Simpson

Panel Instruments

GIMA

Customers have counted on Simpson Electric Company to provide quality panel meters for over 70 years. From the analog meter used in Charles Lindbergh's historic solo trans-Atlantic flight in 1927 to the digital controllers used to raise and lower stages at the 2004 MTV Video Music Awards (VMAs) show or the MiniMax meters which monitor the lighting at CNN, Simpson continues to provide solutions for a wide variety of electrical, electronic and environmental testing and measuring applications.

Quality makes Simpson the logical choice for panel instruments. Our warranty is an ongoing quality assurance program against defects in materials and workmanship. Our goal is 100 percent customer satisfaction.

Modularity gives Simpson customers access to full-featured performance, while only paying for functions needed. Custom dials and ranges are available on analog products by special order for specific requirements. Orders are easily accommodated by contacting local Simpson Authorized Modification Centers or Simpson Distributors. For the names of Modification Centers or Distributors, call 715-588-3947 or visit our website at www.simpsonelectric.com.

Simpson Electric Company is owned by the Lac du Flambeau Band of Lake Superior Chippewa Indians and is a Certified Minority (Native American) Business Enterprise by the Wisconsin Supplier Development Council. The Chippewa Band dedicates itself to expanding Simpson's success in the Panel Meter Industry and to furthering economic growth in the Native American community.

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MADE IN THE USA

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Which Panel Meter is Best - Analog or Digital?

Panel meter users in today's marketplace should become familiar with the unique advantages common to digital and analog meter design when making their selections. Many already recognize the inherent superiority of the digital meter under certain applications and the value of the analog meter in others. While the enormous popularity and decreasing costs of digital panel meters have made them the choice of many consumers, there are other factors to consider when choosing a panel meter.

When precise measurements and resolution are the foremost consideration, a Simpson Digital Panel Meter would be the better choice. Digital panel meters offer accuracies ranging from 1% to 0.02%, while the analog counterpart is typically rated at 2%. Digital displays are easily read from 20 feet, under poor lighting and with no parallax problems. (Parallax is an optical illusion caused by viewing an object from an angle rather than directly. Since there is a space between the pointer and the face of the meter scale, an analog pointer will seem to be at different positions on its scale, depending on the angle from which it is read.) Digital panel meters, such as the Simpson Hawk 3, offer scaling (the capability of the meter to associate, in engineering units, any desired value to the electrical input range). This provides flexibility and versatility for a variety of applications. An additional option is the RS485 serial interface -- suitable for connection between a digital controller, personal computer, host computer or printer -- and unique to digital panel meters. 12DCV and 24DCV excitation outputs are available to power ancillary devices such as strain gauge bridges and transmitters -- eliminating the need for an external power supply. Analog and relay outputs are also useful options in many monitoring and control applications.

Digital Panel Meter

Analog Panel Meter

Analog panel meters are preferable to digital where readings tend to fluctuate or oscillate and where extended monitoring is required to indicate trends or rates of change. Digital sampling times may cause reading errors and the highs and lows of the swing cannot be identified. Analog panel meters also provide rugged durability and dependability to withstand changing outdoor environments. They are generally easier to read in bright sunlight or well-lit rooms. And, unlike the digital meter, the analog meter requires no external power source. Simpson Analog Panel Meters come in a variety of designs made possible through customized dials, mounting options (window, surface and bezel) and a large selection of case styles and sizes.

Simpson panel meter accessories include stock thermocouples, current transformers, external portable and switchboard shunts and external multipliers, transducers, and transmitters.

Write us at Simpson Electric Company,
853 Dundee Avenue, Elgin IL, 60120
Call us at 847.697.2260 or find us on the web @ www.simpsonelectric.com

Mini M135 & M145 Digital Panel Meters

- ***3/64 DIN Indicator***
- ***Minimum depth - requires less than 0.7" (17mm) behind the panel***
- ***Snaps right into panel - no mounting hardware required***

Specifications

DISPLAY	
Type	7-segment LCD
Height	0.5" (12.7mm)
Decimal point	3 or 4 position user-programmable
Overrange indication	Most significant = "1" other digits blank
Backlighting	Optional negative image, red backlighting at 5, 10, 12, 24 or 48 DCV
Polarity	Auto with "-" indication, "+" indication implied
POWER REQUIREMENTS	
DC Power	±5V, +5V and +9V Low Power Indication included with 9V units
Power supply current	2mA max
Backlight supply current	50mA typical. For 24 and 48DCV, 10mA typical
ACCURACY @ 25°C	3 1/2 digit: ±(0.1% of reading + 1 count) 4 1/2 digit: ±(0.04% of reading + 1 count)
ENVIRONMENTAL	
Operating Temperature	0 to 55°C
Storage Temperature	-10 to 60°C
Relative Humidity	0 to 85% non-condensing @ 40°C
Warmup time	Less than 20 minutes
Temperature Coefficient	(All inputs) ± (0.02% of input ± 0.2 digit)/°C
NOISE REJECTION	
NMRR	60dB, 50/60Hz
CMRR	(with 1KΩ unbalanced @ 60 Hz) 90dB min
A TO D CONVERSION	
Technique	Integrating
Rate	3 samples/second-typical
MECHANICAL	
Bezel	0.94" x 2.83"
Depth	0.43"
Panel cutout	0.89" x 2.71" (22.6mm x 68.8mm)
Weight	1.0oz (28.3g)
Case Material	94-VO, UL-rated ABS

Input Specifications

DC Voltage

Range	Resolution	Input Impedance	Max Input (Unfused)
200mV	100µV	>100mΩ	50V
2V	1mV	10mΩ	250V
20V	10mV	10mΩ	250V
200V	100mV	10mΩ	250V

DC Current

Range	Resolution	Voltage Drop	Max Input (Unfused)
200µA	100µA	200mV	10mA
2mA	1µA	200mV	40mA
20mA	10µA	200mV	100mA
200mA	100µA	200mV	400mA

Mounting Requirements

The Mini indicators require a panel cutout of 2.71" (68.8mm) wide by 0.89" (22.6mm) high, and a panel area of 0.94" (24mm) high by 2.83" (72mm) wide. The depth behind the panel, including terminals, is 0.7" (17.8mm). The front bezel protrudes 0.16" (4mm) from the front of the mounting surface. The unit will snap-mount into panels from 0.050" to 0.125" thick. A 12-pin connector with 6" wire leads is included with each unit for quick installation.

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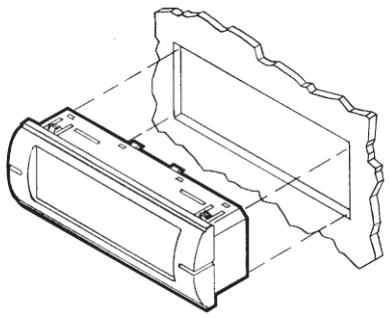
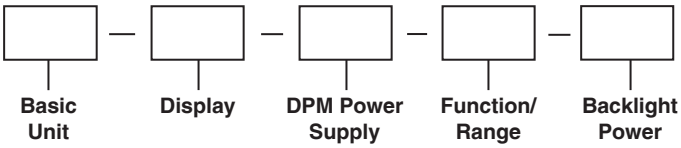


Ordering Information

Mini Indicators can be configured by making an entry in each section. Example: M135-0-2-11-0



Basic Unit

Selection	Description
M135	3-1/2 Digit LCD
M145	4-1/2 Digit LCD

Display

Selection	Description
0	Non Backlit
1	Negative Red Backlight

DPM Power Supply

Selection	Description
0	+ 5 DCV
1	± 5 DCV
2	+ 9 DCV

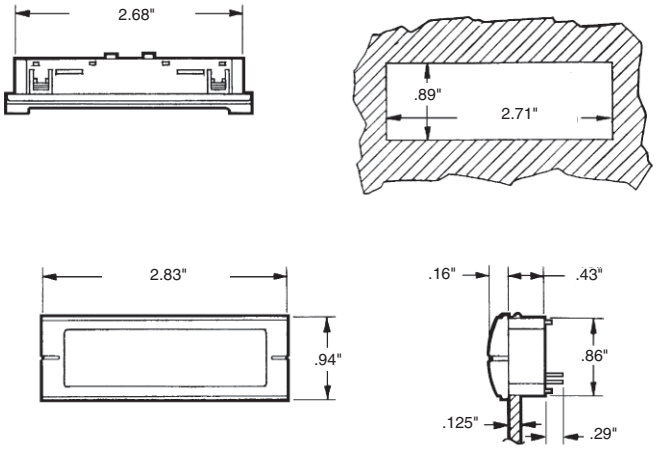
Function/Range

Selection	Description
11	200 DCmV
12	2 DCV
13	20 DCV
14	200 DCV
21	200 DCμA
22	2 DCmA
23	20 DCmA
24	200 DCmA

Backlight Power

Selection	Description
0	None
1	5 DCV
2	10 DCV
3	12 DCV
4	24 DCV
5	48 DCV

Installation and Panel Cutout



Mini-Max M235 & M245 Digital Panel Meters

- *3/64 DIN Indicator*
- *Unique mounting bracket allows stacking of multiple units*
- *Screw terminal connectors for easy installation*
- *3-1/2 or 4-1/2 digit LCD display with optional negative red backlighting*

Specifications

DISPLAY	
Type	7-segment LCD
Height	0.5" (12.7mm)
Decimal point	3 or 4 position user-programmable
Overrange indication	Most significant digit ="1", other digits blank
Backlighting	Optional negative image, red backlighting
Polarity	Auto with "-" indication, "+" implied
POWER REQUIREMENTS	
AC Volt	85-250VAC @40-440Hz
DC Volt	9-32DCV
Power Consumption	
85-250VAC	2.5VA min/4VA max
9-32DCV	1.5VA min/3VA max
Rated Circuit to Ground Voltage	750VRMS
ACCURACY @ 25°C	
200 Hz	±0.2% of input ± 0.2Hz
2 KHz	±0.2% of input ±2 Hz
DC V & A M235	±0.1% of reading ± 1 count
DC V & A M245	±0.04% of reading ± 1 count
DC 2A M235 & M245	±0.25% of reading ± 1 count
DC 5A M235 & M245	±0.5% of reading ± 1 count
AC TRMS V & A M235	±0.5% of reading ± 5 counts
AC TRMS V & A M245	±0.5% of reading ± 50 counts
AC Amps M235	±1% of reading ± 5 counts
AC Amps M245	±1% of reading ± 50 counts
DC Process M235	±0.02% of reading ± 1 count
DC Process M245	±0.02% of reading ± 1 count
Excitation Max. Current	25mA
ENVIRONMENTAL	
Operating Temperature	0 to 55°C
Storage Temperature	-10 to 60°C
Relative Humidity	0 to 85% non condensing @ 40°C
Temperature Coefficient	0.02% of input ± 0.2 digits/°C
Warmup time	Less than 20 minutes
NOISE REJECTION	
NMRR	60dB, 50/60Hz
CMRR	(w/1KΩ unbalanced @ 60Hz) 90dB min
A TO D CONVERSION	
Technique	Integrating
Rate	3 samples/second typical
FREQUENCY	
Technique:	Frequency-to-voltage
INPUT LEVEL (Frequency)	500mV to 750VRMS at 1.0MΩ impedance OR 5V to 24V Square Wave (DC offset 2V max)
MECHANICAL	
Bezel:	0.94" x 2.83"
Depth:	2.36"
Panel cutout:	0.89" x 2.71" (22.6mm x 68.8mm)
Weight:	3.5oz (99g)
Case Material:	94-0,UL-rated, glass-filled thermoplastic

Inputs

AC TRMS Current

Range	Resolution	Voltage Drop	Max Input (Unfused)
200µA	100µA	200mV	10mA
2mA	1µA	200mV	40mA
20mA	10µA	200mV	100mA
200mA	100µA	200mV	400mA
2A	1mA	200mV	3A
5A	10mA	50mV	6A

AC TRMS Voltage

Range	Resolution	Input Impedance	Maximum Input
200mV	100µV	>100MV	100V
2V	1mV	10MV	750V
20V	10mV	10MV	750V
200V	100mV	10MV	750V
750V	1V	100MV	750V

DC Current

Range	Resolution	Voltage Drop	Max Input (Unfused)
200µA	100µA	200mV	10mA
2mA	1µA	200mV	40mA
20mA	10µA	200mV	100mA
200mA	100µA	200mV	400mA
2A	1mA	200mV	3A
5A	10mA	50mV	6A

DC Voltage

Range	Resolution	Input Impedance	Max Input
200mV	100µV	>100mΩ	100V
2V	1mV	10mΩ	750V
20V	10mV	10mΩ	750V
200V	100mV	10mΩ	750V
750V	1V	10mΩ	750V

DC Process

Range	Resolution	Voltage Drop	Max Input (Unfused)
4-20mA	0.1%	200mV	100mA

Range	Resolution	Input Impedance	Maximum Input
1-5 DCV	0.1%	10 MΩ	750 V
0-10 DCV	0.1%	10 MΩ	750 V
0-100 DCV	0.1%	10 MΩ	750 V

Mounting Requirements: see page A6

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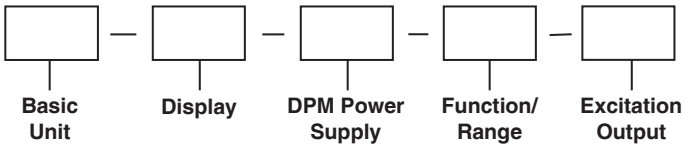
Ordering Information

Mini-Max Indicators can be configured by making an entry in each section. Example: M245-1-0-71-0.



Selection	Description
Basic Unit	
M235	3-1/2 Digit LCD
M245	4-1/2 Digit LCD
Display	
0	Non Backlit
1	Negative Red Backlight
DPM Power Supply	
0	85-250 ACV
2	9-32 DCV*
Function/Range	
11	200 DCmV
12	2 DCV
13	20 DCV
14	200 DCV
15	750 DCV
21	200 DCμA
22	2 DCmA
23	20 DCmA
24	200 DCmA
25	2 DCA
26	5 DCA

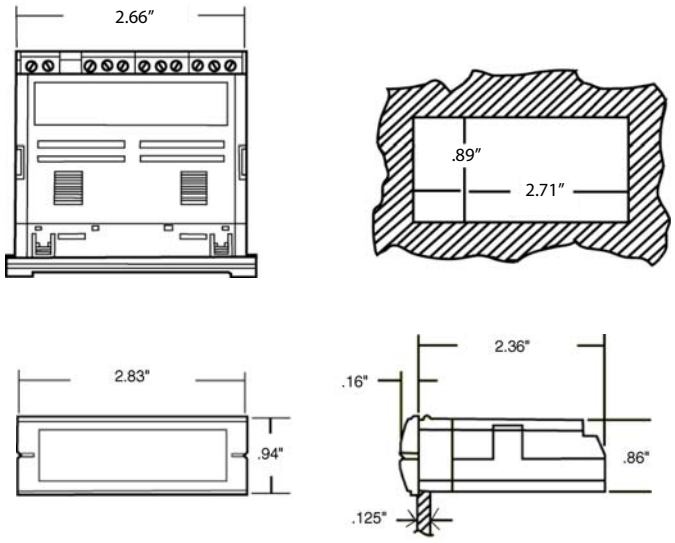
Selection	Description
Function/Range (continued)	
31	200 mVAC TRMS
32	2 VAC TRMS
33	20 VAC TRMS
34	200 VAC TRMS
35	750 VAC TRMS
41	200 ACμA TRMS
42	2 ACmA TRMS
43	20 ACmA TRMS
44	200 ACmA TRMS
45	2 ACA TRMS
46	5 ACA TRMS
71	4-20 DCmA (DC Process)
72	1-5 DCV (DC Process)
73	0-10 DCV (DC Process)
74	0-100 DCV (DC Process)
81 (M235)	20-199.9 Hz RMS
82 (M235)	20-1999 Hz RMS
83 (M235)	20-199.9 Hz Sq. Wave
84 (M235)	20-1999 Hz Sq. Wave
Excitation Output (N/A w/Frequency)	
0	None
1	12 DCV @ 25mA
2	24 DCV @ 25mA

* Not Available on Frequency (Hz) Meters

Mini-Max M240 Temperature Indicator

- ***3/64 DIN Temperature Indicator***
- ***Jumper-selectable input type and ºC/ºF indication***
- ***Screw terminal connectors for easy installation***
- ***Unique mounting bracket allows for stacking of multiple meters***

Dimensions - M235, M245 & M240



Specifications

DISPLAY
Type 7-segment red LED
Height 0.56" (14.2mm)

Display resolution 0.1° from -99.9° to 999.9°; 1.0° below -100° or above 1000°; 0.1mV for mV indication

Overrange indication (T/C or mV) The left-most digit shows 1: "1" (other digits are blank)

Open or faulty input connection "----"

Uncalibrated instrument Display will flash for 2 minutes upon application of power, alternating between "----" and the measured value

Polarity Automatic, with "-" indication; "+" indication implied

POWER REQUIREMENTS
AC Voltage 85-250VAC @50-60Hz
Power Consumption 2VA
INPUTS
Thermocouple J, K
Millivolt ±70mV (uncompensated for temperature)
Lead Resistance Effect -13µV/100Ω max.

RTD Platinum 100 Ohm (.00385 alpha)
Lead Resistance Effect 4-wire -.26°C/100V max.
2- and 3-wire 1°/.29Ω max.

Temperature Coefficient ±0.1°C / °C

Input Type	Temperature Range	Accuracy @25ºC
K T/C	-200 to 1370°C -328 to 2498°F	±(0.1% rdg +1°C) ±(0.1% rdg +1.8°F)
J T/C	-200 to 1200°C -328 to 2192°F	±(0.1% rdg +1°C) ±(0.1% rdg +1.8°F)
RTD Pt100 (4-wire)	-200 to 850°C -328 to 1562°F	±(0.2% rdg +1°C) ±(0.2% rdg +1.8°F)
mV	-70 to 70mV	±(0.1% rdg +0.1mV)

Input Impedance: 22MΩ

ENVIRONMENTAL
Operating Temperature 0 to 55°C
Storage Temperature -10 to 60°C

Relative Humidity 0 to 85% non-condensing
Warmup time Less than 20 minutes

A TO D CONVERSION
Technique Special dual slope
Rate 2 samples per second

NOISE REJECTION
NMRR 60dB, 50/60Hz
CMRR (w/1KΩ unbalanced @ 60Hz) 90dB min

MECHANICAL
Bezel 0.94" x 2.83"
Depth 2.36"
Panel cutout 0.89" x 2.71"
Weight 3.5oz (99.2g)
Case Material 94-0,UL-rated, glass-filled thermoplastic

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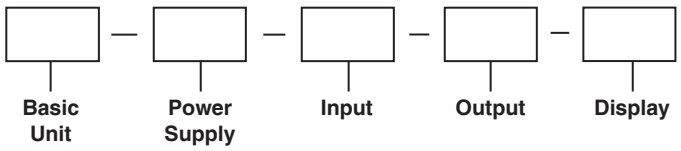
Mini-Max M240 Temperature Indicator

Ordering Information

Mini-Max Indicators can be configured by making an entry in each section. Example: M240-0-91-0-F.



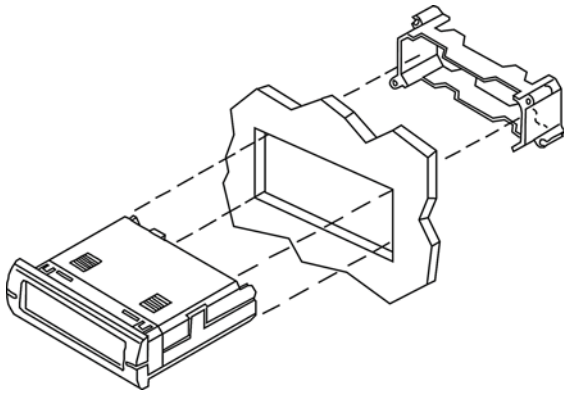
Selection	Description
	Basic Unit
M240	4 Digit LED
	Power Supply
0	85-250 VAC
	Input
91	J T/C
92	K T/C
93	RTD Pt100 Ohm
94	DC mV

Selection	Description
	Output
0	None
	Display
C	°C
F	°F
0	mV

Thermocouples can be found on page C2

Mounting Requirements

Insert the Mini-Max through the panel, and then slide the mounting bracket on to the Mini-Max. The mounting bracket allows Mini-Max units to be stacked side-to-side or top-to-bottom. Panel cutout instructions for stacking multiple units are provided under “stacking features” on our website.



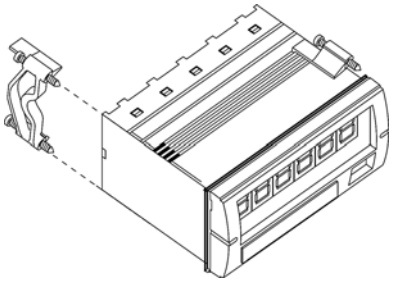
See Dimensions page A5

Falcon F35 & F45 Digital Panel Meters

- *1/8 DIN Indicator*
- *3-1/2 or 4-1/2 digit bright red LED display*
- *Front panel pops off for easy decimal point setting and display scaling*
- *Only 3.12" (79mm) required behind panel*
- *Optional excitation output*
- *NEMA 4X enclosure optional*
- *Din Rail Adapter available (page C1)*

Mounting Requirements

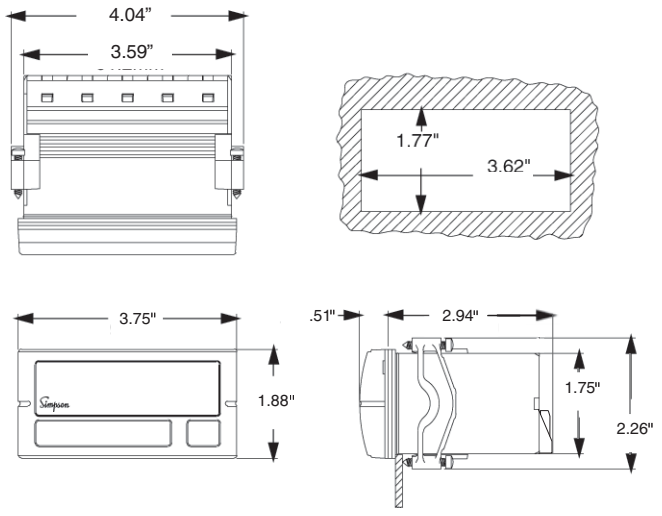
The Falcon series 1/8 DIN indicators require a panel cutout of 1.77" (45mm) high by 3.62" (92mm) wide. To install the Falcon into a panel cutout, remove the clips from the side of the meter. Slide the meter through your panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure a proper fit. Tighten screws.



Specifications

DISPLAY	
Type	7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	3 or 4 position user-programmable, internally or on the terminal block
Overrange indication	most significant digit = "1"; other digits blank
Polarity	Automatic, with "-" indication, "+" indication implied
POWER REQUIREMENTS	
AC Voltages	120 or 220VAC, ±10% 50/60Hz
DC Voltages	9-32DCV, ±1%
Power Consumption	F35: 3VA, F45: 2VA
ACCURACY @25°C	
F45 DC Process/Voltage	±0.02% of reading ± 1 count 750 ± 2 count
F35 DC Process/Voltage	±0.1% of reading ± 1 count 750 ± 2 count
F45 DC Current	±0.05% of reading ±1 count 2A ± 5 counts 5A ± 5 counts
F35 DC Current	±0.1% of reading ± 1 count 2A ± 5 counts (45Hz-1KHz)
F45 AC Voltage/Current	±0.5% of reading ± 35 counts (45Hz-1KHz)
F35 AC Voltage/Current	±1% of reading ± 5 counts (45Hz-1KHz)
ENVIRONMENTAL	
Operating Temperature	0 to 55°C
Storage Temperature	-10 to 60°C
Relative Humidity	0 to 85% non-condensing
Temperature Coefficient	(±0.1% of input ± 0.5 count)/°C
Warm-up Time	Less than 15 minutes
Response Time	Less than 3 seconds
NOISE REJECTION	
NMRR	50dB, 50/60Hz
CMRR	(w/1KΩ unbalanced @ 60Hz) 90dB min.
A TO D CONVERSION	
Technique	Dual slope integration
Rate	3 samples per second, nominal
MECHANICAL	
Bezel	3.75" x 1.88" x .51"
Depth	2.94"
Panel Cutout	3.62" X 1.77"
Case Material	94V-1, UL rated Noryl®
Weight	9.0oz (255.1g)

Dimensions



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Falcon F35 & F45 Digital Panel Meters

Specifications for F35 Frequency Meters

DISPLAY

Type	7-segment, red LED
Height	0.56" (14.2mm)
Overrange indication	Most significant digit = "1"; other digits blank

POWER REQUIREMENTS

AC Voltages	120 or 220VAC, ±10% 50/60Hz
Power Consumption	2.5VA min./4VA max.

ACCURACY @25°C

200 Hz:	±0.2% of input ±0.2 Hz
2 KHz:	±0.2% of input ± 2Hz
INPUT LEVEL	500mV to 750V RMS at 1.0MW impedance OR 5V to 24V Square Wave (DC offset 2V maximum)
Resolution:	200Hz = 0.1Hz 2kHz =1Hz

ENVIRONMENTAL

Operating Temperature	0 to 55°C
Storage Temperature	-10 to 60°C
Relative Humidity	0 to 85% non-condensing @ 40°C
Temperature Coefficient	(±0.05% of input ± 0.5 count)/°C
Warm-up Time	Less than 15 minutes
Response Time	Less than 3 seconds

CONVERSION

Technique	Frequency-to-voltage
Rate	3 samples per second, nominal

ACCURACY @ 25°C

F35 ACA	±1% of reading ± 5 counts (45Hz - 1 kHz)
F45 ACA	±0.5% of reading ± 35 counts (45Hz - 1kHz)
F35 ACV	±0.1% of reading ± 5 counts (45Hz - 1kHz)
F45 ACV	±0.5% of reading ± 35 counts (45Hz - 1kHz)
F35 DCA & DC Process	±0.1% of reading ± 1 count 2A ± 5 counts (45Hz - 1 kHz)
F45 DCA	±0.05% of reading ± 1 count 2A ± 5 counts 5A ± 5 counts
F35 DCV	±0.1% of reading ± 1 count 750 ± 2 counts
F45 DCV & DC Process	±0.02% of reading ± 1 count 750 ± 2 counts
F35 Frequency	**200 Hz:** ±0.2% of input ± 0.2Hz **2kHz:** ±0.2% of input ± 2Hz

Specifications for F45 Temperature Meters

DISPLAY

Type	7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	Jumper-selectable 2-position (corresponding to resolution desired)
Overrange indication	Most significant digit = "1"; other digits blank
Polarity	Automatic, with "-" indication, "+" indication implied

POWER REQUIREMENTS

AC Voltages	120 or 220 ACV, ±10% 50/60Hz
DC Voltages	9-32 DCV, ±1%
Power Consumption	3VA

ENVIRONMENTAL

Operating Temperature	0 to 55°C
Storage Temperature	-10 to 60°C
Relative Humidity	0 to 85% non-condensing
Warm-up Time	Less than 20 minutes

INPUTS

Thermocouple	J, K, E, T, R, and S
RTD	Platinum 100 (.00385 alpha), 2, 3 or 4 wire
Millivolt	±84mV reading of uncompensated mV
Cold Junction Compensation Error	0.1°C/°C
Input Impedance	10MW(typical)
Lead Resistance Effect	4.0µV/100W
Conversion Rate	2-1/2 times per second
Open Thermocouple Detection	-1 on display, -40nA bias on thermocouple

Inputs

DC Process

Range	Resolution	Voltage Drop	Max Input (Unfused)
4-20mA	1 uA	0.2V	100mA

Range	Resolution	Input Impedance	Maximum Input
1-5 DCV	10mV	10 MΩ	100 V
0-10DCV	10mV	10 MΩ	100 V

DC Current

Input Range	Resolution	Voltage Drop	Maximum Overload
200 uA	10nA	200mV	20mA
2 mA	100nA	200mV	20mA
20 mA	1uA	200mV	100mA
200 mA	10uA	200mV	500mA
2 A	100uA	200mV	2.2A

AC/AC TRMS Voltage

Input Range	Resolution	Input Impedance	Maximum Overload
200 mV	10uV	≥100MΩ	50V
2 V	100uV	10MΩ	100V
20 V	1mV	10MΩ	100V
200 V	10mV	10MΩ	250V
750 V	100mV	1MΩ	750V

AC/AC TRMS Current

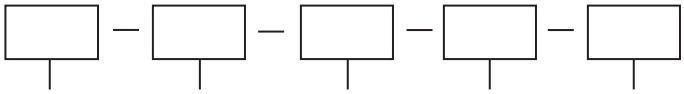
Input Range	Resolution	Voltage Drop	Maximum Overload
200 uA	10nA	200mV	20mA
2 mA	100nA	200mV	20mA
20 mA	1uA	200mV	100mA
200 mA	10uA	200mV	500mA
2 A	100uA	200mV	2.2A
5 A	1mA	200mV	2.2A

DC Voltage

Input Range	Resolution	Input Impedance	Maximum Overload
200 mV	10uA	≥100MΩ	50V
2 V	100uA	10MΩ	100V
20 V	1mV	10MΩ	100V
200 V	10mV	10MΩ	250V
750 V	100mV	1MΩ	750V

Ordering Information

Falcon Indicators can be configured by making an entry in each section. Example: F45-1-52-0.



