

## SAFETY CONSIDERATIONS

This device is marked with the international Caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

### Unpacking & Inspection

**Note** Unpack the instrument and inspect for obvious shipping damage. Do not attempt to operate the unit if damage is found.

This instrument is a DIN rail mount device. Installation of this instrument should be done by Qualified personnel. In order to ensure safe operation, the following instructions should be followed.

This instrument has no power-on switch. An external switch or circuit-breaker shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall not interrupt the Protective Conductor (Earth wire), and it shall meet the relevant requirements of IEC 947-1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the mains supply cord.

Furthermore, to provide protection against excessive energy being drawn from the mains supply in case of a fault in the equipment, an overcurrent protection device shall be installed.

The **Protective Conductor** must be connected for safety reasons. Check that the power cable has the proper Earth wire, and it is properly connected. It is not safe to operate this unit without the Protective Conductor Terminal connected.

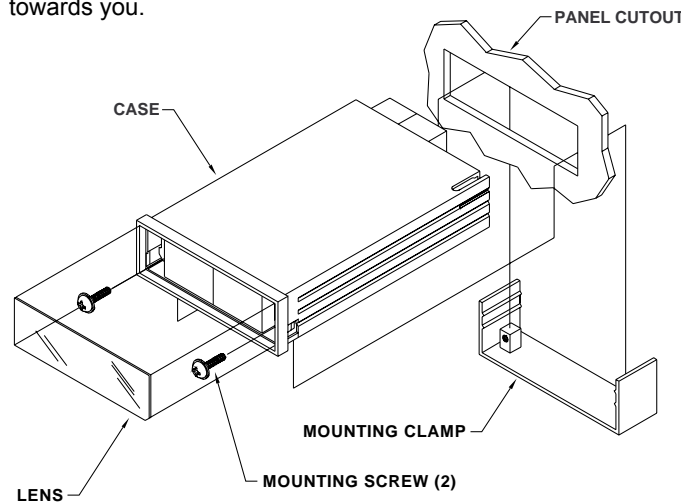
**Note** Do not exceed voltage rating on the label located on the top of the instrument housing.  
 Always disconnect power before changing signal and power connections.  
 Do not use this instrument on a work bench without its case for safety reasons.  
 Do not operate this instrument in flammable or explosive atmospheres.  
 Do not expose this instrument to rain or moisture.  
 Unit mounting should allow for adequate ventilation to ensure instrument does not exceed operating temperature rating.  
 Use electrical wires with adequate size to handle mechanical strain and power requirements. Install without exposing bare wire outside the connector to minimize electrical shock hazards.

### EMC Considerations

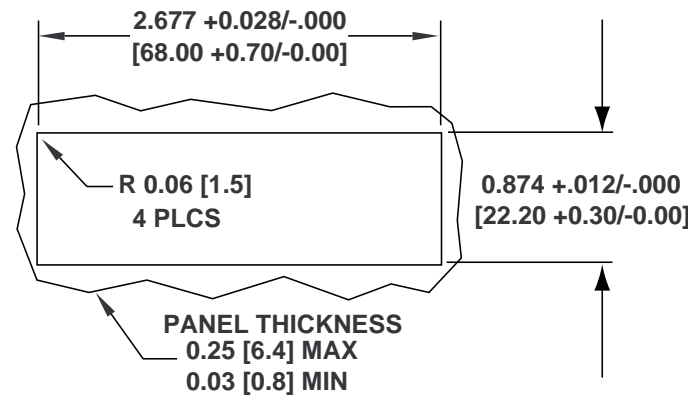
- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

