered from AC or less than 24 Vdc, 100 mA if powered from 24 Vdc or greater				
Operating temperature	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)	32° to 130°F (0° to 55°C)
Operating humidity	85% relative, non-condensing				
Storage temperature	-10° to 160°F (-40° to 71°C)	-10° to 160°F (-40° to 71°C)	-10° to 160°F (-40° to 71°C)	-10° to 160°F (-40° to 71°C)	-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)	5 digits (0.0001 to 9.9999)	5 digits (0.0001 to 9.9999)	5 digits (0.0001 to 9.9999)	6 digits (0.00001 to 9.99999)
Count input frequency	See table on <b>Page 76</b>	See table on <b>Page 76</b>	See table on <b>Page 76</b>	See table on <b>Page 77</b>	See table on <b>Page 77</b>
Count input impedance	6.8k ohms to 15 Vdc when control is powered by AC line; 6.8k ohms to 10 Vdc when control is powered by DC line				
Control input threshold	High 10.5 to 24.5 Vdc; Low 0.0 to 4.5 Vdc when powered by AC				
Control input impedance	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc	4.5k ohms to +5 Vdc
Control input response time	Min. high 5.3 ms; min. low 3.9 ms				
Relay contact output ratings	SPDT Form C; 10 amps resistive at 24 Vdc or 230 Vac; 1/3 hp at 115 Vac or 230 Vac; 150 Vdc 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; 30 Vdc 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				

**Note**

<sup>①</sup> DC power output is only regulated if unit is powered by AC or greater than 18.5 Vdc.

# 1.2

## Counters, Panel Meters, Tachometers and Timers

### Count Controls/Preset Counters

1

#### 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

#### 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

#### 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

#### 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

**58867400 Count Frequency** <sup>①</sup>

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

**58827410 Count Frequency**

Sample Scale Factor	Count Speed (Pulses per Second)				
	Typical Combinations of Features <sup>②</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

**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

**Notes**

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

# 1.2

## Counters, Panel Meters, Tachometers and Timers

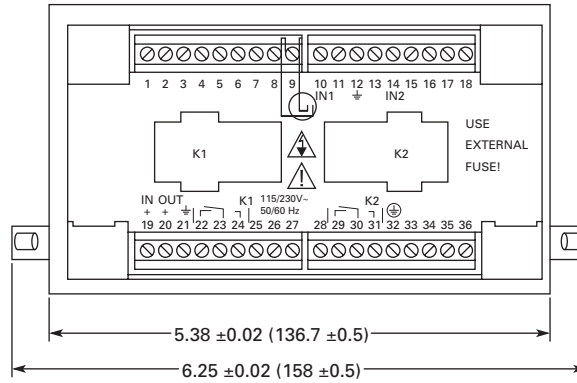
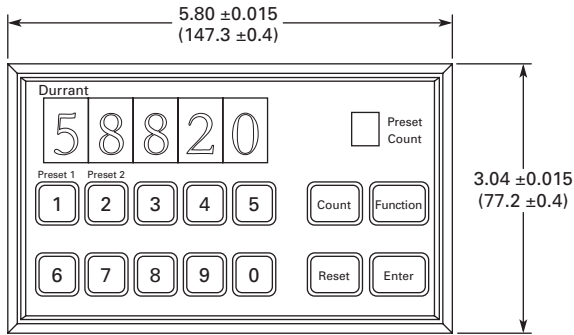
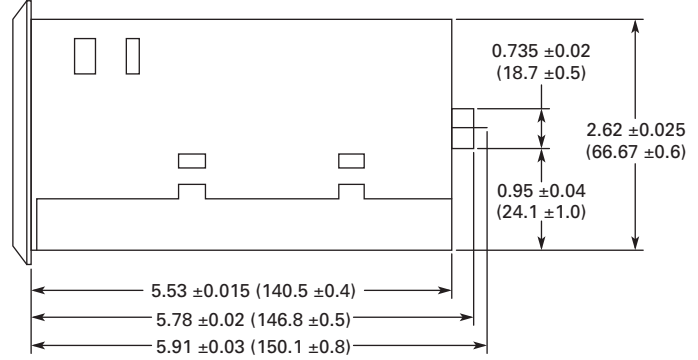
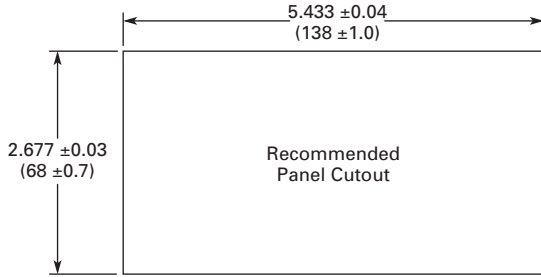
### Count Controls/Preset Counters

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### President Series Count Control



**PD-Q and PD-ER Series—Durant®****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, 250 Vac 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.

**Features**

- Easy setpoint adjustment
- Available in base mount or panel mount configurations

**Standards and Certifications**

- UL recognized as indicated

**Product Selection****When Ordering Specify**

When ordering PD-Q and PD-ER Series Predetermined Counters, specify catalog

numbers according to the features selected.

**5-Y-41433-\*-PD-Q****PD-Q and PD-ER Series Predetermined Counters**

Voltage	Mounting	Wire Leads	Catalog Number	Order Number
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

**Note**

① UL recognized.

# 1

## Technical Data and Specifications

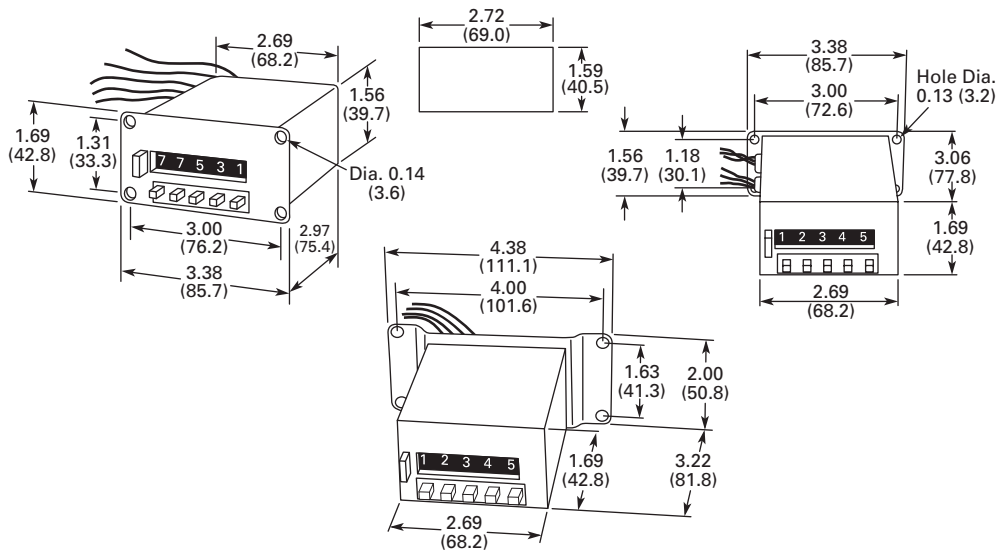
### General Specifications

Description	Specification
Number of digits	Five
Speed	1000 cpm
Window	Acrylic
Shaft	Stainless steel
Frame	Zinc alloy die cast
Digit size	3/16 in high by 7/64 in 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 250 Vac

### Dimensions

Approximate Dimensions in Inches (mm)

#### PD-Q and PD-ER Series





## Tachometers/Ratemeters



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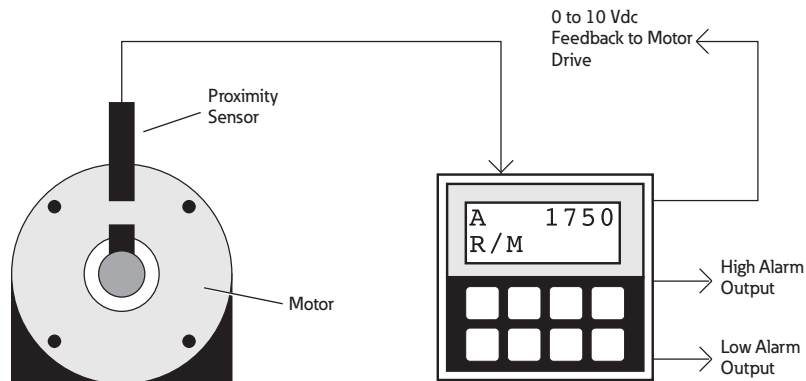
 Learn Online
**Product Overview**

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.









**Typical Application**

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 pickups, Hall effect sensors, etc. may also be used as inputs.

**Application Example**

## Product Selection Guide

## Tachometers/Ratemeters

	Characteristics	Panel Cutout in Inches (mm)	Page
<b>E5-24-E</b> 	Compact device with bright, LED display Multiple functions available: count, time, rate, multifunction, double-function 24 Vdc Power	0.870 x 1.772 (22 x 45)	<b>44</b>
<b>E5-496-C</b> 	Economical, multifunction display Large, LED characters AC or DC power options	1.772 x 3.780 (45 x 96)	<b>49</b>
<b>President</b> 	Bright LED display with 14 mm characters Simple configuration with 14-button tactile keypad Many different versions fit almost any application	2.667 x 5.433 (68 x 138)	<b>54</b>
<b>E5-148-C</b> 	Low cost, simple count control Various power options: battery, AC, DC Easy-to-change preset values Two-line display: input and preset values	1.772 x 1.772 (45 x 45)	<b>63</b>
<b>Courier</b> 	Replaceable lithium battery Eight-digit, high-visibility LCD display Optional backlighting Various input options available	1.299 x 2.677 (33 x 68)	<b>83</b>
<b>Eclipse</b> 	Six-digit, super bright LED display Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls	1.772 x 3.780 (45 x 96)	<b>85</b>
<b>Ambassador</b> 	Six-digit, high-visibility, two-line LCD display User-configurable control inputs Highly flexible control/display	2.667 x 2.667 (68 x 68)	<b>88</b>
<b>Fusion</b> 	Integrated controller combines operator interface, ladder logic and high-speed counting	2.667 x 5.433 (68 x 138)	<b>61</b>

**Courier Series—Durant®****Product Description**

Eaton's Courier Series is powered by a replaceable lithium battery.

**Features**

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

**Standards and Certifications**

- CE marked

**Product Selection****Courier Series****LCD 1/Tau Ratemeter** <sup>①</sup>

Description	Catalog Number
Battery	53300404
Extended temperature range, battery	53301404
Backlight, battery	53302404

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Power</b>	
Internal battery	3V, Lithium
Life expectancy	5 years +
Replacement part	35367-202
<b>Backlight</b>	
Backlight	10–30 Vdc at 30 mA max. <sup>②</sup>
	Reverse polarity protected
<b>Physical</b>	
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% RH (non-condensing)
Weight	2.2 oz. (62g) net
Display size	0.43 in (10.9 mm) high
Front panel rating	NEMA 4X when mounted with gasket provided
Case material	Cyclac X-17
<b>Rate Indicator</b>	
Type	1/Tau
Digits	4/5 (four calculated, five displayed with fixed 0 in LSD)
Scaler range	0.001 to 9999
Decimal point	Five positions, programmable
Accuracy	±0.2%
Update time	0.7 seconds
Zero time	10 seconds

**Notes**

<sup>①</sup> For units with rate and total, see Totalizers.

