

Simpson

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Panel



Instruments



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.



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Analog Panel Meters

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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



Digital Panel Meter

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.

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



Analog Panel Meter

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**

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.

more >>

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 |

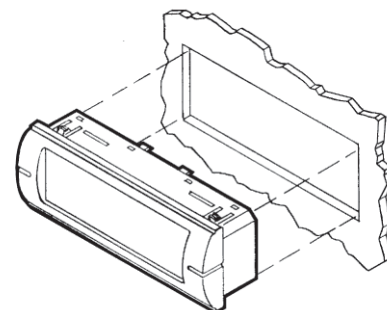
Input Specifications

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 |

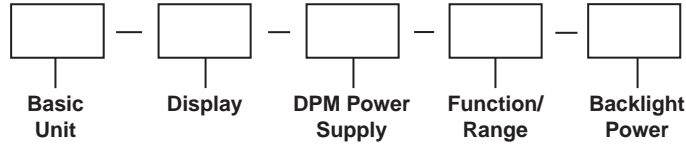




Mini M135 & M145 Digital Panel Meters

Ordering Information

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



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

| Selection | Description |
|-----------------------|-------------|
| Function/Range | |
| 11 | 200 DCmV |
| 12 | 2 DCV |
| 13 | 20 DCV |
| 14 | 200 DCV |

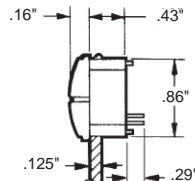
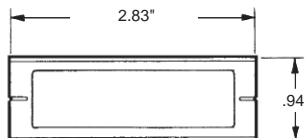
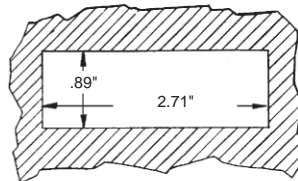
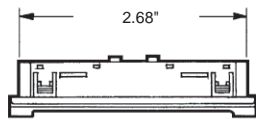
| Selection | Description |
|----------------|------------------------|
| Display | |
| 0 | Non Backlit |
| 1 | Negative Red Backlight |

| | |
|----|----------|
| 21 | 200 DCμA |
| 22 | 2 DCmA |
| 23 | 20 DCmA |
| 24 | 200 DCmA |

| Selection | Description |
|-------------------------|-------------|
| DPM Power Supply | |
| 0 | + 5 DCV |
| 1 | ± 5 DCV |
| 2 | + 9 DCV |

| Selection | Description |
|------------------------|-------------|
| Backlight Power | |
| 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 | 2.5VA min/4VA max |
| 85-250VAC | 1.5VA min/3VA max |
| 9-32DCV | |
| 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 | >100MΩ | 100V |
| 2V | 1mV | 10MΩ | 750V |
| 20V | 10mV | 10MΩ | 750V |
| 200V | 100mV | 10MΩ | 750V |
| 750V | 1V | 100MΩ | 750V |

DC Current

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

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 |

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 |

Mounting Requirements: see page A6

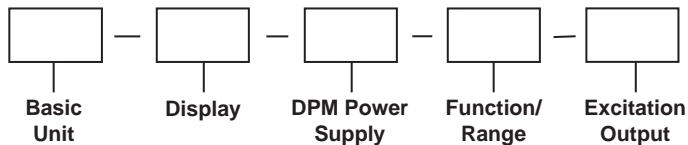
more >>



Mini-Max M235 & M245 Digital Panel Meters

Ordering Information

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



| Selection | Description | Selection | Description |
|----------------------------------|------------------------|--|------------------------|
| Basic Unit | | Function/Range (continued) | |
| M235 M245 | 3-1/2 Digit LCD | 31 | 200 mVAC TRMS |
| | 4-1/2 Digit LCD | 32 | 2 VAC TRMS |
| | | 33 | 20 VAC TRMS |
| | | 34 | 200 VAC TRMS |
| | | 36 | 270 VAC TRMS |
| Display | | | |
| 0 1 | Non Backlit | 41 | 200 AC μ A TRMS |
| | Negative Red Backlight | 42 | 2 ACmA TRMS |
| | | 43 | 20 ACmA TRMS |
| | | 44 | 200 ACmA TRMS |
| | | 45 | 2 ACA TRMS |
| | | 46 | 5 ACA TRMS |
| DPM Power Supply | | | |
| 0 2 | 85-250 ACV | 71 | 4-20 DCmA (DC Process) |
| | 9-32 DCV* | 72 | 1-5 DCV (DC Process) |
| | | 73 | 0-10 DCV (DC Process) |
| | | 74 | 0-100 DCV (DC Process) |
| Function/Range | | | |
| 11 12 13 14 | 200 DCmV | 81 (M235) | 20-199.9 Hz RMS |
| | 2 DCV | 82 (M235) | 20-1999 Hz RMS |
| | 20 DCV | 83 (M235) | 20-199.9 Hz Sq. Wave |
| | 200 DCV | 84 (M235) | 20-1999 Hz Sq. Wave |
| 21 22 23 24 25 26 | 200 DC μ A | Excitation Output (N/A w/Frequency) | |
| | 2 DCmA | 0 | None |
| | 20 DCmA | 1 | 12 DCV @ 25mA |
| | 200 DCmA | 2 | 24 DCV @ 25mA |
| | 2 DCA | | |
| | 5 DCA | | |

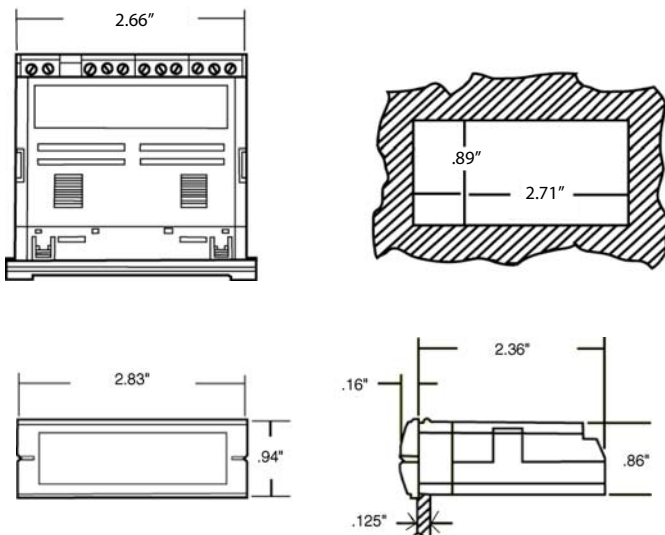
* Not Available on Frequency (Hz) Meters

Mini-Max M240 Temperature Indicator



- 3/64 DIN Temperature Indicator
- Jumper-selectable input type and °C/°F 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 continuously "INFO FAIL CALB REQD" upon application of power. |
| 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 | |
| Lead Resistance Effect | Platinum 100 Ohm (.00385 alpha) 4-wire -.26°C/100V max. 2- and 3-wire 1°/.29Ω max. |
| Temperature Coefficient | ±0.2°C / °C |

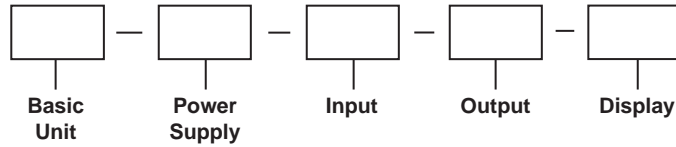
| Input Type | Temperature Range | Accuracy @25°C |
|--------------------|-------------------|--------------------|
| K T/C | -100 to 1370°C | ±(0.1% rdg +1.5°C) |
| | -148 to 2498°F | ±(0.1% rdg +2.7°F) |
| J T/C | -100 to 1200°C | ±(0.1% rdg +1.5°C) |
| | -148 to 2192°F | ±(0.1% rdg +2.7°F) |
| RTD Pt100 (4-wire) | -100 to 850°C | ±(0.2% rdg +1.5°C) |
| | -148 to 1562°F | ±(0.2% rdg +2.7°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 | 12 Bit Successive Approximation (SAR) |
| Rate | 10 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 |

[more >>](#)

Ordering Information

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



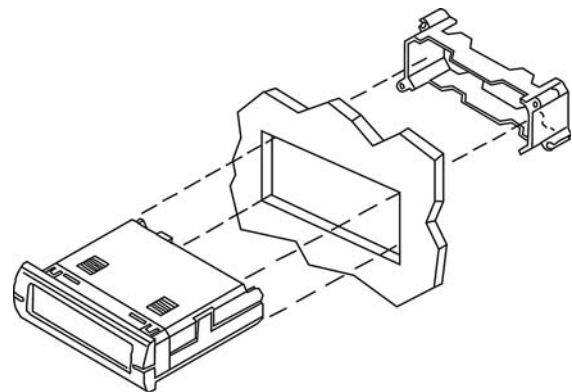
| Selection | Description | Selection | Description |
|---------------------|---------------|----------------|-------------|
| Basic Unit | | Output | |
| M240 | 4 Digit LED | 0 | None |
| Power Supply | | Display | |
| 0 | 85-250 VAC | C | °C |
| Input | | F | °F |
| 91 | J T/C | 0 | mV |
| 92 | K T/C | | |
| 93 | RTD Pt100 Ohm | | |
| 94 | DC 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

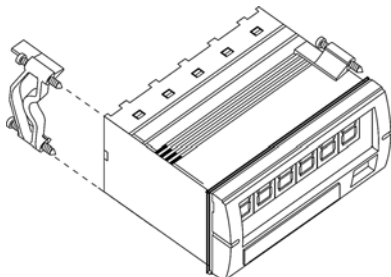
Falcon F35 & F45 Digital Panel Meters



- 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

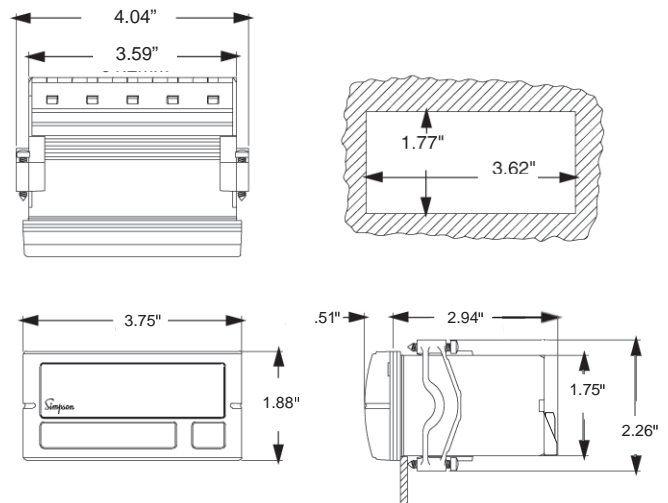
The Falcon series 1/8 DIN indicators require a panel cutout of 1.77" (45mm) high by 3.62" (92mm) wide. To install the Falcon into a panel cutout, remove the clips from the side of the meter. Slide the meter through your panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure 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 most significant digit = "1"; other digits blank |
| Overrange indication | Automatic, with "-" indication, "+" indication implied |
| Polarity | Automatic, with "-" indication, "+" indication implied |
| POWER REQUIREMENTS | |
| AC Voltages | 120 or 220VAC, $\pm 10\%$ 50/60Hz |
| DC Voltages | 9-32DCV, $\pm 1\%$ |
| Power Consumption | F35: 3VA, F45: 2VA |
| ACCURACY @25°C | |
| F45 DC Process/Voltage | $\pm 0.02\%$ of reading ± 1 count 750 ± 2 count |
| F35 DC Process/Voltage | $\pm 0.1\%$ of reading ± 1 count 750 ± 2 count |
| F45 DC Current | $\pm 0.05\%$ of reading ± 1 count 2A ± 5 counts 5A ± 5 counts |
| F35 DC Current | $\pm 0.1\%$ of reading ± 1 count 2A ± 5 counts (45Hz-1KHz) |
| F45 AC Voltage/Current | $\pm 0.5\%$ of reading ± 35 counts (45Hz-1KHz) |
| F35 AC Voltage/Current | $\pm 1\%$ 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 | ($\pm 0.1\%$ 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/1K Ω 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



more >>



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, $\pm 10\%$ 50/60Hz
Power Consumption 2.5VA min./4VA max.