## INSTALLATION

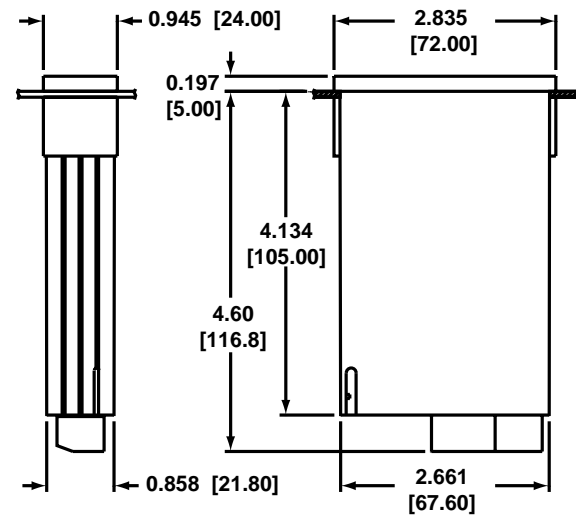
- Unpack and verify that all equipment has been received. If there are any questions about the shipment, contact the service department nearest you.
- Cut or punch a hole in the panel where you want the meter to go.
- Remove the lens by inserting a paper clip or small flat screwdriver into the rounded corner of the lens and lift out.
- Remove the two mounting screws from both sides of display. Pry both sides of the mounting clamp *out and down* to remove it from the case.
- Insert the meter into the panel cutout and reinstall the mounting clamp from the rear.
- Reinstall the mounting screws to secure the meter into the panel. Do not overtighten the screws.
- Pop the lens back in, making sure the dull side of the lens faces towards you.



## PANEL CUTOUT



## DIMENSIONS

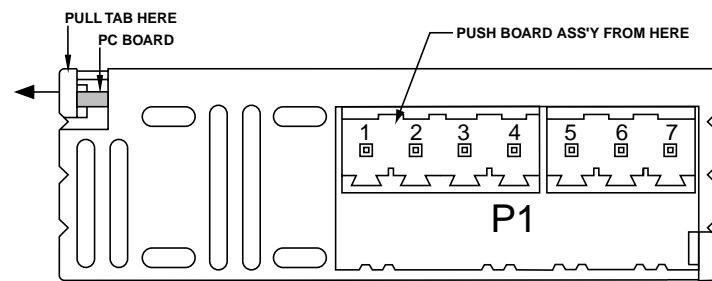


SIDE VIEW

TOP VIEW

All dimensions are in inches [millimeters].

## REMOVING BOARD FROM CASE



REAR OF CASE

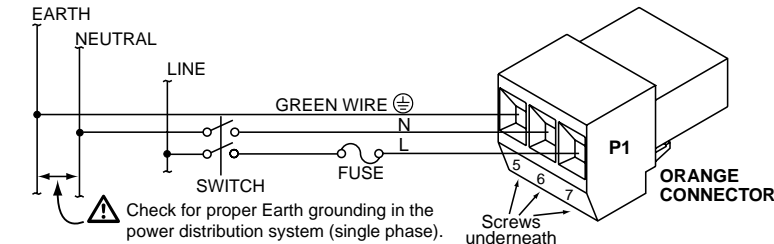
## ELECTRICAL CONNECTIONS

POWER AND SIGNAL INPUT			
~ AC POWER		= DC POWER	
P1	DPF52	DPF51 & DPF53	DPF51 & DPF53
1	SIG HI (+S)	SIG HI (+S)	SIG HI (+S)
2	SIG LO (-S)	SIG LO (-S)	SIG LO (-S)
3	+ Exc	Hold	Hold
4	- Exc	Digital Return	Digital Return
5	AC Earth GND (⊕)	AC Earth GND ( )	-DC (-)
6	AC Neutral (N)	AC Neutral (N)	+ DC (+)
7	AC Line (L)	AC Line (L)	No Connection (N/C)

## WIRING

### AC POWER WIRING

Connect the ac main power connections as shown below.



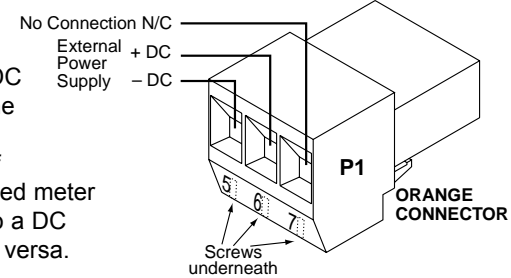
**WARNING:** Do not connect ac power to your meter until you have completed all input and output connections. Failure to do so may result in injury! This device must only be installed electrically by specially trained electrician with corresponding qualifications. The main power input to the unit as well as the AC input signal to be measured must agree with the wiring instruction.