<sup>②</sup> Derate operating temperature 1°C/Volt above 17 Vdc.

# 1.3

## Counters, Panel Meters, Tachometers and Timers

### Tachometers/Ratemeters

1

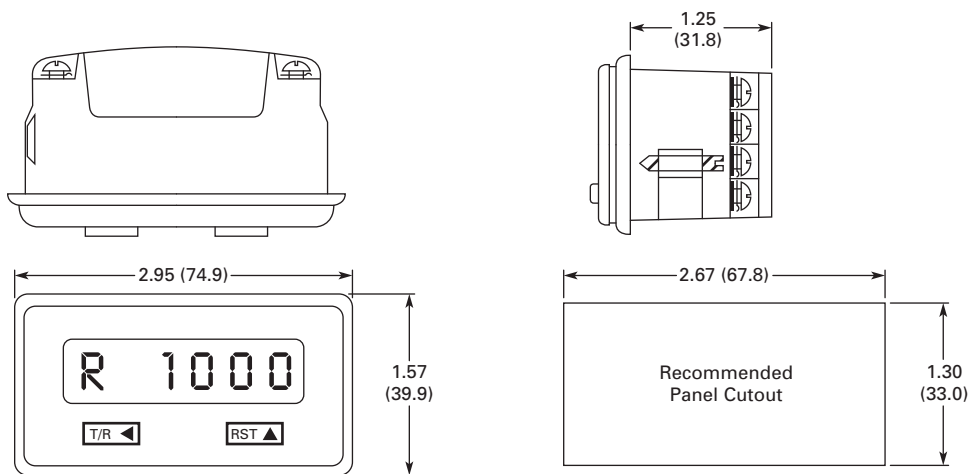
#### General Specifications, continued

Description	Specification
<b>DC Common (Terminal 1) Rate Inputs</b>	
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	0–0.4 Vdc
High	2.0–28 Vdc
Max. high	28 Vdc
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 ①
Min. low time	80 ms ①
Min. high time	20 ms ①
Input impedance	2k ohms above 5 Vdc
Voltage thresholds	
Low	0–1.2 Vdc
High	2.0–28 Vdc
Max. high	28 Vdc
<b>Programmable Enable Input (Terminal 5)</b>	
Operation	Level sensitive (maintained)
<b>Count Accuracy</b>	
Operated within specifications	100%

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Courier Series Ratemeter



#### Note

① Times are with a 0–5.0V swing.

**Eclipse Series—Durant®****Product Description**

Eaton's Eclipse Series offers a high visibility LED and a variety of optional outputs.

**Features**

- 1/8 DIN cutout
- NEMA 4X front panel
- Universal AC power supply (85–265 Vac)
- DC power modules (9–30 Vdc)
- Removable screw terminals
- Short depth: 3.6 in (91 mm)
- Front panel programming

**Standards and Certifications**

- UL and cUL listed
- CE marked

**Product Selection**

57700470

**Eclipse Series Five-Digit LED Ratemeter**

Description	Catalog Number
9–30 Vdc	57700470
9–30 Vdc, alarms	57700471
9–30 Vdc, analog out	57700472
9–30 Vdc, alarms, analog out	57700473
9–30 Vdc, RS-485	57700474
9–30 Vdc, alarms, RS-485	57700475
9–30 Vdc, analog out, RS-485	57700476
9–30 Vdc, alarms, analog out, RS-485	57700477
85–265 Vac	57701470
85–265 Vac, alarms	57701471
85–265 Vac, analog out	57701472
85–265 Vac, alarms, analog out	57701473
85–265 Vac, RS-485	57701474
85–265 Vac, alarms, RS-485	57701475
85–265 Vac, analog out, RS-485	57701476
85–265 Vac, alarms, analog out, RS-485	57701477

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Input Power</b>	
AC powered models (57701-4XX)	
Input power	85–265 Vac, 47–63 Hz, 20V A
External fuse	0.2A, 250 Vac, time delay (T200 mA, 250V)
Isolation dielectric strength	2300 Vac
DC powered models (57700-4XX)	
Input power	9–30 Vdc, 12 VA
External fuse	2.0A, 50 Vdc, time delay, (T2A, 50V)
Reverse voltage protection	Yes
Isolation dielectric strength	2300 Vac to signal inputs and relays, 500 Vac to RS-485 and analog outputs
<b>Human Interface</b>	
Display	Five digits
Type	0.56 in high, seven segment, red LED
Indicator	One red LED program/calibration indicator
Update time	0.1 to 99.9 seconds minimum

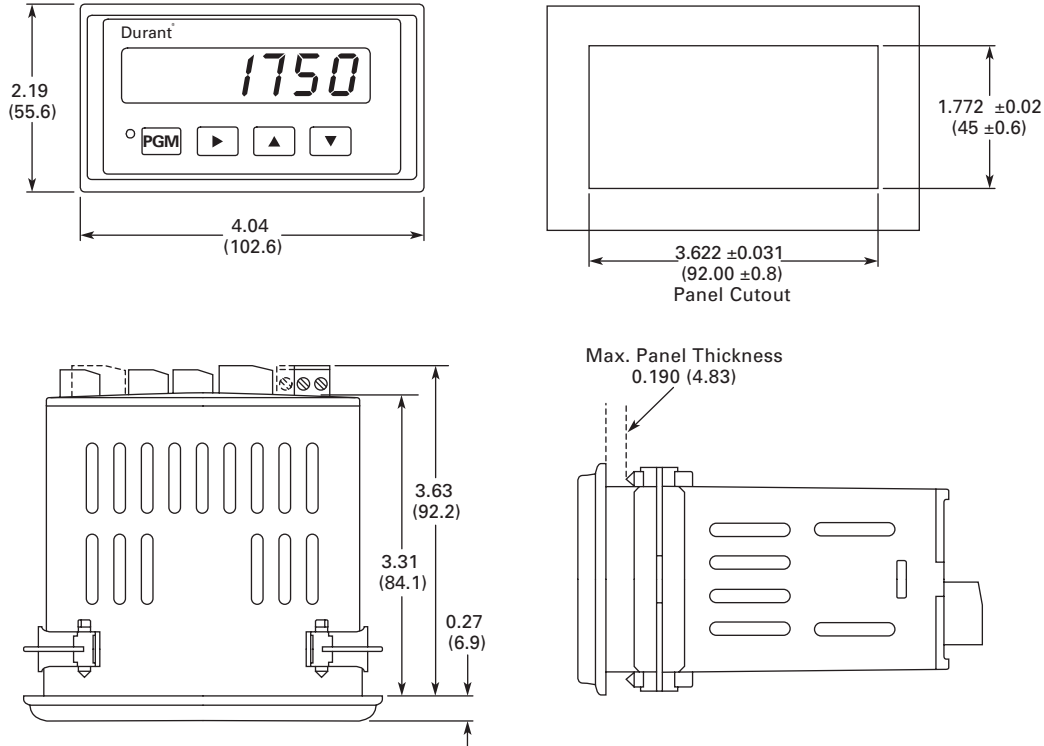
## General Specifications, continued

Description	Specification
<b>Data Retention</b>	
Memory type	EEPROM, no batteries required
Duration	100 years
<b>Signal Input</b>	
Rate/process time	Signal in
Sensor type	Sink or source, DIP switch selectable
Input impedance	4.75k ohms to +5 Vdc or 34.9k ohms to ground
Thresholds	
High	3.5 to 28 Vdc
Low	0 to 1.9 Vdc, for single ended signals
Magnetic pickup range	200 mV p-p to 65V rms into 34.9k ohms
Frequency response	200 Hz max. or 10 kHz max. (5V signals), DIP switch selectable
<b>Program Enable Input</b>	
Sensor type	Sink only
Input impedance	4.75k ohms to +5 Vdc
Thresholds	
High	3.5 to 28 Vdc
Low	0 to 1.9 Vdc
Response	25 ms max. (5V signal)
<b>Accessory Power Output</b>	
Voltage	12 Vdc $\pm$ 12%
Current	75 mA max.
Protection	Short-circuit protected
<b>Optional Outputs</b>	
Relay board	
Number of relays	Two
Contact type	1 set Form C per relay
Contact rating	5A, 250 Vac or 30 Vdc
Isolation dielectric strength	2300 Vac
Analog retransmission	
Output signals	4–20 mA (<750 ohms) and 0–10V (>2500 ohms)
Accuracy	0.13% full scale and 100 PPM/°C (and 0.07% full scale change over 4–20 mA load ranges)
Isolation dielectric strength	2300 Vac to signal inputs, relays and AC power inputs; 500 Vac 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 <sup>®</sup> compatible
Isolation dielectric strength	2300 Vac to signal inputs, relays and AC power inputs; 500 Vac to analog outputs and DC power inputs
<b>Environmental</b>	
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	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

### Dimensions

Approximate Dimensions in Inches (mm)

#### Eclipse Series Ratemeter



**Ambassador Series—Durant®****Product Description**

Eaton's most noise-immune ratemeter with an easy-to-read two-line LCD.

**Features**

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

**Standards and Certifications**

- UL and cUL listed
- CE marked

**Product Selection**

57150400

**Ambassador Series Ratemeter**

Description	Catalog Number
<b>Single Input</b>	
LCD rate indicator, 2 rate alarms, 10–15 Vdc	<b>57150400</b>
LCD rate indicator, 2 rate alarms, 115 Vac	<b>57151400</b>
LCD rate indicator, 2 rate alarms, 230 Vac	<b>57152400</b>
<b>Dual Input</b> ①	
Rate/ratio/draw with alarms and analog out, 10–15 Vdc	<b>57150405</b>
Rate/ratio/draw with alarms and analog out, 115 Vac	<b>57151405</b>
Rate/ratio/draw with alarms and analog out, 230 Vac	<b>57152405</b>

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Power Input</b>	
Model 57150-40X	10 to 15 Vdc, 300 mA maximum
Model 57151-40X	115 Vac (±15%) 50–60 Hz, 7W
Model 57152-40X	230 Vac (±15%) 50–60 Hz, 7W
<b>DC Power Output (AC Models Only)</b>	
Output	12 Vdc (±25%), 100 mA maximum (includes all line and load variations)
<b>Environment</b>	
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
<b>Ratemeter</b>	
Type	1/Tau
Digits	Five with overrange indication
Scaler range	0.00001 to 99999
Decimal point	Five positions, programmable
Average time	0.1 to 99.9 seconds, programmable
Zero time	0.1 to 99.9 seconds, programmable
Accuracy	±0.015% of reading

**Note**

- 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.