ACCURACY @25°C

200 Hz: $\pm 0.2\%$ of input ± 0.2 Hz
2 kHz: $\pm 0.2\%$ of input ± 2 Hz

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

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, $\pm 10\%$ 50/60Hz
DC Voltages 9-32 DCV, $\pm 1\%$
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 ± 84 mV reading of uncompensated mV
Cold Junction Compensation Error 0.1°C/°C
Input Impedance 10MW(typical)
Lead Resistance Effect 4.0 μ V/100V
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 μ A | 0.2V | 100mA |
| Range | Resolution | Input Impedance | Maximum Input |
| 1-5 DCV 0-10DCV | 10mV 10mV | 10 M Ω 10 M Ω | 100 V 100 V |

DC Current

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

AC/AC TRMS Voltage

| Input Range | Resolution | Input Impedance | Maximum Overload |
|-------------|-------------|-----------------------|------------------|
| 200 mV | 10 μ V | ≥ 100 M Ω | 50V |
| 2 V | 100 μ V | 10M Ω | 100V |
| 20 V | 1mV | 10M Ω | 100V |
| 200 V | 10mV | 10M Ω | 250V |
| 750 V | 100mV | 1M Ω | 750V |

AC/AC TRMS Current

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

DC Voltage

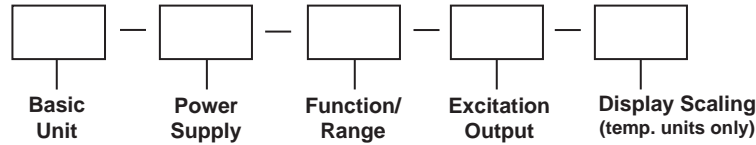
| Input Range | Resolution | Input Impedance | Maximum Overload |
|-------------|-------------|-----------------------|------------------|
| 200 mV | 10 μ A | ≥ 100 M Ω | 50V |
| 2 V | 100 μ A | 10M Ω | 100V |
| 20 V | 1mV | 10M Ω | 100V |
| 200 V | 10mV | 10M Ω | 250V |
| 750 V | 100mV | 1M Ω | 750V |

Falcon F35 & F45 Digital Panel Meters



Ordering Information

Falcon Indicators can be configured by making an entry in each section. Example: F35-1-52-0.



| Selection | Description | Selection | Description |
|-----------------------|-----------------|--|----------------------------|
| Basic Unit | | Function/Range cont'd | |
| F35 | 3 1/2 digit LED | 61 | 200 AC μ A TRMS • |
| F45 | 4 1/2 digit LED | 62 | 2 ACmA TRMS • |
| Power Supply | | 63 | 20 ACmA TRMS • |
| 1 | 120 ACV | 64 | 200 ACmA TRMS • |
| 2 | 220 ACV | 65 | 2 ACA TRMS • |
| 3 | 9-32 DCV† | 66 | 5 ACA TRMS • |
| Function/Range | | 71 | 4-20 DCmA Process |
| 11 | 200 DCmV | 72 | 1-5 DCV Process |
| 12 | 2 DCV | 73 | 0-10 DCV Process |
| 13 | 20 DCV | 80 (F45) | J T/C |
| 14 | 200 DCV | 81 (F45) | K T/C |
| 15 | 750 DCV | 82 (F45) | S T/C |
| 21 | 200 DC μ A | 83 (F45) | T T/C |
| 22 | 2 DCmA | 84 (F45) | E T/C |
| 23 | 20 DCmA | 85 (F45) | R T/C |
| 24 | 200 DCmA | 86 (F45) | DCmV |
| 25 | 2 DCA | 90 (F45) | RTD Pt100 Ohm |
| 26 | 5 DCA | 91 (F35) | 20-199.9 Hz RMS |
| 31 | 200 ACmV | 92 (F35) | 20-1999 Hz RMS |
| 32 | 2 ACV | 93 (F35) | 20-199.9 Hz Sq. Wave |
| 33 | 20 ACV | 94 (F35) | 20-1999 Hz Sq. Wave |
| 34 | 200 ACV | Excitation Output | |
| 35 | 750 ACV | (not available with AC, temperature, or frequency inputs) | |
| 41 | 200 AC μ A | 0 | None |
| 42 | 2 ACmA | 1 | 12 DCV @ 25mA max. current |
| 43 | 20 ACmA | 2 | 24 DCV @ 25mA max. current |
| 44 | 200 AC mA | Display Scaling | |
| 45 | 2 ACA | (Temperature units only) | |
| 46 | 5 ACA | C | °C |
| 51 | 200 ACmV TRMS • | F | °F |
| 52 | 2 ACV TRMS • | | |
| 53 | 20 ACV TRMS • | | |
| 54 | 200 ACV TRMS • | | |
| 55 | 750 ACV TRMS • | | |

† Not available for use with frequency meters

• Only available with F35



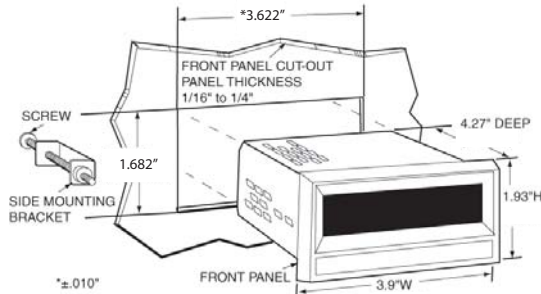
2800 Series Digital Panel Meters



- 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 "EEEE" 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 13.2mm) |
| 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 |



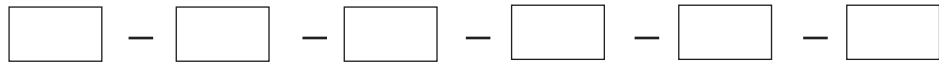
more >>



Hawk 3 Digital Panel Meter/Controller

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 | Selection | Description |
|--------------------------|-------------------------|---------------------------------|---------------------|
| Basic Unit | | Function/Range continued | |
| H335 | 3-1/2 digit, Red LED | 51 | 200 ACmV TRMS |
| H345 | 4-1/2 digit, Red LED | 52 | 2 ACV TRMS |
| Power Supply | | 53 | 20 ACV TRMS |
| 1 | 120 ACV (3-1/2 only) | 54 | 200 ACV TRMS |
| 2 | 85-250 ACV (4-1/2 only) | 55 | 600 ACV* TRMS |
| 3 | 9-36 DCV | 61 | 200 ACμA TRMS |
| 4 | 85-250 ACV (3-1/2 only) | 62 | 2 ACmA TRMS |
| Function/Range | | 63 | 20 ACmA TRMS |
| 11 | 200 DCmv | 64 | 200 ACmA TRMS |
| 12 | 2 DCV | 65 | 2 ACA TRMS |
| 13 | 20 DCV | 66 | 5 ACA TRMS |
| 14 | 200 DCV | 71 | 4-20 DCmA Process |
| 15 | 600 DCV* | 72 | 0-10 DCV Process |
| 21 | 200 DCμA | 81 | 200 Ohm |
| 22 | 2 DCmA | 82 | 2K Ohm |
| 23 | 20 DCmA | 83 | 20K Ohm |
| 24 | 200 DCmA | 84 | 200K Ohm |
| 25 | 2 DCA | Output | |
| 26 | 5 DCA | 0 | None |
| 31 | 200 ACmV | 1 | 4-20 DCmA |
| 32 | 2 ACV | 2 | 0-10 DCV |
| 33 | 20 ACV | 6 | RS-485 (4-1/2 only) |
| 34 | 200 ACV | 5A Relays | |
| 35 | 600 ACV* | 0 | None |
| 41 | 200 ACμA | 1 | One |
| 42 | 2 ACmA | 2 | Two |
| 43 | 20 ACmA | 4 | Four |
| 44 | 200 ACmA | Excitation | |
| 45 | 2 ACA | 0 | None |
| 46 | 5 ACA | 1 | 12 DCV |
| Continued on next column | | 2 | 24 DCV |

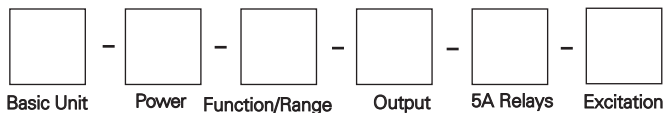
* Awaiting UL approval

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



Selection Description Selection Description

| Selection | Description | Selection | Description |
|-----------|---|-----------|----------------------------|
| H340 | Basic Unit 4 digit, Red LED | 0 | Output None |
| | | 1 | 4-20 DCmA |
| | | 2 | 0-10 DCV |
| 1 | Power Supply 120 ACV | | |
| 3 | 9-36 DCV | 0 | 5A Relays None |
| 4 | 85-250 ACV | 1 | One |
| | | 2 | Two |
| 91 | Function/Range J Thermocouple | 4 | Four |
| 92 | K Thermocouple | | |
| 93 | RTD, PT100 3-wire | 0 | Excitation None |
| 94 | E Thermocouple | 1 | 12 DCV - 100mA max current |
| 95 | T Thermocouple | 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 "EEEE" indicating Maximum Value Exceeded |
| Underrange indication | Display flashes "-EEEE" indicating Minimum Value Exceeded |

| | |
|-------------------------|---|
| Sensor Break Excitation | Display reads "EEEE" 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" (99.8mm x 51.8mm x 13.2mm) |
| 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 |



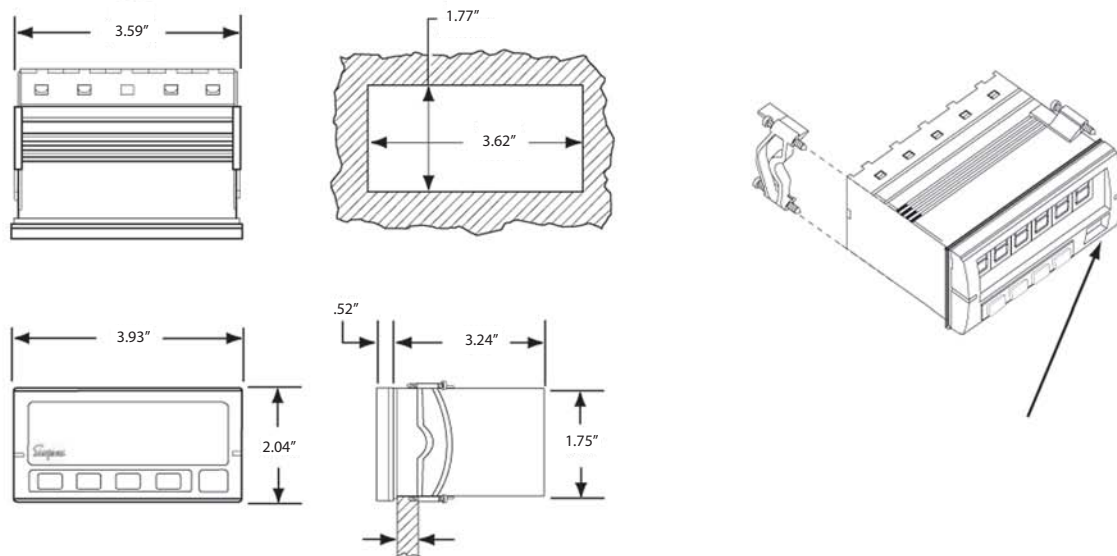
Panel Cutout Dimensions on page A14

more >>



Hawk 3 Installation Instructions

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

| | Per Phase | 3 Phase |
|--|-----------------------|--|
| Current 5% to 120%FS | ±0.2%FS | 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.