Selection	Description
	Basic Unit
F35	3 1/2 digit LED
F45	4 1/2 digit LED
	Power Supply
1	120 ACV
2	220 ACV*
3	9-32 DCV†
4	120 ACV*
	Function/Range
11	200 DCmV
12	2 DCV
13	20 DCV
14	200 DCV
15	750 DCV
21	200 DCμA
22	2 DCmA
23	20 DCmA
24	200 DCmA
25	2 DCA
26	5 DCA
31	200 ACmV
32	2 ACV
33	20 ACV
34	200 ACV
35	750 ACV
41	200 ACμA
42	2 ACmA
43	20 ACmA
44	200 AC mA
45	2 ACA
46	5 ACA
51	200 ACmV TRMS
52	2 ACV TRMS
53	20 ACV TRMS
54	200 ACV TRMS
55	750 ACV TRMS

Selection	Description
	Function/Range cont'd
61	200 ACμA TRMS
62	2 ACmA TRMS
63	20 ACmA TRMS
64	200 ACmA TRMS
65	2 ACA TRMS
66	5 ACA TRMS
71	4-20 DCmA Process
72	1-5 DCV Process
73	0-10 DCV Process
80 (F45)	J T/C
81 (F45)	K T/C
82 (F45)	S T/C
83 (F45)	T T/C
84 (F45)	E T/C
85 (F45)	R T/C
86 (F45)	DCmV
90 (F45)	RTD Pt100 Ohm
91 (F35)	20-199.9 Hz RMS
92 (F35)	20-1999 Hz RMS
93 (F35)	20-199.9 Hz Sq. Wave
94 (F35)	20-1999 Hz Sq. Wave
	Excitation Output (not available with AC, temperature, or frequency inputs)
0	None
1	12 DCV @ 25mA max. current
2	24 DCV @ 25mA max. current
	Display Scaling (Temperature units only)
C	° C
F	° F

† Not available for use with frequency meters

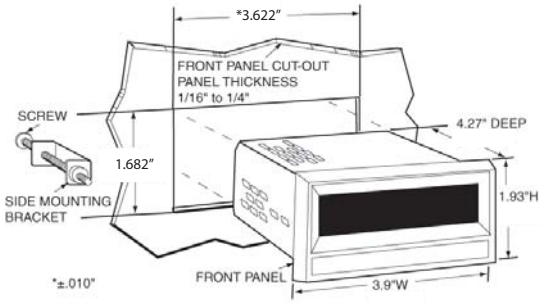
* Meets CE EMI EN-50082-1, EN-55022, EN-61000-3-2, EN-61000-3-3

2800 Series Digital Panel Meters

- *3 1/2 or 4-1/2 digit red LED display*
- *Optional display hold*
- *Input/output edge connector*
- *" U"-shaped mounting bracket*
- *Jumper-selectable decimal point*

Mounting Instructions

The 2800 indicators are installed with the mounting hardware provided. Slide the meter through the panel cutout. Next, insert a side mounting bracket to each side of the meter. Use the two holes located near the bezel to attach them to the meter. Slide the brackets back until they lock into the meter. Turn the screws in each bracket until they firmly contact the panel surface.



Inputs

DC Voltage

Range	Display Resolution	Maximum Input
200mV	100µV	100MΩ
2V	10µV	100MΩ
20V	10mV	10MΩ
200V	1µΩ	10MΩ

AC Current

Range	Display Resolution	Maximum Input
20µA	10µA	20mA
200µA	100µA	20mA
2mA	1µA	20mA
20mA	10µA	100mA
200mA	1mA	1mA

DC Current

Range	Display Resolution	Maximum Input
20µA	10µA	20mA
200µA	100µA	20mA
2mA	1mA	20mA
20mA	10µA	100mA
200mA	1mA	1mA

Specifications

DISPLAY

Type	7-segment, red LED
Height	0.56" (14.2mm)
Decimal point	Jumper-selectable
Overrange indication	All digits blink "0"

POWER REQUIREMENTS

AC Voltages	120V, ±10%, 50Hz to 400Hz, 3VA
DC Voltages	5 DCV
Rated Circuit to Ground Voltage	250DCV (Models 2865 and 2869) or -4.06 to +4.5DCV (Model 2866)

ACCURACY @ 23°C, ±2°C ±(1.0% of input +5 counts) 45Hz to 1KHz

ENVIRONMENTAL

Operating Temperature	0 to 55°C
Storage Temperature	-40 to 60 °C
Relative Humidity	0 to 85%, non-condensing
Temp. Coefficient	±(0.1% of input) ± 0.05 count/per °C
Warmup time	15 minutes

A TO D CONVERSION

Technique	Dual slope
Rate	2.5 samples/second-nominal

MECHANICAL

Bezel	1.93" x 3.9" (49mm x 99mm)
Depth	4.72" (120mm)
Panel cutout	1.68" x 3.622" (42.72mm x 92mm)
Weight	12.5oz (354.3g)

Ordering Information

Catalog No.	Model # & Description
24500	2865 0-200 DCmV, 120 VAC, Red LED
24501	2865 0-2 DCV, 120 VAC, Red LED
24502	2865 0-20 DCV, 120 VAC, Red LED
24503	2865 0-200 DCV, 120 VAC, Red LED
24504	2865 0-20 DCµA, 120 VAC, Red LED
24505	2865 0-200 DCµA, 120 VAC, Red LED
24506	2865 0-2 DCmA, 120 VAC, Red LED
24507	2865 0-20 DCmA, 120 VAC, Red LED
24508	2865 0-200 DCmA, 120 VAC, Red LED
24600	2866 0-200 DCmV, 5 DCV, Red LED
24601	2866 0-2 DCV, 5 DCV, Red LED
24602	2866 0-20 DCV, 5 DCV, Red LED
24603	2866 0-200 DCV, 5 DCV, Red LED
24630	2869 0-200 ACmV, 117 VAC, Red LED
24631	2869 0-2 ACV, 117 VAC, Red LED
24632	2869 0-20 ACV, 117 VAC, Red LED
24633	2869 0-200 ACV, 117 VAC, Red LED
24634	2869 0-20 ACµA, 117 VAC, Red LED
24635	2869 0-200 ACµA, 117 VAC, Red LED
24636	2869 0-2 ACmA, 117 VAC, Red LED
24637	2869 0-20 ACmA, 117 VAC, Red LED
24638	2869 0-200 ACmA, 117 VAC, Red LED

Hawk 3 Digital Panel Meter/Controller

- ***All parameters set from easy to understand front panel access***
- ***One, two or four 5-amp relays optional***
- ***Five user-selectable brightness levels***
- ***1/8 DIN, shallow depth case, 3.24"***
- ***RS485 digital communications optional (H345)***
- ***12 or 24 DCV power supply output optional***
- ***4-20mA or 0-10 DCV analog transmission optional***
- ***NEMA 4X rated front panel***
- ***DIN Rail adapter available*** *(page C1)*

Specifications

DISPLAY

Type	7-segment, red LED
Quantity	4 or 5
Brightness	5 user-selectable levels
Height	0.56" (14.2mm)
Decimal point	4 or 5 position, user programmable
Overrange indication	Display flashes "EEEEE" indicating Maximum Value Exceeded
Underrange indication	Display flashes "-EEEE" indicating Minimum Value Exceeded
Alarm Indicators	4 LED indicators for up to four independent setpoints

POWER REQUIREMENTS

AC	120, 85-250 VAC @ 10VA
DC	9-36 DCV @ 10VA

ACCURACY @ 25°C as % of rdg	**4-1/2 digit**	**3-1/2 digit**
DC Current		
High (5A, 2A)	0.2% ± 1 count	0.3% ± 1 count
All Others	0.05% ± 1 count	0.1% ± 1 count
DC Volts		
High (600 V)	0.1% ± 1 count	0.2% ± 1 count
All others	0.05% ± 1 count	0.1% ± 1 count
Resistance		
All ranges	0.1% ± 2 counts	0.1% ± 2 counts
***AC Current**		
High (2A, 5A)	0.2% ± 2 counts	0.3% ± 2 counts
All others	0.1% ± 2 counts	0.2% ± 2 counts
***AC Volts**		
High (600V)	0.1% ± 1 count	0.2% ± 1 count
All others	0.05% ± 1 count	0.1% ± 1 count

* AC functions measured at 50 Hz, include ± 1 count for each additional 100 Hz above 50 Hz

ENVIRONMENTAL

Operating Temperature	0 to 50°C
Storage Temperature	-10 to +60°C
Relative Humidity	<80%
Ambient Temperature	25°C
Temperature Drift	100 ppm/°C
Warmup time	10 minutes
Noise Rejection	
NMRR	60 dB @ 50-60 Hz
CMRR	70 dB @ 50-60 Hz

A TO D CONVERSION

Technique	Successive approximation with oversampling
Sample Rate	10 conversions per second
Display Rate	User programmable 1-420 updates/min (240 default)

MECHANICAL

Bezel	3.9" x 2.0" x 0.52" (99.8mm x 51.9mm x 13.2 mm)
Depth	3.24" (82.3 mm)
Panel cutout	3.62" x 1.77" (92 mm x 45mm)
Weight	10 oz (283.5g)
Cover	NEMA 4X Rated front panel

more >>

Panel Cutout Dimensions on page A14

Ordering Information

Hawk 3 Indicators can be configured by making an entry into each section. Example: H335-3-71-0-4-1

[ ] – [ ] – [ ] – [ ] – [ ] – [ ]

Basic Unit **Power Supply** **Function/Range** **Output Signal** **5A Relay** **Excitation**

Selection	Description
	Basic Unit
H335	3-1/2 digit, Red LED
H345	4-1/2 digit, Red LED
	Power Supply
1	120 ACV (3-1/2 only)
2	85-250 ACV (4-1/2 only)
3	9-36 DCV
4	85-250 ACV (3-1/2 only)
	Function/Range
11	200 DCmv
12	2 DCV
13	20 DCV
14	200 DCV
15	600 DCV*
21	200 DCµA
22	2 DCmA
23	20 DCmA
24	200 DCmA
25	2 DCA
26	5 DCA
31	200 ACmV
32	2 ACV
33	20 ACV
34	200 ACV
35	600 ACV*
41	200 ACµA
42	2 ACmA
43	20 ACmA
44	200 ACmA
45	2 ACA
46	5 ACA

Continued on next column

* Awaiting UL approval

Selection	Description
	Function/Range continued
51	200 ACmV TRMS
52	2 ACV TRMS
53	20 ACV TRMS
54	200 ACV TRMS
55	600 ACV* TRMS
61	200 ACµA TRMS
62	2 ACmA TRMS
63	20 ACmA TRMS
64	200 ACmA TRMS
65	2 ACA TRMS
66	5 ACA TRMS
71	4-20 DCmA Process
72	0-10 DCV Process
81	200 Ohm
82	2K Ohm
83	20K Ohm
84	200K Ohm
	Output
0	None
1	4-20 DCmA
2	0-10 DCV
6	RS-485 (4-1/2 only)
	5A Relays
0	None
1	One
2	Two
4	Four
	Excitation
0	None
1	12 DCV
2	24 DCV

Hawk 3 Temperature Meter/Controller

- ***All parameters set from easy to understand front panel access***
- ***One, two or four 5-amp relays optional***
- ***7-segment 4 digit red LED***
- ***Five user-selectable brightness levels***
- ***Activated set point indicators on display***
- ***Min/Max and password lockout***
- ***NEMA 4X rated front panel***
- ***RS485 digital communications output available by special order***
- ***4-20mA or 0-10 DCV analog retransmission optional***
- ***1/8 DIN, shallow depth case, 3.24"***
- ***Din Rail Adapter available*** *(page C1)*

Ordering Information

	–		–		–		–		–	
Basic Unit		Power		Function/Range		Output		5A Relays		Excitation

Selection	Description
Basic Unit	
H340	4 digit, Red LED
Power Supply	
1	120 ACV
3	9-36 DCV
4	85-250 ACV
Function/Range	
91	J Thermocouple
92	K Thermocouple
93	RTD, PT100 3-wire
94	E Thermocouple
95	T Thermocouple

Selection	Description
Output	
0	None
1	4-20 DCmA
2	0-10 DCV
5A Relays	
0	None
1	One
2	Two
4	Four
Excitation	
0	None
1	12 DCV - 100mA max current
2	24 DCV - 100mA max current

Specifications

DISPLAY

Type	7-segment, red LED
Quantity	4
Height	0.56" (14.2mm)
Brightness	5 settings, user programmable
Overrange indication	Display flashes "EEEEE" indicating Maximum Value Exceeded
Underrange indication	Display flashes "-EEEE" indicating Minimum Value Exceeded
Sensor Break	Display reads "EEEE"
Excitation	100mA Max Current

POWER REQUIREMENTS

AC	85 to 250 VAC/120VAC @ 10VA
DC	9 to 36 DCV @ 10VA

ACCURACY @ 25°C as % of rdg	Accuracy	Temperature Range
Sensor Type		
RTD Pt 100	0.2% ± 2 counts	-200°C to +200°C
J	0.2% ± 2 counts	-100°C to +760°C
K	0.2% ± 2 counts	-200°C to +1250°C
E	0.2% ± 2 counts	-100°C to +800°C
T	0.2% ± 2 counts	-200°C to +400°C

ENVIRONMENTAL

Operating Temperature	0 to 50°C
Storage Temperature	-10 to +60°C
Relative Humidity	<80%
Ambient Temp	25°C
Temperature Drift	100 ppm/°C ± 0.05 dgt/°C
Warmup time	10 minutes

NOISE REJECTION

NMRR	60 dB @ 50-60 Hz
CMRR	100 dB @ 50-60 Hz

A TO D CONVERSION

Technique	Successive approximation with oversampling
Sample Rate	10 conversions per second
Display Rate	User programmable from 1/minute - 8/second

MECHANICAL

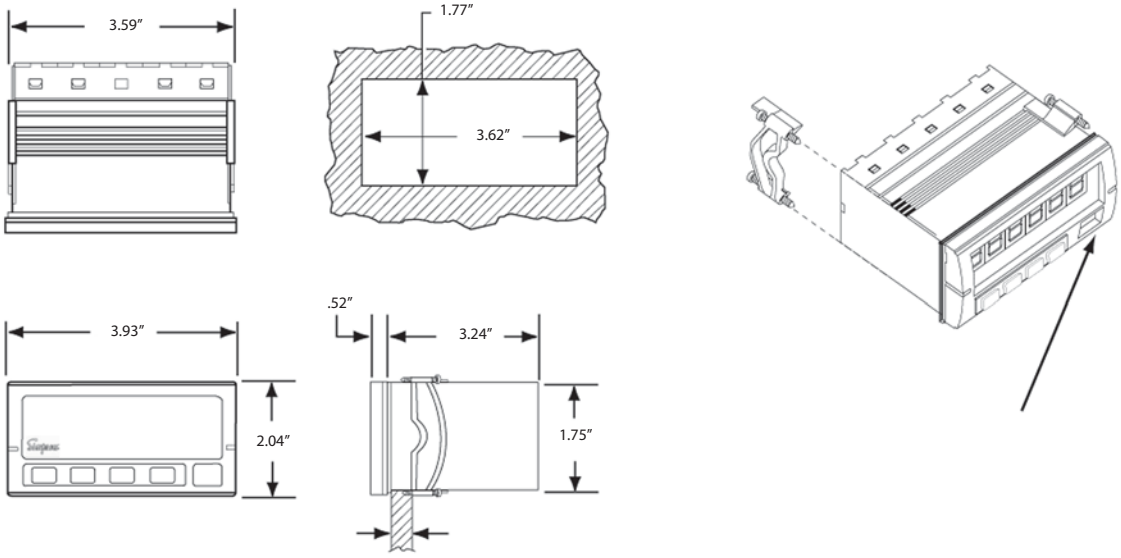
Bezel	3.92" X 2.0" X 0.52" (99.8 mm x 51.8 mm x 13.2 mm)
Depth	3.24" (82.3mm) behind panel
Panel cutout	3.62" x 1.77" (92 mm x 45 mm) 1/8 DIN
Weight	10oz (283.5g)
Cover	NEMA 4X Rated front panel

MADE IN THE USA
www.simpsonelectric.com

Panel Cutout Dimensions on page A14

more >>

Installation and Panel Cutout - H335, H340, H345



Mounting Requirements

The Hawk 3 Advanced Digital Controller 1/8 DIN meters require a panel cutout of 1.77" (45mm) high and 3.62" (92 mm wide). To install the Hawk 3 meter into the panel cutout, remove the clips from the side of the meter. Slide the meter through the panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure a proper fit. Tighten screws.

Engineering Label Placement

To replace the engineering unit label, place the tip of a ballpoint pen into the small hole at the base of the engineering label in the bezel. Slide the label up until it pops out. Grasp and remove. Slide the new label half the distance in, then use the ballpoint pen to slide it into place.

Inputs

DC Voltage

Range	Resolution 4.5	Resolution 3.5	Input Impedance	Overload
200mV	10µV	.1 mV	1 MΩ	10DCV
2 V	.1mV	1 mV	1 MΩ	100DCV
20 V	1mV	10 mV	2 MΩ	100DCV
200 V	10 mV	.1 V	2 MΩ	300DCV
600 V	.1 V	1V	2 MΩ	1K DCV

DC Current

Range	Resolution 4.5	Resolution 3.5	Input Impedance	Overload
200µA	10 nA	.1 mA	1KΩ	11mA DC
2 mA	.1µA	1 mA	100Ω	35mA DC
20 mA	1µA	10 mA	10Ω	111mA DC
200mA	10 µV	.1 mA	1Ω	353 mA DC
2 A	.1 mA	1 mA	.013Ω	7A DC
5 A	.1 mA	1 mA	.013Ω	7A DC

AC Current

Range	Resolution 4.5	Resolution 3.5	Input Impedance	Overload
200µA	10 nA	.1 mA	1KΩ	11mA AC
2 mA	.1µA	1 mA	100Ω	35mA AC
20 mA	1µA	10 mA	10Ω	111mA AC
200mA	10 µV	.1 mA	1Ω	353mA AC
2 A	.1 mA	1 mA	.013Ω	7A AC
5 A	.1 mA	1 mA	.013Ω	7A AC

AC Voltage

Range	Resolution 4.5	Resolution 3.5	Input Impedance	Overload
200mV	10µV	.1 mV	200KΩ	10DCV
2 V	.1mV	1 mV	200KΩ	100DCV
20 V	1mV	10 mV	2 MΩ	300DCV
200 V	10 mV	.1 V	2 MΩ	300DCV
600 V	.1 V	1V	2 MΩ	1K DCV

Resistance

Range	Resolution 4.5	Resolution 3.5	Input Impedance	Overload
200mΩ	10mΩ	.1Ω	1.2KΩ	± 5DCV
2Ω	.1Ω	1Ω	12KΩ	± 5DCV
20Ω	1Ω	10Ω	121Ω	± 5DCV
200Ω	10Ω	.1Ω	1.2MΩ	± 5DCV

GIMA® Three Phase Digital Panel Meter

- ***Four model types designed to fit a wide range of applications***
- ***One meter to measure all your values***
- ***Easy installation - software detection/ correction of wiring errors***
- ***Wide backlit LCD display for easy viewing***
- ***Easy to use - four keys select all parameters***
- ***Use for single or three-phase applications***

Specifications

INPUT

System	3-phase, 3 or 4 wire unbalanced load
Voltages	120/208, 120/240, 277/480, 63/110
Measurement range	0.5% to 120%
Current	5 amp from external CTs Fully Isolated
Measurement range	0.5% to 120%
Operating Frequency	45 to 65 Hz
Harmonics	Up to the 20th harmonic
Input Loading	
Voltage	Less than 0.1VA per phase
Current	Less than 0.1VA per phase
Overload	
Voltage	x2 for 2 seconds max.
Current	x40 for 1 second max.
Auxiliary Supply	
Standard	115V±15% 45-65Hz
Optional	230V±15% 45-65Hz
General Display	Custom backlit supertwist LCD 3 lines of .47" (12mm) digits plus .15" (3.8mm) legends

ENVIRONMENTAL

Temperature	14°F to 149°F (-10°C to 65°C) operating
Humidity	<75% RH non-condensing
Programming	
CT Primary	5amp to 6500 amp
VT Primary	60v to 50,000v
Pulse Outputs	2
Function	
Output No. 1	Wh (G200, G300 & G400 only)
Output No. 2	Total varh (G300 & G400 only)
Pulse Length	100ms
Isolation	2500V (50 Output No. 1 to Output No. 2)
Scaling	Settable 1, 10 or 100 pulse output rate

ACCURACY

Current 5% to 120%FS	**Per Phase** ±0.2%FS	**3 Phase** N/A
Voltage LN 20% to 120%FS	±1% Rdg* ±0.2%FS	 N/A
Voltage LL 20% to 120%FS	±1% Rdg* ±0.3%FS	 N/A
Watts 5% to 120%FS	±1% Rdg* ±0.4%FS	 ±0.6%FS
VA 5% to 120%FS	±1% Rdg* ±0.6%FS	±1% Rdg* ±1%FS
var 5 % to 120%FS	±1.5% Rdg* ±0.8%FS	±1.5% Rdg* ±1.5% FS
PF	±2% Rdg*	±2% Rdg
Frequency	±0.2°	±0.2°FS
Neutral Current 5% to 120%FS		 ±0.05 Hz
Wh Register	N/A	±0.6% FS ±2% Rdg
VAh Register	N/A	Class 1
Varh Register	N/A N/A N/A	EN 61036 Class 2 Class 2 IEC 1268

Note: All accuracies specified are ±1 digit
*Rdg = Reading

MECHANICAL

Bezel	2.77" x 3.79" (w/ .28" lip)
Depth	2.83"
Panel Cutout	3.62" x 3.62"
Weight	14 oz.
Height	3.79"

more >>

GIMA® Three Phase Digital Panel Meter

Models & Parameters

	G100	G200	G300	G400
Phase Amps	X	X	X	X
Phase Volts	X	X	X	X
Line Volts	X	X	X	X
Per Phase PK	X	X	X	X
Per Phase kW	X	X	X	X
Per Phase kvar			X	X
Per Phase kVA				X
3 Phase PF	X	X	X	X
3 Phase kW	X	X	X	X
3 Phase kvar			X	X
3 Phase kVA				X
Frequency	X	X	X	X
KWh		X	X	X
Capacitive kvarh			X	X
Inductive kvarh			X	X
Total kvarh			X	X
Import kvarh				X
Current Demand	X	X	X	X
Voltage Demand	X	X	X	X
kW Demand			X	X
Peak Amps				X
Peak Phase Volts				X
Peak Current Demand	X	X	X	X
Peak Voltage Demand	X	X	X	X
Neutral Current				X

Accessories - Three-Phase Current Transformer

A three-phase terminal style current transformer must be used with GIMA® three phase meters.

The current transformer is equipped with terminals to permit easy connection to the GIMA units. These terminals are #8-32 brass studs and come with a flatwasher, lockwasher and a regular nut (leads are not provided).

Ordering Information

Catalog Number	Current Ratio	Accuracy @ 60Hz	Burden VA @ 60 Hz
37026	50:5	± 3%	2.0
37027	100:5	± 2%	2.0
37028	150:5	± 1%	4.0
37029	200:5	± 1%	5.0
37030	300:5	± 1%	10.0

Ordering Information

G [ ] - [ ] - [ ] - [ ] - [ ]

Basic Unit | Power | Voltage Inputs | Current Input | Other

Basic Unit
- 100 GIMA 100 Meter
- 200 GIMA 200 Meter
- 300 GIMA 300 Meter
- 400 GIMA 400 Meter

Power Supply
- 1 115 VAC @ 45-65Hz
- 2 230 VAC @ 45-65 Hz

Voltage Input
- 1 120/208V
- 2 120/240V - Split Phase
- 3 277/480V
- 4 63/110V

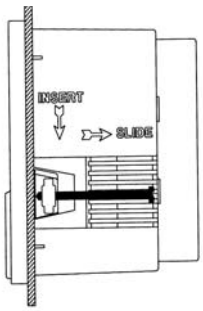
Current Input
- 1 5 amp

Other
- 0 None

For other Voltage and Current Inputs, contact Simpson Electric Company

Mounting Requirements

Panels should be .04 to .16 inches (1mm to 4mm) thick with a square cut-out of 3.62" x 3.62" (92mm x 92mm.) A minimum depth of 2.83" (72mm) should be allowed behind the panel for the meter. Remove the panel mounting clips and insert the meter into the cut-out from the front of the panel. Push the meter home. Ensure the screws in each panel mount clip are fully retracted and insert the clips as shown in the diagram below. Tighten the screws to secure the meter firmly in the panel.
Do not overtighten.



GIMA Options Quad Analog Output

The Quad Analog Output Options Module adds four analog 4-20 DCmA outputs to any standard GIMA Series Power Meter. All outputs are isolated from the metering elements to provide safe connection to external systems. The device uses a high-speed microprocessor to extract information from the meter and a precision digital to analog converter to produce the output signals.

The Options Module provides four DC current sinks with a common signal return which allows connection to PLCs and other equipment fitted with a suitable interface. 4-20mA systems are commonly used where signals require transmission over long distances.