## General Specifications, continued

<b>Maximum Rate Input Frequencies</b>	
Maximum frequencies	All maximum frequencies listed are with a square wave input (50-50 duty cycle)
<b>Contact Input</b>	
Contact input	40 Hz
<b>Solid-State Input</b>	
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 ≤–3 to ≥+3V, single input 60 kHz ≤–2 to ≥+2V, two inputs 30 kHz (each input)
<b>Rate Inputs</b>	
Sink	
Impedance	4.6k ohms to +5 Vdc
Voltage	High 3.5 to 34.0, low 0.0 to 1.9 Vdc
Source (high)	
Impedance	2.3k ohms to common
Voltage	High 3.5 to 17.0 Vdc, low 0.0 to 1.9 Vdc
Source (low)	
Impedance	2.3k ohms to common
DC voltage	High 0.63 to 17.0 Vdc, low –17.0 to –0.6 Vdc
AC voltage	17 Vac (48V peak-peak) maximum
<b>Control Inputs</b>	
Impedance	4.7k ohms to +5 Vdc
Voltage	High +3.7 to +24 Vdc, low 0.0 to 0.9 Vdc
Response	Min, low 15 ms, min, high 15 ms
<b>Transistor Outputs (x2 for 5715X-401; x4 for 5715X-405)</b>	
Type	NPN open collector with transient protection
Max. voltage (OFF state)	30 Vdc
Max. current (ON state)	200 mA at 1.3 Vdc
<b>Communication</b>	
Type	RS-485
Format	One start bit, seven data bits (ASCII), one parity bit, one stop bit
Protocol	Opto-22 <sup>®</sup> compatible
Speed	300, 1200, 2400, 4800, 9600, 19200 baud
Parity	Odd, even, none (space transmitted, ignore received)
<b>Analog Output (Models 5715X-401 Only)</b>	
Range	0–10 Vdc ± 0.2% at 5 mA
DAC resolution	12 bit
<b>Connections</b>	
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)

# 1.3

## Counters, Panel Meters, Tachometers and Timers

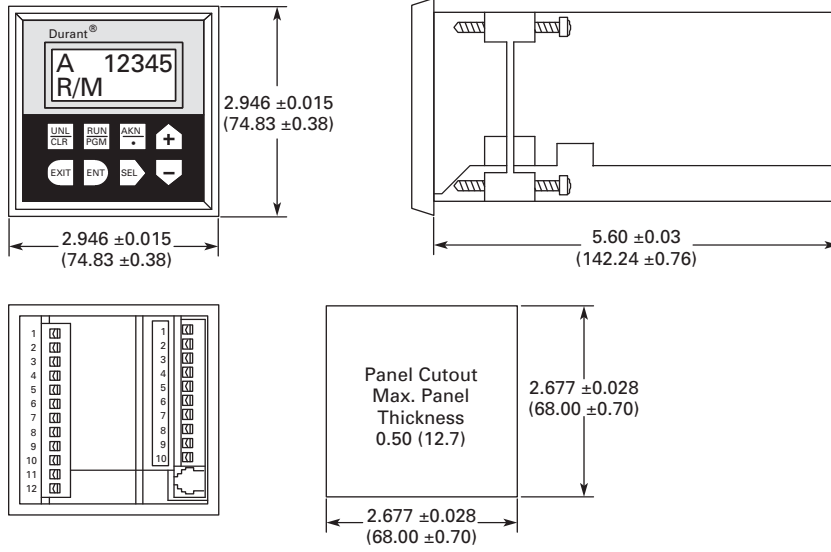
### Tachometers/Ratemeters

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Ambassador Series Ratemeters



## Digital Panel Meters



## Contents

## Description

## Page

Count Controls/Preset Counters

E5-324-E Series . . . . . 92

Eclipse Series—Durant® . . . . . 94



## Product Overview

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.

## Typical Application

- 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

## Product Selection Guide

## Digital Panel Meters

	Characteristics	Panel Cutout in Inches (mm)	Page
<b>E5-324-E</b>	Bright, easy-to-read LED in 1/32 DIN package Programmable scaling of inputs Input for display-hold 24 Vdc power	0.870 x 1.772 (22 x 45)	<b>92</b>
<b>Eclipse</b>	Six-digit, super bright LED display Multiple models available: DC voltage, AC voltage, DC current, AC current, 5A AC current, 4–20 mA/0–10V process meter Various output options including relay, analog and RS-485	1.772 x 3.780 (45 x 96)	<b>94</b>



# 1.4

## Counters, Panel Meters, Tachometers and Timers

### Digital Panel Meters

1

#### E5-324-E Series

##### Product Description

Eaton's most compact panel meter provides an easy-to-read LED in a very small package.

##### Features

- Galvanic isolation with protection against incorrect polarity
- Automatic MIN/MAX value detection
- Freely programmable characteristic curve end points
- Input Range—
  - Single current measuring input (0/4–20 mA)
  - Single 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



#### Product Selection

E5-324-E0402



#### E5-324-E0402 Digital Panel Meter

Description	Catalog Number
LED digital panel meter, 24 x 48 mm	E5-324-E0402

#### Technical Data and Specifications

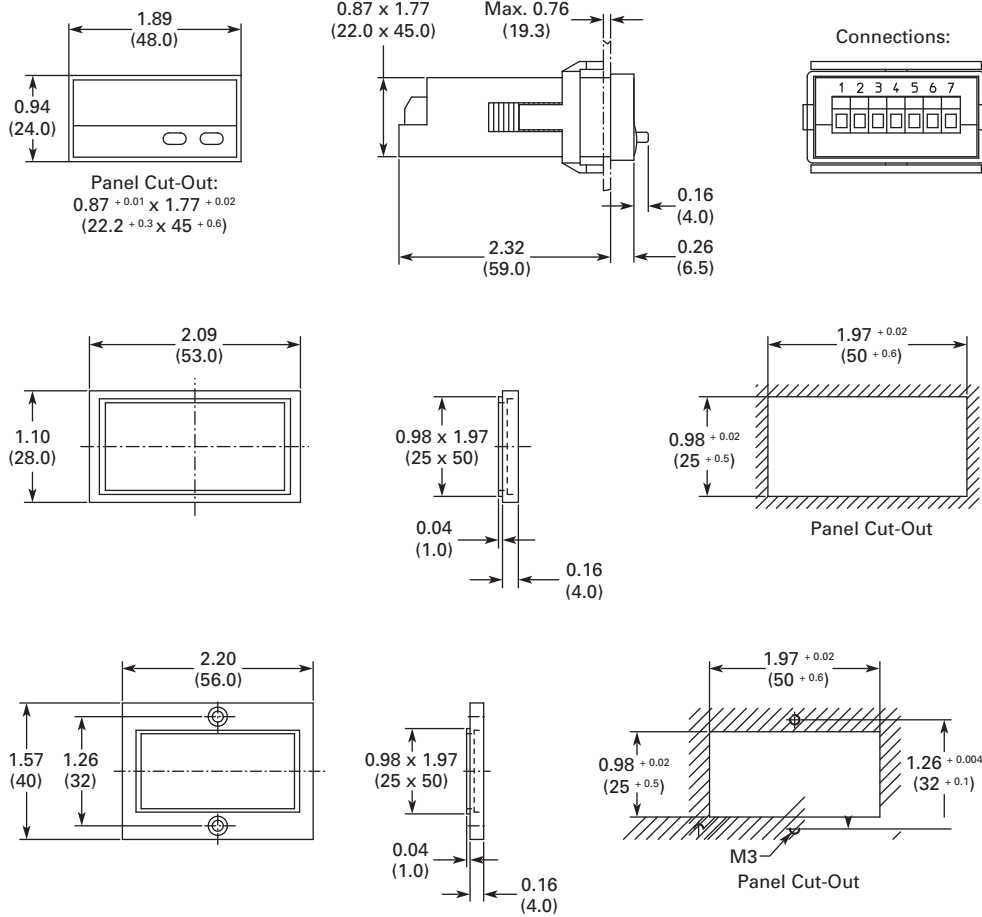
##### General Specifications

Description	Specification
Supply voltage	10–30 Vdc, galvanically isolated with integrated protection against incorrect polarity
Current consumption	Max. 50 mA
Display	Five-digit display, red seven-segment LEDs; 0.31 in (8 mm) high
Measuring rate	Two measurements/second
Data backup	EEPROM
Housing	Housing for control panel 1.898 x 0.94 in (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. 1.5 Vdc
Input voltage measurement	0–10V, 2–10V
Input resistance approx.	1M ohm
Max. input signal level	30 Vdc
Control inputs	
High	4–30 Vdc
Low	0–2 Vdc
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 (50g)
Connection technique	Screw terminal, pitch 0.2 in (5.08 mm), seven-poles

### Dimensions

Approximate Dimensions in Inches (mm)

#### E5-324-E Series



# 1.4

## Counters, Panel Meters, Tachometers and Timers

### Digital Panel Meters

1

#### Eclipse Series—Durant®

##### Product Description

Eaton's Eclipse Series panel meter features a high-visibility LED and is available with a variety of input and scaling options.

##### Features

- Four full digits
- 1/8 DIN Size
- Red, LED display
- 0.56 in (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

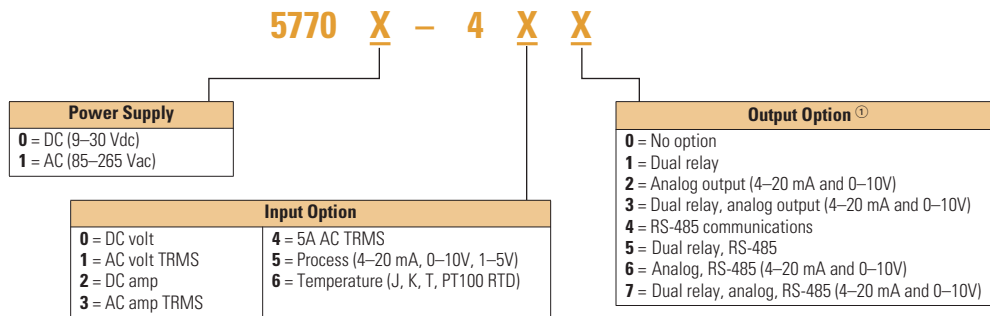


#### Eclipse Series Panel Meter



#### Catalog Number Selection

##### Eclipse Series



##### Note

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

## Technical Data and Specifications

### General Specifications

Description	Specification
<b>Input Power</b>	
AC powered models (57751-4XX)	
Input power	85–265 Vac, 47–63 Hz, 20 VA
External fuse	0.2A, 250 Vac, time delay (T200 mA, 250V)
Isolation dielectric strength	2300 Vac
DC powered models (57750-4XX)	
Input power	9-30 Vdc, 12 VA
External fuse	2.0A, 50 Vdc, time delay (T2A, 50V)
Reverse voltage protection	Yes
Isolation dielectric strength	2300 Vac to signal inputs and relays, 500 Vac to RS-485 and analog outputs
<b>Human Interface</b>	
Display	±4 full digits
Type	0.56 in (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
<b>Data Retention</b>	
Memory type	EEPROM, no batteries required
Duration	100 years
<b>Signal Input</b>	
DC voltage models (5770X-40X)	
Range	±199.9m Vdc, ±1.999 Vdc, ±19.99 Vdc, ±199.9 Vdc, DIP switch selectable
Impedance	1M ohm
Overrange	750 Vdc/530 Vac except 220 Vdc/Vac on 199.9 mV range
Accuracy	±0.1% of reading, ±0.03% FS, ±0.5 digit, and ±80 PPM/°C
AC voltage models (5770X-41X)	
Range	199.9 m Vac, 1.999 Vac, 19.99 Vac, 199.9 Vac, DIP switch selectable, all ranges true rms
Frequency	40 to 1000 Hz
Impedance	1M ohm (capacity coupled)
Overrange	750 Vdc/530 Vac except 220 Vdc/Vac on 199.9 mV range
Accuracy	±0.5% of reading, ±0.13% FS, ±0.5 digit, ±180 PPM/°C for crest factor = 1; plus ±0.7% for crest factor = 1 to 3; and ±2.5% for crest factor = 5
DC current models (5770X-42X)	
Range	±199.9 µA DC, ±1.999 mA DC, ±19.99 mA DC, ±199.9 mA DC, DIP switch selectable
Impedance	199.9 mV/selected range
Overrange	30 mA (199.9 µA range), 100 mA (1.999 mA range), 300 mA (19.99 mA range), 1A (199.9 mA range)
Accuracy	±0.1% of reading, ±0.03% FS, ±0.5 digit, and ±120 PPM/°C
AC current models (5770X-43X)	
Range	199.9 µA 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 (1199.9 µA range), 100 mA (1.999 mA range), 300 mA (19.99 mA range), 1A (199.9 mA range)
Accuracy	±0.5% of reading, ±0.13% FS, ±0.5 digit, and ±200 PPM/°C for crest factor = 1; plus ±0.7% for crest factor = 1 to 3; and ±2.5% for crest factor = 5