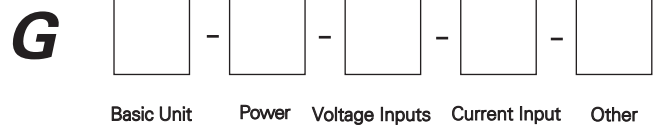
The current transformer is equipped with terminals to permit easy connection to the GIMA units. These terminals are #8-32 brass studs and come with a flatwasher, lockwasher and a regular nut (leads are not provided).



Ordering Information

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

Ordering Information



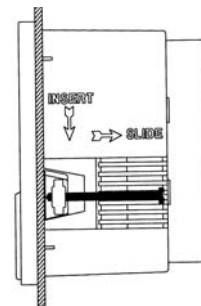
- | | |
|-----|---|
| 100 | Basic Unit GIMA 100 Meter GIMA 200 Meter GIMA 300 Meter GIMA 400 Meter |
| 200 | |
| 300 | |
| 400 | |
| 1 | Power Supply 115 VAC @ 45-65Hz 230 VAC @ 45-65 Hz |
| 2 | |
| 1 | Voltage Input 120/208V 120/240V - Split Phase 277/480V 63/110V |
| 2 | |
| 3 | |
| 4 | |
| 1 | Current Input 5 amp |
| 0 | Other 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 Option Module | 230V AC or 115V AC 50/60Hz±15% Automatic voltage selection when inserted into GIMA® Power Meter MUST be rated to match Option Module rating |
| Load Isolation | 4 VA Maximum 2.5 kV continuous (supply internally wired to GIMA® main inputs) |
| Mechanical (Options Module) Enclosure Material Dimensions | Custom Options Enclosure Mablex, UL94-V-0 3.43" x 2.32" x 2.95" W=87mm x H=59mm x L=75mm 3.78" x 3.78" x 5.43" W=96mm x H=96mm x L=138mm |
| GIMA® Meter + Options | Approx. 200g Modular screwdown contacts, .2" centers Quad 4-20 DCmA Current Sink with common Nominal 24 DCV Max 28 DCV (at options module) Min 5 DCV (at options module) Unregulated 18 DCV |
| Weight Terminals 4-20mA Output Output Loop Supply | Max 30 DCV Min 10 DCV |
| Internal Supply | 600V per channel (maximum 950V) 24V supply |
| Load Impedance/Ext. Supply | 250Ω per channel (maximum 500Ω) at nominal V _{aux} |
| Internal (Unreg) Supply | Max output 21mA 10 Bit (830 levels from 4mA to 21mA) Outputs updated every second (as GIMA® meter) |
| Over Range Resolution Update Speed Output Accuracy | Test range 4mA to 20mA, load impedance = 250Ω I _{out} < 5.6mA ±0.5% reading + GIMA® meter errors <0.02% (0Ω to 250Ω) |
| Effect of Loop Impedance 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.



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

| | |
|-----------------------|--|
| Low Bias | <200Hz |
| High Bias | VLT = 1.6V ±10% VUT = 3.6V ±10% |
| Count Rate | VLT = 5.0V ±10% VUT = 7.0V ±10% |
| Maximum Voltage Input | 20KHz (Pulse Max) 5KHz (Quadrature X4 Max) |

| | |
|----------------|-------------|
| 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) |

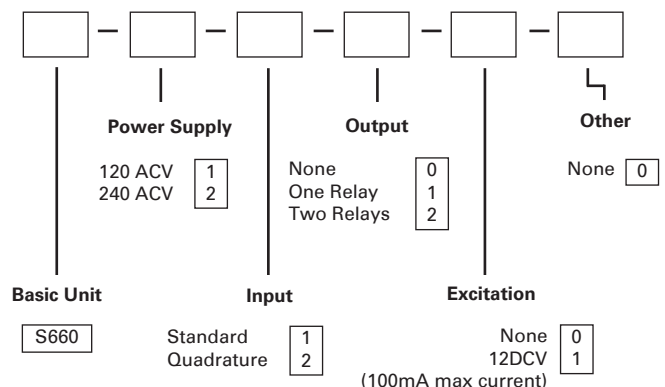
ENVIRONMENTAL

| | |
|----------------------------|--|
| 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

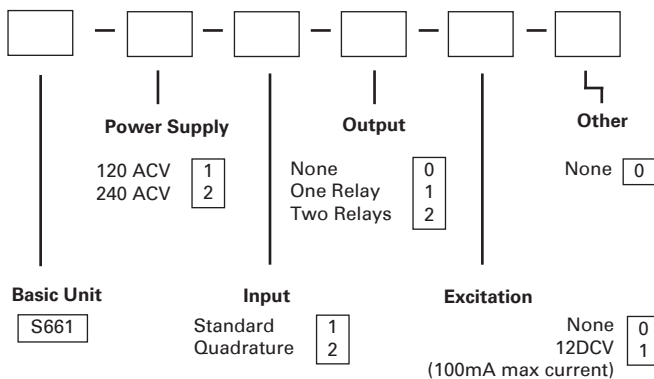


S661 Preset Rate Counter



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

Ordering Information



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) |

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 | Display Scaling |
| Set Point Programming | 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

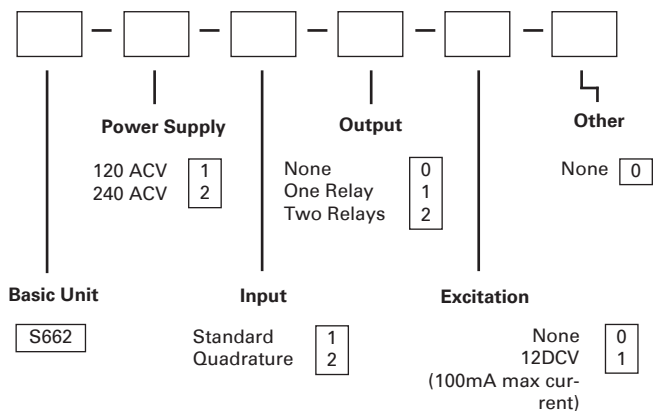
The S660 series 1/8 DIN counters require a panel cutout of 1.77" (45mm) high by 3.62" (92mm) wide. To install the counter into a panel cutout, remove the clips from the side of the meter. Slide the meter through your panel cutout, then slide the mounting clips back on the meter. Press evenly to ensure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

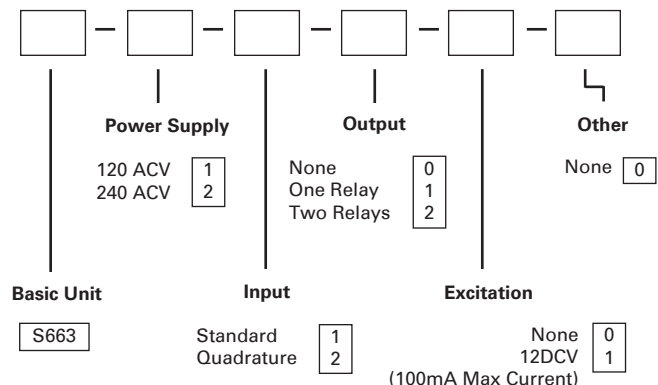
Mounting Requirements

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.

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



Panel Cutout Dimensions on page A23



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* *Display Scaling*
 - Set Point Programming* *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.

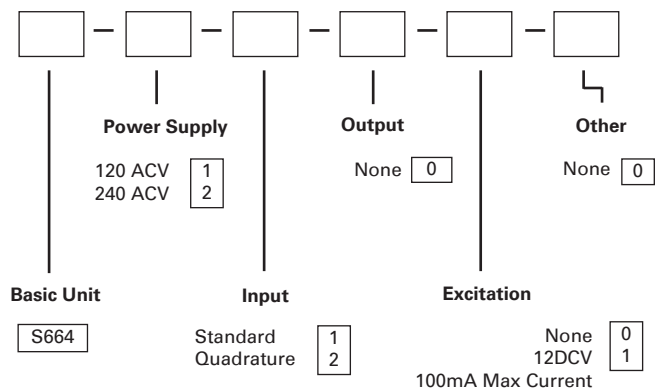


Panel Cutout Dimensions on page A23

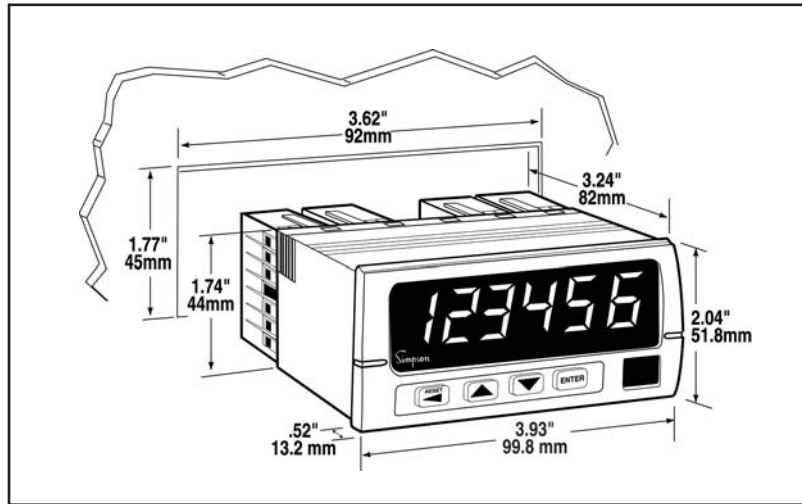
Specifications

| | |
|--------------------------------------|--|
| 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



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.



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.

Description

Coupling: For connecting an encoder to a 3/8" shaft
Coupling package: For connecting an encoder to 1/4" or 5/16" diameter shaft*

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

Catalog No.

46002
46003

Tire Durometer

80A, black tire; longer service life for plastics, metals
83A, non-marking tire for textiles, medium textures
92A, non-marking tire for plastics, metals, coarse wood
70A, non-marking tire for soft textiles

Catalog No.

46004
46005
46006
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 to 149°F (0-65°C)

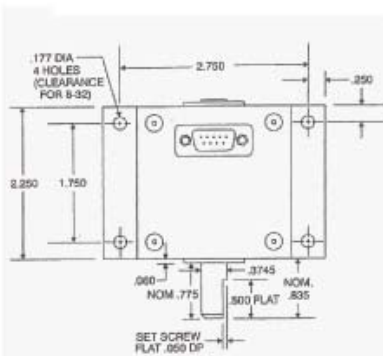


Ordering Information

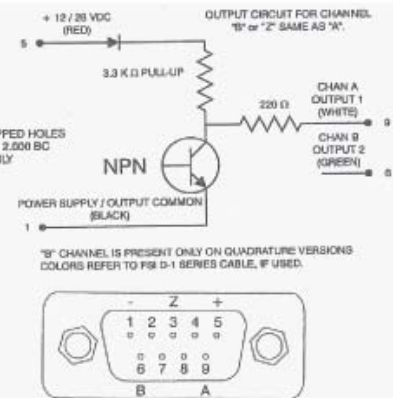
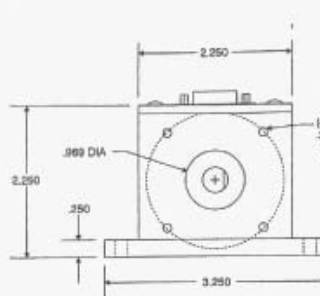
SE Quadrature Encoders

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

Installation and Wiring



VARIOUS OPTIONS SHOWN IN THESE DRAWINGS.



VIEW OF THE MALE CONNECTOR MOUNTED ON THE ENCODER. THE CORRESPONDENCE BETWEEN FUNCTIONS AND PIN NUMBERS REMAINS THE SAME IN ALL VIEWS.