The meter is factory set to the power specified by the customer at the time of ordering. The voltage is printed on the label under Input power.

To connect power to the unit, attach wires, as shown from the ~AC power cord to the orange 3-pin female connector that is supplied with the meter. Plug the female connector into the orange P1 (male) connector at the rear of the meter.

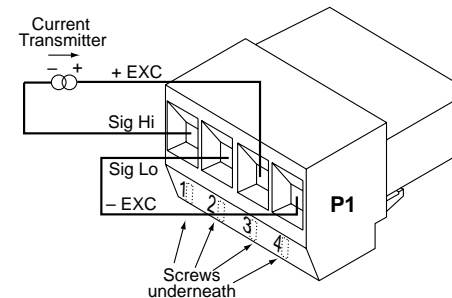
### DC POWER WIRING

The meter can be configured at the factory to operate on DC non-isolated power. The DC voltage option is specified at the time of ordering. An AC powered meter cannot be converted to a DC powered meter or vice versa.

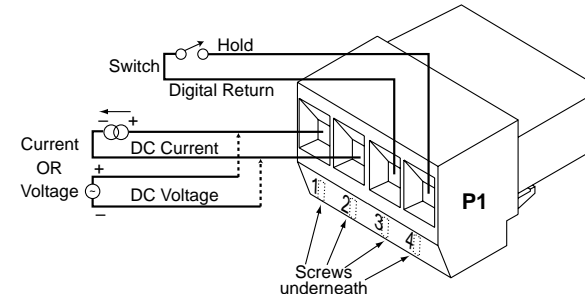


To connect power to the unit, attach wires, as shown, to the orange 3-pin female connector that is supplied with the meter. Plug the female connector into the orange P1 (male) connector at the rear of the meter.

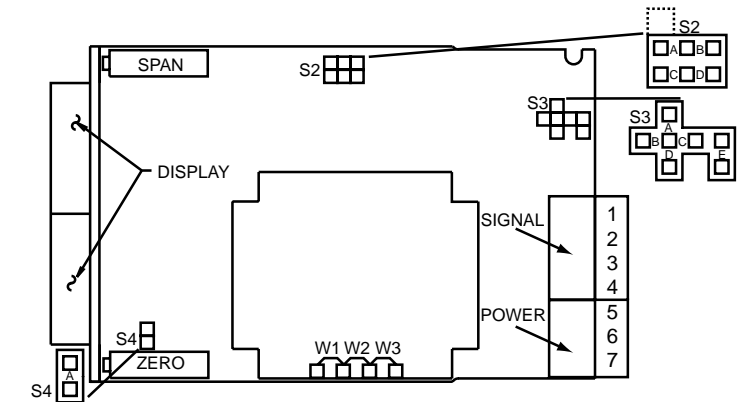
### SIGNAL INPUT WIRING DPF52



### SIGNAL INPUT WIRING DPF51



## RANGE SELECTION



CURRENT / VOLTAGE INPUT (DPF51 & DPF52)	S3	
4-20 mA	D, E	
0-0.2 V dc	E	
1-5 V dc	A	
0-10 V dc	B	
0-100 V dc	C	
VOLTAGE INPUT RANGE (DPF53)	S3	
±199.9 mV dc	-	
±1.999 V dc	A	
±19.99 V dc	B	
±199.9 V dc	C	
EXCITATION VOLTAGE (DPF52)	S2	S4
10 V, (standard internal reference)	B, D	A
24 V, (standard internal reference)	B, D	-
10 V, (reference based on excitation voltage)	A, C	A

Voltage operation was configured per customer order. 115 and 230 Vac operation use the same transformer and may be reversed with simple wiring installation.