## General Specifications, continued

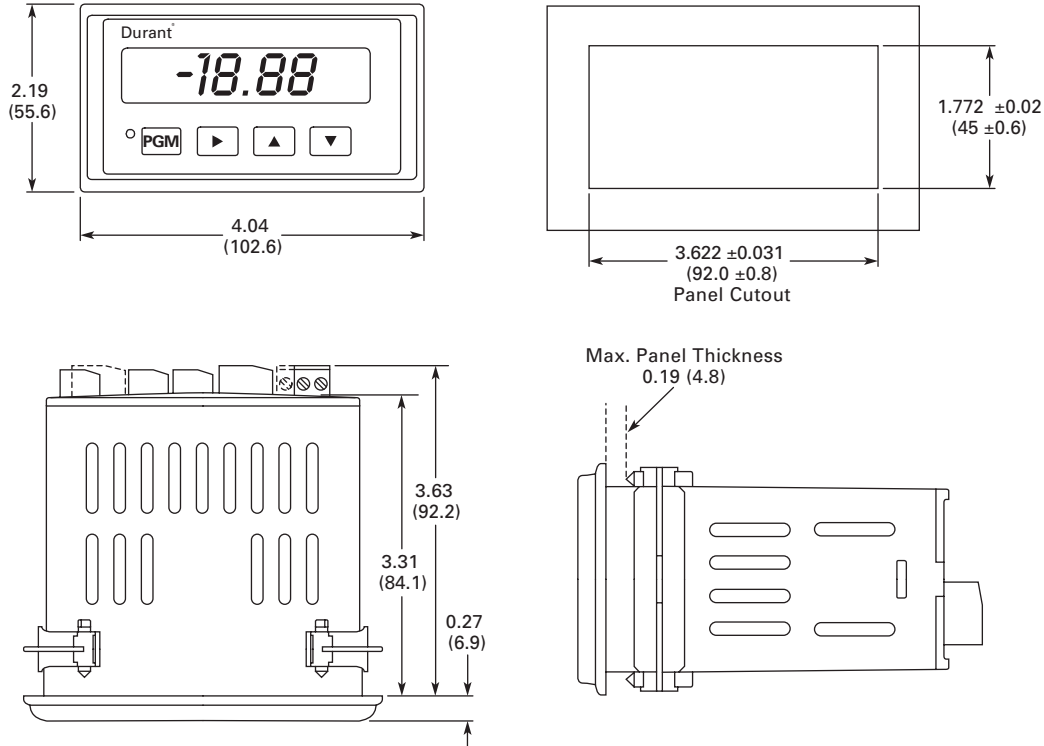
Description	Specification
<b>Signal Input, continued</b>	
5A AC models (5770X-44X)	
Range	5A AC, true rms
Frequency	40 to 1000 Hz
Impedance	0.02 ohm (shunt output capacitive coupled)
Overrange	10A maximum
Accuracy	±0.4% of reading, ±0.13% FS, ±0.5 digit, and ±200 PPM/°C for crest factor = 1; plus ±0.7% for crest factor = 1 to 3; and ±2.5% for crest factor = 5
Process models (5770X-45X)	
Range	4–20 mA DC, 0–10 Vdc, 1–5 Vdc; separate input terminals for voltage and current signals
Impedance	100 ohms (current input) and 1.27M ohms (voltage input)
Overrange	50 mA maximum (current input) and 100V maximum (voltage input)
Power output	24 Vdc ±10%, 90 mA max, short-circuit protected
Accuracy	±0.1% of reading, ±0.03% FS, ±0.5 digit, and ±80 PPM/°C
<b>Optional Outputs</b>	
Relay board	
Dual relay	1 set of Form C contacts each
Contact rating	5A, 250 Vac or 30 Vdc
Isolation dielectric strength	2300 Vac
Analog retransmission	
Output signals	4–20 mA (<750 ohms) and 0–10V (>2500 ohms)
Accuracy	0.13% FS, 100 PPM/°C, 0.07% FS change with 4–20 mA load, ±0.3% FS for 4–20 mA output, only after exposure to 85% relative humidity
Isolation dielectric strength	2300 Vac to signal inputs, relays and AC power input; 500 Vac 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 <sup>®</sup> compatible
Isolation dielectric strength	2300 Vac to signal inputs, relays, and AC power input; 500 Vac to analog outputs and DC power inputs
<b>Environmental</b>	
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/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 degree 2	Overvoltage Category II



### Dimensions

Approximate Dimensions in Inches (mm)

#### Eclipse Series





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#### Description

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Learn  
Online

### Product Overview






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).

### Typical Application

- 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

## Product Selection Guide

## Timers/Hour Meters

	Characteristics	Panel Cutout in Inches (mm)	Page
<b>E5-24-E</b> 	Compact device with bright, LED display Multiple functions available: count, time, rate, multifunction, double-function 24 Vdc Power	0.870 x 1.772 (22 x 45)	<b>44</b>
<b>E5-496-E</b> 	Economical, multifunction display Large, LED characters AC or DC power options	1.772 x 3.622 (45 x 92)	<b>49</b>
<b>E5-224-C</b> 	Non-replaceable battery (minimum eight-year life) Compact, low cost and high efficiency Eight-digit LCD timer Manual or electrical reset Various timing modes (Hr/Min/Sec)	0.870 x 1.772 (22 x 45)	<b>101</b>
<b>Hour Meters</b> 	Compact, low-cost LCD and electromechanical elapsed time meters Various power options for almost any power supply	Various	<b>106</b>
<b>Hour Meter/Counter</b> 	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 UL Approved	1.988 (50.5) dia. or DIN rail	<b>112</b>

Electronic Timers/Hour Meters



### Contents

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Electromechanical Timers/Hour Meters .....	<b>106</b>

### Electronic Timers/Hour Meters

#### Product Overview

Eaton’s electronic hour meters are a simple and effective way to monitor equipment on time.

#### Features

- Reset or non-reset
- Variety of power options
- LCD displays

#### Standards and Certifications

- UL recognized
- CE



**1/32 DIN LCD—Timers****Product Description**

Simple battery-powered timers provide an easy-to-read LCD and a variety of timing display options.

**Features**

- Low price and high efficiency
- Large eight-digit LCD display, height of the figures 0.31 in (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 10–260 Vac/Vdc voltage pulses
- IP65
- Screw terminals, RM 5 mm
- Lifetime of the battery approximately eight years
- Locking of the reset key
- Operating temperature 14° to 140°F (–10° to 60°C)

**Standards and Certifications**

- UL recognized
- CE marked

**Product Selection**

E5-224-C04

**1/32 DIN LCD Timers**

Description	Catalog Number
<b>Eight-Digit LCD Timer, Battery Power</b>	
Hours/minutes, 0.94 x 1.89 in (24 x 48 mm)	<b>E5-224-C0440</b>
Hours/minutes, 10–260V input, 0.94 x 1.89 in (24 x 48 mm)	<b>E5-224-C0448</b>
Minutes/seconds, 0.94 x 1.89 in (24 x 48 mm)	<b>E5-224-C0450</b>
Minutes/seconds, 10–260V input 0.94 x 1.89 in (24 x 48 mm)	<b>E5-224-C0458</b>

**Technical Data and Specifications****General Specifications**

Description	Specification
Power supply	Non-replaceable lithium battery (lifetime approximately eight years at 68°F (20°C))
Display	LCD, eight-digits
Figure size	0.31 in (8 mm) high
Counting direction	Adding
Display range	
Time range	99999h 59m (134)
Display	<b>99999 - 59</b>
Time range	99999.99h (134)
Display	<b>99999 - 99</b>
Time range	9999h 59m 59s (135)
Display	<b>9999.59.59</b>
Time range	9999999.9s (135)
Display	<b>9999999.9</b>
Reset	Manual and electrical

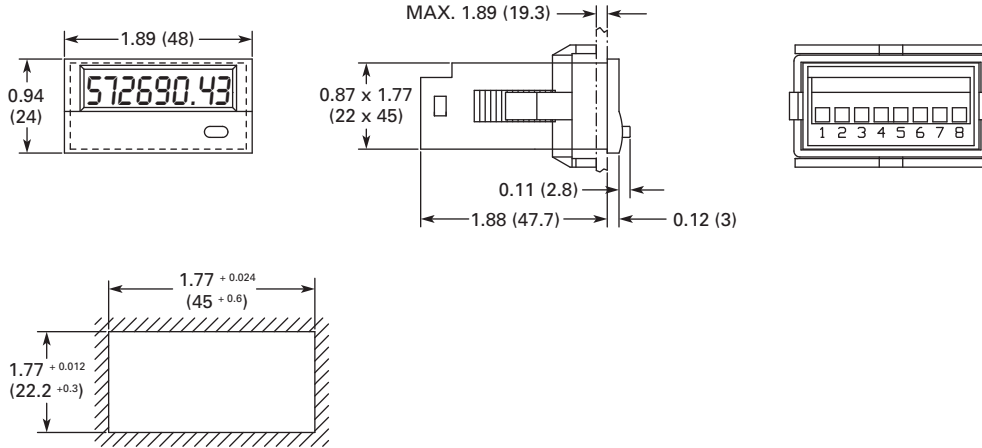
## General Specifications, continued

Description	Specification
Timer inputs, DC versions (max. 30 Vdc)	
Timer input	NPN or PNP depending on the type
Switching level	
NPN low	0–0.7V
NPN high	3–30 Vdc
PNP low	0–0.7V
PNP high	4–30 Vdc
Counting start	
NPN	For low signal at the timer input
PNP	For high signal at the timer input
Timer inputs, high voltage version (10–260 Vdc/Vac)	
Timer input	Optocoupler input max. 30 Hz
Min. pulse time	16 ms
Switching level	
Low	0–2 Vdc/Vac
High	10–260 Vdc/Vac
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	3–5 Vdc
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	3–30 Vdc
High voltage input	10–260 Vdc/Vac
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	3–5 Vdc
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 (50g)

### Dimensions

Approximate Dimensions in Inches (mm)