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

250° 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
-



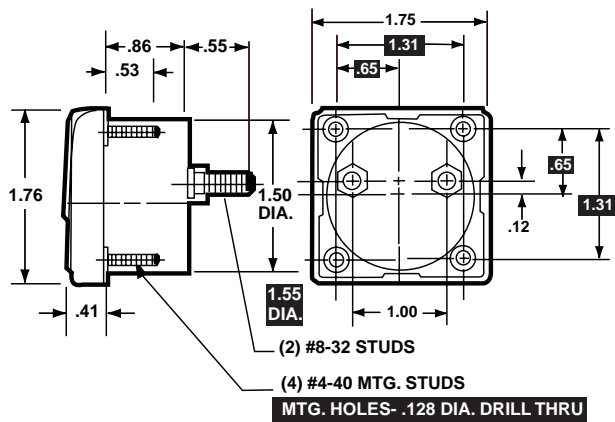
Wide-Vue Style Analog Panel Meters



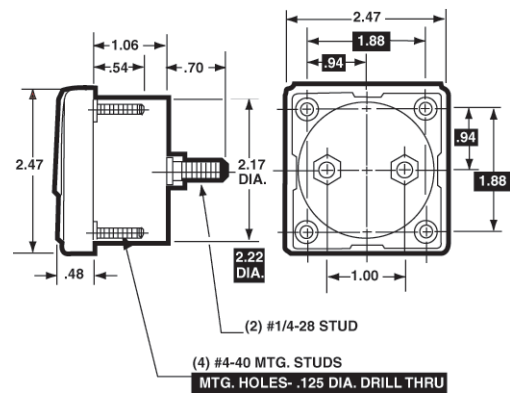
- Clear acrylic window for wide angle visibility
- Rugged black plastic case
- Black spade pointer for easy distant reading
- Optional behind-panel mounting bezel kit

Dimensions

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



2-1/2" - Model 1287



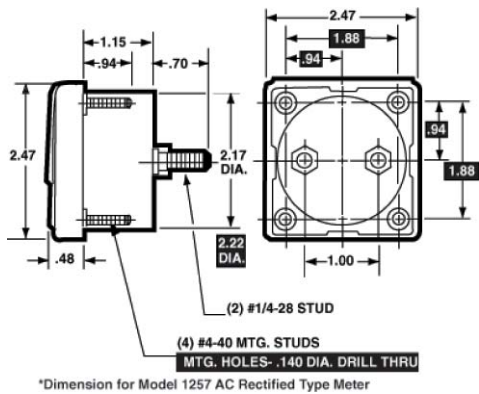
Specifications

| | |
|-------------------------------|---|
| 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) |

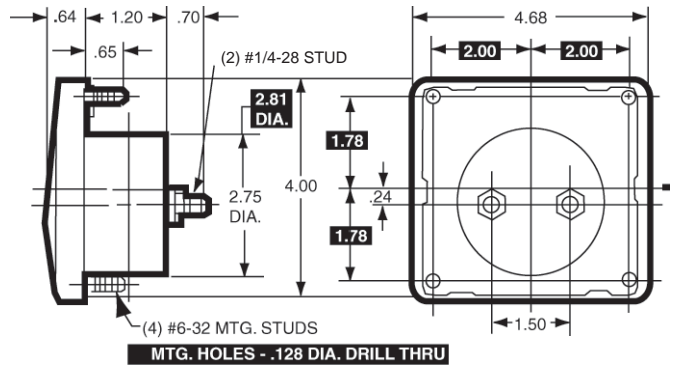
Wide-View Style Analog Panel Meters



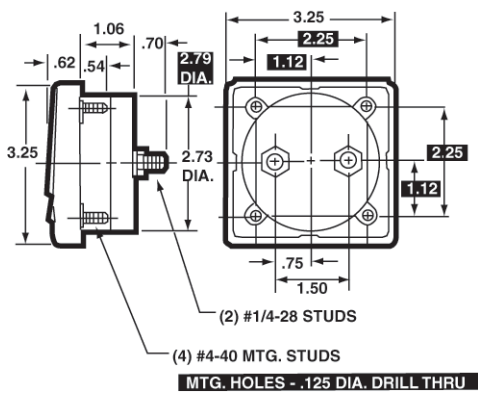
2-1/2"-Model 1227, 1227T, 1247, 1257



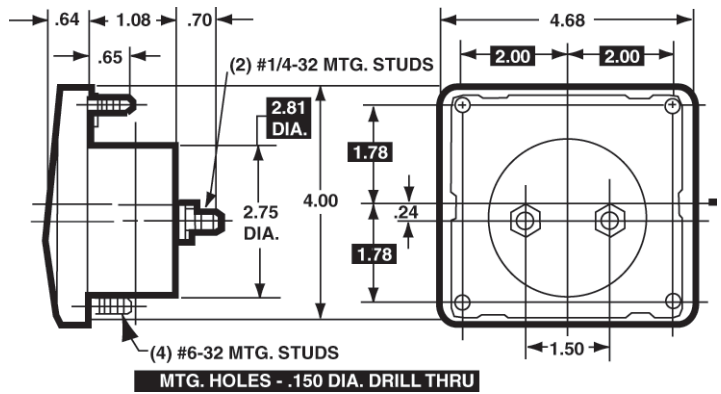
4-1/2"-Model 1329, 1329T, 1349, 1359



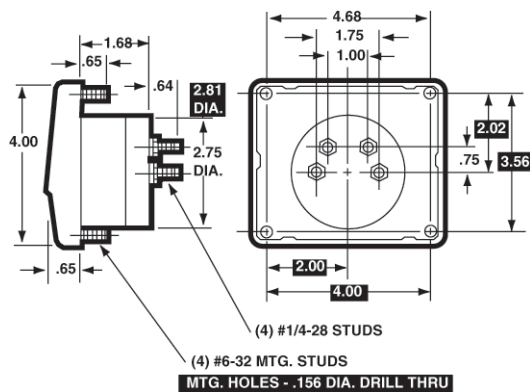
3-1/2"-Model 1387



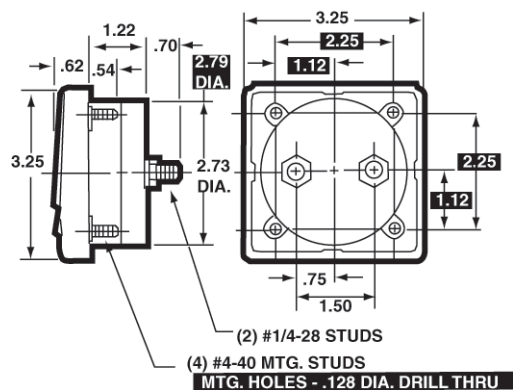
4-1/2"-Model 1389



4-1/2" Model 1379



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





Wide-Vue Style Analog Panel Meters

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 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 | 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 |
| 0-10 | 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



Wide-Vue Style Analog Panel Meters



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

| Range | Maximum | | Model/Size and Catalog Number |
|--------|---------|------|-------------------------------|
| | Volts | Amps | 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 ± 0.3 Hz (120V-240V) 55-65Hz ± 0.3 Hz (120V-240V) 380-420Hz ± 1.2 Hz (120V-240V) |
| Movement | Small core magnet, self-shielding |
| Suspension | Pivot and jewel |
| Tracking | $\pm 3\%$ |
| 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 | $\pm 2\%$ F.S.; Compensated Meters: $\pm 3\%$ F.S. |
| Movement | Dynamometer |
| Suspension | Pivot and jewel |
| Tracking | $\pm 3\%$ |
| 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. $\pm 15\%$ 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) |
| Scale Length | Model 2174: 3.68" (93.5mm) Model 2173: 9oz (0.26kg) Model 2174: 13oz (0.37kg) |
| Net Weight | |

Specifications for other meters

| | |
|------------------------------|--|
| Accuracy | $\pm 2\%$ F.S. Iron Vane, $\pm 3\%$ 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 | $\pm 3\%$ |
| 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. $\pm 15\%$ 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 2121 & 2121T: 1.25" (31.7mm) |
| Scale Length | 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) |

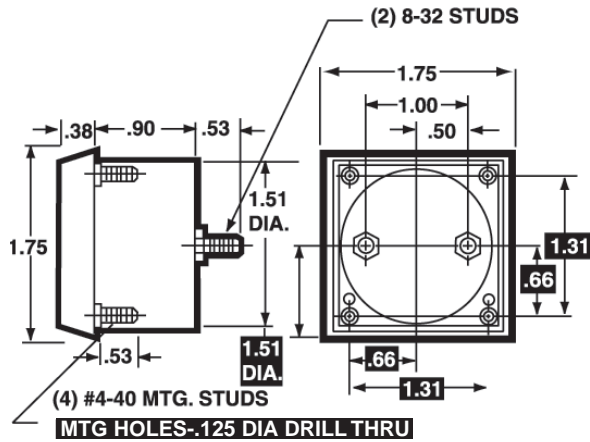
Century Style Analog Panel Meters



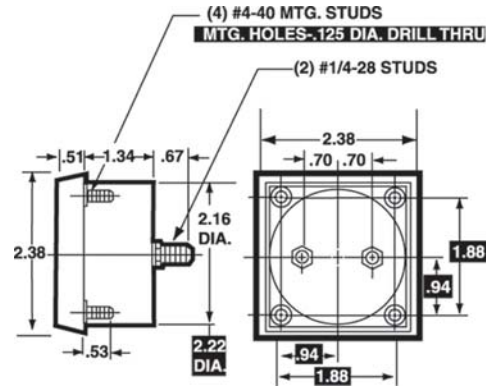
Dimensions

1 = Panel Meter Cut-out Dimensions

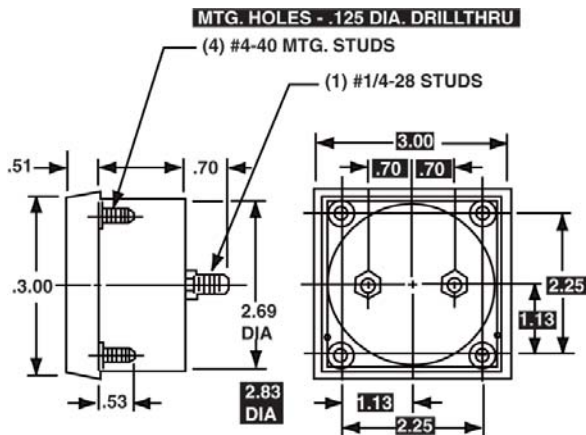
1-1/2"-Models 2121, 2121T, 2141,



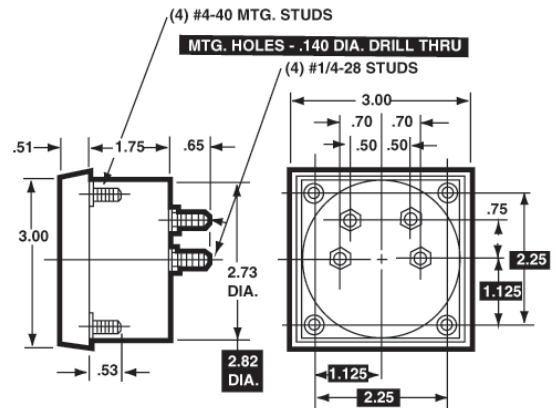
2-1/2"-Models 2122, 2122T, 2142, 2152, 2182



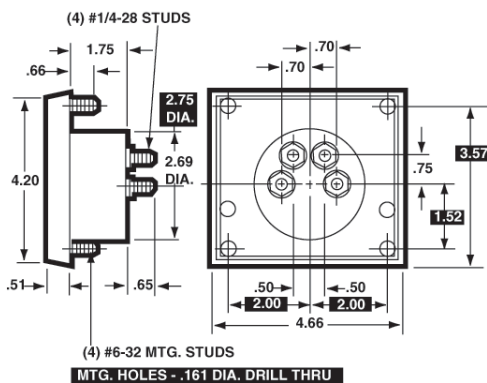
3-1/2"-Models 2123, 2123T, 2143, 2153, 2183



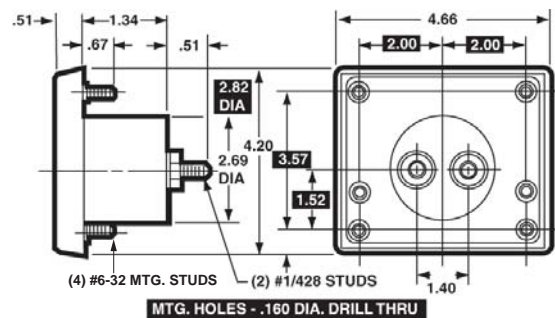
3-1/2"-Model 2173



4-1/2"-Model 2174



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





Century Style Analog Panel Meters

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 | 15,030 | - | 17694 | 17739 |
| 0-5A | 0.021 | | | |

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 (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 | 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 | 17607 |
| 0-100 | 1.0 (1.5)† | 17832 | 17438 | 17518 | 17608 |
| 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.