Disconnect power before attempting to convert or remove the unit.

You must remove the printed circuit board from the case in order to change from 115 Vac to 230 Vac (and vice versa). These changes must be performed by a qualified technician in order to avoid damage to the unit and avoid personal electric shock.

TRANSFORMER #	AC VOLTAGE	INSTALL	REMOVE
48131	115 Vac	W1, W3	W2
48131	230 Vac	W2	W1, W3

## CALIBRATION / DPF51 & DPF52

- Apply the minimum current or voltage to the signal input. Adjust the zero pot for the minimum display reading ±1 count.
- Apply the maximum current or voltage to the signal input. Adjust the span pot for the maximum display reading ±1 count.
- Repeat steps 1 and 2 until ±1 count desired reading. Reinstall the lens.

## CALIBRATION / DPF53

- Apply a voltage equivalent to 95% of the range selected to the signal input.
- Adjust the span pot for a reading of 1900 ±1 count.
- Reinstall the lens.

Decimal Point	S1
1.999	A
19.99	B
199.9	C
1999	Store jumper above A

## AVAILABLE MODELS

DESCRIPTION	PART #
Field selectable for 4-20 mA, 0-199.9 mV dc, 1-5 V dc, 0-10 V dc, 0-100 V dc input	DPF51
DPF51 with sensor excitation output	DPF52
Field Selectable for ranges $\pm 1999.9$ mV $\pm 1.999$ V, $\pm 19.999$ V, $\pm 199.9$ V	DPF53
ADD-ON OPTIONS	PART #
230 V ac Input Power	Add suffix "-230V"
100 V ac Input Power	Add suffix "-100V"
24 V ac Input Power	Add suffix "-24VAC"
5 V dc (DPF51)	Add suffix "-5VDC"
7-32 V dc (DPF51)	Add suffix "-7/32"
Green LED display (instead of Red)	Add suffix "-GR"
25 x 75 mm bezel adaptor	Add suffix "-DPF50-A"
<i>Ordering Example: DPF51-230V (DPF51 unit w/ 230 Vac)</i>	



## WARRANTY/DISCLAIMER

OMEGA Engineering, Inc. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. Omega's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

## RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

- P.O. number under which the product was PURCHASED.
- Model and serial number of the product under warranty, and
- Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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## SPECIFICATIONS

### ANALOG INPUT / DPF51 & DPF52

Range	4-20 mA	0-0.2 V	1-5 V	0-10 V	0-100 V
Input resistance	13 $\Omega$	1 M $\Omega$	1 M $\Omega$	1 M $\Omega$	1 M $\Omega$
Bias current	50 pA	50 pA	10 pA	5 pA	1 pA
Maximum input	55 mA	250 Vp	250 Vp	250 Vp	250 Vp

### ANALOG INPUT / DPF53

Range	$\pm 199.9$ mV	$\pm 1.999$ V	$\pm 19.99$ V	$\pm 199.9$ V
Input resistance	1 G $\Omega$	1.1 M $\Omega$	1.0 M $\Omega$	1.0 M $\Omega$
Bias current	50 pA	5 pA	1 pA	1 pA
Maximum input	130 Vp	250 Vp	250 Vp	250 Vp

### NOISE REJECTION

NMR, sig hi to sig lo	56 dB, 50/60 Hz
CMR, sig lo to pwr gnd	120 dB, DC to 60 Hz
CMV, sig lo to pwr gnd	Dielectric strength to 1500V transient per 260 Volt RMS or DC working voltage.
CMV, sig lo to dig return (DPF53)	0 Volts

### ACCURACY AT 25°C / DISPLAY

Maximum error	$\pm 0.05\%$ of reading $\pm 1$ count
Display range	$\pm 1999$
Span adjustment (DPF51 & DPF52)	0-2000 counts
Span tempco	$\pm 0.02\%$ of reading/ $^{\circ}$ C
Zero adjustment (DPF51 & DPF52)	-1500 to +500 counts with zero input
Zero tempco (DPF51 & DPF52)	$\pm 0.01\%$ of offset $\pm 0.2$ counts/ $^{\circ}$ C
Full-scale step response	1 second
Warmup	30 minutes
Reading rate	2.5 / second
Overrange indication	Three least-significant digits blank

### POWER OPTIONS / DPF52

Voltage	115/230 Vac $\pm 15\%$
Frequency	50-60Hz
Power	3.3W max.
"Voltage options" with same power and frequency.	
"-100V"	100Vac $\pm 15\%$ (36mA max.)
"-24VAC"	24Vac $\pm 10\%$ (145mA max.)