#### 1/32 DIN LCD Timers



1

#### E42DI24/E42DIR Series—Durant®

##### Product Description

Simple LCD hour meters with flexible input voltages

##### 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



#### Product Selection

##### E42DI24/E42DIR Series Elapsed Time Meters

	Description	Catalog Number
<b>E42DIR_</b> 	<b>Round LCD</b>	
	Elapsed hour meter, 48–150 Vdc/100–230 Vac	<b>E42DIR48230</b>
	Elapsed hour meter with reset, 48–150 Vdc/100–230 Vac	<b>E42DIR48230R</b>
	Elapsed hour meter, 12–48 Vdc/20–60 Vac	<b>E42DIR1260</b>
<b>E42DI24_</b> 	<b>Rectangular LCD</b>	
	Elapsed hour meter, 48–150 Vdc/100–230 Vac	<b>E42DI2448230</b>
	Elapsed hour meter, with reset, 48–150 Vdc/100–230 Vac	<b>E42DI2448230R</b>
	Elapsed hour meter, 12–48 Vdc/20–60 Vac	<b>E42DI241260</b>

#### Technical Data and Specifications

##### General Specifications

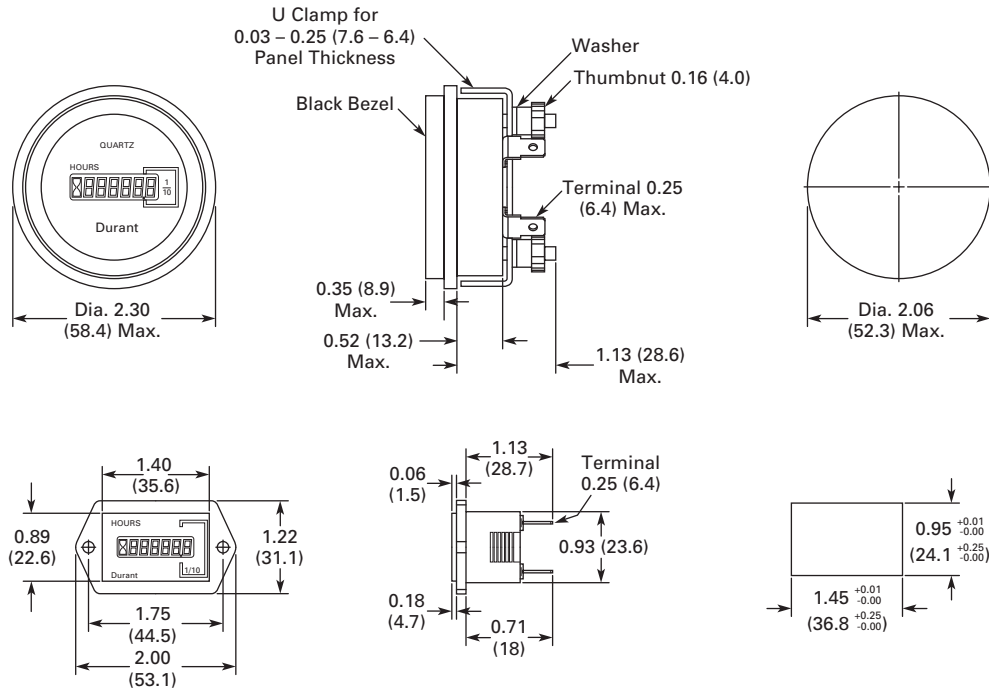
Description	Specification
Function	Solid-state hour meter
Power supply	
E42DIXX1260X	12–48 Vdc $\pm 25\%$ /20–60 Vac $\pm 25\%$
E42DIXX48230X	48–150 Vdc $+23\%$ – $25\%$ /100–230 Vac $+17\%$ – $25\%$
Frequency range	48–440 Hz
Display	Six-digit LCD, 0.20 in (5 mm)
Accuracy	$\pm 0.1\%$
Recording/display capacity	99,999.9 hours
Resolution	0.1 hour (6 minutes)
Current consumption max. at nominal voltage	
E42DIXX1260X	0.8 mA at 12 Vdc 5.0 mA at 48 Vdc 0.5 mA at 20 Vac 2.5 mA at 60 Vac
E42DIXX48230X	0.8 mA at 48 Vdc 2.5 mA at 150 Vdc 0.9 mA at 100 Vac 2.0 mA at 230 Vac
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 (55g)
E42DI24XXXXXX	0.78 oz (22g)



### Dimensions

Approximate Dimensions in Inches (mm)

#### E42DI24/E42DIR Series



#### 1

#### Electromechanical Timers/Hour Meters



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### Electromechanical Timers/Hour Meters

#### Product Overview

Eaton's electromechanical hour meters are available in a variety of configurations and provide a cost-effective way to monitor equipment on time.

#### Features

- Non-resettable
- Always readable display

#### Standards and Certifications

- UL recognized
- CE



**1/16 DIN Hour Meters—Eaton®****Product Description**

Eaton's most cost-effective elapsed time meter. Features IP65 protection against water intrusion.

**Typical Application**

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

**Features**

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

**Standards and Certifications**

- UL recognized

**Product Selection**

7-T-65-4848PM-40

**1/16 DIN Hour Meters**

Description	Catalog Number
10–30 Vdc, 1.89 x 1.89 in (48 x 48 mm)	<b>8-T-65-4848PM-402</b>
10–30 Vdc, 1.89 x 1.89 in (48 x 48 mm), 50 pc. package	<b>8-T-65-4848PM-40284</b>
100–130 Vac, 1.89 x 1.89 in (48 x 48 mm)	<b>7-T-65-4848PM-406</b>
100–130 Vac, 1.89 x 1.89 in (48 x 48 mm), 50 pc. package	<b>7-T-65-4848PM-40684</b>

T4848DINADAPT

**DIN Rail Adapter**

Description	Catalog Number
DIN rail adapter for DIN electromechanical hour meter	<b>T4848DINADAPT</b>

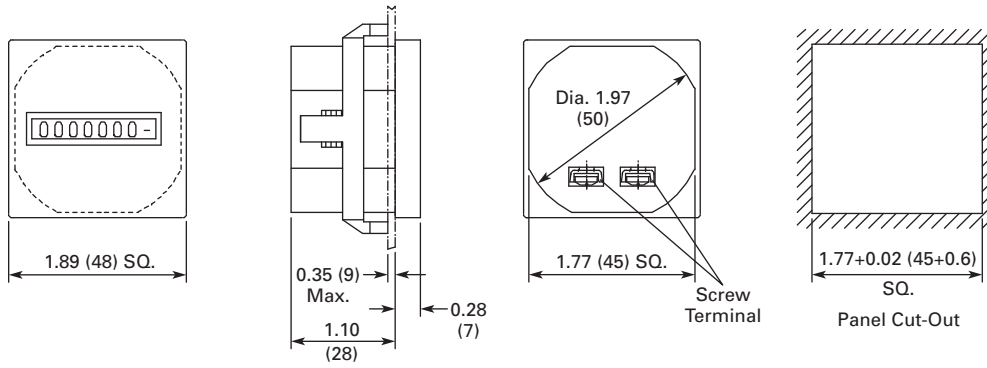
**Technical Data and Specifications****General Specifications**

<b>Description</b>	<b>Specification</b>
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	
10–30 Vdc	Approx. 500 mW
100–130 Vdc	Approx. 750 mW
Rated voltages	100–130 Vac, 50 or 60 Hz 10–30 Vdc
On time	100%
Display	
Seven at AC	99999.99
Eight at DC	999999.99
Accuracy	
AC	Supply frequency + 30 ms
DC	<0.003% (24h)
Count mode	Adding
Figure size	0.16 in (4 mm) high
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 (48g)
Operating indicator of the running time meter	
AC	Fast rotating wheel with red dashes
DC	1/100h display turns continuously by 1-digit in 36 seconds
Test voltage	2000 Vac, 50 Hz for AC counters
Options	Further voltages on request
Color of housing	Gray

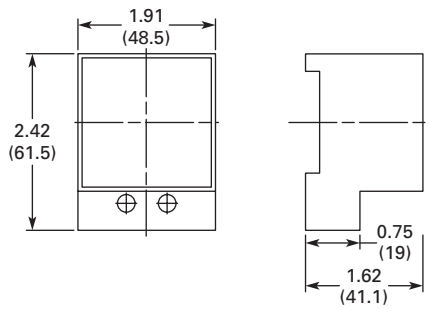
### Dimensions

Approximate Dimensions in Inches (mm)

#### 1/16 DIN Hour Meters



#### DIN Rail Adapter



**71.1 Round Hour Meters—Eaton®****Product Description**

Eaton's 6-T-3H hour meters are heavy-duty elapsed time meters with NEMA 4X protection.

**Typical Application**

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

**Features**

- Six-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

**Standards and Certifications**

- UL recognized

**Product Selection**

6-T-3H-508RPM-40

**71.1 Round Hour Meters**

Description	Catalog Number
115 Vac, 2.80 in (71.1 mm) round	<b>6-T-3H-508RPM-406</b>
115 Vac, 2.80 in (71.1 mm) round—48-piece package	<b>6-T-3H-508RPM-40684</b>
10–80 Vdc, 2.80 in (71.1 mm) round	<b>6-T-3H-508RPM-402</b>
10–80 Vdc, 2.80 in (71.1 mm) round—48-piece package	<b>6-T-3H-508RPM-40284</b>

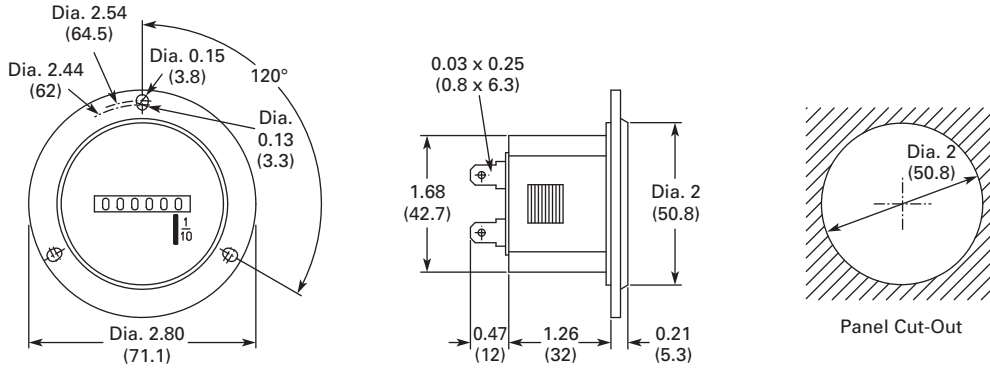
**Technical Data and Specifications****General Specifications**

Description	Specification
Electrical connection	Flat pins 0.8 x 6.3
Power consumption	
AC	Max. 0.4 VA
12 Vdc	Max. 0.08W
48 Vdc	Max. 0.7W
Rated voltages	115 Vac $\pm$ 10%, 50/60 Hz, 10–80 Vdc
On time	100%
Display	Six-digits, 99999.9h
Count mode	Adding
Figure size	0.14 in (3.5 mm) high
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

**Dimensions**

Approximate Dimensions in Inches (mm)

**71.1 Round Hour Meter**



**Hour Meter/Counter****Product Description**

Eaton's CEC series combination meters provide an event counter and elapsed time meter in one compact unit.

