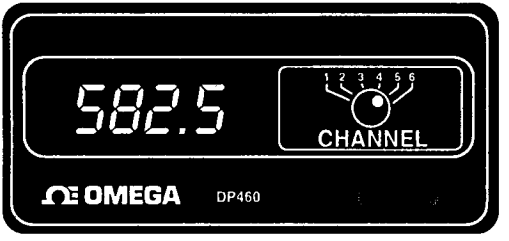
DP460V, DP461V, and DP462V

Digital Process Panel Meter for Voltage and Current Inputs



OMEGA®
An OMEGA Technologies Company

Operator's Manual

Table of Contents

Scalable Indicator

Introduction

Congratulations! You have purchased the best, value-packed scalable DC indicator available. Your new indicator is a compact panel instrument; designed for accurate, reliable, trouble-free measurement of voltage and milliamps.

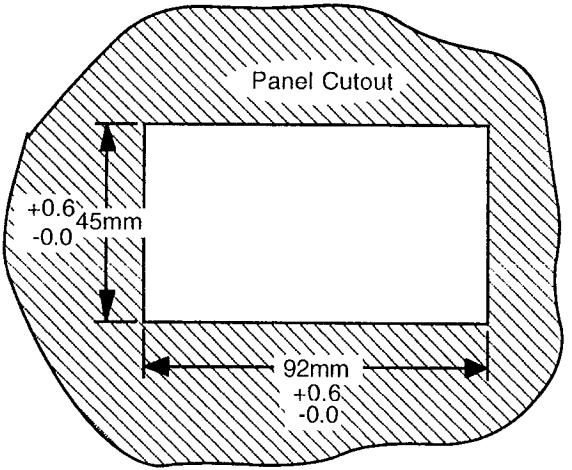
This is a display scalable, 4-digit instrument. Add-on options include an alarm multiple inputs and DC excitation.

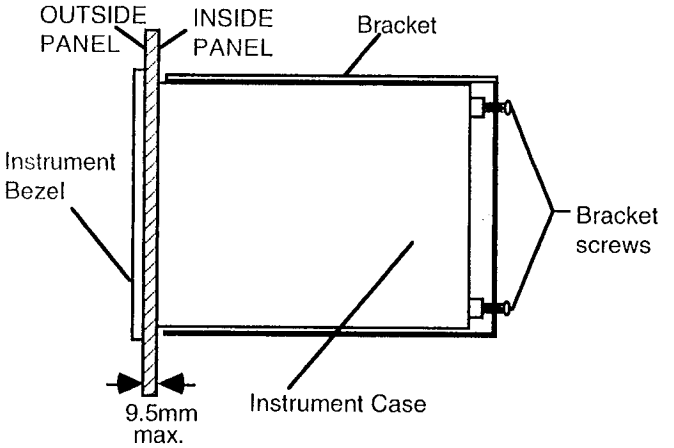
Unpacking

When unpacking your indicator, compare its configuration to your order by checking the label at the top of the instrument case. Also be sure the power requirement indicated on the label matches your power source. Report any discrepancies immediately.

Panel Installation

1. Prepare a mounting panel cutout by cutting a rectangular hole (92mm +0.6mm/-0.0mm x 45mm +0.6mm/-0.0mm) in the desired location. The maximum panel thickness is 9.5mm (3/8 inches).
2. Remove the mounting bracket from the instrument housing by removing the two bracket screws on the rear of the indicator.
3. Install the indicator in the panel cutout from the front side of the panel. Be sure the instrument is right-side-up.
4. Reinstall the mounting bracket on the indicator. Tighten the bracket screws to achieve a snug fit against the panel. Avoid distorting or cracking the housing by not over-tightening the bracket screws.

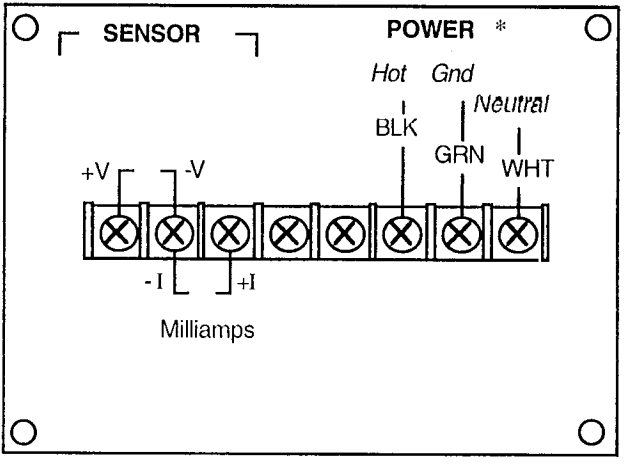

Panel Cutout
+0.6
-0.0
45mm
92mm
+0.6
-0.0


OUTSIDE PANEL
INSIDE PANEL
Bracket
Instrument Bezel
Bracket screws
9.5mm max.
Instrument Case

Wiring

Input Sensor and Power Wiring

Connect the input sensor and power wires to the screw terminals at the back of the instrument as shown below:

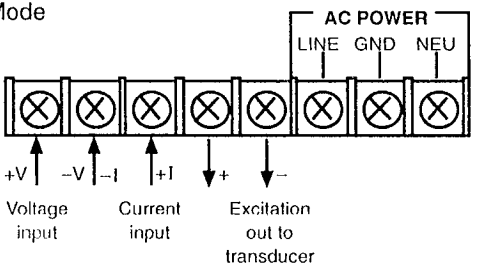


* 115VAC or 230VAC is selectable using a switch on the indicator's main circuit board. Check the instrument's tag for the voltage range set at the factory. You may move the switch to match your power source if needed.