Ordering Information

Cat. Number 47130

Specifications

Auxiliary Supply	230V AC or 115V AC 50/60Hz±15%
Option Module	Automatic voltage selection when inserted into GIMA® Power Meter **MUST** be rated to match Option Module rating
Load	4 VA Maximum
Isolation	2.5 kV continuous (supply internally wired to GIMA® main inputs)
Mechanical (Options Module)	
Enclosure	Custom Options Enclosure
Material	Mablex, UL94-V-0
Dimensions	
Options Unit Unfitted	3.43" x 2.32" x 2.95" W=87mm x H=59mm x L=75mm
GIMA® Meter + Options	3.78" x 3.78" x 5.43" W=96mm x H=96mm x L=138mm
Weight	Approx. 200g
Terminals	Modular screwdown contacts, .2" centers
4-20mA Output	Quad 4-20 DCmA Current Sink with common
Output	Nominal 24 DCV
Loop Supply	Max 28 DCV (at options module) Min 5 DCV (at options module) Unregulated 18 DCV
Internal Supply	Max 30 DCV Min 10 DCV
Load Impedance/Ext. Supply	600V per channel (maximum 950V) 24V supply
Internal (Unreg) Supply	250Ω per channel (maximum 500Ω) at nominal V_{aux}
Over Range	Max output 21mA
Resolution	10 Bit (830 levels from 4mA to 21mA)
Update Speed	Outputs updated every second (as GIMA® meter)
Output Accuracy	Test range 4mA to 20mA, load impedance = 250Ω I_{out} <5.6mA ±0.5% reading + GIMA® meter errors
Effect of Loop Impedance	<0.02% (0Ω to 250Ω)
Effect of Supply Voltage	<0.05% for V_{aux} ±15% (internal supply, 250V load)

Accessories - Modbus Communications

The Modbus Communications Option Module for the GIMA Series adds multi-drop serial communications to any standard GIMA meter. The device uses a high speed microprocessor to extract information from the meter and interface to an industry standard Modbus system.

Use of a dedicated communications processor ensures optimum efficiency, allowing fast access to data on systems with multiple meters. At 19200 baud, it is possible to access and download the main instantaneous data tables (24 values) from 10 GIMA meters in one second.

The use of Modbus protocol ensures compatibility with existing systems and/or many readily available software packages. This Options Module may be configured as RS485 or RS422 providing 2 or 4-wire communications over distances up to 3,960 feet (3/4 mile). Data rates of 4800, 9600 or 19200 baud may be selected to suit system requirements.

The Communications Option Module is available in two formats:

Standard: Only parameters displayed on the GIMA meter can be accessed via Modbus **(Cat. Number 46240)**

All Value: The full set of GIMA G400 parameters can be accessed via Modbus from any GIMA **(Cat. Number 46241)**

S660 Preset Totalizer Counter

- ***Easily programmed from the front panel***
- ***Remote reset capability***
- ***Input variety: Quadrature, Switch, TTL, CMOS, NAMUR, PNP, NPN***
- ***Software functions include:***
  - ***Password***
  - ***Set Point Programming***
  - ***Display Scaling***
  - ***Decimal Point Selection***
- ***5 amp relay outputs***
- ***Optional 12DCV Excitation***

The S660 is a versatile totalizing counter that can be adapted to a wide variety of counting, measuring and controlling applications. The control inputs offer several counter operation modes: count/direction, add/add, add/subtract, subtract/subtract, quadrature and reverse quadrature. Optional relay outputs enhance the counter from a passive device to an integral control element for your application.

MADE IN THE USA
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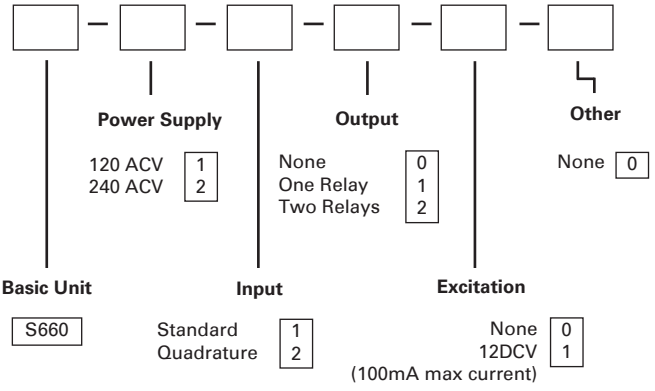
Panel Cutout Dimensions on page A23

Specifications

DISPLAY	
Type	6-digit, 7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	User-programmable
Count Direction	"+" indication implied, "-" indication displayed
Display Range	-99,999 to +999,999
Output Indicators	1 and 2
POWER REQUIREMENTS	
AC Voltages	120, 240VAC, ±10%
Power Consumption	3VA
INPUT RATINGS	
Current Sinking	10KΩ 5% Resistor pull-up to (9.0 - 16DCV) ±10%
Current Sourcing	5.1KΩ 5% Resistor pull-down to common
Minimum Pulse Width	~5µs
Low Pass Filter	<200Hz
Low Bias	VLT = 1.6V ±10% VUT = 3.6V ±10%
High Bias	VLT = 5.0V ±10% VUT = 7.0V ±10%
Count Rate	20KHz (Pulse Max) 5KHz (Quadrature X4 Max)
Maximum Voltage Input A, B, and User	30DCV (Max)
INPUT	
User Input	(Display Hold) Display is frozen when the User Input is pulled low.
Standard Input	VLT ≦0.2DCV guaranteed low, VUT = 3.0DCV (max)
Quadrature Input	VLT ≦ 0.9DCV VUT =3.15DCV (max)
ENVIRONMENTAL	
Operating Temp.	0°C to +40°C
Storage Temp.	-10°C to +60°C
Relative Humidity	0-80% non-condensing for temperatures less than 32°C, decreasing linearly to 50% at 40°C
Ambient Temperature	25°C
Temp. Coefficient (per °C)	±100ppm/°C
Warmup Time	15 minutes
MECHANICAL	
Bezel	3.93" x 2.04" x .52" (99.8mm x 51.8mm x 13.2mm)
Depth	3.24" (82.3mm)
Panel Cutout	3.62" x 1.77" (92mm x 45mm)
Case Material	PBT-ABS
Weight	9oz (255.1g)

Ordering Information



S661 Preset Rate Counter

- ***Easily programmed from the front panel***
- ***Remote reset capability***
- ***Input variety: Quadrature, Switch, TTL, CMOS, NAMUR, PNP, NPN***
- ***Software functions include:***
  Password ***Display Scaling***
  Set Point Programming ***Decimal Point Selection***
- ***Optional 12DCV Excitation***

Ordering Information

Basic Unit	Input	Excitation	Power Supply	Output	Other
S661	Standard 1, Quadrature 2	None 0, 12DCV (100mA max current) 1	120 ACV 1, 240 ACV 2	None 0, One Relay 1, Two Relays 2	None 0

Specifications

DISPLAY

Type	6-digit, 7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	User-programmable
Count Direction	"+" indication implied, "-" indication displayed
Display Range	-99,999 to +999,999
Output Indicators	1 and 2

POWER REQUIREMENTS

AC Voltages	120, 240VAC, ±10%
Power Consumption	3VA

INPUT RATINGS

Current Sinking	10KΩ 5% Resistor pull-up to (9.0 - 16DCV) ±10%
Current Sourcing	5.1KΩ 5% Resistor pull-down to common
Minimum Pulse Width	~5µs
Low Pass Filter	<200Hz
Low Bias	VLT = 1.6V ±10% VUT = 3.6V ±10%
High Bias	VLT = 5.0V ±10% VUT = 7.0V ±10%
Count Rate	20KHz (Pulse Max) 5KHz (Quadrature X4 Max)
Maximum Voltage Input A, B, and User	30DCV (Max)

INPUT

User Input	(Display Hold) Display is frozen when the User Input is pulled low.
Standard Input	VLT ≦0.2DCV guaranteed low, VUT = 3.0DCV (max)
Quadrature Input	VLT ≦ 0.9DCV VUT =3.15DCV (max)

ENVIRONMENTAL

Operating Temp.	0°C to +40°C
Storage Temp.	-10 °C to +60°C
Relative Humidity	0-80% non-condensing for temperatures less
Ambient Temperature	than 32°C, decreasing linearly to 50% at 40°C
Temp. Coefficient (per °C)	25°C
Warmup Time	±100ppm/ °C 15 minutes

MECHANICAL

Bezel	3.93" x 2.04" x .52" (99.8mm x 51.8mm x 13.2mm)
Depth	3.24" (82.3mm)
Panel Cutout	3.62" x 1.77" (92mm x 45mm)
Case Material	PBT-ABS
Weight	9oz (255.1g)

Panel Cutout Dimensions on page A23

Mode	Range (implied scale)	Typical Update Period	Min. Input Frequency	Max. Input Frequency	Display Resolution
0	MSec (Hz x 1000)	1.0 sec	1Hz	30KHz	0.001Hz
1	Sec (Hz)	0.5 sec	2Hz	30KHz	1Hz
2	Min (Hz x 60)	3 sec	20 Counts/Min	1.2 Million Counts/Min	1 Pulse per Minute
3	Hr (Hz x 3600)	90 sec	40 Counts/Hr	3.0 Million Counts/Hr	1 Pulse per Hour

S662 Preset Batch/Dual Counter

- ***Easily programmed from the front panel***
- ***Remote Reset capability***
- ***Input variety: Quadrature, Switch, TTL, CMOS, NAMUR, PNP, NPN***
- ***Software functions include:***
  - ***Password***
  - ***Set Point Programming***
  - ***Display Scaling***
  - ***Decimal Point Selection***

The S662 is a multi-function counter that can be easily configured to operate either in a dual mode or in a totalizing/batch mode, each with separate scaling and reset functions. When functioning in the dual mode, full direction control is maintained for the totalizing and batch counts. In the totalizing batch mode, the secondary value (batch count) is incremented after the primary totalizing count has completed its cycle.

The counter is powered from 120 or 240VAC and has a non-volatile EEPROM to retain all programming and count information when the power source is removed or interrupted. An option 12DCV excitation output module can provide power for external sensors.

This versatile counter has latching, boundary or timed (0.01 to 599.99 seconds) output modes.

Mounting Requirements

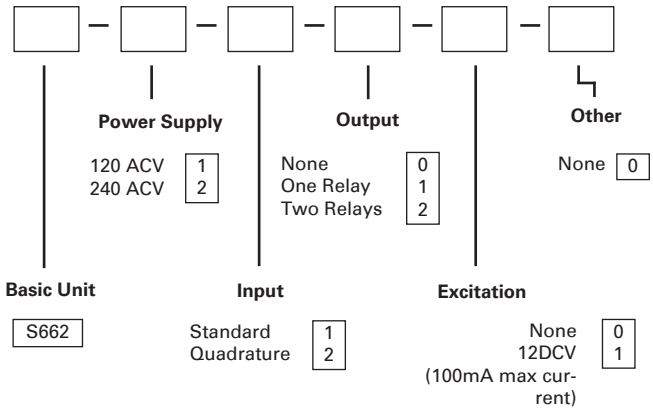
The S660 series 1/8 DIN counters require a panel cutout of 1.77" (45mm) high by 3.62" (92mm) wide. To install the counter into a panel cutout, remove the clips from the side of the meter. Slide the meter through your panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure a proper fit.

Panel Cutout Dimensions on page A23

Specifications

DISPLAY	
Type	6-digit, 7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	User-programmable
Count Direction	"+" indication implied, "-" indication displayed
Display Range	-99,999 to +999,999
Output Indicators	1 and 2
POWER REQUIREMENTS	
AC Voltages	120, 240VAC, ±10%
Power Consumption	3VA
INPUT RATINGS	
Current Sinking	10KΩ, 5% Resistor pull-up to (9.0 - 16DCV) ±10%
Current Sourcing	5.1KΩ, 5% Resistor pull-down to common
Minimum Pulse Width	~5µs
Low Pass Filter	<200Hz
Low Bias	VLT = 1.6V ±10% VUT = 3.6V ±10%
High Bias	VLT = 5.0V ±10% VUT = 7.0V ±10%
Count Rate	20KHz (Pulse Max) 5KHz (Quadrature X4 Max)
Maximum Voltage Input A, B, and User	30DCV (Max)
INPUT	
User Input	(Second channel reset) Count on the second channel is reset when the User Input is pulled low.
Standard Input	VLT ≦0.2DCV guaranteed low, VUT = 3.0DCV (max)
Quadrature Input	VLT ≦ 0.9DCV VUT =3.15DCV (max)
ENVIRONMENTAL	
Operating Temp.	0°C to +40°C
Storage Temp.	-10°C to +60°C
Relative Humidity	0-80% non-condensing for temperatures less than 32°C, decreasing linearly to 50% at 40°C
Ambient Temperature	25°C
Temp. Coefficient (per °C)	±100ppm/ °C
Warmup Time	15 minutes
MECHANICAL	
Bezel	3.93" x 2.04" x .52" (99.8mm x 51.8mm x 13.2mm)
Depth	3.24" (82.3mm)
Panel Cutout	3.62" x 1.77" (92mm x 45mm)
Case Material	PBT-ABS
Weight	9oz (255.1g)

Ordering Information



S663 Preset Rate/Totalizer Counter

- ***Easily programmed from the front panel***
- ***Remote Reset capability***
- ***Input variety: Quadrature, Switch, TTL, CMOS, NAMUR, PNP, NPN***
- ***Software functions include:***
  - ***Password***
  - ***Set Point Programming***
  - ***Display Scaling***
  - ***Decimal Point Selection***

The S663 is a multi-function counter that allows the end user to track the rate (speed) of a product and continuously monitor the product quantity for a given process. The count and rate displays have separate programmable decimal point settings and scaling values.

The counter is powered from 120 or 240VAC and has a non-volatile EEPROM to retain all programming and count information when the power source is removed or interrupted. An option 12DCV excitation output module can provide power for external sensors.

Optional field-replaceable single/dual relay modules enhance the counter from a passive display device to an integral control element for your application. This versatile counter has latching, boundary or timed (0.01 to 599.99 seconds) output modes.

Mounting Requirements

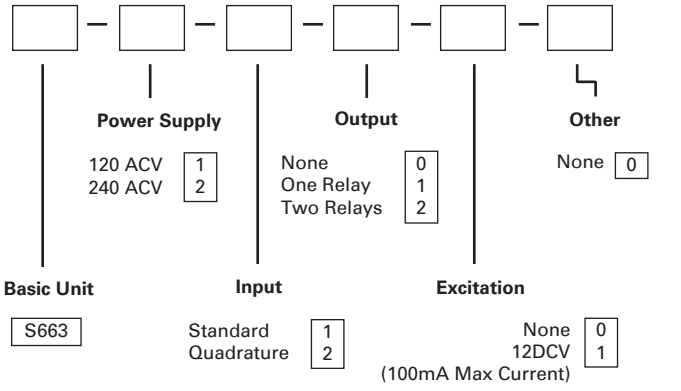
The S660 series 1/8 DIN counters require a panel cutout of 1.77" (45mm) high by 3.62" (92mm) wide. To install the counter into a panel cutout, remove the clips from the side of the meter. Slide the meter through your panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure a proper fit.

Panel Cutout Dimensions on page A23

Specifications

DISPLAY	
Type	6-digit, 7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	User-programmable
Count Direction	"+" indication implied, "-" indication displayed
Display Range	-99,999 to +999,999
Output Indicators	1 and 2
POWER REQUIREMENTS	
AC Voltages	120, 240VAC, ±10%
Power Consumption	3VA
INPUT RATINGS	
Current Sinking	10KΩ, 5% Resistor pull-up to (9.0 - 16DCV) ±10%
Current Sourcing	5.1KΩ, 5% Resistor pull-down to common
Minimum Pulse Width	~5µs
Low Pass Filter	<200Hz
Low Bias	VLT = 1.6V ±10% VUT = 3.6V ±10%
High Bias	VLT = 5.0V ±10% VUT = 7.0V ±10%
Count Rate	20KHz (Pulse Max) 5KHz (Quadrature X4 Max)
Maximum Voltage Input A, B, and User	30DCV (Max)
INPUT	
User Input	(Rate channel reset) Count on the rate channel is reset when the User Input is pulled low.
Standard Input	VLT ≦0.2 DCV guaranteed low, VUT = 3.0 DCV(max)
Quadrature Input	VLT ≦ 0.9 DCV VUT =3.15 DCV (max)
ENVIRONMENTAL	
Operating Temp.	0°C to +40°C
Storage Temp.	-10 °C to +60°C
Relative Humidity	0-80% non-condensing for temperatures less than 32°C, decreasing linearly to 50% at 40°C
Ambient Temperature	25°C
Temp. Coefficient (per °C)	±100ppm/ °C
Warmup Time	15 minutes
MECHANICAL	
Bezel	3.93" x 2.04" x .52" (99.8mm x 51.8mm x 13.2mm)
Depth	3.24" (82.3mm)
Panel Cutout	3.62" x 1.77" (92mm x 45mm)
Case Material	PBT-ABS
Weight	9oz (255.1g)

Ordering Information



S664 Frequency Counter

- ***Easily programmed from the front panel***
- ***Remote Reset capability***
- ***Input variety: Quadrature, Switch, TTL, CMOS, NAMUR, PNP, NPN***
- ***Software functions include:***
  - ***Password***
  - ***Set Point Programming***
  - ***Display Scaling***
  - ***Decimal Point Selection***

This counter offers a wide input frequency range from 1Hz to 35KHz, and four display ranges of 99.99Hz, 999.9Hz, 9999Hz, and 35KHz.

The easiest to use counter in the S660 counter series, the S664 offers 12 DCV, 100mA sensor excitation and requires no programming to use.

After the counter is mounted and wired, selecting the appropriate frequency range is the only setup required. One of four frequency ranges may be selected to measure from 1Hz to 35KHz.

Mounting Requirements

The S660 series 1/8 DIN counters require a panel cutout of 1.77" (45mm) high by 3.62" (92mm) wide. To install the counter into a panel cutout, remove the clips from the side of the meter. Slide the meter through your panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure a proper fit.

MADE IN THE USA
www.simpsonelectric.com

Panel Cutout Dimensions on page A23

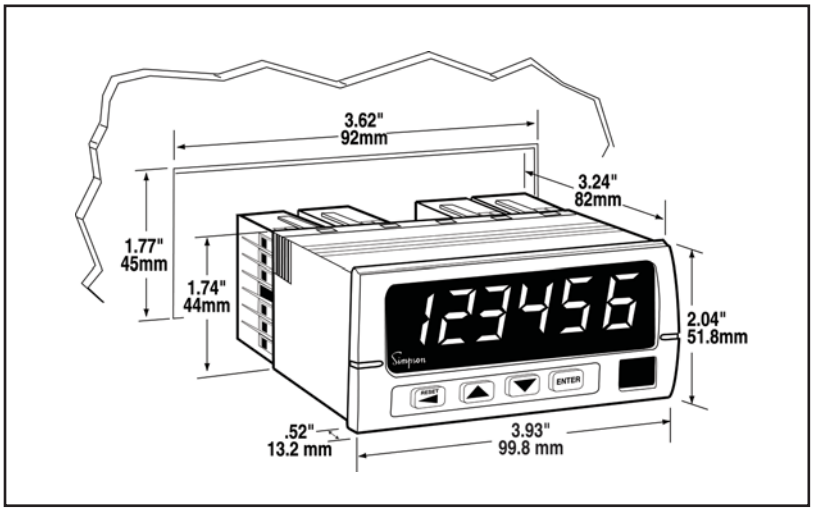
Specifications

DISPLAY	
Type	4-digit, 7-segment, red LED
Height	0.56" (14.2mm)
Decimal Point	Position according to scale selection
Count Direction	"+" indication implied, "-" indication displayed
Display Range	-999 to +9999
Output Indicators	1 and 2
POWER REQUIREMENTS	
AC Voltages	120, 240VAC, ±10%
Power Consumption	3VA
INPUT RATINGS	
Current Sinking	10KΩ, 5% Resistor pull-up to (9.0 - 16DCV) ±10%
Current Sourcing	5.1KΩ, 5% Resistor pull-down to common
Minimum Pulse Width	~2µs
Low Pass Filter	<200Hz
Low Bias	VLT = 1.6V ±10% VUT = 3.6V ±10%
High Bias	VLT = 5.0V ±10% VUT = 7.0V ±10%
Count Rate	35KHz (Pulse Max) 8.75KHz (Quadrature X4 Max)
Maximum Voltage Input A, B, and User	30DCV (Max)
ENVIRONMENTAL	
Operating Temp.	0°C to +40°C
Storage Temp.	-10°C to +60°C
Relative Humidity	0-80% non-condensing for temperatures less than 32°C, decreasing linearly to 50% at 40°C
Ambient Temperature	25°C
Temp. Coefficient (per °C)	±100ppm/ °C
Warmup Time	15 minutes
MECHANICAL	
Bezel	3.93" x 2.04" x .52" (99.8mm x 51.8mm x 13.2mm)
Depth	3.24" (82.3mm)
Panel Cutout	3.62" x 1.77" (92mm x 45mm)
Case Material	PBT-ABS
Weight	9oz (255.1g)

Ordering Information

	–		–		–		–		–	
Basic Unit		**Power Supply**		**Input**		**Output**		**Excitation**		**Other**
S664		120 ACV 1 240 ACV 2		Standard 1 Quadrature 2		None 0		None 0 12DCV 1 100mA Max Current		None 0

Dimensions - S660, S661, S662, S663, S664



Accessories

Chariot

The Chariot is used to mount most cube-style quadrature encoders and measuring wheels. Made of anodized aluminum, the chariot includes mounting hardware and selectable pivotal points. Wheels, tires, and flexible shaft couplings are sold separately.

Catalog No. 46012

Flexible Shaft Couplings

The one-piece flexible coupling connects the shaft of a cube-style encoder to an ancillary equipment shaft without worry of misalignment of rotary frequency. The coupling ensures minimum windup, minimum rotary oscillation, and no hysteresis.

Description	Catalog No.
Coupling: For connecting an encoder to a 3/8" shaft	46002
Coupling package: For connecting an encoder to 1/4" or 5/16" diameter shaft*	46003

*Package includes: One flexible coupling (1/2" I.D.) and three reducing inserts (1/4", 5/16", 3/8").

A Simpson 12" anodized aluminum measuring wheel is the right choice to complete the setup of a length measurement system. Whether the application requires one or two, Simpson's measuring wheels will perform accurately and reliably throughout the measuring process. Also included on the measuring wheel is a printed alignment scale which assists in the installation and measurement of the length measurement system. Simpson offers four replaceable durometer tires that consist of a black tire that has a longer life span and three non marking tires. The three non marking tires are for delicate materials such as plastics, textiles, wood, metal and paper to prevent tearing, damage or marking of delicate materials.

Tire Durometer	Catalog No.
80A, black tire; longer service life for plastics, metals	46004
83A, non-marking tire for textiles, medium textures	46005
92A, non-marking tire for plastics, metals, coarse wood	46006
70A, non-marking tire for soft textiles	46007

SE Quadrature Dual Shaft Encoder

The SE Quadrature Dual-Shaft Encoders combine the most routinely-used features in one standard device, and are available with a selection of five different resolutions (pulses/revolution).
The cube-style unit uses an infrared light source and precision mechanical components to provide exact, repeatable counts. Mounting the encoder is quick and easy using the pre-drilled holes in the base flange, or the housing mounting holes located at each shaft output. This encoder can be used as a direct replacement for other brand encoders, with no blind holes to drill. The double-ended, flat-keyed shaft permits a choice of mounting positions. Chrome steel bearings provide 20% longer life than stainless steel bearings.
To aid in troubleshooting, LEDs are located directly on the body to instantly verify correct output operation. Quadrature output is standard and can be externally scaled to provide any engineering unit (RPM, angular position, feet/min., etc.). Gold-plated connectors ensure maximum signal transfer. Very low power consumption; typical current draw, 35mA @ 15DCV.

Specifications

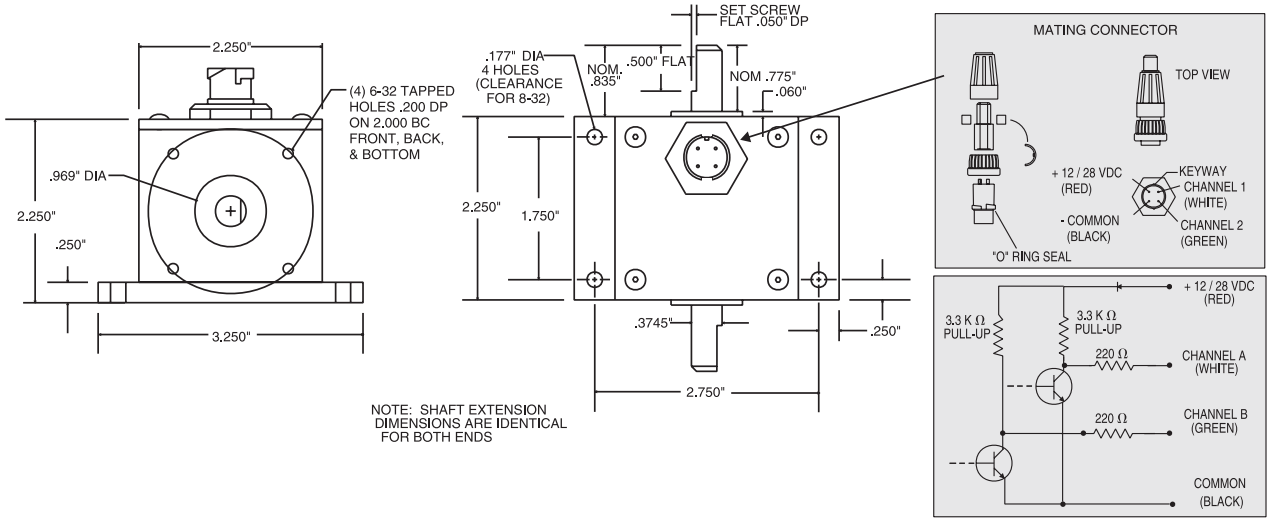
DISPLAY
System OK LED,
operation/verification on trouble
shooting aid
INPUTS
12-28 DCV - 35mA@ 15DCV typical
High noise immunity
Short circuit protection
Reverse polarity protection
OUTPUT
Square wave with 50%
duty cycle 0 - 10,000 pulse/sec.
MECHANICAL
Housing--rugged anodized aluminum
Shaft Rotation--either direction
Shaft Speed--6,000 RPM max.
Shaft--stainless steel
Bearings--heavy-duty chrome steel
Load--30lbs. radial; 10lbs. axial
ENVIRONMENTAL
32°F to149°F (0-65°C)

Ordering Information

SE Quadrature Encoders

Pulses Per Revolution	Catalog No.
60	SE-060
100	SE-100
120	SE-120
360	SE-360
600	SE-600

Installation and Wiring



Analog Panel Meters

Simpson Electric offers a wide range of reliable and durable analog panel meters to fulfill your application requirements. Our products continue to set the standard for quality with each of our analog panel meter families.