**Typical Application**

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

**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

**Standards and Certifications**

- cRU<sup>us</sup> certified
- CE marked

**Product Selection**

CEC-...-406

**Hour Meter/Counters**

Description	Catalog Number
Combination hour meter/counter, 55 mm square front panel mount, 100–130 Vac, 60 Hz	<b>CEC-55PM-406</b>
Combination hour meter/counter, 48 mm DIN rail mount, 100–130 Vac, 60 Hz	<b>CEC-48DR-406</b>

**Technical Data and Specifications****General Specifications**

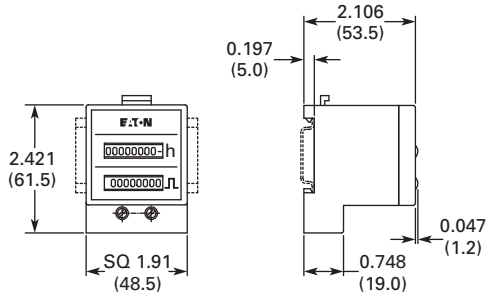
Description	Specification
Electrical connection	Flat pin 0.8 x 6.3 mm with screw terminal, tightening torque max. 0.8 Nm
Power consumption 100–130 Vac	60 Hz, approx. 1.43 VA
Count mode	Adding
Figure size	0.16 x 0.07 in (4 x 1.7 mm)
Color of figures Hour	White on black
Decimal	Red on black
Running time meter operating indicator	Fast rotating wheel with red dashes; 99999.99 hour
Accuracy AC	Supply frequency $\pm 30$ ms
Reset	None
Ambient temperature	5° to 122°F (–15° to 50°C)
Mounting position	Any
Color of housing	Black



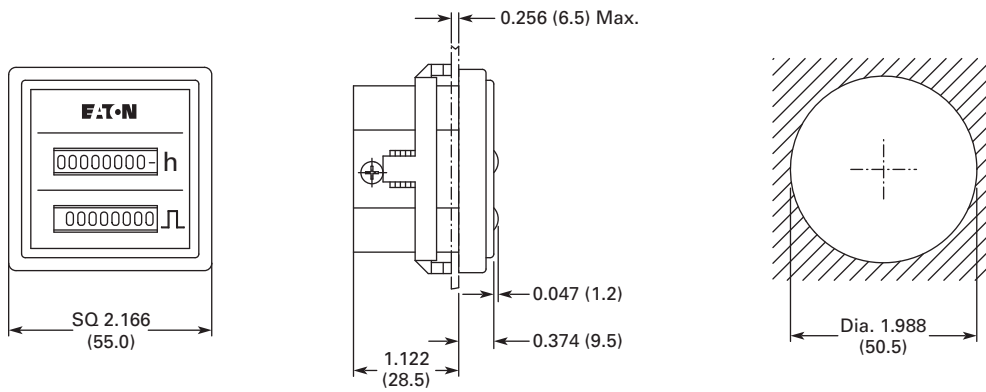
## Dimensions

Approximate Dimensions in Inches (mm)

### DIN Rail Mount



### Front Panel Mount



# 1.6

## Counters, Panel Meters, Tachometers and Timers

### Flow Totalizers, Transmitters and Controls

1

#### Flow Totalizers, Transmitters and Controls



#### Contents

##### Description

Flow Totalizers, Transmitters and Controls

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#### Product Overview

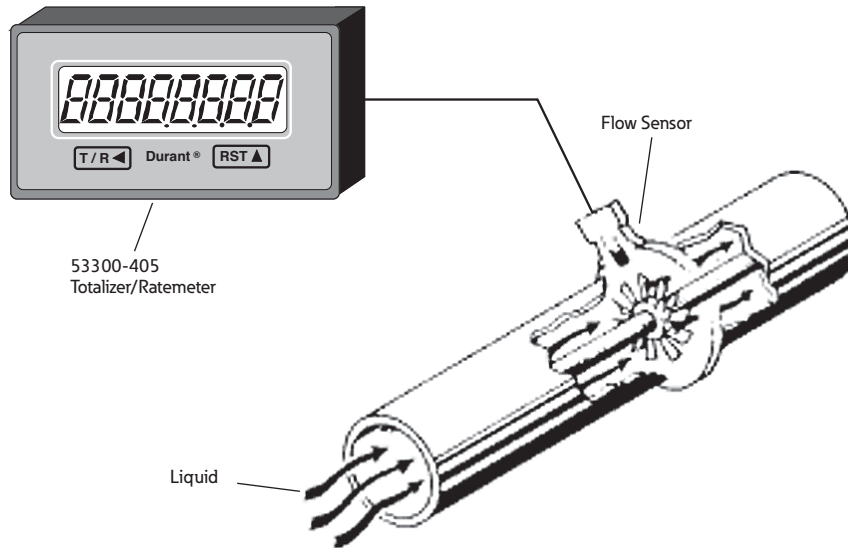
Flow products are used in a variety of applications where liquid gas flow needs to be monitored or controlled. Eaton offers models for flow total, flow rate and flow batch control. Several optional outputs allow great flexibility to meet most application needs.

#### Typical Application

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.).

#### Application Example



## Product Selection Guide

## Totalizers

	Characteristics	Typical Applications	Panel Cutout in Inches (mm)	Page
<b>Courier</b> 	Replaceable lithium battery Eight-digit, high-visibility LCD display Optional backlighting Various input options available	Portable/mobile/remote flow monitoring (e.g. sewer pumping, pesticide application)	1.299 x 2.677 (33 x 68)	<b>46</b>
<b>Eclipse</b> 	Six-digit, super bright LED display Multiple models available: totalizers, ratemeters, count controls, digital panel meters and flow controls	Length measurement and control Flow monitoring and control Process monitoring and display Voltage and current monitoring and display	1.772 x 3.780 (45 x 96)	<b>116</b>

# 1.6

## Counters, Panel Meters, Tachometers and Timers

### Flow Totalizers, Transmitters and Controls

1

#### Eclipse Series—Durant®

##### Product Description

Eaton's Eclipse series flow totalizer and controller can accept signals from analog flow meters and display flow rates and volumes on a high-visibility LED.

##### Features

- Six- or 10-digit display
- 1/8 DIN size
- Red, LED display
- 0.56 in (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

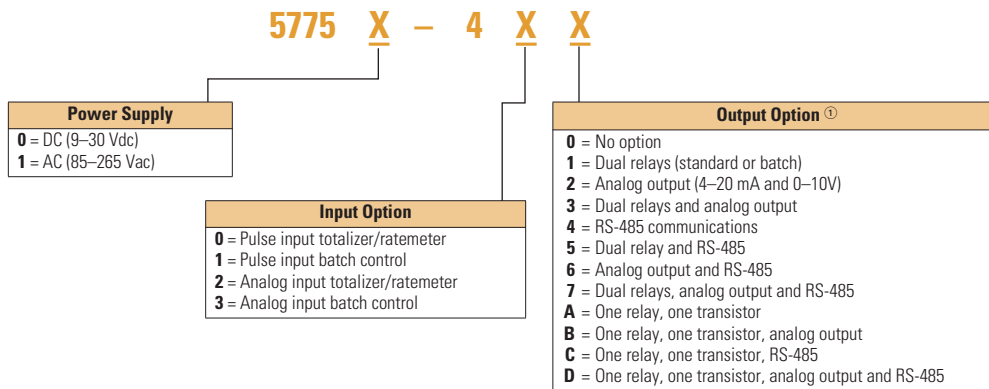


#### Eclipse Series Flow Totalizer and Control



#### Catalog Number Selection

##### Eclipse Flow Model



##### Note

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

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Input Power</b>	
AC powered models (57751-4XX)	
Input power	85–265 Vac, 47–63 Hz, 20 VA
External fuse	0.2A, 250 Vac, time delay (T200mA, 250V)
Isolation dielectric strength	2300 Vac
DC powered models (57750-4XX)	
Input power	9–30 Vdc, 12 VA
External fuse	2.0A, 50 Vdc, time delay (T2A, 50V)
Reverse voltage protection	Yes
Isolation dielectric strength	2300 Vac to signal inputs and relays, 500 Vac to RS-485 and analog outputs
<b>Human Interface</b>	
Display	Six digits
Type	0.56 in high, seven segment, red LED
<b>Data Retention</b>	
Memory type	EEPROM, no batteries required
Duration	100 years
<b>Count Signal Input/Count Inhibit Signal Input</b>	
Sensor type	Sink or source, DIP switch selectable
Input impedance	4.75k ohms to +5 Vdc or 34.9k ohms to ground
Thresholds	
High	3.5 to 28 Vdc
Low	0 to 1.9 Vdc, for single ended signals
Magnetic pickup range	50 mV p-p to 65V rms into 34.9k ohms
Slow response	50 Hz max. (DIP switch 2 and/or 5 ON)
Flat response	10 kHz
<b>Flow Signal Input (Analog Input Models)</b>	
Types	4–20 mA and 0–10 Vdc
Input impedance	100 ohms (current input), 1.27M ohms (voltage input)
Overrange	50 mA max. (current input), 100V max. (voltage input)
Accuracy	±0.1% of reading, ±1 digit, and ±80 PPM/°C
<b>Control Inputs</b>	
Sensor type	Sink only
Input impedance	4.75k ohms to +5 Vdc
Thresholds	
High	3.5 to 28 Vdc
Low	0 to 1.0 Vdc
Response	25 ms maximum (5V signal)
<b>Accessory Power Output (Pulse Input Models)</b>	
Voltage	12 Vdc +10%/–13%
Current	75 mA max.
Protection	Short-circuit protected
<b>Accessory Power Output (Analog Input Models)</b>	
Voltage	24 Vdc ±10%
Current	90 mA max.
Protection	Short-circuit protected

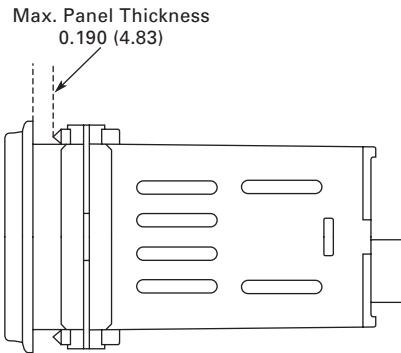
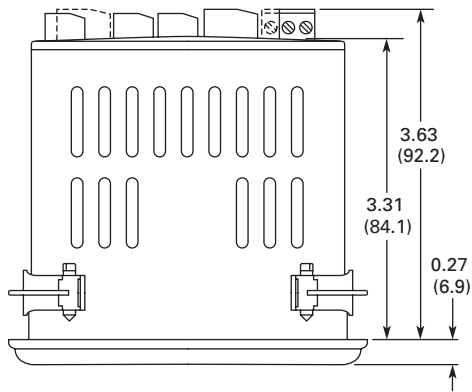
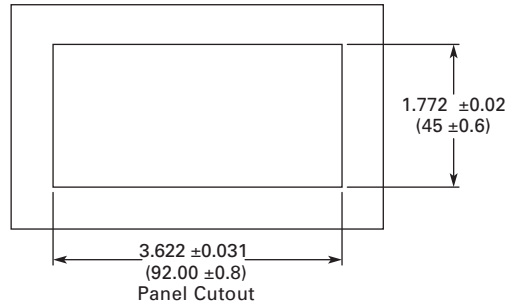
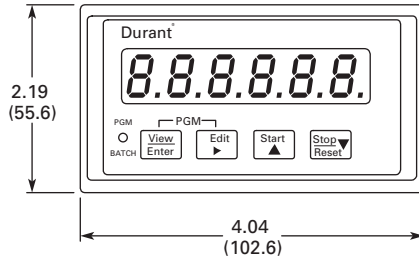
## General Specifications, continued