### POWER OPTIONS / DPF51 & DPF53

Voltage	115/230 Vac $\pm 15\%$
Frequency	50-60Hz
Power	2.3W max.
"Voltage options" with same power and frequency.	
<b>AC</b>	
"-100V"	100Vac $\pm 15\%$ (36mA max.)
"-24VAC"	24Vac $\pm 10\%$ (133mA max.)
<b>DC*</b>	
"-7/32"	7-32 Vdc (100mA max.)*
"-5VDC"	5 Vdc (75mA max.)*

\* External Supply must meet safety Agency Approval for safety DC output. (Equipment CLASS I/II, CAT I min., Double Insulation)

## SPECIFICATIONS (continued)

### REQUIRED EXTERNAL FUSE PROTECTION

24Vac	160mA, UL Slow-Blow or IEC 127-2/111 Time-lag
100/115Vac	40mA, UL Slow-Blow or IEC 127-2/111 Time-lag
230Vac	20mA, UL Slow-Blow or IEC 127-2/111 Time-lag

### ELECTRICAL SAFETY CLASSIFICATION

Installation Category	CAT I	per EN61010-1
Pollution Degree	2	per EN61010-1
Class of Equipment	I	per EN61010-1

### TRANSMITTER EXCITATION SUPPLY / DPF52

Output voltage	Selected for 10 or 24 V dc
Output current, max	30 mA @ 10 V, 20 mA @ 24 V
Line regulation	$\pm 0.01\%$ / V of ac power
Load regulation	$\pm 0.5\%$
Tempco	$\pm 0.02\%$ / $^{\circ}$ C
Ripple at 50/60 Hz	$\pm 0.01\%$

### DISPLAY

Type	3 1/2 digit, 7-segment, red or green LED
Height	14.2 mm (0.56 in.)
Symbols	-1.8.8.8
Overrange Indication	Three least-significant digits blank

### ENVIRONMENTAL

Operating temperature DPF52	0 $^{\circ}$ C to 50 $^{\circ}$ C (32 $^{\circ}$ F to 122 $^{\circ}$ F)
Operating temperature DPF51 & DPF53	0 $^{\circ}$ C to 60 $^{\circ}$ C (32 $^{\circ}$ F to 140 $^{\circ}$ F)
Storage temperature	-40 $^{\circ}$ C to +85 $^{\circ}$ C (-40 $^{\circ}$ F to 185 $^{\circ}$ F)
Relative humidity	95% at 40 $^{\circ}$ C (104 $^{\circ}$ F) (non-condensing)

### MECHANICAL

Case type	3/64 DIN (2472-100)
Bezel	24 x 72 mm (0.94 x 2.83 in)
Panel cutout <sup>3</sup> / <sub>64</sub> DIN	22.2 x 68 mm (0.87 x 2.68 in)
Panel Thickness	0.8 mm (0.03 in) min. 6.4 mm (0.25 in) max.

Depth behind bezel, with connector	120 mm (4.72 in)
Weight	200 g (7 oz)
Case material	94V-1 UL-rated thermoplastic

**WARNING:** These products are not designed for use in, and should not be used for, patient- connected applications.

This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device, as the guide contains important information relating to safety and EMC.

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

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# OMEGA®



## MODEL DPF50 3 1/2 DIGIT MINI-SIZE PROCESS METER (DPF51) PROCESS WITH ISOLATED EXCITATION (DPF52) DC VOLTAGE INPUT (DPF53)

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