Century Style Analog Panel Meters



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 |
| 0-10 | 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 |
| 0-3000 | 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 |
| 0-50 | 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* | 17632* |

*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-View Style Analog Panel Meters



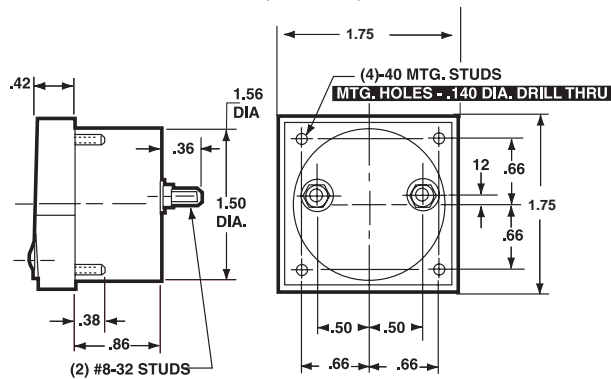
- Clear acrylic case updates panel design
- Black knife-edge pointer for precision reading
- Special colored scales or logos available

Specifications

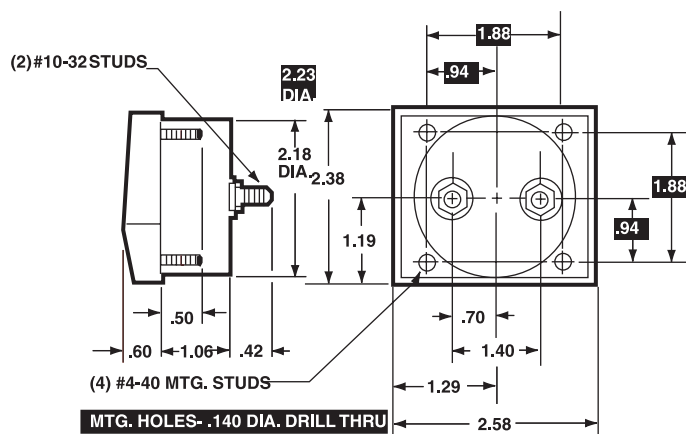
| | |
|-------------------------------|---|
| Accuracy: | ±2% F.S. (iron vane), ±3% F.S. (rectifier) |
| Movement: | DC: Annular, self-shielding AC: Models 953 & 954: Iron-vane, magnetically damped others: Annular, rectified |
| Suspension: | Pivot and jewel or taut band |
| Tracking: | ±3% |
| Repeatability: | 2%, taut band: 0.5% |
| Shielding: | Calibration is unaffected by stray magnetic field or panel mounting. |
| Response Time: | 1.5 seconds maximum above 10mA. |
| 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

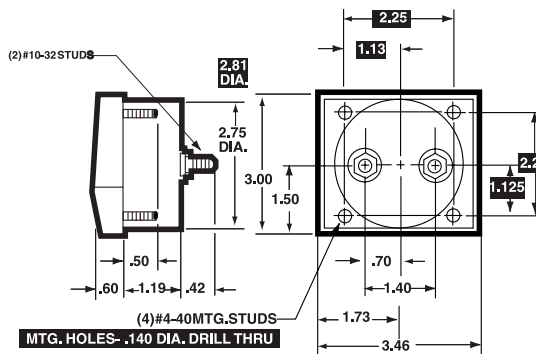
1-1/2"-Model 921, 921T, 941



2-1/2"-Model 922, 942

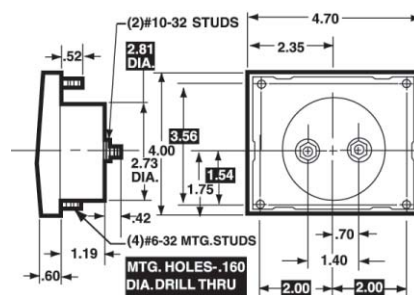


3-1/2"-Model 923, 923T, 943, 953



1 = Panel Meter Cut-out Dimensions

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



Tru-View Style Analog Panel Meters



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 | TV3AAA1R5 | 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" X 6" 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 | TV3DUA500 | 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 ()





Tru-View Style Analog Panel Meters

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 | TV6DAA030 |
| 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 | All 1,000 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



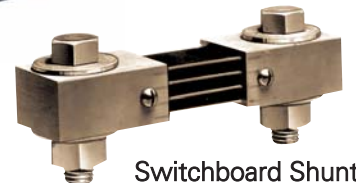
Donut Current Transformer



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" (63.5mm)
 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 |
|-------|--------------------------|-------------------------------|
| 4-20 | 5.0 | 35022 |

more >>



Round Style Analog Panel Meters

Ordering Information

AC Voltmeters, Iron Vane Movement

| Range | Approx. Impedance (Ohms) @ 60 Hz | Model/Size and Catalog Number | |
|-------|----------------------------------|-------------------------------|-----------------|
| | | 2-1/2" Model 155 | 3-1/2" Model 55 |
| 0-5 | 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 | | Model/Size and Catalog Number | |
|-------|---------|------|-------------------------------|--|
| | Volts | Amps | 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 |
| 0-30 | Per Volt | 08920 | 07130 |
| 0-50 | | 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 | | <> | 07210 |
| 0-1000 | 2000 | <> | 07220* |
| 0-2000 | Per Volt | <> | 07240* |
| 0-3000 | | <> | 07260* |
| 0-5000 | | <> | 07280* |

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

<> Available on special order.

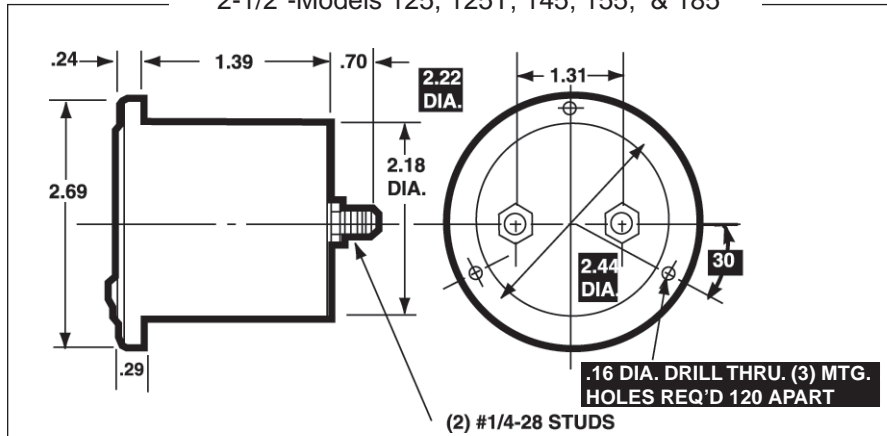
Frequency Meters, Self-Shielding Movement

| 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 |

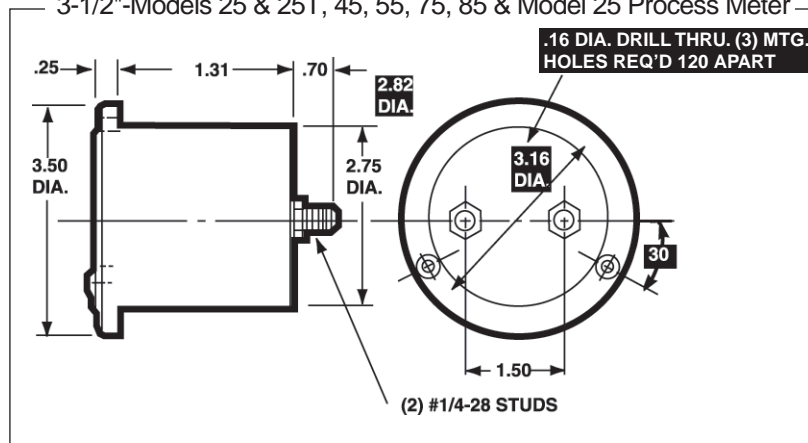
Round Style Analog Panel Meters



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



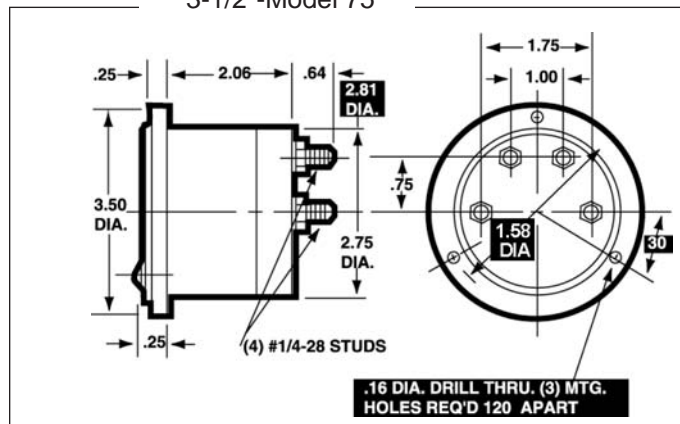
3-1/2"-Models 25 & 25T, 45, 55, 75, 85 & Model 25 Process Meter