Century

- *Rugged black plastic case*
- *Glass window for optimum viewing*

Wide - Vue

- *Clear, acrylic window for wide angle visibility*
- *Black spade pointer for easy distant viewing*

Round / Rectangular

- *Popular replacement style meter*
- *Rugged black plastic case*

Tru - Vue

- *Modern, clear acrylic case updates panel design*
- *Black knife-edge pointer for precision reading*

Designer

- *Red knife-edge pointer for precision readability*
- *Clean, uncluttered design offers maximum readability in minimum required height*

Rugged Seal

- *Splash-proof and sealed against moisture, dust and dirt*
- *Zero adjust and electrical terminals are o-ring sealed*

250⁰ Long Scale

- *More than double the scale length*
- *Phenolic and shielded metal cases*

Rugged Seal Controller

- *Use in control, alarm and limit applications*
- *Single or dual set point versions available*

Wide-Vue Style Analog Panel Meters

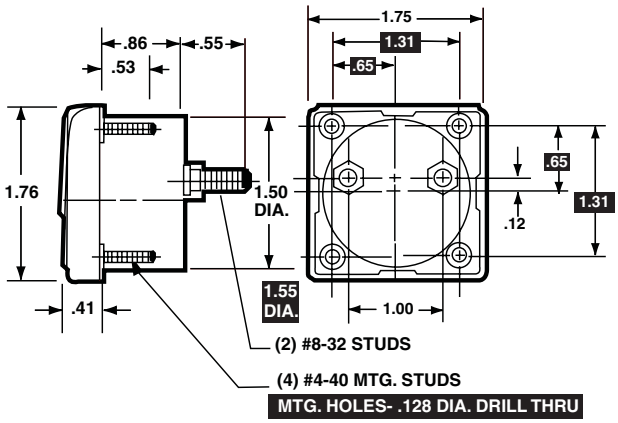
- ***Clear acrylic window for wide angle visibility***
- ***Rugged black plastic case***
- ***Black spade pointer for easy distant reading***
- ***Optional behind-panel mounting bezel kit***

Specifications

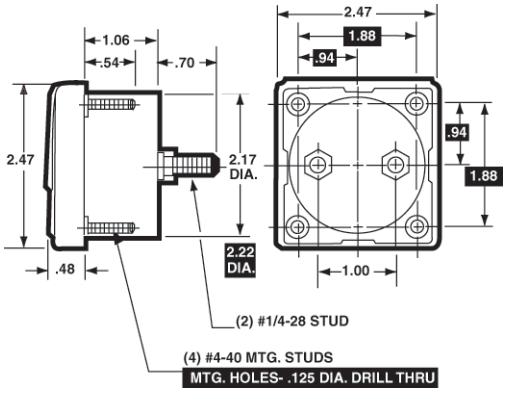
Accuracy:	±2% F.S. (Iron-Vane), ±3 F.S. (Rectified)
Movement:	Models 1212, 1212T: Small core magnet Models 1247, 1347, 1349: Annular, rectifier Models 1257, 1357, 1359: Iron-vane, magnetically damped
Tracking:	±3%
Shielding:	Calibration is unaffected by magnetic panel mounting.
Response Time:	1.5 seconds maximum
Overload (1 sec.):	10 times F.S.
Overload (Continuous):	1.5 times F.S.
Repeatability:	2%: AC Current, DC Process 3%: AC Voltage, DC Voltage, Wattmeters 0.5%: DC Current
Dial:	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Resistance:	±15% of meter impedance
Operating Temperature:	-4°F to +149°F (-20°C to +65°C)
Case:	High density black plastic
Pointer:	Model 1212: Black lance; All other models: Spade with black matte finish
Scale Length:	Model 1212, 1212T: 1.50" (38.1mm); Model 1227, 1227T, 1247, 1257: 2.3" (58.4mm) Model 1327, 1327T, 1347, 1357, 1377: 3.14" (79.9mm); Model 1329, 1329T, 1349, 1359, 1379: 3.93" (100mm)
Net Weight:	Model 1212, 1212T: 2oz (0.06kg); Model 1257: 4 oz. (0.11kg) Model 1359: 5 oz. (0.14kg) Model 1227, 1227T: 6oz (0.17kg) Model 1327, 1327T, 1347: 8oz (0.23kg); Model 1329, 1329T, 1349, 1377: 9oz (0.26kg) Model 1379: 10 oz.(0.28kg)

Dimensions

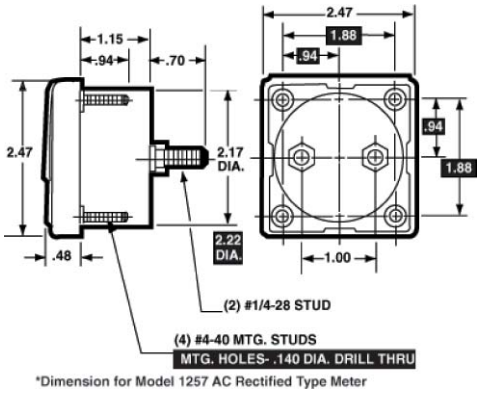
1-1/2"-Model 1212, 1212T



2-1/2" - Model 1287

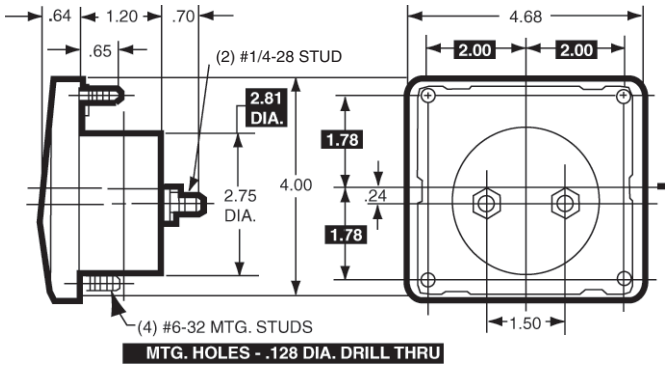


2-1/2"-Model 1227, 1227T, 1247, 1257

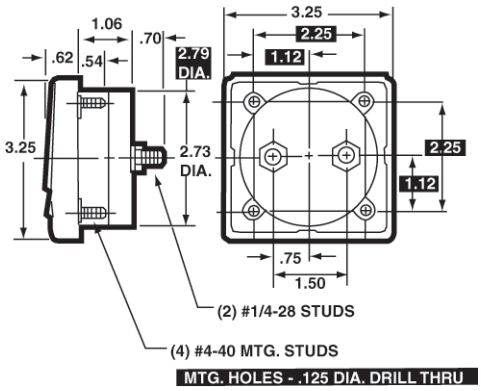


*Dimension for Model 1257 AC Rectified Type Meter

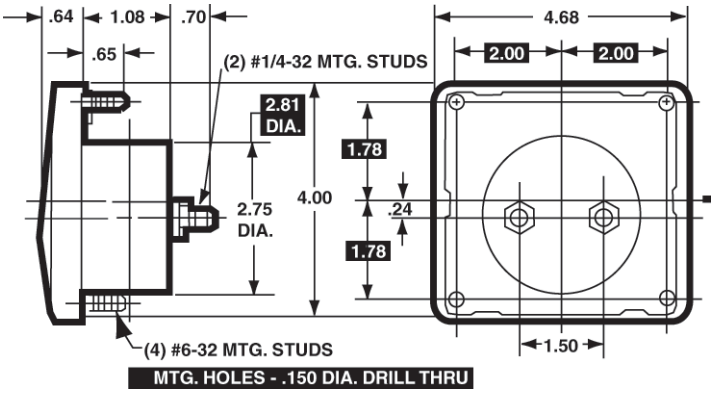
4-1/2"-Model 1329, 1329T, 1349, 1359



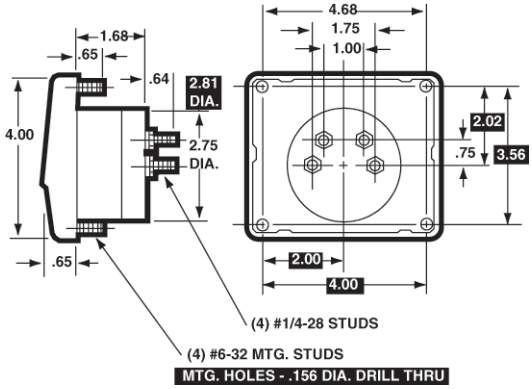
3-1/2"-Model 1387



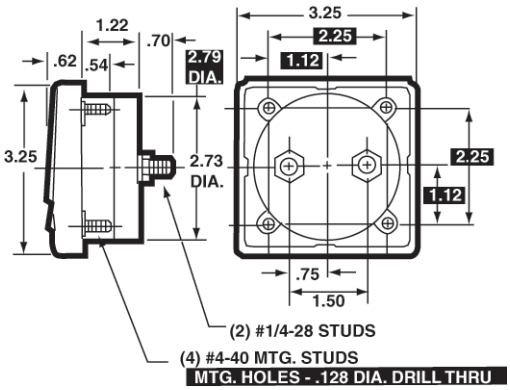
4-1/2"-Model 1389



4-1/2" Model 1379



3-1/2"-Model 1327, 1327T, 1347, 1357



Ordering Information

AC Milliammeters, Iron Vane Movement,

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 1257	3-1/2" Model 1357	4-1/2" Model 1359
0-10	1,650	06294	06625	06665
0-50	80	06295	06630	06670
0-100	17.2	06296	06640	06680
0-250	3.15	06297	06650	06690
0-500	0.9	06300	06660	06699
0-1000	.213	<>	35065	<>

<> Available on special order

AC Ammeters, Iron Vane Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 1257	3-1/2" Model 1357	4-1/2" Model 1359
0-1	.213	02560	03130	03260
0-1.5	.105	02570	03140	03270
0-2	.065	<>	03150	03280
0-3	.025	02575	03160	03290
0-5	.008	02580	03170	03300
0-10	.004	02590	03180	03310
0-10	.008	<>	35073*	35077*
0-15	.0025	02599	03190	03320
0-25	.002	02609	03200	03330
0-25	.008	<>	35074*	35078*
0-30	.0015	02615	03205	03335
0-50	.001	02619	03210	03340
0-50	.008	<>	35075*	35079*
0-75	.0002	<>	03215	03345
0-75	.008	<>	35076*	35080*
0-100	.008	02622*	03220*	03350*
0-150	.008	02624*	03230*	03360*
0-200	.008	02626*	03240*	03370*
0-300	.008	02627*	03250*	03380*

<> Available on special order
* These meters require use of an external current transformer from page C5.

AC Voltmeters, Iron Vane Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 1257	3-1/2" Model 1357	4-1/2" Model 1359
0-5	33	<>	10160	10260
0-10	133	09670	10170	10270
0-15	300	09675	10180	10280
0-25	833	09680	10190	10290
0-50	3,333	09690	10200	10300
0-100	16,333	09695	10210	10310
0-150	25,000	09700	10220	10320
0-250	41,166	09705	10230	10330
0-300	50,000	09710	10240	10340
0-500	83,333	09715*	10250	10350*

<> Available on special order
* External multipliers (model 183) are furnished on AC meters having a range of 500 volts or higher

AC Voltmeters Rectified, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 1247	3-1/2" Model 1347	4-1/2" Model 1349
0-5	2000 Ohms Per Volt	10015	10020	10090
0-10		10016	10030	10100
0-15		<>	10040	10110
0-50		<>	10050	10120
0-150		10017	10060	10130
0-300		10018	10070	10140

<> Available on special order

DC Microammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 z	Model/Size and Catalog Number			
		1-1/2" Model 1212	2-1/2" Model 1227	3-1/2" Model 1327	4-1/2" Model 1329
0-50	1800(5500)*	04294	04310	04380	04480
0-100	1800	04295	04320	04390	04490
0-200	1100	04296	04330	04400	04500
0-500	90(190)*	04297	04340	04410	04510
25-0-25	1800	04298	<>	04420	04520
50-0-50	1800(5500)*	04302	04350	04430	04530
100-0-100	1100	04300	04351	04440	04540
500-0-500	43	04301	04352	04450	04550

<> Available on special order
* Impedance of Model 1212 shown in ( ).

DC Taut Band Microammeters, Iron Vane Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number			
		1-1/2" Model 1212T	2-1/2" Model 1227T	3-1/2" Model 1327T	4-1/2" Model 1329T
0-5	5750	<>	<>	04358	04458
0-10	4900	<>	04303	04359	04459
0-15	1960(5500)*	04601	04304	04361	04461
0-25	1960	04602	04306	04371	04471
0-50	960	04603	04311	04381	04481
0-100	500	04604	04321	04391	04491
0-200	234	04605	04331	04401	04501

<> Available on special order

Ordering Information

DC Milliammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 1212	2-1/2" Model 1227	3-1/2" Model 1327	4-1/2" Model 1329
0-1	43.0	06163	06175	06310	06470
0-3	2.0	<>	06180	06320	06480
0-5	2.0 (20)†	06164	06190	06330	06490
0-10	10.0 (2.2)†	06165	06200	06340	06495
0-15	6.6 (2.2)†	06166	06210	06350	06502
0-20	5.0	<>	06215	06360	06524
0-25	4.0 (6.0)†	06167	06220	06370	06530
0-50	2.0 (3.0)†	06168	06230	06380	06540
0-100	1.0 (1.5)†	06169	06240	06390	06550
0-150	.66 (1.0)†	06170	06250	06400	06560
0-200	.50 (.75)†	06171	06260	06410	06570
0-250	.40 (.60)†	06172	06270	06420	06580
0-300	.33 (.50)†	06173	06280	06430	06590
0-500	.20 (.30)†	06174	06290	06440	06600
0-750	.13	<>	<>	06450	06610
0-1000	.05	<>	06292	06460	06620

† Impedance of Model 1212 shown in ( )
<> Available on special order

DC Ammeters, Self Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 1212	2-1/2" Model 1227	3-1/2" Model 1327	4-1/2" Model 1329
0-1	.050	02431	02440	02640	02820
0-1.5	.033	<>	02450	02650	02830
0-2	.025	02432	02460	02660	02840
0-3	.0166	02433	02470	02670	02850
0-5	.010	02434	02480	02680	02860
0-10	.005	02435	02490	02690	02870
0-15	.0033*	02436†	02500	02700	02880
0-25	.0020*	02437†	02510	02710	02890
0-30	.0017	<>	02520	02720	02900
0-50	.001*	02438†	02530	02730	02910
0-100	10.0	<>	02540†	02740†	02920†
0-150	10.0	<>	02550†	02750†	02930†
0-200	10.0	<>	02552†	02760†	02940†
0-300	10.0	<>	02554†	02770†	02950†
0-500	10.0	<>	<>	02780†	02960†
15-0-15	.0033	<>	<>	02790	<>
30-0-30	.0017	<>	<>	02800	<>
50-0-50	.001	<>	<>	02810	<>

† 1-1/2" DC current meters are self-contained through 10 amps. 15 amps and higher are supplied as 50mV meters to be used with external shunts. 2-1/2", 3-1/2" and 4-1/2" DC current meters are self-contained through 50 amps. Higher range DC current meters are 50mV meters to be used with external shunts.
<> Available on special order.
*Model 1212 only - 10 ohms

Wattmeters/Dynamometer Type, Not UL

Range	Maximum Volts	Maximum Amps	Model/Size and Catalog Number 4-1/2" Model 1379
0-10	150	.175	10930*
0-20	150	.400	10940*
0-75	150	1.0	10960
0-150	150	2.0	10970
0-300	150	4.0	10975
0-600	300	4.0	10980
0-750	150	10.0	10990
0-1500	300	10.0	11000
0-3000	300	20.0	11010

* Compensated wattmeters: calibrated for either magnetic or non-magnetic panels and for a frequency of 25-125Hz.

DC Millivoltmeters, Self Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 1212	2-1/2" Model 1227	3-1/2" Model 1327	4-1/2" Model 1329
0-50	10.0	07005	07010	07020	07030
50-0-50	20.0	<>	<>	07021	07031

<> Available on special order.

DC Voltmeters, Self Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 1212	2-1/2" Model 1227	3-1/2" Model 1327	4-1/2" Model 1329
0-5	1000 ohms per volt	09540	09550	09720	09870
0-8		<>	<>	09730	09880
0-10		09541	09560	09740	09890
0-15		09542	09570	09750	09900
0-25		09543	09580	09760	09910
0-30		09544	09590	09770	09920
0-50		09545	09600	09780	09930
0-100		09546	09610	09790	09940
0-150		09547	09620	09800	09950
0-200		<>	09622	09810	09960
0-250		<>	09623	09820	09970
0-300		<>	09630	09830	09980
0-300	2000 ohms per volt	09548	<>	<>	<>
0-500		09549*	09640	09840	09990
0-750		<>	09650*	09850	10000
0-1000		<>	09660*	09860*	10010*

*External multipliers (Model 183) are furnished on 1-1/2" DC meters 500 volts or higher; on 2-1/2" DC meters 750 volts or higher; and on 3-1/2" and 4-1/2" DC meters 1000 volts or higher. All others have self-contained multipliers.
<> Available on special order.

Percent Motor Load Meters

Type	Rating	Model/Size and Catalog Number 3 -1/2" Model #	Catalog #	4 -1/2" Model #	Catalog #
DC (Note 1)	30mV	1327	07028	1329	07029
AC (Note 2)	5 amps	1357	03171	1359	03301

Note 1: DC load meters require an external shunt and potentiometer (not supplied). Use 8 to 10Ω, 2 watt wire-wound potentiometer. The appropriate shunt should be selected from accessory section and ordered separately. To select the proper shunt, first obtain the full-load current rating of your motor from the name plate, manufacturer's specifications of N.E.C. listing. Multiply that rating by 1.25 and select and order the shunt with an amps rating as large or slightly larger than the calculated value. Installation and calibration instructions are included with the meter.
Note 2: AC load meters must be used with external donut transformers. Complete instructions for proper selection are included with each AC load meter. Advance assistance in selecting the appropriate transformer and determining the correct primary/secondary turns ratio can be obtained from a Simpson technical service representative or authorized service center.

4-20mA Process Meters

Size	Scale	Model	Catalog No.
3-1/2"	0-100%	1327	35025
4-1/2"	0-100%	1329	35026

Frequency Meters, Self-Shielding Movement

Range	Voltage	Model/Size and Catalog Number 2-1/2" Model 1287	3-1/2" Model 1387	4-1/2" Model 1389
45-55 Hz	120V	35100	35106	35112
55-65Hz	120V	35102	35108	35114
380-420 Hz	120V	35104	35110	35116
45-55 Hz	240V	35101	35107	35113
55-65Hz	240V	35103	35109	35115
380-420 Hz	240V	35105	35111	35117

- ***Glass window for optimum viewing***
- ***Rugged black plastic case***
- ***Black knife-edge pointer for precision reading***

Frequency Meter Specifications

Accuracy	45-55Hz ±0.3Hz (120V-240V) 55-65Hz ±0.3Hz (120V-240V) 380-420Hz ±1.2Hz (120V-240V)
Movement	Small core magnet, self-shielding
Suspension	Pivot and jewel
Tracking	±3%
Shielding	Calibration is unaffected by magnetic panel mounting.
Center Scale Value	50/60/400Hz
Power Consumption	1.6VA
Max. Input Voltage (10 sec)	150, 120V normal 280, 240V normal
Dial	Each dial arc is calibrated to track the specific type of movement used.
Operating Temperature	-4°F to +149°F (-20°C to +65°C)
Case	High density black plastic
Pointer	Knife-edge, with black matte finish
Scale Length	Model 2182: 1.88" (47.2mm) Model 2183: 2.48" (63.0mm) Model 2184: 3.68" (93.5mm)
Net Weight	Model 2182: 5oz (0.14kg) Model 2183: 6oz (0.17kg) Model 2184: 9oz (0.26kg)
Warm-up Time	5 minutes

Watt Meter Specifications

Accuracy	±2% F.S.; Compensated Meters: ±3% F.S.
Movement	Dynamometer
Suspension	Pivot and jewel
Tracking	±3%
Shielding	Calibration is unaffected by magnetic panel mounting.
Response Time	1.5 seconds maximum
Overload (1 sec.)	10 times F.S.
Overload (Continuous)	1.5 times F.S.
Repeatability	2%
Dial	Each dial arc is calibrated to track the specific type of movement used. ±15% of meter impedance
Resistance	-4°F to +149°F (-20°C to +65°C)
Operating Temperature	High density black plastic
Case	Knife-edge, with black matte finish
Pointer	Model 2173: 2.48" (63.0mm) Model 2174: 3.68" (93.5mm)
Scale Length	Model 2173: 9oz (0.26kg) Model 2174: 13oz (0.37kg)
Net Weight	

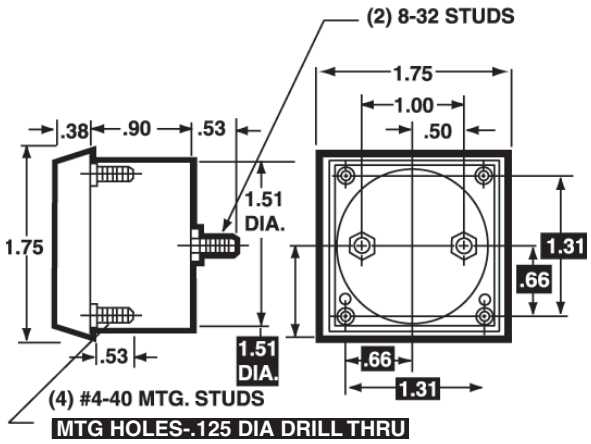
Specifications for other meters

Accuracy	±2% F.S. Iron Vane, ±3% F.S. Rectified
Movement	Models 2152, 2153, 2154: Iron-vane, magnetically damped. 2121 and 2121T: small core magnet, all others Annular, self-shielding
Suspension	Pivot and jewel except for "T" models which have taut band movement
Tracking	±3%
Shielding	Calibration is unaffected by magnetic panel mounting.
Response Time	1.5 seconds maximum
Overload (1 sec.)	10 times F.S.
Overload (Continuous)	1.5 times F.S.
Repeatability	2% pivot and jewel, 0.5% taut band
Dial	Each dial arc is calibrated to track the specific type of movement used.
Resistance:	±15% of meter impedance
Operating Temperature	-4°F to +149°F (-20°C to +65°C)
Case	High density black plastic
Pointer	Knife-edge, with black matte finish
Scale Length	Model 2121 & 2121T: 1.25" (31.7mm) Model 2152: 1.86" (47.2mm) Model 2122, 2122T, 2142: 2.07" (52.7mm) Model 2153: 2.48" (63.0mm) Model 2123, 2123T, 2143: 2.75" (69.8mm) Model 2154: 3.68" (93.5mm) Model 2124, 2124T, 2144: 4.09" (103.9mm)
Net Weight	Model 2121 & 2121T: 2oz (0.06kg) Model 2152: 5oz (0.14kg) Model 2153: 6oz (0.17kg Model 2122, 2122T, 2142: 7oz (0.20kg) Model 2123, 2123T, 2143: 8oz (0.23kg) Model 2154: 9oz (0.26kg) Model 2124, 2124T, 2144: 11oz (0.31kg)

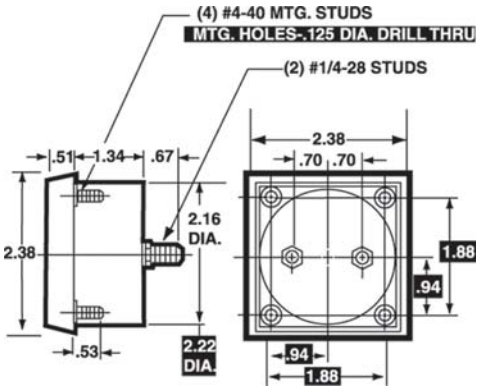
Dimensions

1 = Panel Meter Cut-out Dimensions

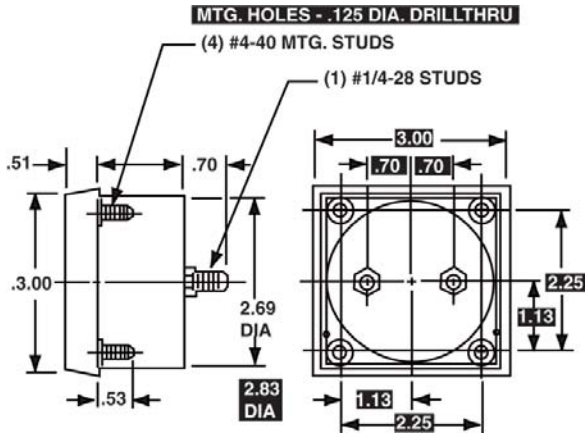
1-1/2"-Models 2121, 2121T, 2141,



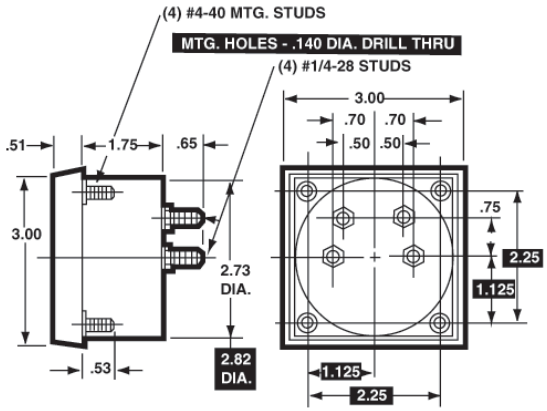
2-1/2"-Models 2122, 2122T, 2142, 2152,2182



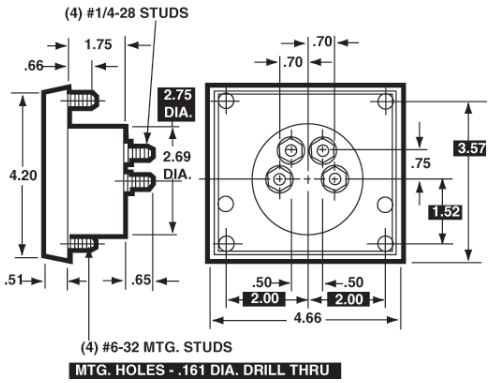
3-1/2"-Models 2123, 2123T, 2143, 2153, 2183



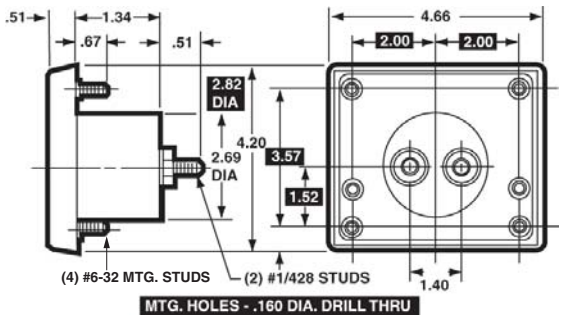
3-1/2"-Model 2173



4-1/2"-Model 2174



4-1/2"-Model 2124, 2124T, 2144, 2154, 2184



Ordering Information

AC Milliammeters, Iron-Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2152	3-1/2" Model 2153	4-1/2" Model 2154
0-10	1,650	17680	<>	17760
0-50	80	17681	17716	17761
0-100	17.2	17682	17717	17762
0-250	3.15	17683	17718	17763
0-500	0.9	17684	17719	17764

AC Ammeters, Iron-Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2152	3-1/2" Model 2153	4-1/2" Model 2154
0-1	.213	17665	17695	17740
0-1.5	.105	17666	< >	< >
0-2	.065	<>	17697	17742
0-3	.028	17667	17698	17743
0-5	.008	17668	17699	17744
0-10	.004	17669	17700	17745
0-10	.008	<>	35081†	35085†
0-15	.0025	17670	17701	17746
0-25	.002	17671	17702	17747
0-25	.008	<>	35082†	35086†
0-30	.0015	17672	17703	17748
0-50	.001	17673	17704	17749
0-50	.008	<>	35083†	35087†
0-75	.0002	<>	17710	17755
0-75	.008	<>	35084†	35088†
0-80	.008	<>	35036†	< >
0-100	.008	17674†	17706†	17751†
0-150	.008	<>	17707†	17752†
0-200	.008	<>	17708†	17753†
0-300	.008	<>	17709†	17754†

<> Available on special order.

†These meters are 5-amp meters, to be used with an external current transformer.

AC Dual Range Ammeter/Voltmeter, Iron-Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2152	3-1/2" Model 2153	4-1/2" Model 2154
0-150V 0-5A	15,030 0.021	-	17694	17739

AC Voltmeters, Iron-Vane Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2152	3-1/2" Model 2153	4-1/2" Model 2154
0-5	33	< >	17725	< >
0-10	133	17685	17726	17771
0-15	300	17686	17727	17772
0-25	833	17687	17728	17773
0-50	3,333	17688	17729	17774
0-100	16,666	< >	17730	17775
0-150	25,000	17690	17731	17776
0-250	41,166	17691	17732	17777
0-300	50,000	17692	17733	17778
0-500†	83,333	< >	17734†	17779†

† External multipliers, Model 183 are furnished on AC meters having a range of 500 volts or higher. All others have self-contained multipliers.

<> Available on special order.