Description	Specification
<b>Relay/Transistor Outputs (Standard on Batch Controls, Optional on Totalizers)</b>	
Number	Two relays or one relay and one transistor
Relay contact type	One set Form C per relay
Relay contact rating	5A, 250 Vac or 30 Vdc
Transistor type	NPN, opto isolated
OFF state block	30 Vdc max., 0.1 mA max. leakage current
ON state conduct	50 mA max., 1.2 Vdc max. C-E drop
Max. switching frequency	4 kHz (50-50 duty cycle)
Isolation dielectric strength	2300 Vac
<b>Optional Outputs</b>	
Analog retransmission	
Output signals	4–20 mA (<750 ohms) and 0–10V (>2500 ohms)
Accuracy	0.13% full scale and 100 PPM/°C (and 0.07% full scale change over 4–20 mA load ranges)
Isolation dielectric strength	2300 Vac to signal inputs, relays and AC power inputs; 500 Vac 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 <sup>®</sup> compatible
Isolation dielectric strength	2300 Vac to signal inputs, relays and AC power inputs; 500 Vac to analog outputs and DC power inputs
<b>Environmental</b>	
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
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

### Dimensions

Approximate Dimensions in Inches (mm)

#### Eclipse Flow Models



## Fusion Integrated Machine Control



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## Fusion Integrated Machine Control

## Product Description

The Fusion® Integrated Machine Control has advanced features, including a five-preset high speed counter with pre-warn, a totalizer with preset, a batch counter with preset and a ratemeter 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 five presets and pre-warn, 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, and (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



## Features and Benefits

Feature	Customer Benefit
High speed count functions; including scaling, main counter, five presets, pre-warn, 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 and 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 and 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 in (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: 85–265 Vac 50/60 Hz or 10–30 Vdc models	Greatly reduces models required for different control voltages.
Output power: 12 Vdc at 75 mA, 24 Vdc at 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.

## Standards and Certifications

- UL and cUL listed
- CE marked



## Product Selection

57550400



### Fusion Integrated Machine Control

Description	Catalog Number
Fusion integrated machine control—10–30 Vdc power	57550400
Fusion integrated machine control—85–265 Vac power	57551400
Fusion configuration software	57590400

## Technical Data and Specifications

### General Specifications

Description	Specification
<b>Environmental</b>	
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 sinewave
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
<b>Input Power</b>	
AC model	85–265 Vac, 47–63 Hz, 20 VA; isolation 2300 Vac
DC model	10–30 Vdc, 15 VA
<b>Inputs</b>	
Control	
Number	10
Impedance	4.75k ohms to +5 Vdc
Thresholds	
High	3.5–30 Vdc
Low	0–1.0 Vdc
Counter	
Number	Three (including reset)
Impedance	4.75k ohms to +5 Vdc or 26.9k ohms to ground
Thresholds	
High	3.5–30V
Low	0–1.5V, or 200 mV p-p to 50V rms at 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 0–10 Vdc
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)

**General Specifications, continued**

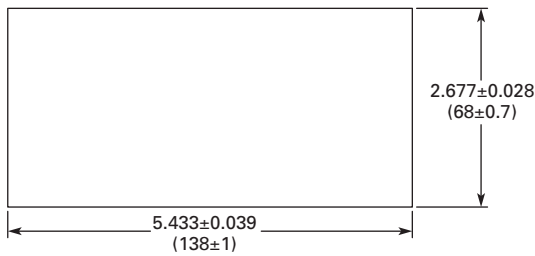
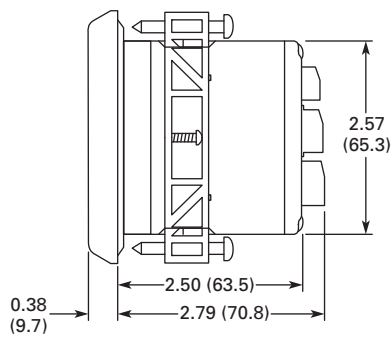
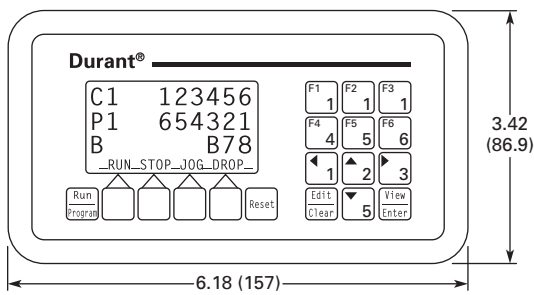
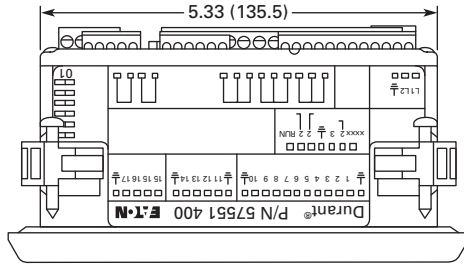
Description	Specification
<b>Outputs</b>	
Power (AC input model only)	24 Vdc $\pm$ 15%, 100 mA max., short-circuit protected
	12 Vdc $\pm$ 10%, 75 mA max., short-circuit protected
Relays	
Number	3 (Form C), 2 (Form A)
Contacts	5A, 250 Vac, 30 Vdc
Isolation	2300 Vac
Transistors	
Number	2
Type	NPN Darlington
Ratings	150 mA max. ON current, 30 Vdc max. OFF voltage
Analog	
Number	2, short-circuit protected
Type	4–20 mA (<450 ohms), 0–10V (>2500 ohms)
Accuracy	$\pm$ 0.5% FS and $\pm$ 200 PPM/ $^{\circ}$ C
Common mode voltage rating	250 Vac
Isolation	2300 Vac
RS-232	
Connector	DB-9S
Polarity	DCE
Baud rate	1200–19200
RS-485	
Connector	Six-wire RJ-12 phonejack
Baud rate	1200–19200
<b>Data Retention</b>	
Program data	
Type	Non-volatile
Duration	100 years, no batteries
Real time clock	
Type	Capacitor
Charge time	Three minutes
Retention	1–5 days
<b>Human Interface</b>	
Display	
Type	128 x 64 pixel graphic LCD with LED backlight
Figure size	
	0.12 in (3 mm) high, 21 characters per line, 6 lines maximum
	0.24 in (6 mm) high, 10 characters per line, 3 lines maximum
	0.35 in (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

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Fusion Integrated Machine Control ①



#### Note

① Recommended panel cutout is 0.375 in (9.5 mm) max. panel thickness.

## TC Series



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**TC Series****Product Description**

Temperature controllers for a wide range of applications including heat treating, baking, packaging, furnace control, and chillers.

**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 five 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



#### 1

#### Product Selection

TC24411100



TC484120001



TC964110100



#### TC Series

Description	Normally Stocked Item	Catalog Number
Temperature control, 24 x 48 mm, two relay out, 90–250 Vac	Yes	TC24411100
Temperature control, 24 x 48 mm, SSR driver/relay out, 90–250 Vac		TC24412100
Temperature control, 48 x 48 mm, one relay out, relay alarm, 90–250 Vac	Yes	TC484110101
Temperature control, 48 x 48 mm, SSR driver out, 90–250 Vac	Yes	TC484120001
Temperature control, 48 x 48 mm, SSR driver out, relay alarm, 90–250 Vac	Yes	TC484120101
Temperature control, 48 x 48 mm, analog out, relay alarm, 90–250 Vac	Yes	TC484130101
Temperature control, 96 x 48 mm, one relay out, relay alarm, 90–250 Vac	Yes	TC964110100
Temperature control, 24 x 48 mm, two relay out, 11–26 Vac/Vdc	—	TC24511100
Temperature control, 48 x 48 mm, one relay out, relay alarm, 11–26 Vac/Vdc	—	TC485110101
Process control, 24 x 48 mm, analog/relay out, 90–250 Vac	—	PC24463100
Temperature control, 48 x 48 mm, analog out, relay alarm, 90–250 Vac	—	TC24413100

## Technical Data and Specifications

### General Specifications

Description	Specification
<b>Power</b>	
Power	90–250 Vac, 47–63 Hz, 10 VA (TC24), 12 VA (TC48/TC96), 5W maximum (TCxx4) 11–26 Vac/Vdc, 10 VA (TC24), 12 VA (TC48/TC96), 5W maximum (TCxx5)
<b>Input</b>	
Resolution	18 bits
Sampling rate	5 times/second
Temperature effect	±1.5 $\mu\text{V}/^\circ\text{C}$ for all inputs except mV input ±3.0 $\mu\text{V}/^\circ\text{C}$ for mV input
Sensor lead resistance effect	
T/C	0.2 $\mu\text{V}/\text{ohm}$
Three-wire RTD	2.6 $^\circ\text{C}/\text{ohm}$ of resistance difference of 2 leads
Two-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
<b>Output</b>	
Relay rating	2A/240 Vac; 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	1000 Vac
Temperature effect	±0.01% of SPAN/ $^\circ\text{C}$
<b>Alarm</b>	
Alarm relay	Form C rating; 2A/240 Vac; 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
<b>Environmental and Physical</b>	
Operating temperature	14 $^\circ$ to 122 $^\circ\text{F}$ (–10 $^\circ$ to 50 $^\circ\text{C}$ )
Storage temperature	–40 $^\circ$ to 140 $^\circ\text{F}$ (–40 $^\circ$ to 60 $^\circ\text{C}$ )
Humidity	0–90% RH (non-condensing)
Altitude	2000m max.
Pollution	Degree 2
Insulation resistance	20M ohms min. (at 500 Vdc)
Dielectric strength	2000 Vac, 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 in (48 mm) (W) x 3.77 in (96 mm) (H) x 3.15 in (80 mm) (D) TC48 = 1.88 in (48 mm) (W) x 1.88 in (48 mm) (H) x 4.56 in (116 mm) (D) TC24 = 1.96 in (50 mm) (W) x 1.04 in (26.5 mm) (H) x 4.35 (110.5 mm) (D)

## Special Control Functions

## Input Characteristics

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



## Accessories and Encoders



## Contents

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## Accessories and Encoders

**Product Overview**

Eaton offers a variety of accessories to complement our counting and control product offering.

**Features**

- Easy integration with Eaton counters

#### 1

### DIN Rail Adapter

#### Product Description

Allows mounting of 1/32 DIN front panel mounted products to DIN rail inside panel.