1 = Panel Meter Cut-out Dimensions

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

3-1/2"-Model 75





Rectangular Style Analog Panel Meters



- **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) |

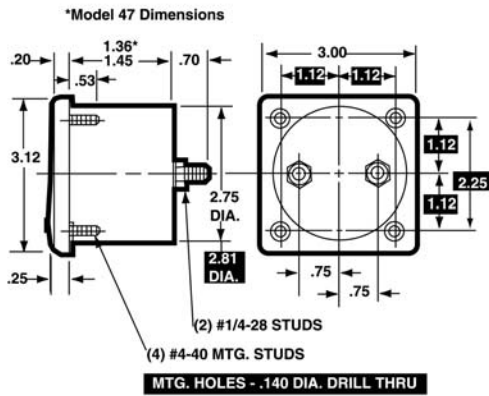


Rectangular Style Analog Panel Meters

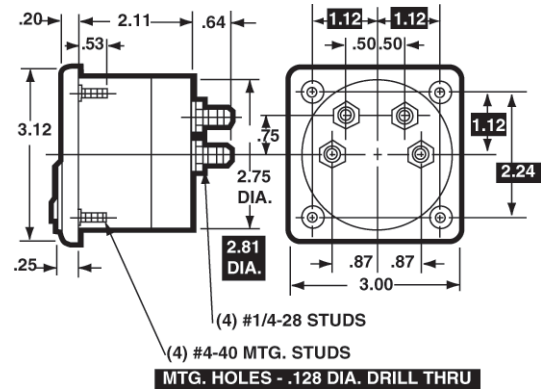


Dimensions

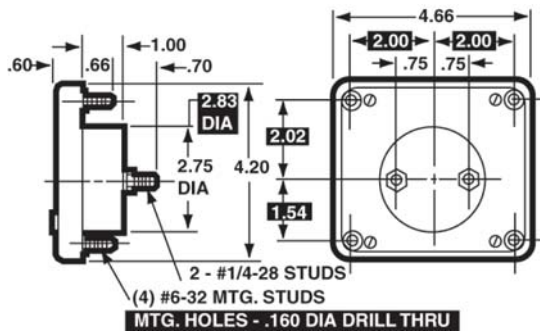
3-1/2"-Models 27 & 27T, 47, 57, & 87



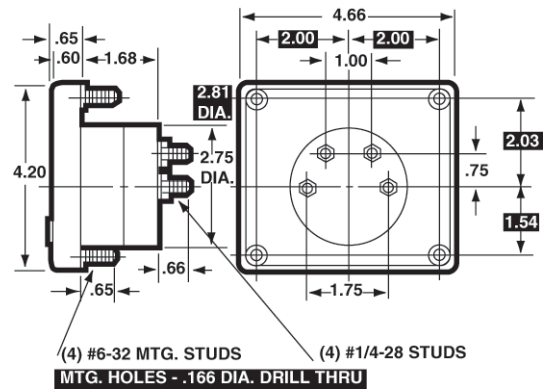
3-1/2"-Model 77



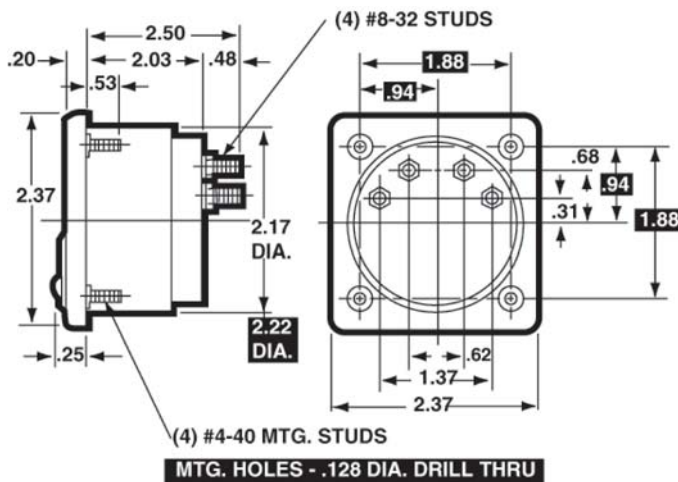
4 - 1/2"-Model 29, 29T, 49, 59, 79 & 89



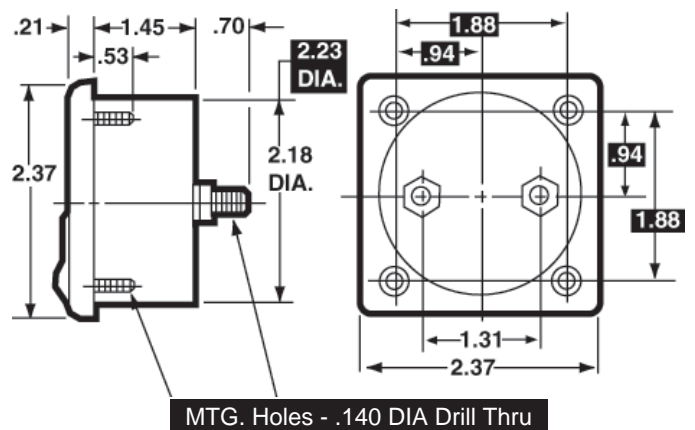
4 - 1/2"-Model 79



2-1/2"-Model 177



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





Rectangular Style Analog Panel Meters

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 89 |
| 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 (Ohms) @ 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 | 2000 Ohms per volt | 09140 | 07410 | 07720 |
| 0-200 | | 09160 | 07430 | 07730 |
| 0-250 | | 09170 | 07440 | 07740 |
| 0-300 | | 09180 | 07450 | 07750 |
| 0-500 | | 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 (Ohms) @ 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 (Ohms) @ 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 (Ohms) @ 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 (Ohms) @ 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 (Ohms) @ 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 | 00480 |
| 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.

Rectangular Style Analog Panel Meters



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 |

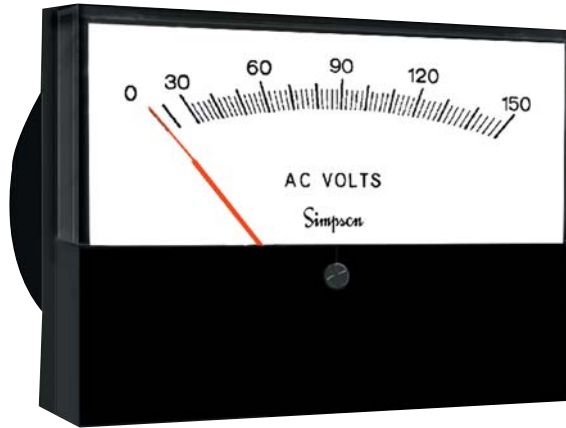
Wattmeters, Self Shielding Movement

| 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



Designer Style Analog Panel Meters



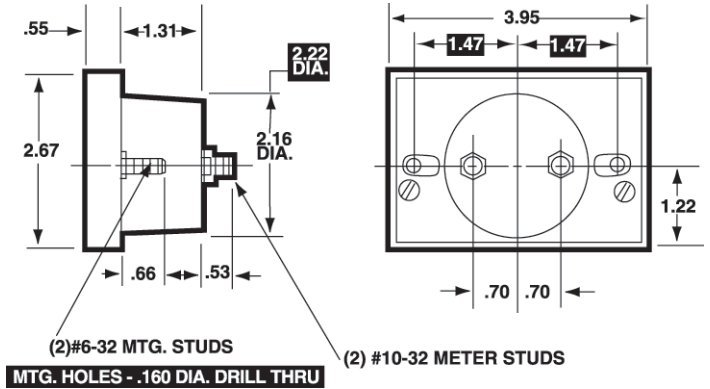
- **Clean, uncluttered design offers maximum visibility in minimum required height**
- **Glass window for optimum viewing**
- **Rugged black plastic case**
- **Red knife-edge pointer for precision readability**

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) |

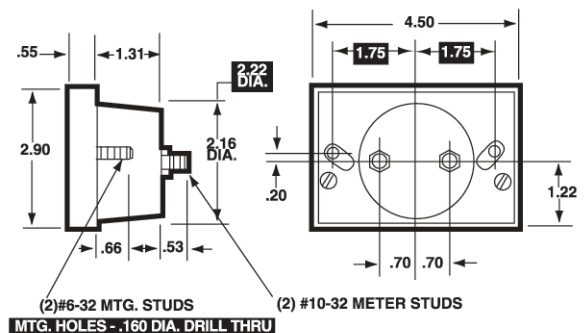
Dimensions

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

Designer Style Analog Panel Meters



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 |



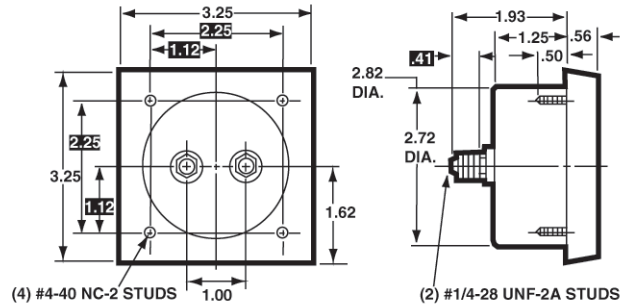


Rugged Seal Style Analog Panel Meters



Dimensions

3 - 1/2"-Model 3323, 3343



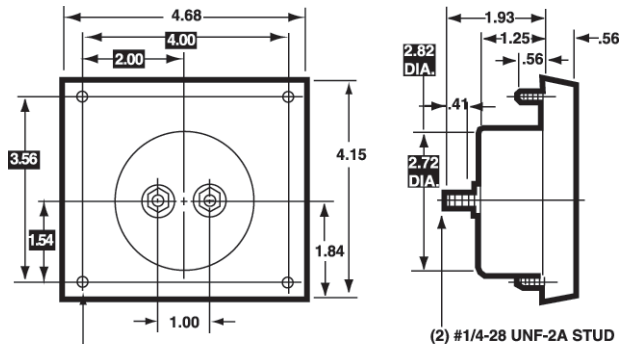
MTG. HOLES- .140 DIA. DRILL THRU

- **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) |

4 - 1/2"-Model 3324, 3344



MTG. HOLES- .166 DIA. DRILL



Rugged Seal Style Analog Panel Meters



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 | 16065 | 16160 |
| 0-300 | per volt | 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 | 16035 | <> |
| 0-10 | 75mV max. | 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.





CE

UL

Model 112ET



Model 1357ET/Wide-Vue



Model 55ET/Round



Model 109ET



R

Model 2153ET/Century

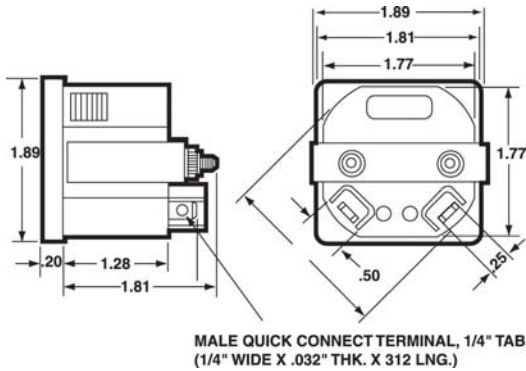


Model 57ET/Rectangular

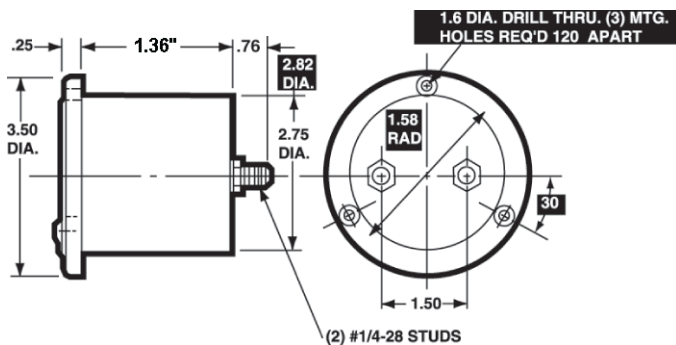
- Record "on" time of electrical equipment
- No reset capability means virtually tamper-proof
- Choice of AC or DC models
- 2 sizes and 6 different case styles

Dimensions

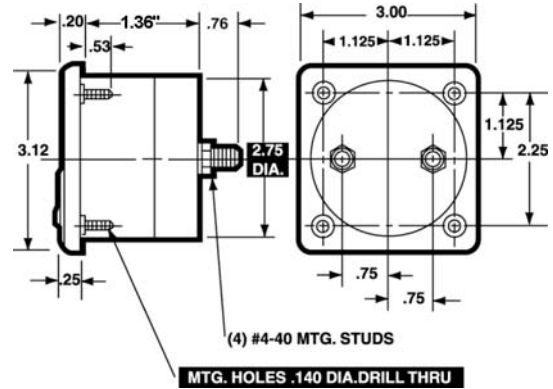
1-1/2" - Model 109ET



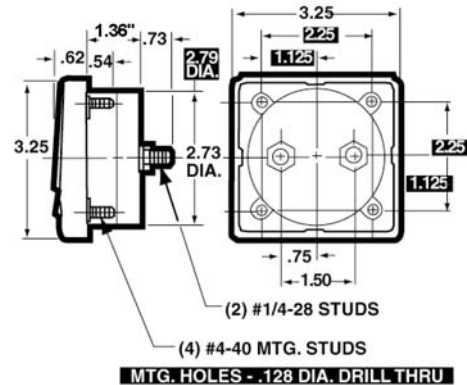
3 - 1/2" - Model 55ET



3 - 1/2" - Model 57ET



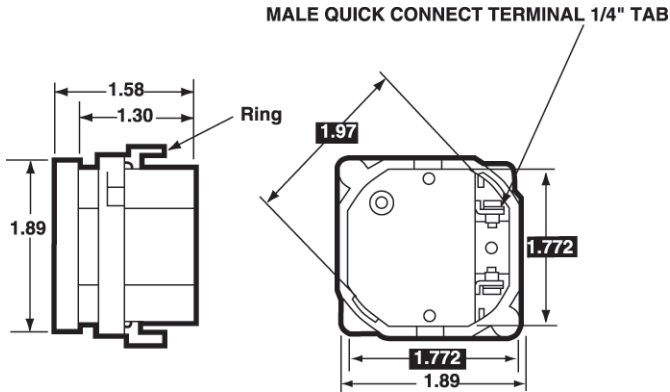
3 - 1/2" - Model 1357ET





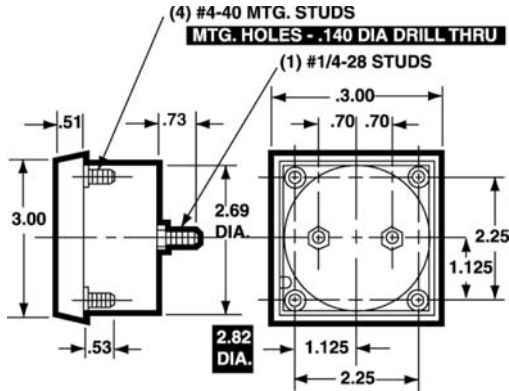
Elapsed Time Meters

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 | 99,999.99 | .5 watt | ≤.01%/24 hrs | | 112ET | 03622 |
| 120 VAC 60 Hz | 99,999.9 | 2.5 watts | synchronous | 3-1/2" | 55ET | 03580 |
| | 99,999.9 | 2.5 watts | synchronous | | 57ET | 03590 |
| | 99,999.9 | 2.5 watts | synchronous | | 1357ET | 03595 |
| | 99,999.9 | 2.5 watts | synchronous | | 2153ET | 17720 |
| 240 VAC 60 Hz | 99,999.9 | 2.5 watts | synchronous | 3-1/2" | 55ET | 03600 |
| | 99,999.9 | 2.5 watts | synchronous | | 57ET | 03610 |
| | 99,999.9 | 2.5 watts | synchronous | | 1357ET | 03615 |
| | 99,999.9 | 2.5 watts | synchronous | | 2153ET | 17721 |