AC Voltage Meters Rectifier Type, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2142	3-1/2" Model 2143	4-1/2" Model 2144
0-5	2000 ohms per volt	17460	17542	17640
0-10		< >	17543	17641
0-15		< >	17544	17642
0-50		< >	17545	17643
0-150		17462	17546	17644
0-300		< >	< >	17645

<> Available on special order.

DC Milliammeters, Self-Shielding Movement

Range	Approx. Impedance (0hms)@ 60 Hz	Model/Size and Catalog Number			
		1-1/2" Model 2121	2-1/2" Model 2122	3-1/2" Model 2123	4-1/2" Model 2124
0-1	43.0	17825	17430	17510	17600
0-3	2.0	<>	17431	17511	17601
0-5	2.0 (20)†	17826	17432	17512	17602
0-10	10.0 (2.2)†	17827	17433	17513	17603
0-15	6.6 (2.2)†	17828	17434	<>	<>
0-20	5.0	<>	<>	17515	<>
0-25	4.0 (6.0)†	17829	17436	17516	17606
0-50	2.0 (3.0)†	17830	17437	17517	07607
0-100	1.0 (1.5)†	17832	17438	17518	07608
0-150	.66 (1.0)†	17833	17439	17519	17609
0-200	.50 (.75)†	17834	17440	17520	17610
0-250	.40 (.60)†	17835	17441	17521	17611
0-300	.33 (.50)†	17836	17442	17522	17612
0-500	.20(.30)†	17837	17443	17523	17613
0-750	.13	<>	<>	17524	17614
0-1000	.05	<>	17444	<>	17615

<> Available on special order.
† Resistances of Model 2121 shown in ( )

DC Microammeters, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number			
		1-1/2" Model 2121	2-1/2" Model 2122	3-1/2" Model 2123	4-1/2" Model 2124
0-50	1800 (5500)*	17815	17418	17499	17589
0-100	1800	17816	17420	17501	17591
0-200	1100	17818	17422	17503	17593
0-500	90 (190)*	17819	17424	17505	17595
25-0-25	1800 (5500)*	17820	<>	17506	17596
50-0-50	1800	17821	17425	17507	17597
100-0-100	1100	17822	17426	17508	17598
500-0-500	43	17823	35063	17509	17599

* Resistances of Model 2121 shown in ( ).

<> Available on special order.

Taut Band DC Microammeters, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2122T	3-1/2" Model 2123T	4-1/2" Model 2124T
0-5	5750	-	17495	17585
0-10	4900	17415	17496	17586
0-15	1960	17416	17497	17587
0-25	1960	17417	17498	17588
0-50	960	17419	17500	17590
0-100	500	17421	17502	17592
0-200	234	17423	<>	17594

<> Available on special order

DC Ammeters, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number			
		1-1/2" Model 2121	2-1/2" Model 2122	3-1/2" Model 2123	4-1/2" Model 2124
0-1	.050	17800	17400	17475	17565
0-1.5	.003	<>	17401	17476	<>
0-2	.025	17801	17402	17477	17567
0-3	.0166	17802	17403	17478	17568
0-5	.010	17803	17404	17479	17569
0-10	.005	17805	17405	17480	17570
0-15	.0033	17806†	17406	17481	17571
0-25	.0020	17807†	17407	17482	17572
0-30	.0017	<>	17408	17483	17573
0-50	.001	17808†	17409	17484	17574
0-100	10.0	<>	17410†	17485†	17575†
0-150	10.0	<>	<>	17486†	17576†
0-200	10.0	<>	17412†	17487†	17577†
0-300	10.0	<>	-	17488†	17578†
0-500	10.0	<>	-	17489†	17579†
2-0-2	.025	<>	-	35064	-
5-0-5	.010	<>	-	35072	-
15-0-15	.0033	<>	-	17490	-
30-0-30	.0017	<>	-	17491	-

†1-1/2" DC current meters are self-contained through 10 amps; higher ranges are supplied as 50mV meters and require an external shunt from page C3. 2-1/2", 3-1/2" and 4-1/2" meters are self-contained through 50 amps. Higher ranges are 50 mv and require use of an external shunt from page C3.

Wattmeters/Dynamometer Type, Not

Range	Maximum		Model/Size and Catalog Number	
	Volts	Amps	3-1/2" Model 2174	4-1/2" Model 2174
0-10	150	.175	17875*	17890*
0-20	150	.400	17876	17891*
0-30	150	0.650	17877*	17892*
0-30	300	0.300	17879*	17894*
0-50	300	0.500	17880*	17895*
0-75	150	1.0	17881	17896
0-150	150	2.0	17882	17897
0-300	150	4.0	17883	17898
0-600	300	4.0	17884	17899
0-750	150	10.0	17885	17900
0-1500	300	10.0	17886	17901
0-300	300	20.0	17887	17902

* Compensated wattmeters: calibrated for either magnetic or non-magnetic panels and for a frequency of 25-125Hz.

Percent Motor Load Meters, Self-shielding Movement

Type	Rating	Model/Size and Catalog Number			
		3-1/2" Model #	Catalog #	4-1/2" Model #	Catalog #
DC (Note 1)	30 mV	2123	17564	2124	17637
AC (Note 2)	5 amps	2153	17711	2154	17756

1. These DC meters require an external shunt from page C3, and an 8 to 10 Ω 2W wire-wound potentiometer (customer supplied).
2. These AC meters require use of a current transformer from page C5.

Frequency Meters, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2182	3-1/2" Model 2183	4-1/2" Model 2184
45-55 Hz	120V	3511B	35124	35130
55-65 Hz	120V	35120	35126	35132
380-420 Hz	120V	35122	35128	35134
45-55 Hz	240V	35119	35125	35131
55-65 Hz	240V	35121	35127	35133
380-420 Hz	240V	35123	35129	35135

DC Millivoltmeters, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 2122	3-1/2" Model 2123	4-1/2" Model 2124
0-5	10.0	17472	17540	17636
50-0-50	20.0	<>	17541	17635

<> Available on special order

DC Voltage Meters, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number			
		1-1/2" Model 2121	2-1/2" Model 2122	3-1/2" Model 2123	4-1/2" Model 2124
0-5		17840	17445	17525	17618
0-8		<>	<>	<>	17619
0-10		17842	17446	17527	17620
0-15		17843	17447	17528	17621
0-25		17844	17448	17529	17622
0-30		17845	17449	17530	17623
0-50	1000 ohms per volt	17846	17450	17531	17624
0-100		17848	17451	17532	17625
0-150		17849	17452	17533	17626
0-200		<>	<>	17534	17627
0-250		<>	<>	17535	<>
0-300		-	17455	17536	17629
0-300	2000 ohms per volt	17580	<>	<>	<>
0-500		17851*	17456	17537	17630
0-750		<>	<>	17538	17631
0-1000		<>	17458*	17539*	17322*

*External multipliers (Model 183) are furnished on 1-1/2" DC meters 500 volts or higher; on 2-1/2" DC meters 750 volts or higher; and on 3-1/2" and 4 - 1/2" DC meters 1000 volts or higher. All others have self-contained multipliers.
<> Available on special order.

Tru-Vue Style Analog Panel Meters

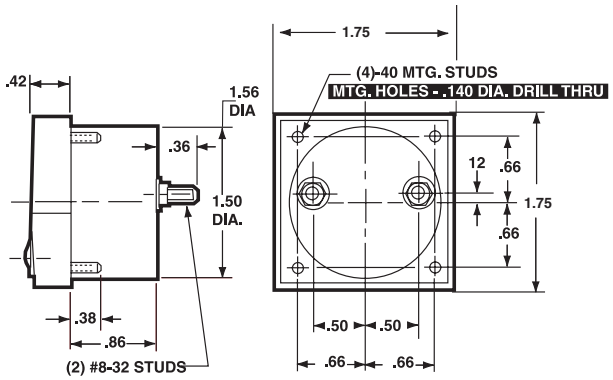
- ***Clear acrylic case updates panel design***
- ***Black knife-edge pointer for precision reading***
- ***Special colored scales or logos available***

Specifications

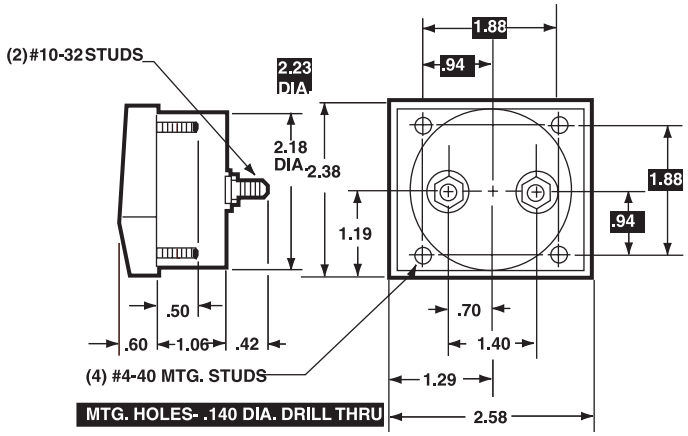
Accuracy:	±2% F.S. (iron vane), ±3% F.S. (rectifier)
Movement:	DC: Annular, self-shielding AC: Models 953 & 954: Iron-vane, magnetically damped others: Annular, rectified
Suspension:	Pivot and jewel or taut band
Tracking:	±3%
Repeatability:	2%, taut band: 0.5%
Shielding:	Calibration is unaffected by stray magnetic field or panel mounting.
Response Time:	1.5 seconds maximum above10mA.
Overload (1 sec.):	10 times F.S.
Overload (Continuous):	1.5 times F.S.
Dial:	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Operating Temperature:	-4°F to +149°F (-20°C to +65°C)
Resistance:	±15% of meter impedance
Case:	Clear plastic
Pointer:	Knife edge, black matte finish
Scale Length:	Models 921 & 941: 1.56" (39.62mm) Models 922 & 942: 2.40" (60.96mm) Model 953: 2.94" (74.68mm) Models 923 & 943: 3.27" (83.06mm) Model 954: 3.53" (89.66mm) Model 924: 3.92" (99.67mm)
Net Weight:	Models 921 & 941: 1.5oz (.04kg) Models 922 & 942: 4oz (.11kg) Models 923, 943 & 953: 6 oz (0.17kg) Models 924, 944 & 954: 8oz (0.23kg)

Dimensions

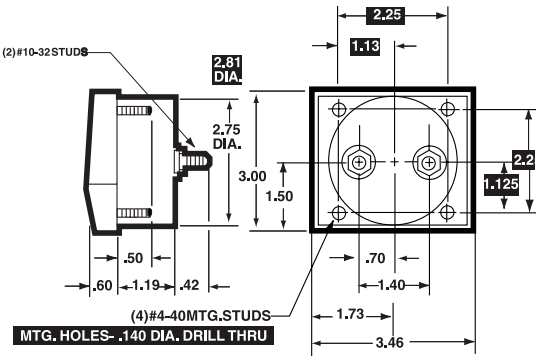
1-1/2"-Model 921, 921T, 941



2-1/2"-Model 922, 942

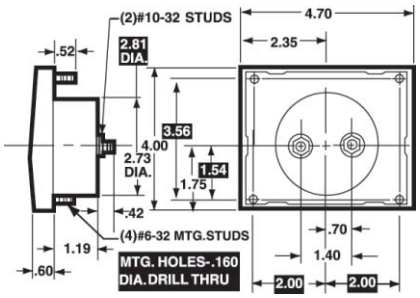


3-1/2"-Model 923, 923T, 943, 953



1 = Panel Meter Cut-out Dimensions

4 - 1/2"-Model 924, 924T, 944, 954



Ordering Information

AC Milliammeters, Iron Vane Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3-1/2" Model 953	4-1/2" Model 954
0-10	1650	TV3AMA010	TV4AMA010
0-50	80	TV3AMA050	TV4AMA050
0-100	17.2	TV3AMA100	TV4AMA100
0-150	7.16	TV3AMA150	TV4AMA150
0-250	3.15	TV3AMA250	TV4AMA250
0-500	0.9	TV3AMA500	TV4AMA500

AC Ammeters, Iron Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number	
		3-1/2" Model 953	4-1/2" Model 954
0-1	0.213	TV3AAA001	TV4AAA001
0-1.5	0.105	V3AAA1R5	TV4AAA1R5
0-2	0.065	TV3AAA002	TV4AAA002
0-3	0.028	TV3AAA003	TV4AAA003
0-5	0.008	TV3AAA005	TV4AAA005
0-10	0.004	TV3AAA010	TV4AAA010
0-15	0.0025	TV3AAA015	TV4AAA015
0-25	0.002	TV3AAA025	TV4AAA025
0-30	0.0015	TV3AAA030	TV4AAA030
0-50	0.001	TV3AAA050	TV4AAA050
0-75	0.008	TV3AAA075*	TV4AAA075*
0-100	0.008	TV3AAA100*	TV4AAA100*
0-150	0.008	TV3AAA150*	TV4AAA150*
0-200	0.008	TV3AAA200*	TV4AAA200*
0-300	0.008	TV3AAA300*	TV4AAA300*

* These meters require use of a current transformer from pages C4-C6

AC Voltmeters, Iron Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number	
		3-1/2" Model 953	4-1/2" Model 954
0-5	33	TV3AVV005	TV4AVV005
0-10	133	TV3AVV010	TV4AVV010
0-15	300	TV3AVV015	TV4AVV015
0-25	833	TV3AVV025	TV4AVV025
0-50	3333	TV3AVV050	TV4AVV050
0-100	16666	TV3AVV100	TV4AVV100
0-150	25000	TV3AVV150	TV4AVV150
0-250	41166	TV3AVV250	TV4AVV250
0-300	50000	TV3AVV300	TV4AVV300
0-500	25000	TV3AVV500*	TV4AVV500*
0-1000	25000	TV3AVV1TH*	TV4AVV1TH*

* AC Voltmeters with a range of 500V or higher require an external multiplier (model 183) from page C7

AC Voltmeters, Rectified, Self-shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number				
		1-1/2" Model 941	2-1/2" Model 942	3-1/2" Model 943	4 -1/2" Model 944	4" x 6" Model 926
0-5	2000 ohms per volt	TV1RVV001	TV2RVV005	TV3RVV005	TV4RVV005	TV64RVV005
0-10		TV1RVV005	TV2RVV010	TV3RVV010	TV4RVV010	TV64RVV010
0-15		TV1RVV010	TV2RVV015	TV3RVV015	TV4RVV015	TV64RVV015
0-20		TV1RVV020	TV2RVV020	TV3RVV020	TV4RVV020	TV64RVV020
0-25		TV1RVV025	TV2RVV025	TV3RVV025	TV4RVV025	TV64RVV025
0-50		TV1RVV050	TV2RVV050	TV3RVV050	TV4RVV050	TV64RVV050
0-100		TV1RVV100	TV2RVV100	TV3RVV100	TV4RVV100	TV64RVV100
0-150		TV1RVV150	TV2RVV150	TV3RVV150	TV4RVV150	TV64RVV150
0-200		TV1RVV200	TV2RVV200	TV3RVV200	TV4RVV200	TV64RVV200
0-250		TV1RVV250	TV2RVV250	TV3RVV250	TV4RVV250	TV64RVV250
0-300		TV1RVV300	TV2RVV300	TV3RVV300	TV4RVV300	TV64RVV300

DC Microammeters, Self-shielding movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number				
		1-1/2" Model 921	2-1/2" Model 922	3-1/2" Model 923	4 - 1/2" Model 924	4"X6" Model 926
0-50	1800 (5500)*	TV1DUA050	TV2DUA050	TV3DUA050	TV4DUA050	< >
0-100	1800	TV1DUA100	TV2DUA100	TV3DUA100	TV4DUA100	TV6DUA100
0-200	1100	TV1DUA200	TV2DUA200	TV3DUA200	TV4DUA200	TV6DUA200
0-500	90 (190)*	TV1DUA500	TV2DUA500	TV2DUA500	TV4DUA500	TV6DUA500
100-0-100	1100	TV1DUA1H1	TV2DUA1H1	TV3DUA1H1	TV4DUA1H1	TV6DUA1H1
500-0-500	43	TV1DUA5H5	TV2DUA5H5	TV3DUA5H5	TV4DUA5H5	TV6DUA5H5

* Resistance for 1/2" sizes shown in ( ).
< > available on special order

DC Taut-Band Microammeters, Self-shielding movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number				
		1 -1/2" Model 921T	2 -1/2" Model 922T	3 -1/2" Model 923T	4 -1/2" Model 924T	4" X 6" Model 926T
0-10	4900	-	TV2TUA010	TV3TUA010	TV4TUA010	< >
0-15	1960	-	TV2TUA015	TV3TUA015	TV4TUA015	< >
0-25	1960	-	TV2TUA025	TV3TUA025	TV4TUA025	< >
0-50	960	TV1TUA050	TV2TUA050	TV3TUA050	TV4TUA050	< >
0-100	500	TV1TUA100	TV2TUA100	TV3TUA100	TV4TUA100	TV6TUA100
0-200	234	TV1TUA200	TV2TUA200	TV3TUA200	TV4TUA200	TV6TUA200

< > available on special order

DC Milliammeters, Self-shielding movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number				
		1 -1/2" Model 921	2 -1/2" Model 922	3 -1/2" Model 923	4 -1/2" Model 924	4" X 6" Model 926
0-1	43	TV1DMA001	TV2DMA001	TV3DMA001	TV4DMA001	TV6 DMA001
0-3	2.0	TV1DMA003	TV2DMA003	TV3DMA003	TV4DMA003	TV6 DMA003
0-5	2.0 (20)*	TV1DMA005	TV2DMA005	TV3DMA005	TV4DMA005	TV6 DMA005
0-10	10.0 (2.2)*	TV1DMA010	TV2DMA010	TV3DMA010	TV4DMA010	TV6 DMA010
0-15	6.6 (2.2)*	TV1DMA015	TV2DMA015	TV3DMA015	TV4DMA015	TV6 DMA015
0-20	5.0	TV1DMA020	TV2DMA020	TV3DMA020	TV4DMA020	TV6 DMA020
0-25	4.0 (6.0)*	TV1DMA025	TV2DMA025	TV3DMA025	TV4DMA025	TV6 DMA025
0-50	2.0 (3.0)*	TV1DMA050	TV2DMA050	TV3DMA050	TV4DMA050	TV6 DMA050
0-100	1.0 (1.5)*	TV1DMA100	TV2DMA100	TV3DMA100	TV4DMA100	TV6 DMA100
0-150	0.66 (1.0)*	TV1DMA150	TV2DMA150	TV3DMA150	TV4DMA150	TV6 DMA150
0-200	0.50 (.75)*	TV1DMA200	TV2DMA200	TV3DMA200	TV4DMA200	TV6 DMA200
0-250	0.40 (.60)*	TV1DMA250	TV2DMA250	TV3DMA250	TV4DMA250	TV6 DMA250
0-300	0.33 (.50)*	TV1DMA300	TV2DMA300	TV3DMA300	TV4DMA300	TV6 DMA300
0-500	0.20 (.30)*	TV1DMA500	TV2DMA500	TV3DMA500	TV4DMA500	TV6 DMA500
0-750	0.13	TV1DMA750	TV2DMA750	TV3DMA750	TV4DMA750	TV6 DMA750

*Resistance for 1-1/2" sizes shown in ( )

Ordering Information

DC Ammeters, Self-shielding movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 921	2-1/2" Model 922	3-1/2" Model 923	4-1/2" Model 924	4"X6" Model 926
0-1	0.050	TV1DAA001	TV2DAA001	TV3DAA001	TV4DAA001	TV6DAA001
0-2	0.025	TV1DAA002	TV2DAA002	TV3DAA002	TV4DAA002	TV6DAA002
0-3	0.0166	TV1DAA003	TV2DAA003	TV3DAA003	TV4DAA003	TV6DAA003
0-5	0.010	TV1DAA005	TV2DAA005	TV3DAA005	TV4DAA005	TV6DAA005
0-10	0.005	TV1DAA010	TV2DAA010	TV3DAA010	TV4DAA010	TV6DAA010
0-15	0.0033*	TV1DAA015*	TV2DAA015	TV3DAA015	TV4DAA015	TV6DAA015
0-20	0.0025*	TV1DAA020*	TV2DAA020	TV3DAA020	TV4DAA020	TV6DAA020
0-25	0.0020*	TV1DAA025*	TV2DAA025	TV3DAA025	TV4DAA025	TV6DAA025
0-30	0.0017*	TV1DAA030*	TV2DAA030	TV3DAA030	TV4DAA030	TV6DAA30
0-50	0.001*	TV1DAA050*	TV2DAA050	TV3DAA050	TV4DAA050	TV6DAA050
0-100	10.0*	TV1DAA100*	TV2DAA100*	TV3DAA100*	TV4DAA100*	TV6DAA100*
0-150	10.0*	TV1DAA150*	TV2DAA150*	TV3DAA150*	TV4DAA150*	TV6DAA150*
0-200	10.0*	TV1DAA200*	TV2DAA200*	TV3DAA200*	TV4DAA200*	TV6DAA200*
0-300	10.0*	TV1DAA300*	TV2DAA300*	TV3DAA300*	TV4DAA300*	TV6DAA300*
0-500	10.0*	TV1DAA500*	TV2DAA500*	TV3DAA500*	TV4DAA500*	TV6DAA500*
50-0-50	0.001	TV1DAA5T5*	TV2DAA5T5*	TV3DAA5T5*	TV4DAA5T5*	TV6DAA5T5*

* 1 1/2" DC current meters are self-contained through 10 amps; 15 amps and higher are supplied as 50mV meters and require an external shunt from page C3. 2 1/2", 3 1/2" and 4 1/2" meters are self-contained through 50 amps. Higher ranges are 50 mV meters and require an external shunt from page C3.

DC Millivoltmeters, Self-shielding movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 921	2-1/2" Model 922	3-1/2" Model 923	4 - 1/2" Model 924	4"X6" Model 926
0-50	10.0	TV1DMV050	TV2DMV050	TV3DMV050	TV4DMV050	TV6DMV050
0-100	20.0	TV1DMV100	TV2DMV100	TV3DMV100	TV4DMV100	TV6DMV100
0-500	100.0	TV1DMV500	TV2DMV500	TV3DMV500	TV4DMV500	TV6DMV500
50-0-50	20.0	TV1DMV5T5	TV2DMV5T5	TV3DMV5T5	TV4DMV5T5	TV6DMV5T5

DC Voltmeters, Self-shielding movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 1-1/2" Model 921	2-1/2" Model 922	3-1/2" Model 923	4 - 1/2" Model 924	4"X6" Model 926
0-1	All1,000 ohms per volt	TV1DVV001	TV2DVV001	TV3DVV001	TV4DVV001	TV6DVV001
0-5		TV1DVV005	TV2DVV005	TV3DVV005	TV4DVV005	TV6DVV005
0-8		TV1DVV008	TV2DVV008	TV3DVV008	TV4DVV008	TV6DVV008
0-10		TV1DVV010	TV2DVV010	TV3DVV010	TV4DVV010	TV6DVV010
0-15		TV1DVV015	TV2DVV015	TV3DVV015	TV4DVV015	TV6DVV015
0-20		TV1DVV020	TV2DVV020	TV3DVV020	TV4DVV020	TV6DVV020
0-25		TV1DVV025	TV2DVV025	TV3DVV025	TV4DVV025	TV6DVV025
0-30		TV1DVV030	TV2DVV030	TV3DVV030	TV4DVV030	TV6DVV030
0-50		TV1DVV050	TV2DVV050	TV3DVV050	TV4DVV050	TV6DVV050
0-100		TV1DVV100	TV2DVV100	TV3DVV100	TV4DVV100	TV6DVV100
0-150		TV1DVV150	TV2DVV150	TV3DVV150	TV4DVV150	TV6DVV150
0-200		TV1DVV200	TV2DVV200	TV3DVV200	TV4DVV200	TV6DVV200
0-250		TV1DVV250	TV2DVV250	TV3DVV250	TV4DVV250	TV6DVV250
0-300		TV1DVV300	TV2DVV300	TV3DVV300	TV4DVV300	TV6DVV300
0-500	2000 ohms per volt	TV1DVV500*	TV2DVV500	TV3DVV500	TV4DVV500	TV6DVV500
0-750		TV1DVV750*	TV2DVV750*	TV3DVV750	TV4DVV750	TV6DVV750
0-1000		TV1DVV1TH*	TV2DVV1TH*	TV3DVV1TH*	TV4DVV1TH*	TV6DVV1TH*

*External multipliers (not included), Model 183, are required with 1 1/2" DC meters 500 volts or higher; on 2-1/2" DC meters, 750 volts or higher; and on 3-1/2" and 4 - 1/2" meters, 1000 volts or higher.

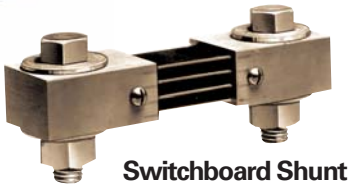
Model 183 Multiplier

Model 186 Current Transformer

Donut Current Transformer

Terminal Type Current Transformer

Portable Shunt



Switchboard Shunt

Ordering information on pages C3

Round Style Analog Panel Meters

- ***Glass window for optimum viewing***
- ***Rugged black plastic case***
- ***Black spade-type pointer for easy distant reading***

Specifications

Accuracy: ±2% F.S. (Iron-Vane), ±3% F.S. (Rectifier)
Frequency models: 45-55Hz ±0.3Hz (120V-240V)
55-65Hz ±0.3Hz (120V-240V)
380-420Hz ±1.2Hz (120V-240V)

Wattmeters: ±2% F.S.; Compensated Meters: ±3% F.S.