#### Features

- For panel-mounting all DIN size counters, timers and process indicators 0.94 x 1.89 in (24 x 48 mm) or 1.97 x 0.98 in (50 x 25 mm)
- Cut-out: 0.98 x 1.97 in (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

A2448DINADAPT

#### DIN Rail Adapter

##### Description

DIN rail adapter for 1/32 DIN panel mount devices

##### Catalog Number

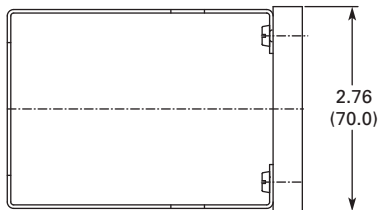
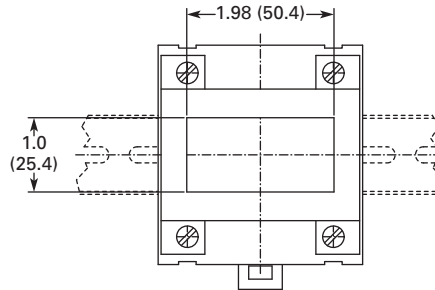
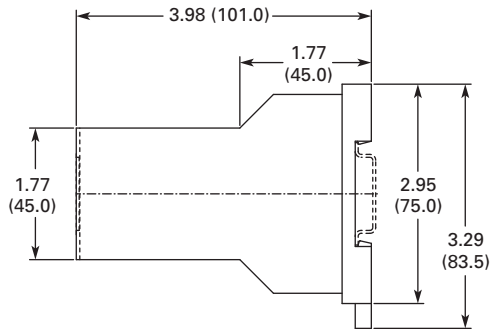
A2448DINADAPT



#### Dimensions

Approximate Dimensions in Inches (mm)

#### DIN Rail Adapter



**C-Face Ring Tachometer****Product Description**

Provides sensing of motor speed when used with ratemeter/tachometer.

**Features**

- 5–16 Vdc 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

**Product Selection**

47007\_

**C-Face Sensor**

Description	Catalog Number
Motor size 56C	47007056
Motor size 143TC, 145TC, 182C, 184C	47007184
Motor size 184TC, 213C, 215C, 254C	47007215

#### 1

### Magnetic Pickup Sensor and Gear

#### Product Description

Sensor ideal for use with a variety of Eaton counters to show motor/shaft speed or measurement.

#### Features

##### Magnetic Pickup

- 0.25 in (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 ft (3m) cable attached
- L-mounting bracket included

##### 30-Tooth Gear Accessory

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

#### Product Selection

47004400 and 28433400



#### Magnetic Pickup Sensor and Gear

Description	Catalog Number
Magnetic pickup	47004400
30-tooth gear for magnetic pickup	28433400

### Rotary Contactor—ES9513/ES9513RS

#### Product Description

Simple reed switch circuit to provide a contact closure for counting.

#### Features

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

#### Product Selection

3910040



#### Rotary Contactor

Description	Catalog Number
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

### Product Description

Measuring wheel mounts to Eaton encoders and rotary contactors to allow for accurate measurement.

### Features

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

### Product Selection

#### Measuring Wheel



#### 1 Ft Circumference Measuring Wheels

Description	Catalog Number
5/16 in bore, urethane rim	20144300
3/8 in bore, urethane rim	20144303
5/16 in bore, rubber rim	20154300
3/8 in bore, rubber rim	20154301
5/16 in bore, knurled rim	20156300
3/8 in bore, knurled rim	20156301

## Mounting Bracket

### Product Description

Mounting bracket for Eaton D-Series counters and rotary contactors.

### Product Selection

#### Mounting Bracket



#### Mounting Bracket

Description	Catalog Number
Mounting bracket	40460-400

## 1

**Cube Style Shaft Encoders****Product Description**

Provides accurate pulse outputs for use with PLCs and counters.

**Features**

- 5–28 Vdc 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 in (9.5 mm) double ended shaft
- ABEC three double sealed ball bearings
- Tapped holes for face or base mounting
- Military style connector

**Product Selection****Cube Shaft Encoder****Cube Shaft Encoders**

Description	Catalog Number
<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

**Accessory****Mounting Bracket****Mounting Bracket** ⓘ

Description	Catalog Number
Mounting bracket	40460-402

**Note**

ⓘ 40460-400 is shown, 40460-402 has additional mounting plate for encoders.

**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Electrical</b>	
Input (38150)	
Voltage	9 to 16 Vdc
Current	60 mA max. at 16 Vdc
Ripple	2%
Input (38151)	
Voltage	5 to 28 Vdc
Current	60 mA nom., 100 mA max.
Ripple	≤2%
Output	
Type	Current sinking transistor with 1.5k ohms pull-up
Sinking current	100 mA max.
Max. voltage at 100 mA	1.3 Vdc
Blocking voltage	40 Vdc 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°
<b>Environmental</b>	
Operating temperature	32° to 167°F (0° to 75°C)
Vibration	3 Gs at 5 to 1000 cps
Shock	20 Gs, 10 ms
<b>Mechanical</b>	
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 in-sec <sup>2</sup>
Radial loading	40 pounds operating
Axial loading	30 pounds operating
Shaft	3/8 in (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 ft (3m) shielded cable and termination for electronic controls

# 1.9

## Counters, Panel Meters, Tachometers and Timers

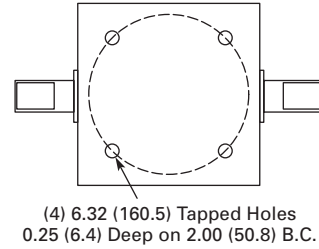
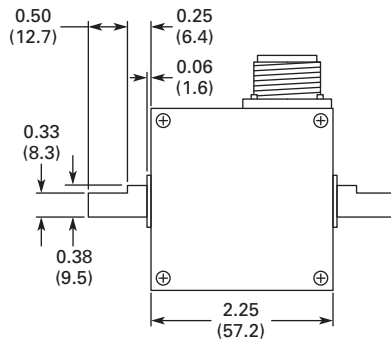
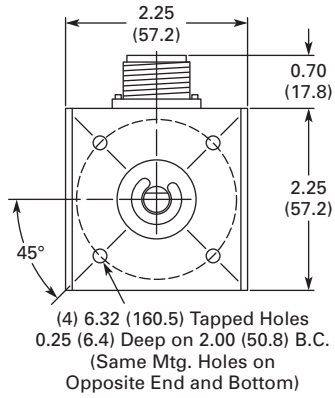
### Accessories and Encoders

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Cube Shaft Encoders





## Heavy-Duty Shaft Encoders

### Product Description

Provides accurate pulse outputs for use with PLCs and counters.

### Features

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

### Product Selection

#### Heavy-Duty Shaft Encoder



#### Heavy-Duty Encoder

Description	Catalog Number
<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

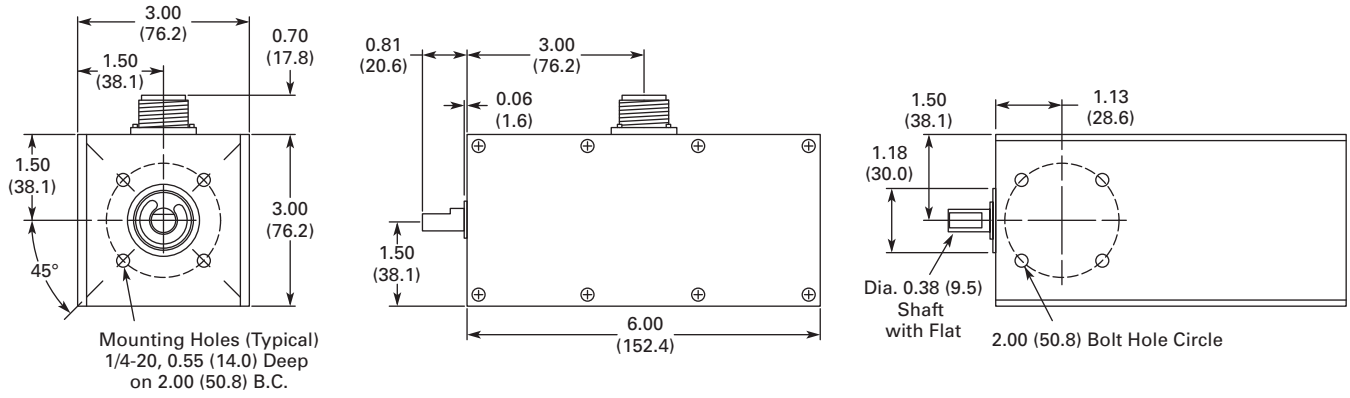
**Technical Data and Specifications****General Specifications**

Description	Specification
<b>Electrical</b>	
Input	
Voltage	5 to 28 Vdc
Current	60 mA nom., 100 mA max.
Ripple	-2%
Output	
Type	Current sinking transistor with 1.5k ohms pull-up
Sinking current	100 mA max.
Max. voltage at 100 mA	1.3 Vdc
Blocking voltage	40 Vdc max.
Polarity	Positive
Wave shape	Square wave (50-50 duty)
Pulse rate	0 to 20,000 pulse per second
Rise time	<1 $\mu$ S
Pulses per rev.	1 to 1270
Accuracy	Within $\pm 0.1^\circ$ or 6 arc minutes
<b>Environmental</b>	
Operating temperature	32° to 167°F (0° to 75°C)
Vibration	3 Gs at 58 to 500 cps
Shock	50 Gs, 11 ms duration
<b>Mechanical</b>	
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 in (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 ft (3m) shielded cable and termination for electronic controls (Part No. 29665-300) Connector, clamp and bushing only (Part No. 29729-300)

### Dimensions

Approximate Dimensions in Inches (mm)

#### Heavy-Duty Encoder



## 1

**Right Angle, Size 20 Shaft Encoders****Product Description**

Provides accurate pulse outputs for use with PLCs and counters.

**Features**

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

**Product Selection**

38159\_

**Right-Angle Shaft Encoder, Size 20**

Description	Catalog Number
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

**Encoder Cables**

Description	Catalog Number
10 ft encoder cable	29665300
15 ft encoder cable	29665315
20 ft encoder cable	29665320
25 ft encoder cable	29665325
30 ft encoder cable	29665330
35 ft encoder cable	29665335
40 ft encoder cable	29665340
50 ft encoder cable	29665350
75 ft encoder cable	29665375
100 ft encoder cable	29665400

## Technical Data and Specifications

### General Specifications

Description	Specification
<b>Electrical</b>	
Input	
Voltage	5 to 28 Vdc (4.75 min., 28.0 max.)
Current	100 mA max. with no output load
Ripple	–2% peak to peak at 5 Vdc
Output	
Type	Quadrature current sinking transistors with 2.2k ohms pull-up
Sinking current	100 mA max.
Max. voltage at 100 mA	1.3 Vdc
Blocking voltage	40 Vdc 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 $\pm 18$
Quadrature phasing	90 electrical degrees $\pm 36$
Minimum edge separation	54 electrical degrees
Rise time	<1 $\mu$ S
Pulses per rev.	1 to 1270
Accuracy	Within $\pm 0.1^\circ$
<b>Environmental</b>	
Operating temperature	32° to 158°F (0° to 70°C)
Vibration	20 Gs at 50 to 500 cps
Shock	75 Gs, 11 ms
<b>Mechanical</b>	
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 in-sec <sup>2</sup>
Radial and axial loading	(80 lbs max.) 20–40 lbs for bearing life of 1.5 x 10 <sup>9</sup> revolutions
Maximum acceleration	1 x 10 <sup>5</sup> radians/second <sup>2</sup>
Shaft	0.375 in (9.5 mm) dia.
Housing	Black non-corrosive finish. Sealed against dust, oil, vapor and moisture.
Mounting	Flange mount
Weight	11 oz (312g)
Connector	MS-3102E-14S-6P
Mating connector	MS-3106A-14S-6S with 10 ft (3m) shielded cable and termination for electronic controls (Part No. 29665-300) Connector, clamp and bushing only (Part No. 29729-300)

#### 1

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Right-Angle Shaft Encoder