250° Long Scale Panel Meters



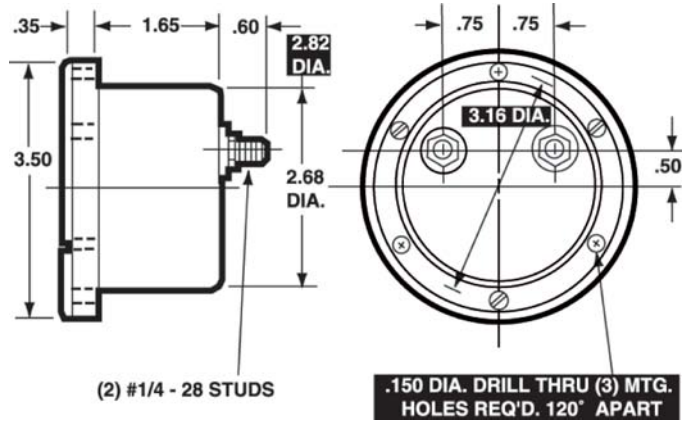
- **Excellent readability -- more than double the scale length of standard movements**
- **Sealed round metal or square plastic cases with glass windows**
- **Zero adjust from front panel**

Specifications

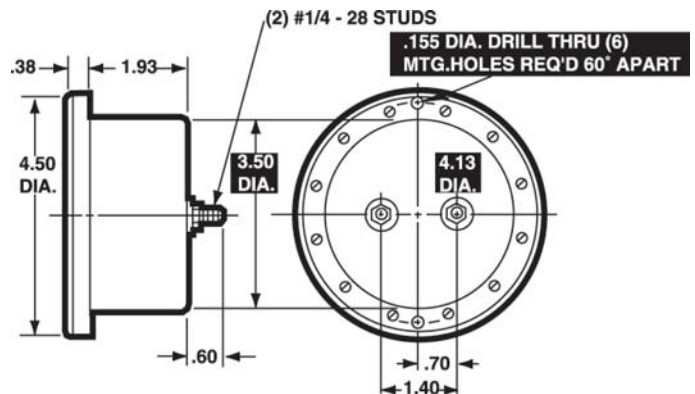
| | |
|-------------------------------|--|
| Accuracy: | AC: $\pm 3\%$ full scale (F.S.) DC: $\pm 2\%$ full scale (F.S.) |
| Movement: | AC: Rectifier type, DC: self-shielded, permanent magnet |
| Suspension: | Pivot and jewel |
| Tracking: | $\pm 3\%$ |
| Shielding: | Calibration is unaffected by magnetic 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 $\pm 15\%$ of meter impedance |
| Resistance: | |
| Operating Temperature: | -4°F to $+149^{\circ}\text{F}$ (-20°C to $+65^{\circ}\text{C}$) |
| 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

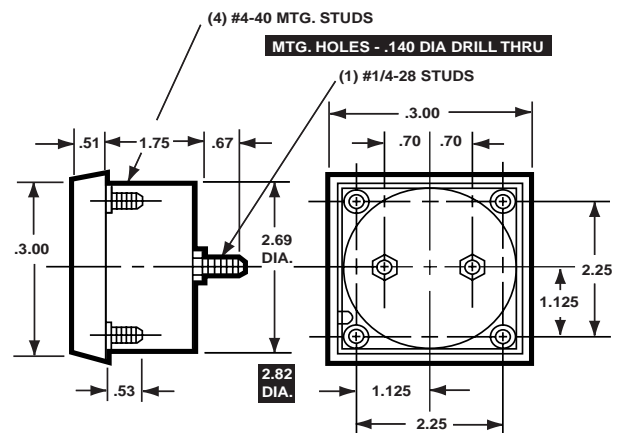
3 - 1/2"-Model 2543, 2523
Round Style



4 - 1/2"-Model 2524, 2544
Round Style



3 - 1/2"-Model 2123L, 2143L
Square Style



1 = Panel Meter Cut-out Dimensions



250° Long Scale Analog Panel Meters

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



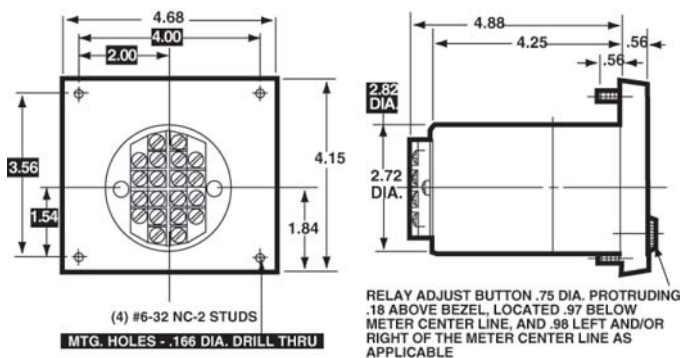
- **Wide Variety of Control, Alarm, and Limit Use**
- **Calibration Not Affected by Steel Panel Mounting**
- **Rugged Metal Case for Rigorous Environments**
- **Commercially-Sealed, Moisture and Dust Proof**

Specifications

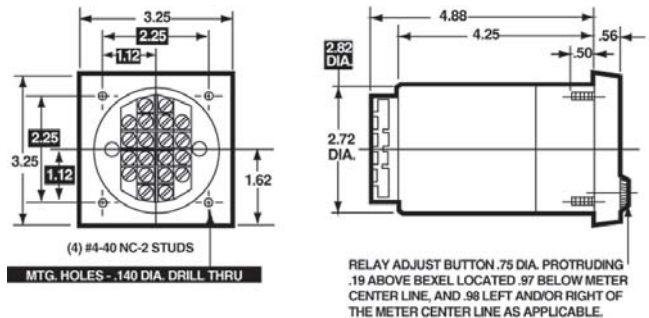
| | |
|-----------------------------------|---|
| Accuracy: | AC: $\pm 3\%$ of full scale; DC: $\pm 2\%$ F.S. |
| Movement: | Annular, self-shielding |
| Suspension: | Pivot and jewel |
| Tracking: | $\pm 3\%$ |
| Repeatability: | Within 0.5% F.S. |
| Shielding: | Calibration is unaffected by magnetic 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) | 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 |
| Adjustments: | |
| 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



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





3300 Series Rugged Seal Meter Relay

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 3323AIXA | | 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% |

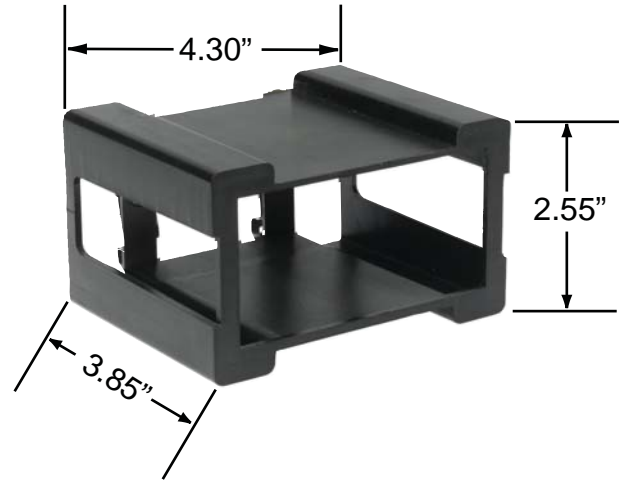
Ordering Information

| 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) | | 21655 | 21615 |
| 0 to 2000°F (0°C to +1093°C) | Type K | 21656 | 21616 |
| 0 to 2500°F (0°C to +1371°C) | | 21657 | 21617 |

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

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.



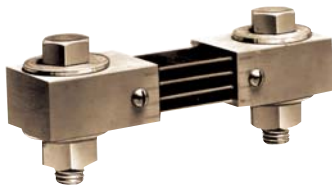
Ordering Information

| 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 |

External Portable and Switchboard Shunts



50mV Shunts
Portable 150 amp
Catalog No. 06714



Switchboard
100 amp
Catalog No. 06500

Dimension Table for External Portable Shunts

| Amps | A | B | C | Amps | A | B | C |
|------|---------|------|--------|------|---------|------|--------|
| 1 | 1-5/16" | 1/2" | 3/8-16 | 30 | 1-5/16" | 1/2" | 3/8-16 |
| 5 | 1-5/16" | 1/2" | 3/8-16 | 50 | 1-5/16" | 1/2" | 3/8-16 |
| 10 | 1-5/16" | 1/2" | 3/8-16 | 75 | 1-5/16" | 1/2" | 3/8-16 |
| 15 | 1-5/16" | 1/2" | 3/8-16 | 100 | 1-5/16" | 1/2" | 3/8-16 |
| 25 | 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 |

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

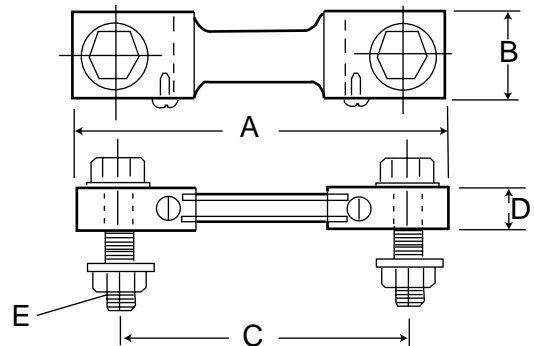
Portable 100mV Shunts

| Amps | Cat. Number |
|------|-------------|
| 10 | 06716 |
| 100 | 06717 |

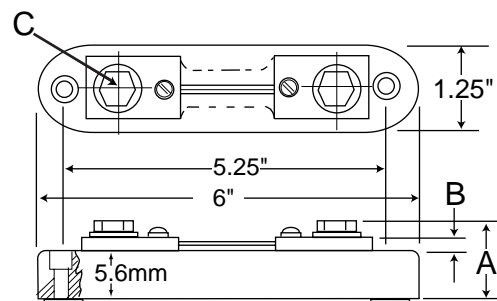
5' leads not included



Switchboard Shunts



External Portable Shunts



Current Transformers

Model 186 Current Transformer

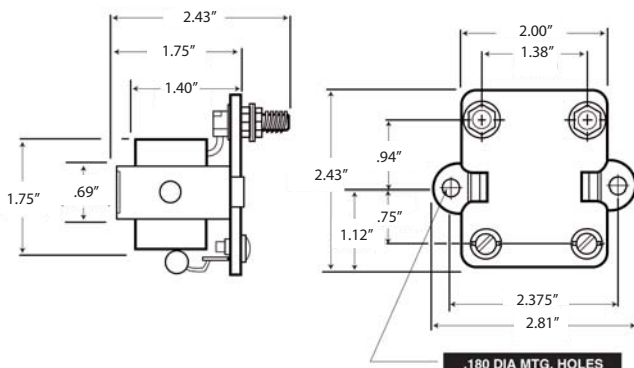


- **Optimal for remote sensing of AC current signals**
- **Converts AC current signal to 0-10 ACV signal**
- **For use with rectifier type analog panel meters or digital indicators**
- **Perfect for low current measurement where a donut current transformer would not sense a signal**