Movement: Models 55, 155: Iron-vane, magnetically damped
Models 45, 145: Annular, rectifier type
Models 85 & 185: small core magnet, self-shielding
Models 25, 27, 29, 125: Annular, self-shielding

Tracking: ±3%
Shielding: Calibration is unaffected by magnetic panel mounting.
Response Time: 1.5 seconds maximum
Overload (1 sec.): 10 times F. S.
Overload (Continuous): 1.5 times F. S.
Repeatability: 2%
Dial: Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Case: High density black plastic
Resistance: ±15%
Operating Temp: -4°F to +149°F (-20°C to +65°C)
Pointer: Models 85 & 185: knife edge, black finish
All others: spade pointer with black matte finish
Scale Length: Model 155 & 185: 1.6" (40.6mm)
Models 125 & 145: 1.8" (45.7mm)
Model 55: 2.3" (58.4mm)
Models 25, 27, 45 & 85: 2.5" (63.5m)
Model 29: 3.80" (96.5mm)
Net Weight: Models 55, 155 & 185: 5oz (0.14kg)
Models 85, 125, 145 & 45: 7oz (0.20kg)
Models 25 & 27: 8oz (.23kg)
Model 29: 11oz. (.31kg)

Ordering Information

AC Microammeters Rectifier Type, Self Shielding Movement

Range	Approx. Impedance (ohms)	Model/Size and Catalog Number
		3-1/2" Model 45
0-100	3400	04080

AC Milliammeters, Iron Vane & Rectified Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 155	3-1/2" Model 55	4-1/2" Model 45
0-1	600	<>	<>	06820*
0-5	200	<>	<>	06840*
0-10	887.0	<>	05380	<>
0-15	80.0	<>	05400	<>
0-100	717.2	<>	05410	<>
0-150	8.76	<>	35069	<>
0-250	3.1	06080	05420	<>
0-500	.9	<>	05430	<>

* Rectified Models

AC Ammeters, Iron Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number	
		2-1/2" Model 155	3-1/2" Model 55
0-1	.213	02100	00950
0-1.5	.105	<>	00960
0-2	.065	02120	00970
0-3	.028	02130	00980
0-5	.008	02140	00990
0-10	.004	02150	01001
0-15	.0025	02160	01010
0-25	.002	02170	01020
0-30	.0015	02180	01030
0-50	.001	02190	01040
0-75	.0002	<>	03432
0-75	.008	02200*	<>
0-100	.008	02210*	01060*
0-150	.008	02220*	01070*
0-200	.008	<>	01080*
0-250	.008	02240*	01090*
0-300	.008	<>	01100*
0-500	.008	02260*	01110*

<> Available on special order.
* These meters require use of an external current transformer from page C4-C6

4-20mA Process Meters, Dial indicates 0-100 Percent

Range	Approx. Impedance (Ohms)	Model/Size and Catalog number 3-1/2" Model 25
4-20	5.0	35022

more >>

Ordering Information

AC Voltmeters, Iron Vane Movement

Range	Approx. Impedance (Ohms) @ 60 H	Model/Size and Catalog Number 2-1/2" Model 155	3-1/2" Model 55
0-5	33	<>	08410
0-10	133	<>	08420
0-15	300	<>	08430
0-25	833	<>	08440
0-50	3,333	09290	08450
0-100	16,166	<>	08460
0-150	25,000	09310	08470
0-250	41,166	09320	08480
0-300	50,000	09330	08490
0-500	83,333	09340*	08500*
0-750	125,000	<>	08510*

* External multipliers (model 183) are furnished on AC meters having a range of 500 volts or higher.
<> Available on special order

AC Volt Meters Rectifier Type, Self Shielding Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number 3-1/2" Model 45
0-150	300K	08010

DC Microammeters, Self Shielding Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number 2-1/2" Model 125	3-1/2" Model 25
0-50	1800	04210	03760
0-100	1800	04220	03770
0-200	1100	04230	03780
0-500	90	04240	03790
50-0-50	1800	04194	03810
100-0-100	1100	04196	03820
500-0-500	43	<>	03830

<> Available on special order

DC Taut-Band Microammeters, Self-Shielding Movement

Range	Approx. Impedance(ohms) @ 60 Hz	Model/Size and Catalog Number 2-1/2" Model 125T	3-1/2" Model 25T
0-10	4900	04197	<>
0-15	1960	<>	03741
0-25	1960	04201	03751
0-50	960	<>	03761
0-100	500	<>	03771

<> Available on special order

DC Milliammeters, Self Shielding Movement

Range	Approx. Impedance (ohms)@ 60 Hz	Model/Size and Catalog Number 2-1/2" Model 125	3-1/2" Model 25
0-1	43.0	05580	04610
0-1.5	43.0	<>	04620
0-5	2.0	05610	04640
0-10	10.0	05620	04650
0-15	6.6	05630	04660
0-25	4.0	05650	04680
0-50	2.0	<>	04690
0-75	1.3	05670	<>
0-100	1.0	05680	04710
0-150	.66	05690	04720
0-200	.5	05700	04730
0-250	.5	05710	<>
0-300	.33	<>	04750
0-500	.2	05730	04760
0-1000	.05	<>	04780

<> Available on special order.

Wattmeters - Dynamometer Type

Range	Maximum Volts	Maximum Amps	Model/Size and Catalog Number 3-1/2" Model 75
0-300	150	4.0	10600

DC Ammeters, Self Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 2-1/2" Model 125	3-1/2" Model 25
0-1	.050	01460	00005
0-2	.025	<>	00030
0-3	.0166	01490	00040
0-5	.010	01500	00050
0-10	.005	01510	00060
0-15	.0033	01520	00070
0-25	.002	01530	00080
0-30	.0017	01540	00090
0-50	.001	01550	00099
0-75	10.0	01560*	00110*
0-100	10.0	01570*	00120*
0-150	10.0	01580*	00130*
0-200	10.0	01590*	00140*
0-250	10.0	<>	00151*
0-300	10.0	01610*	00160*
0-500	10.0	01620	00170*
0-750	10.0	<>	00177*
0-1000	10.0	<>	00188*
15-0-15	.0033	<>	00200
30-0-30	.0017	01660	00210
50-0-50	.001	016670	00220
75-0-75	20.0	35066	35037*

* DC current meters are self-contained for ranges up to and including 50 amperes. Higher range DC current meters (50 mV) listed above are calibrated for 5' leads and require external shunts.
<> Available on special order.

DC Millivoltmeters, Self Shielding Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number 2-1/2" Model 125	3-1/2" Model 25
0-50	10.0	06970	06910
0-100	20.0	<>	35093

<> Available on special order.

DC Voltmeters, Self Shielding Movement

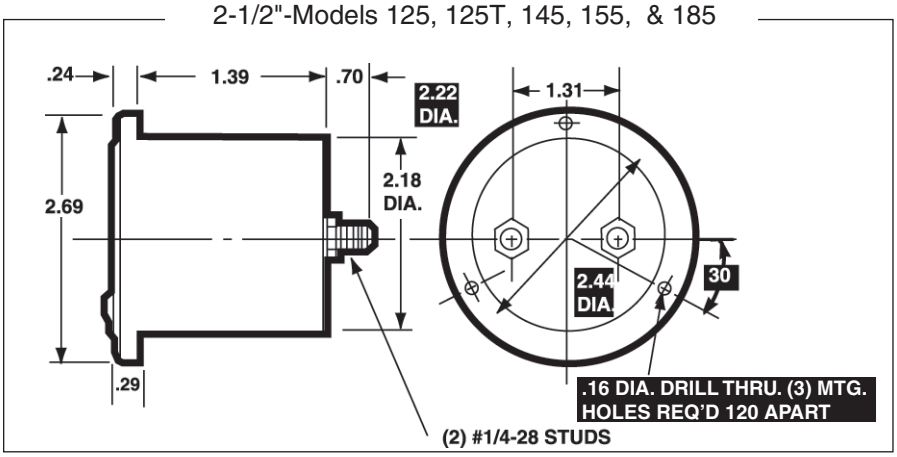
Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number 2-1/2" Model 125	3-1/2" Model 25
0-1.5		08850	<>
0-3		<>	07070
0-5		08870	07080
0-10		08890	07100
0-15	1000	08900	07110
0-25	Ohms	08910	07120
0-3	Per	08920	07130
0-50	Volt	08930	07140
0-100		08940	07150
0-150		08950	07160
0-200		08960	07170
0-250		08970	07180
0-300		<>	07190
0-500		<>	07200
0-750	2000	<>	07210
0-1000	Ohms	<>	07220*
0-2000	Per	<>	07240*
0-3000	Volt	<>	07260*
0-5000		<>	07280*

*External multipliers, Model 183, are furnished on 2-1/2" DC meters 750 volts or higher.
<> Available on special order.

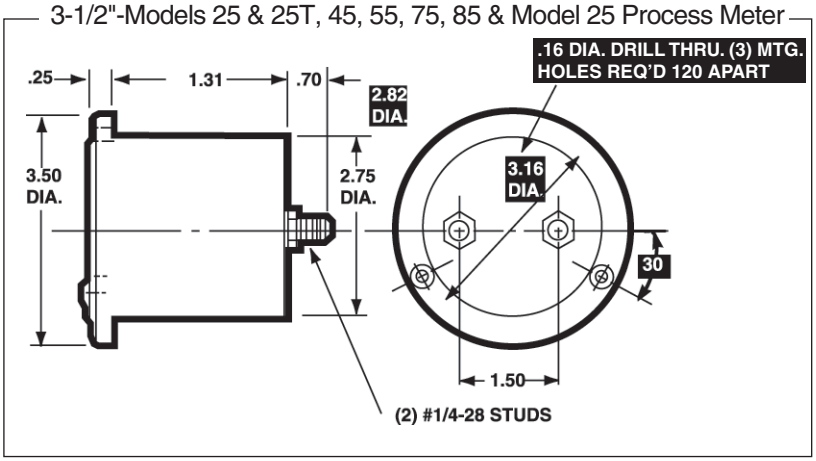
Frequency Meters, Self-Shielding Movement

Range	Voltage	Model/Size and Catalog Number 2-1/2" Model 185	3-1/2" Model 85
45-55 Hz	120V	35154	35160
55-65 Hz	120V	35156	35162
380-420 HZ	120V	35158	35164
45-55 Hz	240V	35155	35161
55-65 Hz	240V	35157	35163
380-420 Hz	240V	35159	35165

2-1/2"-Models 125, 125T, 145, 155, & 185



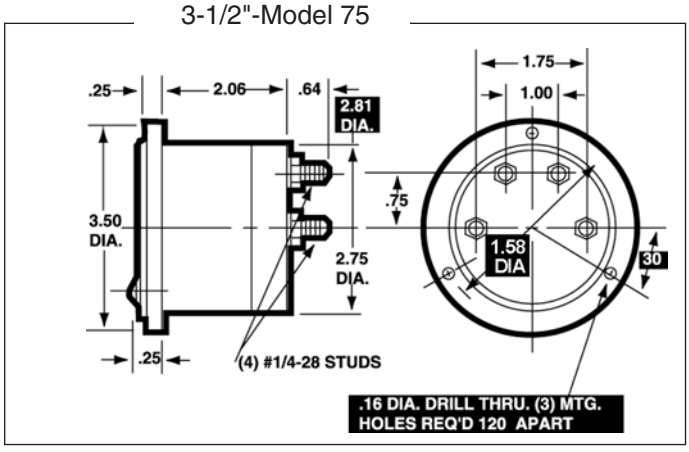
3-1/2"-Models 25 & 25T, 45, 55, 75, 85 & Model 25 Process Meter



1 = Panel Meter Cut-out Dimensions

NOTE: "T" model suffix used for Taut-Band movement

3-1/2"-Model 75



- ***Plastic case with Glass Window***
- ***Calibration not affected when mounted on steel***
- ***Three popular sizes: 2-1/2", 3-1/2", 4-1/2"***

Specifications

Accuracy	±2% full scale (F.S.) (iron-vane), ±3% (rectifier)
Wattmeters:	±2%F.S.; Compensated meters: ±3%F.S.
Movement	Models 57, 59, 157 Iron-vane, magnetically damped Wattmeters: Dynamometer All others: Annular, rectifier type, self-shielding
Suspension	Pivot and jewel; "T" styles: taut band
Tracking	±3%
Shielding	Calibration is unaffected by magnetic panel mounting
Response Time	1.5 seconds maximum
Overload (1 sec.)	10 times F.S.
Overload (Continuous)	1.5 times F.S.
Repeatability	2%, tautband: .5%
Dial	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used
Resistance	±15% of meter impedance
Pointer	Spade pointer with black, matte finish
Scale Length	Models 177 & 157: 1.6" (40.6mm) Models 147, 127 & 127T: 1.8" (45.7mm) Models 57 & 77: 2.3" (58.4mm) Models 27, 27T, & 47: 2.5" (63.5mm) Models 59 & 79: 3.50" (89.0mm) Models 29, 29T, & 49: 3.9" (99.0mm)
Net Weight	Models 57 & 157: 5oz (0.14kg) Models 127, 127T & 147: 7oz (0.20kg) Models 27, 27T, 47 & 59: 8oz (0.23kg) Models 77 & 177: 9oz (0.26kg) Models 29, 29T & 49: 11oz (0.31kg) Model 79: 12oz (0.34kg)

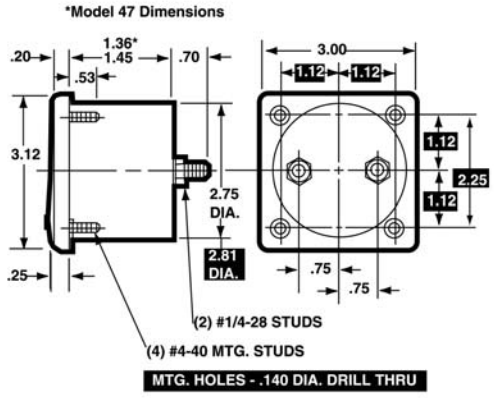
Frequency Meter Specifications

Accuracy	45-55Hz ±0.3Hz (120V-240V) 55-65Hz ±0.3Hz (120V-240V) 380-420Hz ±1.2Hz (120V-240V)
Movement	Small core magnet, self-shielding
Suspension	Pivot and jewel
Shielding	Calibration is unaffected by magnetic panel mounting
Center Scale Value	50/60/400Hz
Power Consumption	1.6VA
Warm-up Time	5 minutes
Max. Input:	
Voltage (10 sec)	150, 120V normal 280, 240V normal
Dial	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used
Case	High density black plastic
Operating Temperature	-4°F to +149°F (-20°C to +65°C)
Pointer:	Spade pointer with black, matte finish
Scale Length:	Model 187: 1.8" (45.7mm) Model 89: 3.5" (89.0mm) Model 87: 3.9" (99.0mm)
Net Weight:	Model 187: 5oz (0.14kg) Model 87: 8oz (0.23kg) Model 89: 11oz (0.31kg)

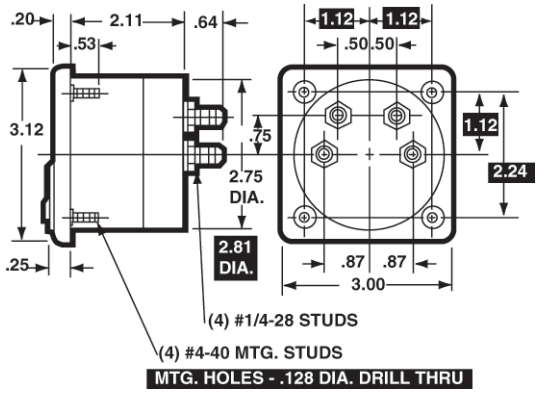
MADE IN THE USA
www.simpsonelectric.com

Dimensions

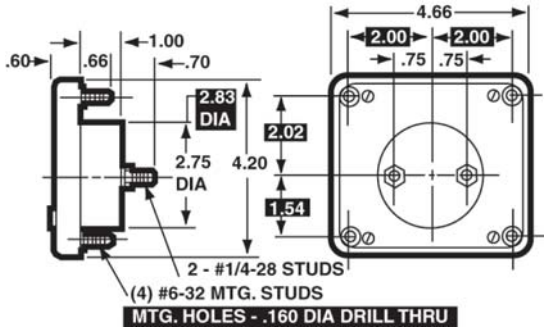
3-1/2"-Models 27 & 27T, 47, 57, & 87



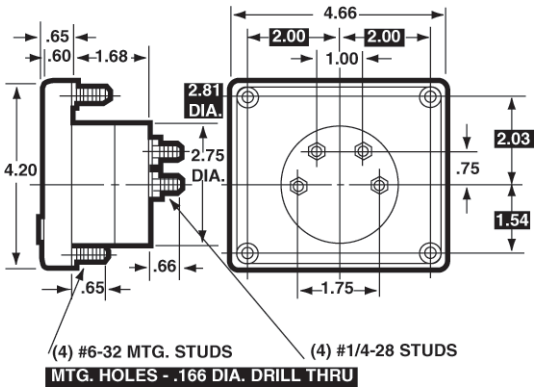
3-1/2"-Model 77



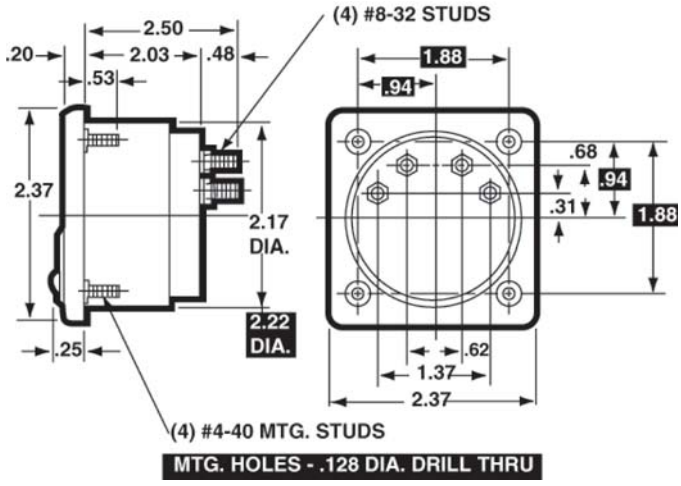
4 - 1/2”-Model 29, 29T, 49, 59, 79 & 89



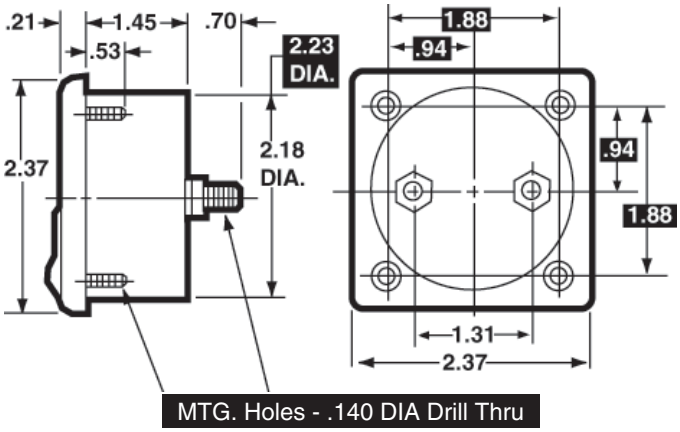
4 - 1/2”-Model 79



2-1/2"-Model 177



2-1/2"-Model 127 & 127T, 147, 157, & 187



Ordering Information

Frequency, Self-Shielding Movement

Range	Voltage	Model/Size and Catalog Number		
		2-1/2"' Model 187	3-1/2" Model 87	4-1/2" Model 29
45-55Hz	120V	35136	35142	35148
55-65Hz	120V	35138	35144	35150
380-420Hz	120V	15140	35146	35152
45-55Hz	240V	35137	35143	35149
55-65Hz	240V	35139	35145	35151
380-420Hz	240V	35141	35147	35153

DC Voltmeters, Self-Shielding Movement

Range	Approx. Impedance (0hms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 127	3-1/2" Model 27	4-1/2" Model 29
0-1.5	1000 Ohms per volt	09020	07290	07620
0-3		09030	07300	07630
0-5		09040	07310	07640
0-8		09050	<>	07650
0-10		09060	07330	07660
0-15		09080	07350	07670
0-25		09090	07360	07680
0-30		09100	07370	07690
0-50		09110	07380	07700
0-100		09130	07400	07710
0-150		09140	07410	07720
0-200		09160	07430	07730
0-250		09170	07440	07740
0-300		09180	07450	07750
0-500	2000 Ohms per volt	09200	07470	07760
0-750		<>	07490	07770
0-1000		<>	07495*	07780*
0-1500		<>	07520*	07790*
0-2000		09225*	07530*	07800*
0-2500		<>	07550*	07810*
0-3000		<>	07560*	07820*
0-4000		<>	<>	07830*
0-5000		<>	07600*	07840*

External multipliers (model 183) are furnished on 2-1/2" DC meters 750 volts or higher: and on 3-1/2" and 4 - 1/2" DC meters 1000 volts or higher.
<> Available on special order.

DC Taut-Band Microammeters, Self Shielding Movement

Range	Approx. Impedance (0hms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 127T	3-1/2" Model 27T	4-1/2" Model 29T
0-10	4900	04246	03839	03939
0-15	1960	04248	03841	03941
0-25	1960	04251	03851	03951
0-50	960	04261	03961	03961
0-100	500	< >	03871	03971

<> Available on special order.

DC Millivoltmeters, Self Shielding Movement

Range	Approx. Impedance (0hms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2"' Model 127	3-1/2" Model 27	4-1/2" Model 29
0-50	10.0	06990	06930	06950
0-100	20.0	<>	06940	06960

<> Available on special order.

DC Microammeters, Self-Shielding Movement

Range	Approx. Impedance (0hms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 127	3-1/2" Model 27	4-1/2" Model 29
0-50	1800	04260	03860	03960
0-100	1800	04270	03870	03970
0-200	1100	04280	03880	03980
0-500	90	<>	03890	03990
25-0-25	1800	04243	03900	04000
50-0-50	1800	04245	03910	04010
100-0-100	1100	04247	03920	04020
500-0-500	43	<>	03930	04030

<> Available on special order.

DC Milliammeters, Self Shielding Movement

Range	Approx. Impedance (0hms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 127	3-1/2" Model 27	4-1/2" Model 29
0-1	43.0	05760	04790	05070
0-1.5	43.0	<>	04810	05080
0-3	2.0	05790	04820	05090
0-5	2.0	05800	04830	05100
0-10	10.0	05810	04840	05110
0-15	6.6	05830	04860	05120
0-20	5.0	<>	04880	05130
0-25	4.0	05860	04890	05140
0-50	2.0	05880	04910	05150
0-75	1.3	<>	<>	<>
0-100	1.0	05910	04940	05170
0-150	.66	05930	04960	05180
0-200	.5	05940	04980	05190
0-250	.4	<>	05000	05200
0-300	.33	<>	05010	05210
0-500	.2	05990	05030	05220
0-750	.13	<>	05050	05230
0-1000	.05	06020	05060	05240

<> Available on special order.

DC Ammeters, Self Shielding Movement

Range	Approx. Impedance (0hms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 127	3-1/2" Model 27	4-1/2" Model 29
0-1	.050	01680	00230	00450
0-1.5	.033	01690	00240	00460
0-2	.025	01709	00250	00470
0-3	.0166	01710	00260	07480
0-5	.010	01720	00270	00490
0-10	.005	01730	00280	00500
0-15	.0033	01740	00290	00512
0-25	.0020	01750	00300	00520
0-30	.0017	01760	00310	00530
0-50	.001	01770	00320	00540
0-75	10.0	01780†	00330†	00550†
0-100	10.0	01790†	00340†	00560†
0-150	10.0	01800†	00350†	00570†
0-200	10.0	01810†	<>	00580†
0-250	10.0	<>	<>	00590†
0-300	10.0	<>	00380†	00600†
0-500	10.0	<>	00390†	00610†
0-750	10.0	<>	00400†	00620†
0-1000	10.0	<>	00410†	00630†
15-0-15	.0033	<>	<>	00640
30-0-30	.0017	01880	00430	00650
50-0-50	.001	01890	00440	00660

† DC current meters are self-contained for ranges up to and including 50 amperes. Higher range DC current meters (50 mV) listed above are calibrated for 5'. leads and require external shunts.
<> Available on special order.

Ordering Information

AC Microammeters Rectifier Type, Self Shielding Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 147	3-1/2" Model 47	4-1/2" Model 49
0-100	3400	< >	04120	04160
0-200	2400	< >	< >	04170
0-300	1800	< >	04140	04180
0-500	1200	< >	04150	04190

<> Available on special order

AC Milliammeters, Iron Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz.	Model/Size and Catalog Number		
		2-1/2" Model 157	3-1/2" Model 57	4-1/2" Model 59
0-10	650.0	< >	05440	05510
0-15	887.0	< >	05499	< >
0-25	270.0	< >	05460	05530
0-50	80.0	06130	05470	05540
0-100	17.2	06140	05480	05550
0-250	3.1	06150	05490	05560
0-500	.9	06152	05500	05570

<> Available on special order

AC Milliammeters Rectifier Type, Self Shielding Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 147	3-1/2" Model 47	4-1/2" Model 49
0-1	600	< >	06850	06880
0-2	400	< >	06860	06890
0-5	200	< >	06870	06900

<> Available on special order

AC Ammeters, Iron Vane Movement

Range	Approx. Impedance (ohms) @ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 157	3-1/2" Model 57	4-1/2" Model 59
0-1	.213	02270	01120	01290
0-1.5	.105	< >	01130	01302
0-2	.065	02290	01140	01310
0-3	.028	02300	01145	01320
0-5	.008	02310	01160	01330
0-10	.004	02320	01170	01340
0-15	.0025	02330	01180	01350
0-25	.002	02340	01190	01360
0-30	.0015	02350	01200	01370
0-50	.001	02360	01210	01380
0-75	.0002	< >	03434	03436
0-75	.008	02370†	<>	<>
0-100	.008	02380†	01230†	01400†
0-150	.008	02390†	01240†	01410†
0-200	.008	< >	01250†	01420†
0-250	.008	02410†	01260†	01430†
0-300	.008	02420†	01270†	01440†
0-500	.008	02422†	01280†	01450†

<> Available on special order.
† These meters are 5 amp meters with scales as indicated and require external donut transformers from pages C4-C5.

AC Voltmeters Rectifier Type, Self Shielding Movement

Range	Approx. Impedance (ohms)@ 60 Hz	Model/Size and Catalog Number		
		2-1/2" Model 147	3-1/2" Model 47	4-1/2" Model 49
0-1	2000 ohms per volt	< >	08120	08300
0-3		< >	08130	08310
0-5		< >	< >	08320
0-10		< >	< >	08330
0-15		< >	< >	08340
0-50		< >	< >	08350
0-100		< >	08180	08360
0-150		< >	08190	08370
0-300		< >	< >	08371

<> Available on special order

AC Voltmeters, Iron Vane Movement

Range	Approx. Impedance (ohms) @ 60Hz	Model/Size and Catalog Number		
		2-1/2" Model 157	3-1/2" Model 57	4-1/2" Model 59
0-1.5	3	< >	< >	08710
0-3	12	< >	08540	08720
0-5	33	09390	08550	08730
0-10	133	09400	08566	08740
0-15	300	09420	08580	08750
0-25	833	09440	08599	08760
0-50	3,333	09450	08610	08770
0-100	16,166	09460	08620	08780
0-150	25,000	09470	08630	08790
0-250	41,166	09490	08650	08800
0-300	50,000	09500	08660	08810
0-500	83,333	09520†	08680†	08820†
0-750	125,000	< >	08690†	08830†
0-1000	166,666	< >	08700†	08840†

† External multipliers. Model 183 are furnished on AC meters having a range of 500 volts or higher. All others have self-contained multipliers.
<> Available on special order.

4-20 mA Process Meters Dial Indicates 0-100%

Size	Style	Model	Approx. Impedance (ohms)	Catalog No.
3-1/2"	Rectangular	27	5.0	35023
4-1/2"	Rectangular	29	5.0	35024

Wattmeters, Self Shielding Movement

Range	Maximum		Model/Size and Catalog Number		
	Volts	Amps	2-1/2" Model 177	3-1/2" Model 77	4-1/2" Model 79
0-20	150	.400	<>	<>	10714
0-75	150	1.0	10860	10650	10720
0-150	150	2.0	<>	<>	10730
0-300	150	4.0	<>	<>	10740
0-600	300	4.0	<>	10680	10750
0-750	150	10.0	10900	10690	10760
0-1500	300	10.0	10910	10700	10770
0-3000	300	20.0	10920	10710	10780

<> Available on special order

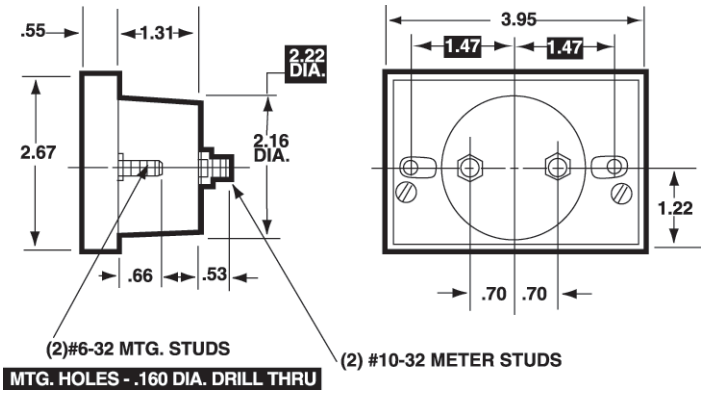
- ***Clean, uncluttered design offers maximum visibility in minimum required height***
- ***Glass window for optimum viewing***
- ***Rugged black plastic case***
- ***Red knife-edge pointer for precision readability***

Specifications

Accuracy:	±2% F.S.
Movement:	AC/Iron-vane, magnetically damped, DC Annular
Tracking:	±3%
Response Time:	1.5 seconds maximum
Overload (1 sec.):	10 times F.S.
Overload (Continuous):	1.5 times F.S.
Repeatability:	2%, 5% for taut band
Dial:	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Case:	High density black plastic
Resistance:	±15% of meter impedance
Operating Temperature:	-4°F to +149°F (-20°C to +65°C)
Pointer:	Red, knife-edge
Scale Length:	Model **553:** 2.69" (68.3mm) **523:** 2.92" (74.2mm) Model **554:** 2.84" (72.1mm) **524:** 3.25" (82.5mm)
Net Weight:	Model **553:** 5oz (0.14kg) **523:** 9 oz (0.26kg) Model **554:** 6oz (0.17kg) **524:** 10 oz (0.28kg)

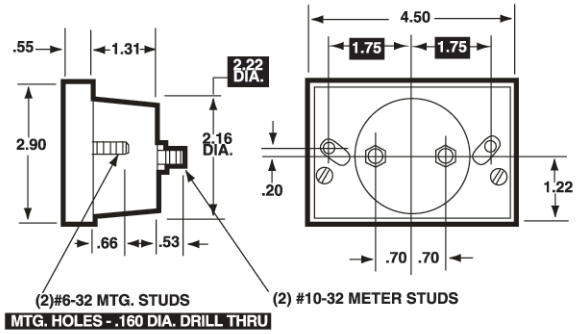
Dimensions

3 - 1/2"-Models 523, 523T, 554



1 = Panel Meter Cut-out Dimensions

4 - 1/2"-Model 524, 524T, 554



Ordering Information

AC Ammeters, Iron-Vane Movement

Range	Approx. Impedance (Ohms) @60Hz	Model/Size and Catalog Number	
		3-1/2" Model 553	4-1/2" Model 554
0-1	.213	15049	15121
0-5	.008	15050	15120
0-10	.004	15052	15122
0-15	.0025	15051	15123
0-25	.002	15053	15125
0-50	.001	15054	15124
0-100	.008	15056†	15127†
0-150	.008	15057†	15128†

† Requires external current transformer from page C3-C4

Ordering Information

AC Voltmeters, Iron-Vane Movement

Range	Approx. Impedance (Ohms) @60Hz	Model/Size and Catalog Number	
		3-1/2" Model 553	4-1/2" Model 554
0-150*	25,000	15060	15130
0-250*	41,166	15061	15131
0-300*	50,000	15062	15132

*Rectifier movements are available on special order.

DC Microammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3-1/2" Model 523	4-1/2" Model 524
0-50	1800	15017	15087
0-100	1800	15019	15089
0-200	1100	15021	15091
0-500	90	15022	15093
25-0-25	1800	15023	15094
50-0-50	1800	15025	15095
100-0-100	1100	15027	15097
500-0-500	43	15024	15096

DC Taut-Band Microammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3-1/2" Model 523T	4-1/2" Model 524T
0-15	1960	15014	15092
0-25	2100	15015	15085

DC Milliammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3-1/2" Model 523	4-1/2" Model 524
0-1	43.0	15000	15070
0-5	2.0	15001	15076
0-10	10.0	15002	15077
0-50	2.0	15003	15078
0-100	1.0	15010	15080
0-200	.5	15004	15079
0-300	.33	15012	15081
0-500	.2	15013	15082

DC Ammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3 - 1/2" Model 523	4 - 1/2" Model 524
0-1	.050	15031	15101
0-3	.0166	15032	15102
0-5	.010	15033	15103
0-10	.005	15030	15100
0-15	.0033	15034	15104
0-25	.0020	15035	15105
0-50	.001	15036	15106

DC Millivoltmeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3 - 1/2" Model 523	4 - 1/2" Model 524
0-50	10.0	15048	15118

DC Voltmeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60 Hz	Model/Size and Catalog Number	
		3 - 1/2" Model 523	4 - 1/2" Model 524
0-5	1000 ohms per volt	15038	15108
0-10		15039	15109
0-15		15040	15110
0-30		15042	15112
0-50		15044	15114
0-100		15045	15111
0-150		15046	15116

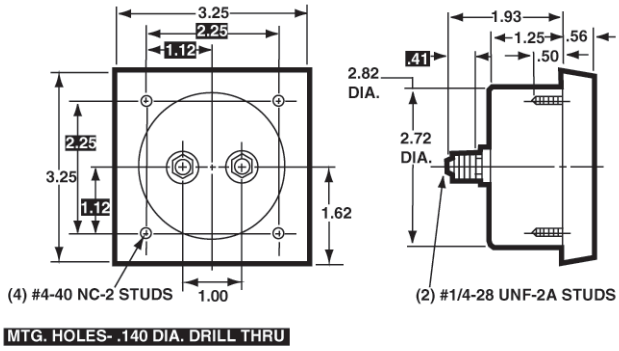
- ***Rugged metal case for rigorous environments***
- ***Splash-proof and sealed against moisture, dust and dirt***
- ***Calibration not affected by steel panel mounting***
- ***O-Ring sealed zero adjust and electrical terminals***

Specifications

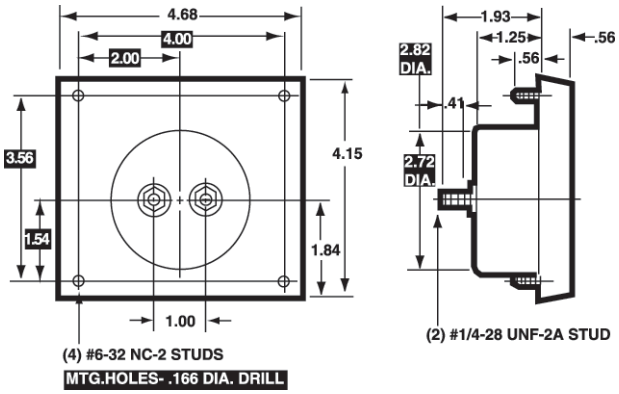
Accuracy:	±3% F.S. AC Rectified, ±2% for DC or Annular
Movement:	Annular rectifier, self-shielding
Suspension:	Pivot and jewel
Tracking:	±3%
Shielding:	Calibration is unaffected by magnetic panel mounting.
Response Time:	1.5 seconds maximum
Overload (1 sec.):	10 times F.S.
Overload (Continuous):	1.5 times F.S.
Repeatability:	2%
Dial:	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Case:	Metal shielded cover with black matte finish
Resistance:	±15% of meter impedance
Operating Temperature:	-4°F to +149°F (-20°C to +65°C)
Pointer:	Knife-edge with black matte finish
Scale Length:	Models 3323, 3343: 2.74" (70.0mm) Models 3324, 3344: 4.05" (103.0mm)
Net Weight:	Models 3323, 3343: 12oz (0.340kg) Models 3324, 3344: 17oz (0.48kg)

Dimensions

3 - 1/2"-Model 3323, 3343



4 - 1/2"-Model 3324, 3344



MADE IN THE USA

www.simpsonelectric.com

Ordering Information

AC Microammeter Rectifier Type, Self-Shielding Movement

Range	Approx. Impedance (ohms) @ 60Hz	Model/Size and Catalog Number	
		3-1/2" Model 3343	4-1/2" Model 3344
0-100	4,000	<>	16185

<> Available on special order.

AC Milliammeter Rectifier Type, Self-Shielding Movement

Range	Approx. Impedance (ohms) @ 60Hz	Model/Size and Catalog Number	
		3-1/2" Model 3343	4-1/2" Model 3344
0-1	600	16085	16180

AC Ammeter Rectifier Type, Self-Shielding Movement

Range	Approx. Impedance (ohms) @ 60Hz	Model/Size and Catalog Number	
		3-1/2" Model 3343	4-1/2" Model 3344
0-5	0.5 VA max.*	16080	16175

* Internal transformer burden.

AC Voltmeters Rectifier Type, Self-Shielding Movement

Range	Approx. Impedance (ohms) @ 60Hz	Model/Size and Catalog Number	
		3-1/2" Model 3343	4-1/2" Model 3344
0-150	1000 ohms per volt	16065	16160
0-300		16070	16165

DC Microammeters, Self-Shielding Movement

Range	Approx. Impedance (ohms)	Model/Size and Catalog Number	
		3-1/2" Model 3323	4-1/2" Model 3324
0-50	3,000	16055	16150
0-100	1450	16060	16155

DC Milliammeters, Self-Shielding Movement

Range	Approx. Impedance (ohms)	Model/Size and Catalog Number	
		3-1/2" Model 3323	4-1/2" Model 3324
0-1	80	16045	16140

DC Ammeters, Self-Shielding Movement

Range	Approx. Impedance (ohms)	Model/Size and Catalog Number	
		3-1/2" Model 3323	4-1/2" Model 3324
0-5	Internal Shunt 75mV max.	16035	<>
0-10		16040	<>

DC Millivoltmeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms)	Model/Size and Catalog Number	
		3-1/2" Model 3323	4-1/2" Model 3324
0-50	10	16062	16157

DC Voltmeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms)	Model/Size and Catalog Number	
		3-1/2" Model 3323	4-1/2" Model 3324
0-1.5	1000 ohms per volt	16000	<>
0-10		16005	<>
0-15		16010	<>
0-25		16015	<>
0-50		16020	<>
0-100		16025	<>
0- 500		16030	<>

<> Available on special order.

Model 112ET

Model 1357ET/Wide-Vue

Model 55ET/Round

Model 109ET

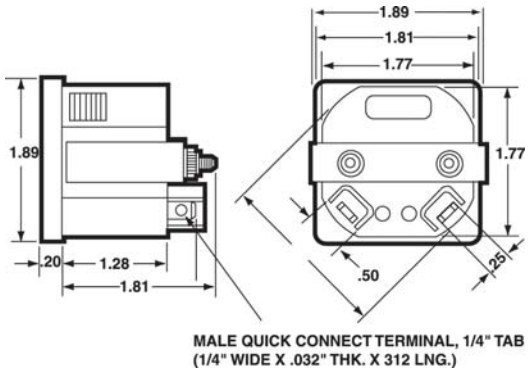
Model 2153ET/Century

Model 57ET/Rectangular

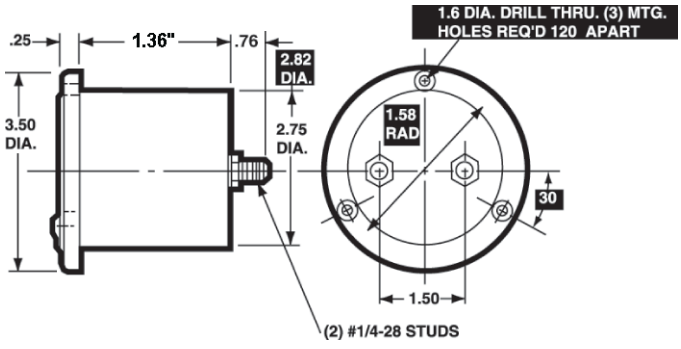
- *Record" on" time of electrical equipment*
- *No reset capability means virtually tamper-proof*
- *Choice of AC or DC models*
- *2 sizes and 6 different case styles*

Dimensions

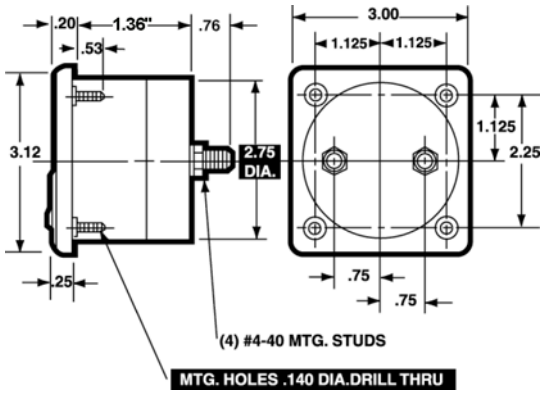
1-1/2"- Model 109ET



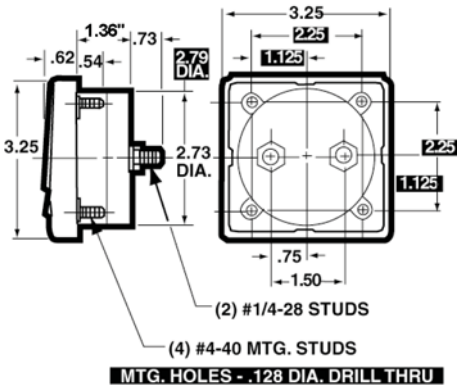
3 - 1/2"- Model 55ET



3 - 1/2"- Model 57ET

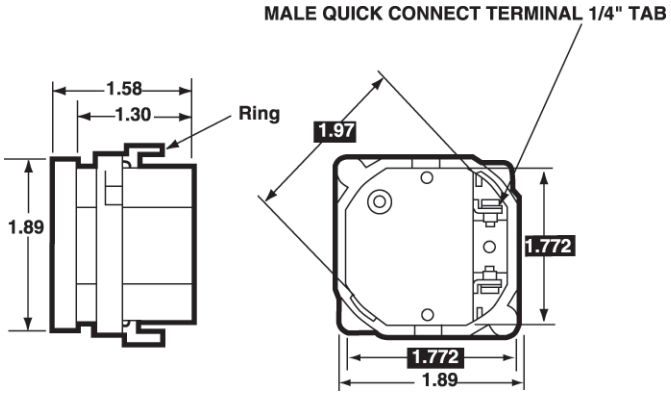


3 - 1/2"- Model 1357ET



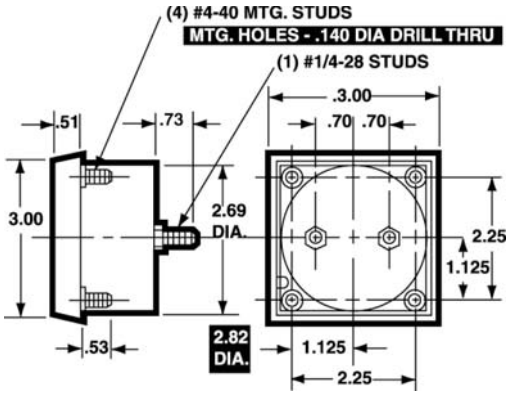
more>>

1-1/2"- Model 112ET



1 = Panel Meter Cut-out Dimensions

3 - 1/2"-Model 2153ET



Specifications

Accuracy:	Models 109ET & 112ET; <.01%/24HRS. Models 55ET, 57ET, 1357ET & 2153ET: Synchronous with AC power
Movement:	Synchronous clock motor
Overload (1 sec.):	10 times F.S.
Maximum Indication:	99,999.9 hours
Power Consumption:	Models 109ET, 112ET: .5 watts All other models: 2.5 watts
Case:	Models 55ET, 57ET, 2153ET: high density plastic Models 109ET, 112ET, 1357ET: high density black acrylic
Operating Temperature:	-4°F to +149°F (-20°C to +65°C)
Net Weight:	Models 112ET, 109ET: 2.5 oz (0.07kg) Models 55ET, 57ET: 12.5 oz (0.35kg) Model 1357ET, 2153ET: 13 oz (0.37kg)

Ordering Information

Operating Voltage	Maximum Indication (hours)	Power Consumption	Accuracy	Model Size	Model Number	Catalog Number
10-80 DCV*	99,999.9	.5 watt	≤.01%/24 hrs	1-1/2"	109ET	03618
120 VAC	99,999.9	.5 watt	≤.01%/24 hrs		112ET	03622
	99,999.9	2.5 watts	synchronous		55ET	03580
120 VAC	99,999.9	2.5 watts	synchronous	3-1/2"	57ET	03590
60 Hz	99,999.9	2.5 watts	synchronous		1357ET	03595
	99,999.9	2.5 watts	synchronous		2153ET	17720
	99,999.9	2.5 watts	synchronous		55ET	03600
240 VAC	99,999.9	2.5 watts	synchronous	3-1/2"	57ET	03610
60 Hz	99,999.9	2.5 watts	synchronous		1357ET	03615
	99,999.9	2.5 watts	synchronous		2153ET	17721

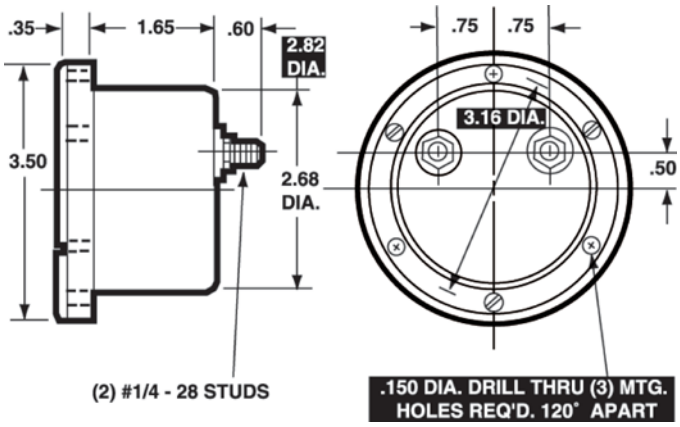
- ***Excellent readability -- more than double the scale length of standard movements***
- ***Sealed round metal or square plastic cases with glass windows***
- ***Zero adjust from front panel***

Specifications

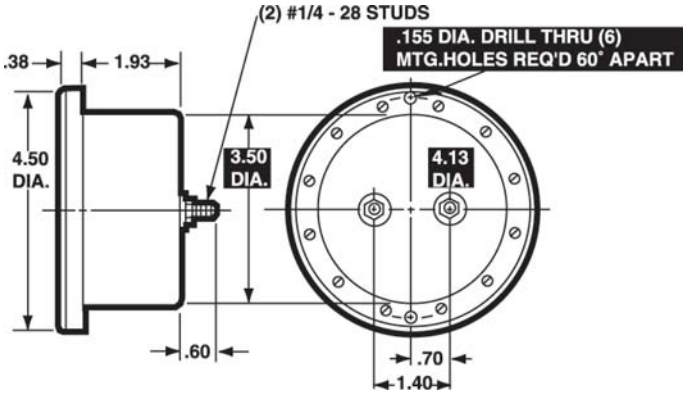
Accuracy:	AC: ±3% full scale (F.S.) DC: ±2% full scale (F.S.)
Movement:	AC: Rectifier type, DC: self-shielded, permanent magnet
Suspension:	Pivot and jewel
Tracking:	±3%
Shielding:	Calibration is unaffected by magnetic panel mounting.
Response Time:	1.5 seconds maximum
Overload (1 sec.):	10 times F.S.
Overload (Continuous):	1.5 times F.S.
Repeatability:	2%
Dial:	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Case:	Models 2523, 2524, 2543 & 2544: Metal Models 2123L, 2143L: Black plastic
Resistance:	±15% of meter impedance
Operating Temperature:	-4°F to +149°F (-20°C to +65°C)
Pointer:	Red, knife-edge
Scale Length:	Models 2123L, 2523, 2543 & 2143L: 4.77" (121.16mm) Models 2524, 2544: 6.54" (166.0mm)
Net Weight:	Models Model 2523, 2123L, 2543 & 2143L: 8oz (230g) Models 2524, 2524, 2544: 9oz (260g)

Dimensions

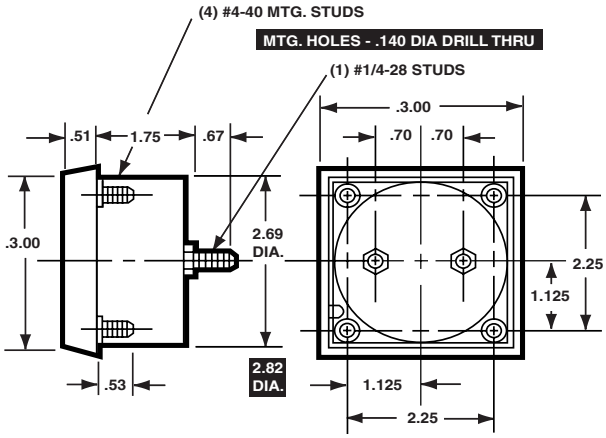
3 - 1/2”-Model 2543, 2523 Round Style



4 - 1/2”-Model 2524, 2544 Round Style



3 - 1/2”-Model 2123L, 2143L Round Style



1 = Panel Meter Cut-out Dimensions

Ordering Information

Percent Motor Load Meters, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60Hz	Model/Size and Catalog Number 3-1/2" Model 2543	3-1/2" Model 2143L	4-1/2" Model 2544
0-5 ACA	0.5VA Maximum*	< >	17918	< >
Motor Load Current**		< >	17919	< >

* Internal transformer burden
** Dial reads 0-150% Motor Load Current
< > Available on special order

AC Voltmeters Rectifier Type, Self-Shielding Movement

Range	Approx. Impedance (Ohms) @ 60Hz	Model/Size and Catalog Number 3-1/2" Model 2543	3-1/2" Model 2143L	4-1/2" Model 2544
0-10	2000Ω/V	17990	< >	17995
0-30		< >	17915	< >
0-150		17978	17916	17988
0-300		17979	17917	17989

< > Available on special order.

DC Millivoltmeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms @ 60 Hz.)	Model/Size and Catalog Number 3-1/2" Model 2523	3-1/2" Model 2123L	4-1/2" Model 2524
0-50	10	17977	17914	17987

DC Microammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms)	Model/Size and Catalog Number 3-1/2" Model 2523	3-1/2" Model 2123L	4-1/2" Model 2524
0-50	8000	17970	17910	17980
0-100	4200	17971	17911	17981
0-500	340	17972	17912	17982

DC Milliammeters, Self-Shielding Movement

Range	Approx. Impedance (Ohms)	Model/Size and Catalog Number 3-1/2" Model 2523	3-1/2" Model 2123L	4-1/2" Model 2524
0-1	135.0	17973	17913	17983
0-10	10.0	17974	< >	17984
0-500	0.2	17975	< >	17985
1-0-1	50.0	17996	< >	17997

< > Available on special order.

DC Ammeter, Self-Shielding Movement

Range	Approx. Impedance (Ohms)	Model/Size and Catalog Number 3-1/2" Model 2523	3-1/2" Model 2123L	4-1/2" Model 2524
0-10	.005	35098	< >	35099

< > Available on special order.
Meters are supplied as 50 millivolt, and requires an external shunt #06704

3300 Series Rugged Seal Meter Relay

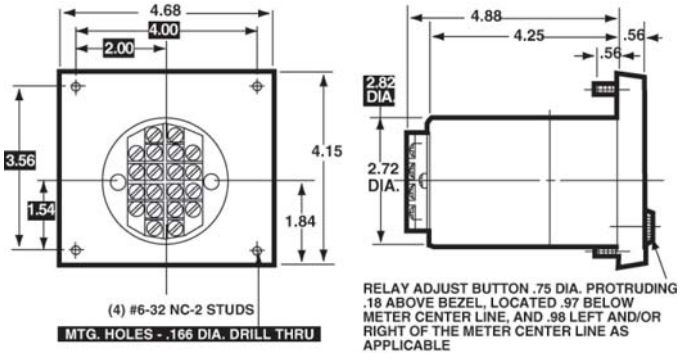
- ***Wide Variety of Control, Alarm, and Limit Use***
- ***Calibration Not Affected by Steel Panel Mounting***
- ***Rugged Metal Case for Rigorous Environments***
- ***Commercially-Sealed, Moisture and Dust Proof***

Specifications

Accuracy:	AC: ±3% of full scale; DC: ±2% F.S.
Movement:	Annular, self-shielding
Suspension:	Pivot and jewel
Tracking:	±3%
Repeatability:	Within 0.5% F.S.
Shielding:	Calibration is unaffected by magnetic panel mounting
Response Time:	1.5 seconds maximum above 10mA
Overload (1 sec.):	AC: 7 amps; DC: 10 times F.S.
Overload (Continuous):	AC: 7 amps, DC: 1.5 times F.S.
Dial:	Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Case:	Sealed metal, plastic window
Voltage Drop:	50mV
Pointer:	Black, knife-edge
Scale Length:	4.05" (103.0mm)
Net Weight:	17oz (0.48kg)
Control Point(s) Adjustments:	Single, high limit, 0-100% of arc; double, low limit 0-95% of arc; high limit 5-100% of arc Adjustable to within 4° of each other
Switching:	Within 1% of indication
Differential:	"On," "Off" difference is within 0.5% of F.S.
Auto/Manual Reset:	Latching function can be enabled independently for each relay by removing jumpers on terminal block
Contacts/Output Relay:	DPDT relay contacts for each control point; Each set of contacts rated at 5 amps, 120/240 VAC resistive.
Frequency Response:	50-1000Hz
Power:	108-132 VAC, 50-400Hz
Operating Temperature:	+41°F to 122°F (5°C to +50°C)
Circuit-to-Ground Voltage:	250V rms maximum
NOTE:	DC meters meet ANSI specification C-39.1

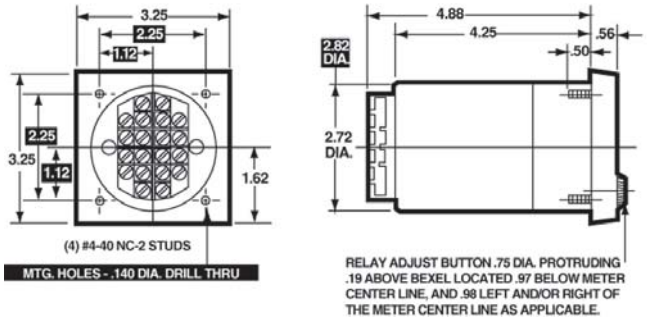
Dimensions

4 - 1/2"-Model 3344AIXA & 3324AIXA



1 = Panel Meter Cut-out Dimensions

3 - 1/2"-Model 3343AIXA & 3323AIXA



Ordering Information

AC Voltmeters Rectified, Self-Shielding Movement

Range	Approx. Resistance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 3343AIXA		4-1/2" Model 3344AIXA	
		Single Set point (High Limit)	Dual Set point	Single Set point (High Limit)	Dual Set point
0-10	200 k	21675	21635	21679	21639
0-150	3 M	21676	21636	21680	21640
0-300	6 M	21681	21641	21682	21642

<> Available on special order.

DC Microammeters, Self-Shielding Movement

Range	Approx. Resistance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 3323AIXA		4-1/2" Model 3324AIXA	
		Single Set point (High Limit)	Dual Set point	Single Set point (High Limit)	Dual Set point
0-25	2 k	21658	21618	<>	<>
0-50	1 k	21659	21619	21666	21626
0-100	500	21660	21620	21667	21627

<> Available on special order.