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

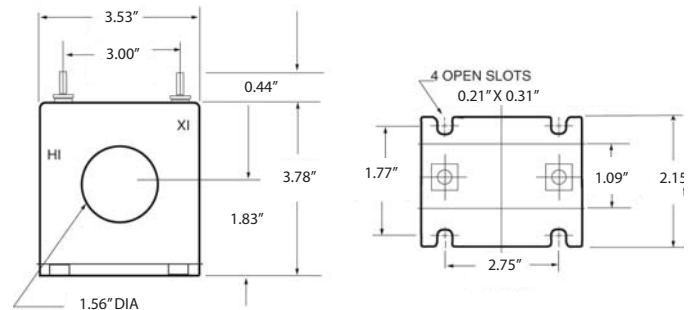
- **Reduces high AC current signal to 5 amp AC signal**
- **Use with analog and 5 amp AC digital indicators**



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



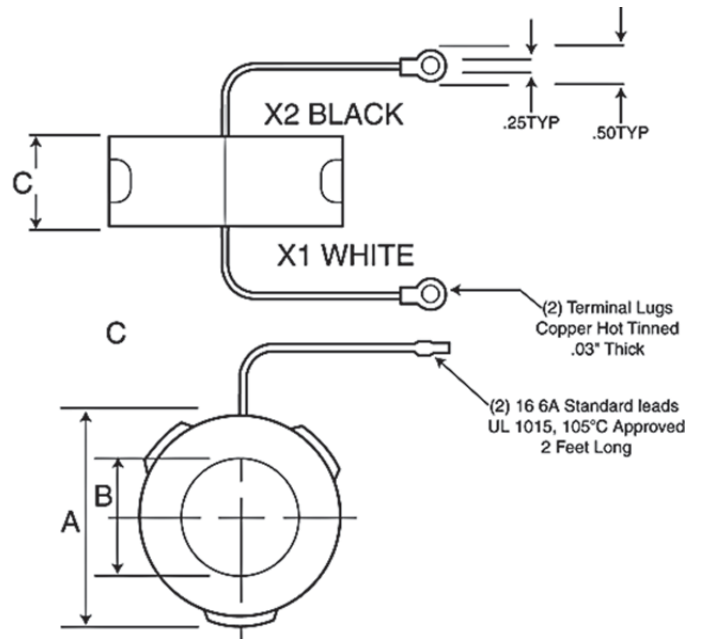
- Meets A.S.A C57.13 Standard
- Flexible leads are UL105, 105°C CSA approved
- Molded from impact and abrasive resistance black nylon for rugged construction
- $\pm 2\%$ Accuracy

| 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% |

Ordering Information

| Ampere | | Turns Ratio | Catalog Number | Dimensions | | |
|---------|-----------|-------------|----------------|------------|-------|---|
| Primary | Secondary | | | A | B | C |
| 50 | 5 | 10:1 | 3.56" | 1.56" | 1.10" | |
| 75 | 5 | 15:1 | | | | |
| 100 | 5 | 20:1 | | | | |
| 150 | 5 | 30:1 | 3.56" | 2.06" | 1.10" | |
| 200 | 5 | 40:1 | | | | |
| 250 | 5 | 50:1 | | | | |
| 300 | 5 | 60:1 | | | | |
| 400 | 5 | 80:1 | | | | |
| 500 | 5 | 100:1 | | | | |
| 600 | 5 | 120:1 | | | | |
| 750 | 5 | 150:1 | 4.50" | 3.00" | 1.09" | |
| 1000 | 5 | 200:1 | | | | |

Dimensions



Donut Current Transformer Wrapping Information

Primary Turn Ratio Modification

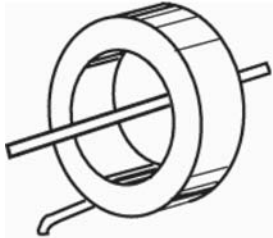
Formula: $K_a = K_n \times N_n / N_a$

Where: K_a = Actual Transformer Ratio
 K_n = Nameplate Transformer Ratio
 N_a = Actual Number of Primary Turns
 N_n = Nameplate Number of Primary Turns

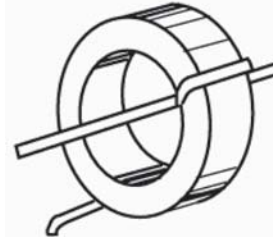
The ratio of the current transformer can be modified by adding more primary turns to the transformer. By adding primary turns, the current required to maintain five amps on the secondary is reduced.

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

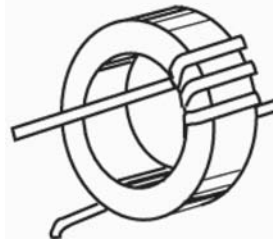
| 1 Primary Turn | | |
|-----------------|--------------|--|
| Nameplate Ratio | Actual Ratio | |
| 100:5 | 100:5 | |



| 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: $\frac{I_p}{I_s} = \frac{N_s}{N_p}$

Where: I_p - Primary Current
 I_s - Secondary Current
 N_p - Number of Primary Turns
 N_s - 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.

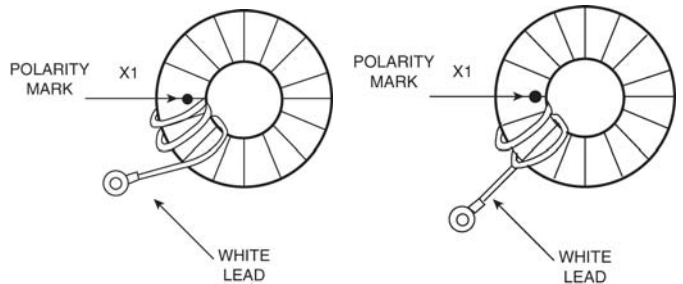
Again using the 300:5 example adding five secondary turns will require 325 amps on the primary to maintain the 5 amp secondary output or

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

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

$$\frac{275p}{5s} = \frac{65s}{1p}$$

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 500 μ ADC
- Accuracy $\pm 1\%$

Ordering Information

DC Volts - 2000 Ohms/Volt

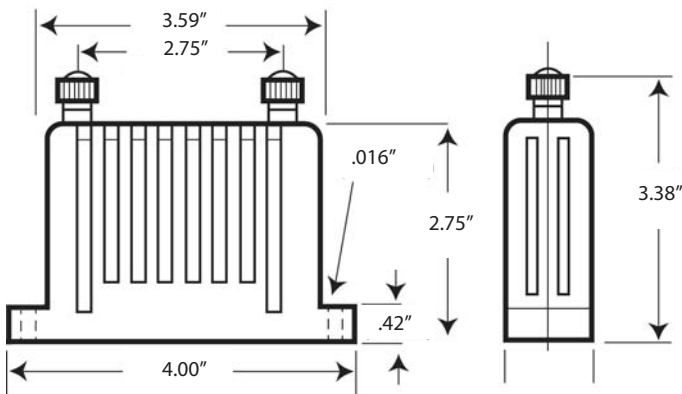
Used only with Simpson DC Volt analog panel meters or with 0-2 mA DC digital panel meters. Digital units will need to be recalibrated when a multiplier is used.

| Range | Multiplier Resistance M Ω | Meter Sensitivity DC μ A | 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 25K Ω /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

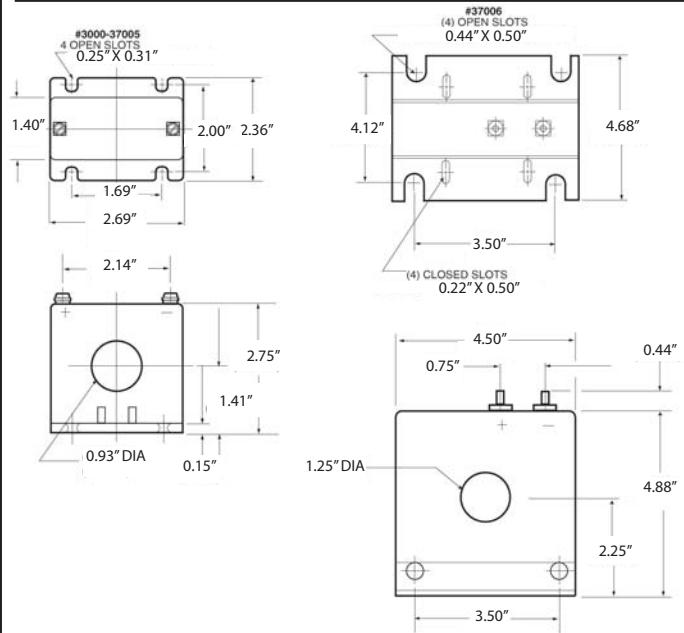
- Reduces AC current signals down to 4-20 DCmA
- Screw terminals for easy connection
- Operates on 24V DC power

Specifications

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



Dimensions



Ordering Information

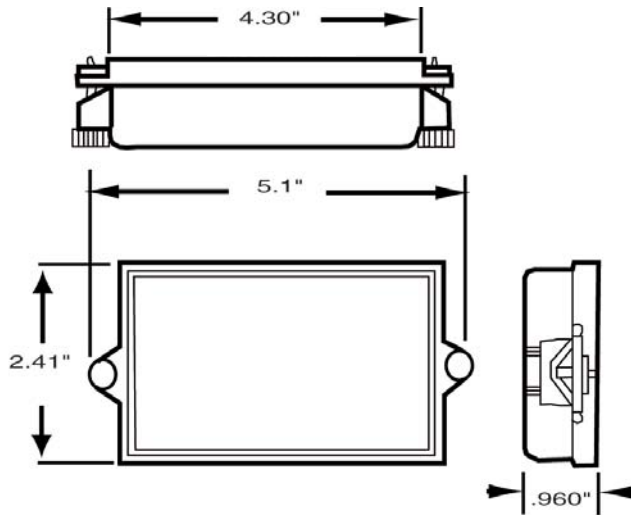
| Input Current Range(ACA) | Output Current Range(DCmA) | Catalog Number |
|--------------------------|----------------------------|----------------|
| 0-5 A | 4-20mA | 37000 |
| 0-50 A | 4-20mA | 37001 |
| 0-75 A | 4-20mA | 37002 |
| 0-100 A | 4-20mA | 37003 |
| 0-150 A | 4-20mA | 37004 |
| 0-200 A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

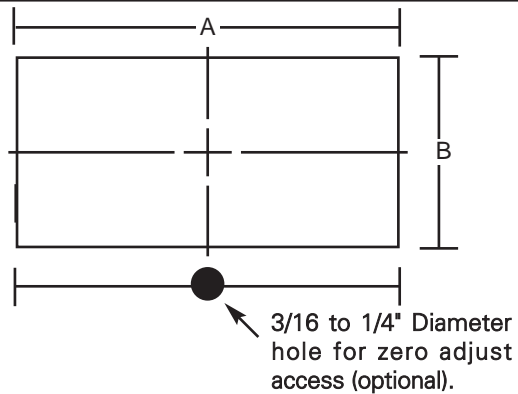
This bezel kit provides an attractive appearance for Wide-Vue analog panel meters. Die cast with a black satin finish, bezel kits are designed for behind panel mounting and can accommodate a panel thickness from 1/8" to 3/16". All required mounting hardware is included.



Ordering Information

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

Panel Cutout



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 | * | | | | | |



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