DC Milliammeters, Self-Shielding Movement

Range	Approx. Resistance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 3323AIXA		4-1/2" Model 3324AIXA	
		Single Set point (High Limit)	Dual Set Point	Single Set point (High Limit)	Dual Set Point
0-1	50	21661	21621	21668	21628

DC Millivoltmeters, Self-Shielding Movement

Ranges	Approx. Resistance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 3323AIXA		4-1/2" Model 3324AIXA	
		Single Set point (High Limit)	Dual Set point	Single Set point (High Limit)	Dual Set point
0-50	1 k	21663	21623	21670	21630

DC Voltmeters, Self-Shielding Movement

Ranges	Approx. Resistance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 323AIXA		4-1/2" Model 3324AIXA	
		Single Set point (High Limit)	Dual Set point	Single Set point (High Limit)	Dual Set point
0-1	20 k	21664	21624	21671	21631
0-50	1 M	21665	21625	21672	21632

<> Available on special order

DC Ammeters, Self-Shielding Movement

Range	Approx. Impedance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 3323AIXA		4-1/2" Model 3324AIXA	
		Single Set point (High	Dual Set Point	Single Set Point	Dual Set Point
0-5	.01	21662	21622	21669	21629

AC Ammeters Rectifier, Self-Shielding Movement

Range	Approx. Impedance (ohms)	Model/Size and Catalog Number			
		3-1/2" Model 3343AIXA		4-1/2" Model 3344AIXA	
		Single Set point (High	Dual Set Point	Single Set point (High	Dual Set Point
0-5	.01	21673	21633	21677	21637

Percent Motor Load Self-Shielding Movement

Scale	Range F.S.	Catalog Number Single Set point (High Limit)	Catalog Number Double Set point	Model
0-150%*	10 VAC	21684*	21644*	3344 AIXA 4-1/2"
0-150%**	5 amp AC	21683**	21643**	3344 AIXA 4-1/2"
0-150%**	5 amp AC	35096**	35097**	3343 AIXA 3-1/2"

* Use with Model 186 current transformers, pages C4-C6
** Use with current transformers, page C4

Temperature Meters

Specifications

Accuracy: ±2% F.S.
Movement: Annular, self-shielding
Suspension: Pivot and jewel
Adjustments: Single, 0-100% of arc; double, low limit 0-95% of arc; high limit, 5-100% of arc, Adjustable to within 4° of each other.
Switching: With 1% of indication
Differential: "On", "Off" difference is within 0.5% of F.S.
Auto/Manual Reset: Latching function can be enabled independently for each relay by removing jumpers on terminal block.
Contacts/Output Relays: DPDT relay contacts for each control point except motor load types. SPDT low point. Each set of contacts rated at 5 amps, 115 VAC
Tracking: ±3%
Repeatability: 2%
Shielding: Calibration is unaffected by magnetic panel mounting

Response Time: 1.5 seconds maximum
Overload (1 sec.): 10 times F.S.
Overload (Continuous): 1.5 times F.S.
Dial: Sharp clear scale. Each dial arc is calibrated to track the specific type of movement used.
Case: Sealed metal, plastic window
Voltage Drop: 50mV
Pointer: Black, knife-edge
Scale Length: 4.05" (103.0mm)
Net Weight: 17oz (0.48kg)
Frequency Response: 50-1000 Hz
Power: 108-132 VAC, 50-400 Hz
Operating Temperature: -4°F to +149°F (-20°C to +65°C)
Circuit to ground voltage: 250 RMS maximum
Tracking: ±3%

Ordering Information

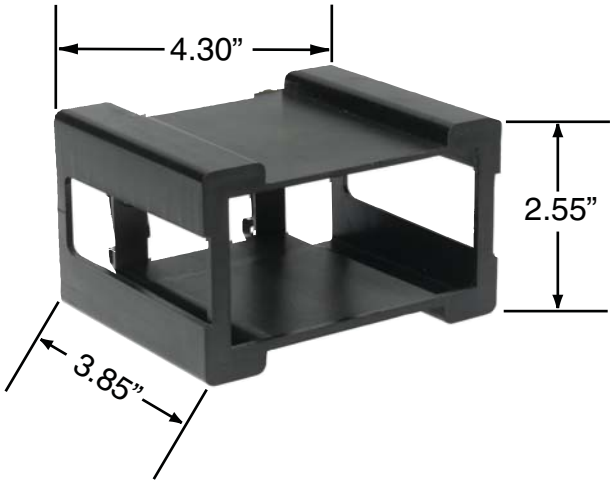
Temperature Range	Thermocouple Type	Catalog Number Model# 3324 AIXA 4 - 1/2"	
		SSP	DSP
0 to 300°F (0°C to +149°C)	Type J	21651	21611
0 to 500°F (0°C to +260°C)		21652	21612
0 to 750°F (0°C to +399°C)		21653	21613
0 to 1000°F (0°C to +538°C)		21654	21614
0 to 1500°F (0°C to +815°C)	Type K	21655	21615
0 to 2000°F (0°C to +1093°C)		21656	21616
0 to 2500°F (0°C to +1371°C)		21657	21617

Thermocouples are not supplied. Available separately from Accessory Section, page C2

Simpson

DIN Rail Mounting Bracket

- ***Fits Simpson Hawk 3, Falcon and Counters***
- ***Fits Standard Din Rail***



Ordering Information

Din Rail Adapter	45004

Specifications

Enclosure: UL94V-0 Rated ABS
Attachment Clips: Spring Steel
Stiffeners: Steel
Installed depth: 4.20” from top of DIN Rail to front of meter bezel

Thermocouples/RTD

Quick Disconnect Assemblies

Ordering Information

Type	ANSI Color Code	Max. Operating Temperature	Catalog Number
J	Black	1500°F	21238
K	Yellow	1600°F	21239

Note: All selections include standard plug and jack connectors.

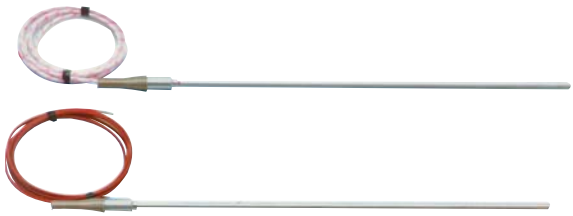
Specifications

316 Stainless Steel Best corrosion resistance of the stainless steel grades. Good corrosion resistance in H2S. Subject to damaging carbide precipitation. 900°-1600°F (482°-871°C) range.

Ungrounded Junction This type of thermocouple junction is fully insulated from the welded sheath end. The ungrounded junction is excellent for applications where stray EMFs would affect the reading and for frequent or rapid temperature cycling. Response time is 2.5 seconds.

Forming The XACTPAK® sheath can be formed around a mandrel twice the sheath diameter.

Metal Transition Assemblies



Ordering Information

Type	ANSI Color Code	Max. Operating Temperature	Catalog Number
J	Black	1500°F	21242
K	Yellow	1600°F	21243
RTD	White	1200°F	21244

Insulated Soft Wire

Soft-wire thermocouples are available in two insulation types. All soft-wire selections have beaded butt welded measurement junctions.

Type	Temperature Rating		Physical Properties		
	Continuous	Single Reading	Abrasion Resistance	Moisture Resistance	Chemical Resistance
Glass Braid	900°F (482°C)	1000°F (538°C)	Fair	Good	Good
Teflon®	400°F (204°C)	500°F (260°C)	Excellent	Excellent	Excellent

Ordering Information

Cat. No.	Description
THJ105	T/C J, 24 Gauge, Fiber Glass Braid, 5 foot
THJ1015	T/C J, 24 Gauge, Fiber Glass Braid, 15 foot
THK105	T/C K, 24 Gauge, Fiber Glass Braid, 5 foot
THK1015	T/C K, 24 Gauge, Fiber Glass Braid, 15 foot
THJ035	T/C J, 20 Gauge, FEP Teflon®, 5 foot
THJ315	T/C J, 20 Gauge, FEP Teflon®, 15 foot

Compression Fitting

This adjustable fitting can be applied at any point along the sheath. It is used to mount a thermocouple assembly at a given depth, or to mount a thermocouple head on an assembly.

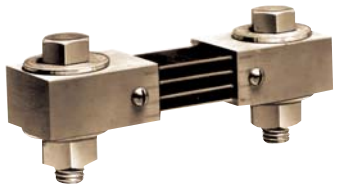
Ordering Information

Single Threaded Catalog#	Length	Sheath O.D. Inches	Bore ±0.001 Inches	Male NPT Inches	Hex Across Flats Inches
21253	1-1/4"	3/16	0.194	1/8	1/2

Simpson

External Portable and Switchboard Shunts

50mV Shunts
Portable 150 amp
Catalog No. 06714



Switchboard
100 amp
Catalog No. 06500

Ordering Information

Portable 50mV Shunts

Range	Cat. Number
1	06700
5	06703
10	06704
15	06705
25	06707
30	06708
50	06709
75	06711
100	06713
150	06714
200	06715

5' leads included

Switchboard 50mV Shunts

Range	Cat. Number
100	06500
150	06503
200	06504
250	06505
300	06506
400	06507
500	06508

5' leads included

Portable 100mV Shunts

Amps	Cat. Number
10	06716
100	06717

5' leads not included

Dimension Table for External Portable Shunts

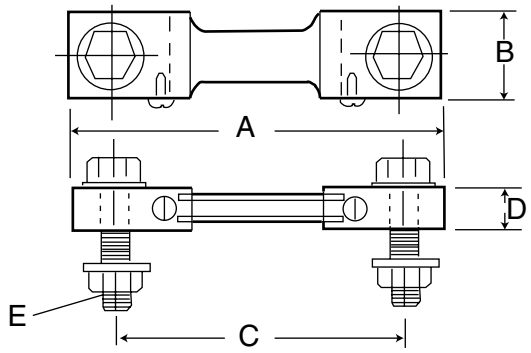
Amps	A	B	C
1	1-1/16"	1/4"	1/4-20
5	1-1/16"	1/4"	1/4-20
10	1-1/16"	1/4"	1/4-20
15	1-1/16"	1/4"	1/4-20
25	1-1/16"	1/4"	1/4-20

Amps	A	B	C
30	1-1/16"	1/4"	1/4-20
50	1-5/16"	1/2"	3/8-16
75	1-5/16"	1/2"	3/8-16
100	1-5/16"	1/2"	3/8-16
150	1-5/16"	1/2"	3/8-16
200	1-5/16"	1/2"	3/8-16

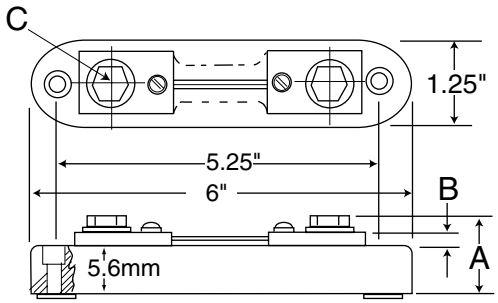
Dimension Table for Switchboard Shunts

Amps	A	B	C	D	E
100	4-1/2"	1"	3-1/2"	1/2"	3/8-16x1-1/2
150	4-1/2"	1"	3-1/2"	1/2"	3/8-16x1-1/2
200	4-1/2"	1"	3-1/2"	1/2"	3/8-16x1-1/2
300	5-1/2"	1-1/2"	4"	1"	1/2-13x2
400	5-1/2"	1-1/2"	4"	1"	1/2-13x2
500	5-1/2"	1-1/2"	4"	1"	1/2-13x2

Switchboard Shunts



External Portable Shunts



Current Transformers

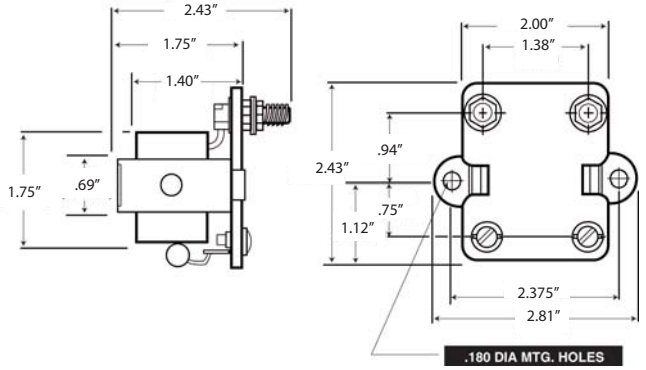
Model 186 Current Transformer

- *Optimal for remote sensing of AC current signals*
- *Converts AC current signal to 0-10 ACV signal*
- *For use with rectifier type analog panel meters or digital indicators*
- *Perfect for low current measurement where a donut current transformer would not sense a signal*

Ordering Information

Range	VA	Cat. Number
0-100mA	0.50	01295
0-500mA	0.53	01304
0-5Amp	0.40	01312
0-10Amp	1.45	01314
0-15Amp	1.05	01315
0-20Amp	1.04	01316
0-25Amp	1.50	01317
0-30Amp	1.10	01318
0-40Amp	1.09	01319
0-50Amp	1.90	01321

Dimensions



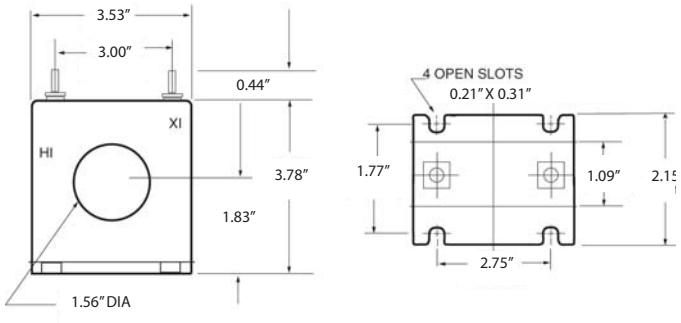
Current Transformers with Terminals

- *Reduces high AC current signal to 5 amp AC signal*
- *Use with analog and 5 amp AC digital indicators*

Specifications

Accuracy	±2.0% (100 Amp) ±1.0% (100-1000 Amp)
Frequency	50-400 Hz
Insulation Class	0.6kV BIL 10kV full wave
Weight	1.0lb (453.59g)

Dimensions



Ordering Information

Range	Burden VA@60Hz	Catalog Number
100:5	2.0	37020
150:5	5.0	37021
200:5	5.0	37022
300:5	12.5	37023
500:5	20.0	37024
1000:5	25.0	37025

Donut Current Transformers

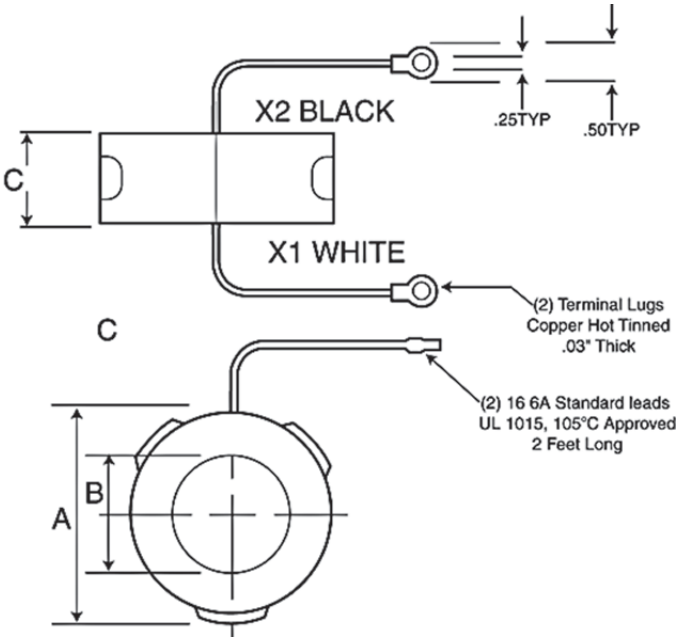
Ordering Information

Ampere		Turns	Catalog	Dimensions		
Primary	Secondary	Ratio	Number	A	B	C
50	5	10:1	01293			
75	5	15:1	01306	3.56”	1.56”	1.10”
100	5	20:1	01297			
150	5	30:1	01298			
200	5	40:1	01299			
250	5	50:1	01313			
300	5	60:1	01300	3.56”	2.06”	1.10”
400	5	80:1	01305			
500	5	100:1	01301			
600	5	120:1	02303			
750	5	150:1	02459	4.50”	3.00”	1.09”
1000	5	200:1	02304			

- ***Meets A.S.A C57.13 Standard***
- ***Flexible leads are UL105, 105°C CSA approved***
- ***Molded from impact and abrasive resistance black nylon for rugged construction***
- ***±2% Accuracy***

Catalog Number	Turns Ratio	Accuracy For 2 VA Burden
01293	10:1	2%
01306	15:1	2%
01297	20:1	1%
01298	30:1	1%
01299	40:1	1%
01313	50:1	.8%
01300	60:1	.6%
01305	80:1	.5%
01301	100:1	.5%
02303	120:1	.5%
02459	150:1	.3%
02304	200:1	.3%

Dimensions



Donut Current Transformer Wrapping Information

Primary Turn Ratio Modification

Formula: Ka = Kn x Nn / Na

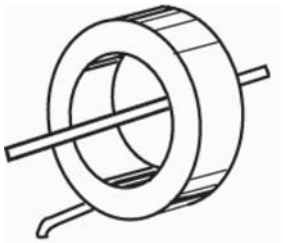
Where:
Ka = Actual Transformer Ratio
Kn = Nameplate Transformer Ratio
Na = Actual Number of Primary Turns
Nn = Nameplate Number of Primary Turns

The ratio of the current transformer can be modified by adding more primary turns to the transformer. By adding primary turns, the current required to maintain five amps on the secondary is reduced.

Example: A 100:5 current transformer designed for one primary turn.

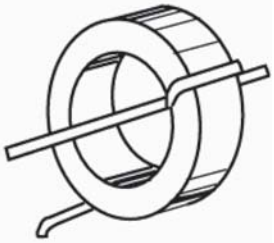
1 Primary Turn

Nameplate Ratio	Actual Ratio
100:5	100:5



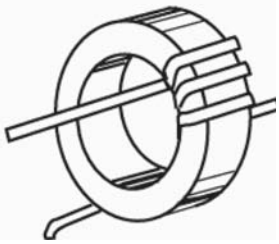
2 Primary Turns

Nameplate Ratio	Actual Ratio
100:5	50:5



4 Primary Turns

Nameplate Ratio	Actual Ratio
100:5	25:5



Primary Turn Ratio Modification

Formula: $\frac{Ip}{Is} = \frac{Ns}{Np}$

Where:
Ip - Primary Current
Is - Secondary Current
Np - Number of Primary Turns
Ns - Number of Secondary Turns

Example: A 300:5 Current Transformer.

$$\frac{300p}{5s} = \frac{60s}{1p}$$

(In practicality one turn is dropped from the secondary as a ratio correction factor.)

The ratio of the current transformer can be modified by altering the number of secondary turns by forward or backwinding the secondary lead through the window of the current transformer. By adding secondary turns, the same primary current will result in a decrease in secondary output. By subtracting turns, the same primary current will result in greater secondary output.

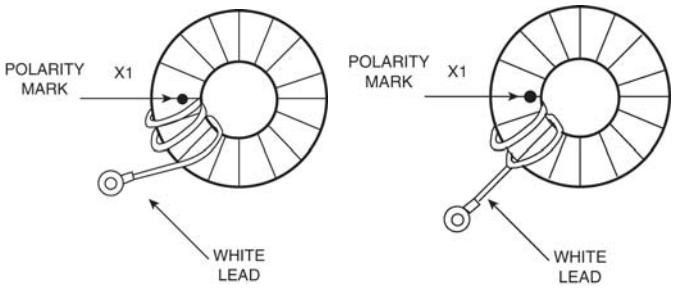
Again using the 300:5 example adding five secondary turns will require 325 amps on the primary to maintain the 5 amp secondary output or

$$\frac{325p}{5s} = \frac{65s}{1p}$$

Deducting 5 secondary turns will only require 275 amps on the primary to maintain the 5 amp secondary output or

$$\frac{325p}{5s} = \frac{65s}{1p}$$

The above ratio modifications are achieved in the following manner:



Model 183 Multiplier

- ***Reduces high AC Voltage Signals down to 150 VAC***
- ***Reduces high DC Voltage signals down to 500µADC***
- ***Accuracy ±1%***

Ordering Information

DC Volts - 2000 Ohms/Volt

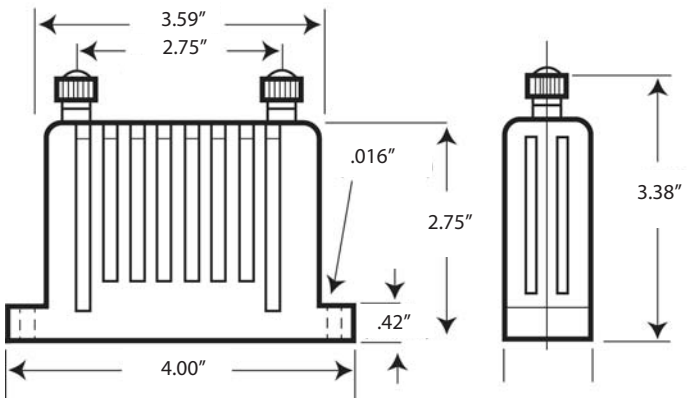
Used only with Simpson DC Volt analog panel meters or with 0-2 mA DC digital panel meters. Digital units will need to be recalibrated when a multiplier is used.

Range	Multiplier Resistance MΩ	Meter Sensitivity DC µA	Catalog Number
0-500	1	500	08552
0-1000	2	500	08554
0-2000	4	500	08557
0-4000	8	500	08560
0-5000	10	500	08561

AC Volts - 166 Ohms/Volt

Used only with Simpson AC Volt, iron vane analog panel meters or with a 0-200 VAC digital meter using an external 25KΩ/1W resistor across the inputs.

Range	Impedance Ω @ 60 Hz	Voltage Reduced	Voltage Drop	Catalog Number
0-500	58,333	350	150	08562
0-600	75,000	450	150	08563
0-750	100,000	600	150	08564
0-1000	141,666	850	150	08565



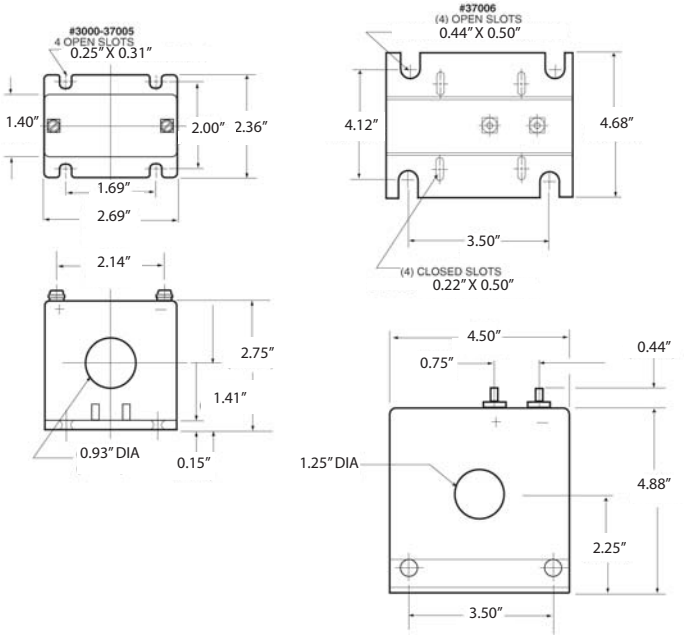
Current Transducers

- ***Reduces AC current signals down to 4-20 DCmA***
- ***Screw terminals for easy connection***
- ***Operates on 24V DC power***

Specifications

Accuracy:	±0.5% F.S. Max
Frequency:	60Hz
Insulation Class:	600V
Max. Output:	30DCmA
Temp. Effect:	
Accuracy:	±0.04%/°C
Operating:	-30°C to +65°C
Storage:	-55°C to +85°C
Supply Voltage:	24 DCV ±10%
Weight:	1.5lb (680.39kg)

Dimensions



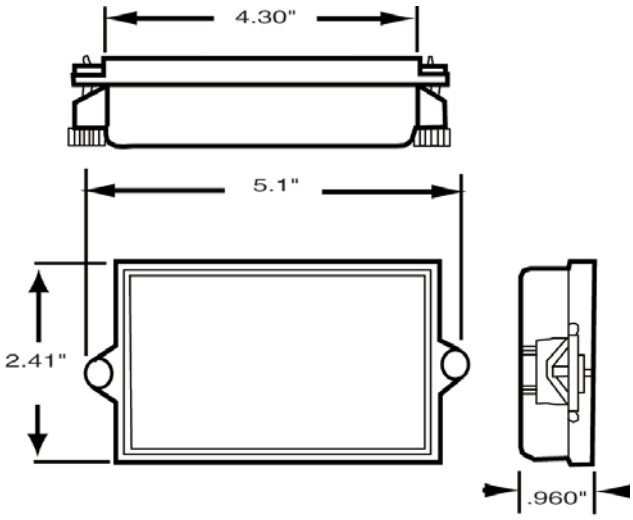
Ordering Information

Input Current Range(ACA)	Output Current Range(DCmA)	Catalog Number
0-5 A	4-20mA	37000
0-50 A	4-20mA	37001
0-75 A	4-20mA	37002
0-100 A	4-20mA	37003
0-150 A	4-20mA	37004
0-200 A	4-20mA	37005
0-300 A	4-20mA	37006

1/8 DIN NEMA 4 Removable Cover

- ***Protects 1/8 DIN indicators and controllers***
- ***Dust tight and water tight to NEMA 4 standards***
- ***Removable front cover allows access to programming buttons or scaling potentiometers***

Dimensions



Specifications

Lens Material	Clear 94-V-0 UL-rated polycarbonate with UV inhibitor
Gasket Material	Closed Cell Neoprene
Bezel Material	Steel
Bezel Finish	Black Polyurethane
Bezel Dimensions	4.3" x 2.41" x 0.28" (109.2mm x 61.2mm x 7.1mm)
Overall Dimensions	4.3" x 2.41" x 0.96" (109.2mm x 61.2mm x 24.4mm)
Panel Cutout	3.66" x 1.79" (93mm x 45.5mm)

Ordering Information

Catalog number	45003

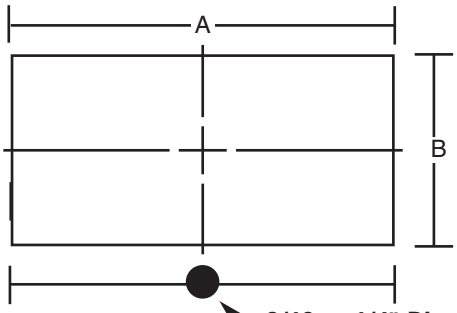
Bezel Kits

This bezel kit provides an attractive appearance for Wide-Vue analog panel meters. Die cast with a black satin finish, bezel kits are designed for behind panel mounting and can accommodate a panel thickness from 1/8" to 3/16". All required mounting hardware is included.

Ordering Information

Size	Panel Cutout A	Panel Cutout B	Catalog Number
3 - 1/2"	3.406"	2.094"	01253
4 - 1/2"	4.812"	2.750"	01123

Panel Cutout



3/16 to 1/4" Diameter hole for zero adjust access (optional).

Wide-Vue or Tru-Vue Bezel Kit

Ordering Information

Bezel kit for 2-1/2 Wide-Vue or Tru-Vue meter	01255

Digital Products Feature Reference Guide






Feature	Mini	Mini-Max	Falcon	Hawk 3	Gima	Counters
Size:						
3/64 DIN	✳	✳				
1/8 DIN			✳	✳		✳
1/4 DIN					✳	
Display:						
LCD	✳	✳				
LCD Backlit	✳	✳			✳	
LED			✳	✳		✳
Resolution:						
3.5 digit	✳	✳	✳	✳		
4.5 digit	✳	✳	✳	✳		
4 digit		Temperature		Temperature		Frequency
6 digit					✳	✳
Power Supply:						
ACV		✳	✳	✳	✳	✳
DCV	✳	✳	✳	✳		
9 DCV Battery	✳					
Inputs:						
AC		✳	✳	✳	✳	
DC	✳	✳	✳	✳		
AC TRMS		✳	✳	✳		
Thermocouple		✳	✳	✳		
RTD		✳	✳	✳		
Frequency		✳	✳		✳	✳
Resistance				✳		
3-Phase					✳	
Wattmeter					✳	
Standard (Counter)						✳
Quadrature (Counter)						✳
Options:						
Relays (5Amp) Programmable				✳		✳
Analog Output				✳	✳	
RS-485 Communication				✳	✳	
RS-422 Communication					✳	
Excitation		✳	✳	✳		✳
Other, included:						
Min/Max, Peak				✳	✳	
Display Hold	✳	✳	✳			
User Scaling		Limited	Limited	✳	✳	✳
Screw Terminal Connections		✳	✳	✳	✳	✳
Pin mate connector w/6” lead wire	✳					

Simpson Authorized Distributor

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