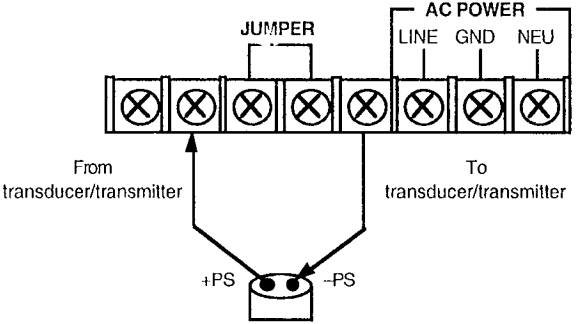
Sensor Hookups with Excitation Option

The following figures provide the user with the necessary information to connect either a 2-wire or a 4-wire transducer to the DC excitation board.

4-Wire Mode



2-Wire Current Loop Mode



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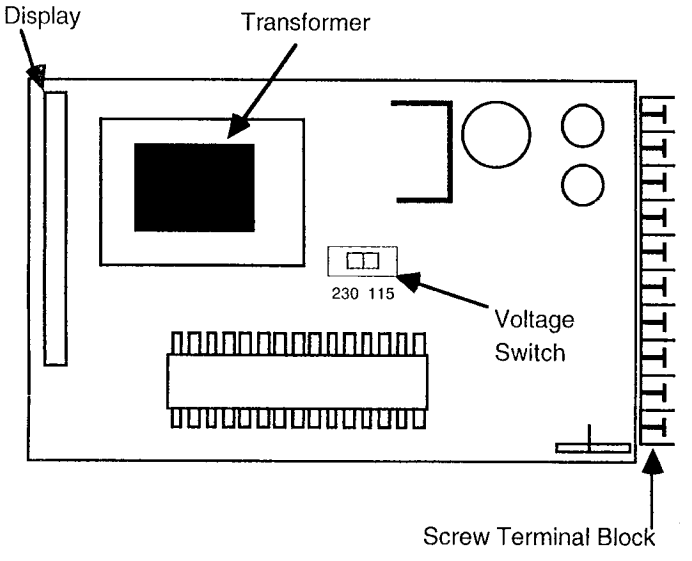
Top View of Main Board



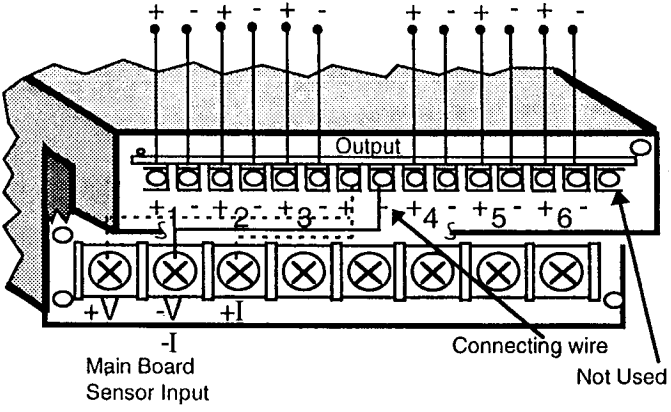
WARNING!

Dangerous voltages are exposed at the screw terminals. Always remove power before working in this area for rewiring, disassembly, and all other activities that involve proximity to electrical circuitry.

Multi-Input Option Wiring

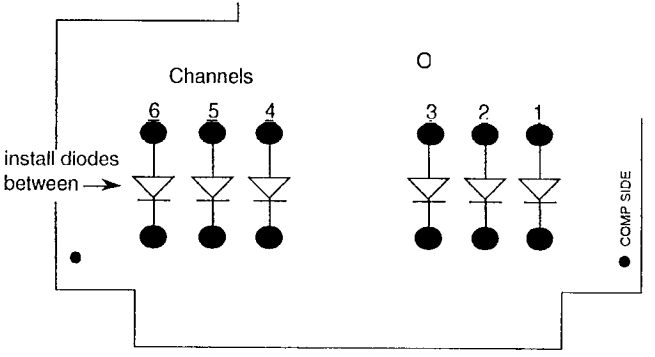
The Multi-Input option uses a quick disconnect terminal block to facilitate input wire changing or servicing. The terminal block engages the printed circuit board (PCB) fingers of the Multi-Input board which is located directly above the screw terminals at the rear. The method of attachment is the same as for a PCB edge connector: push on/pull off. If desired, you can use the two screws that are provided for securing the connector to the instrument case.

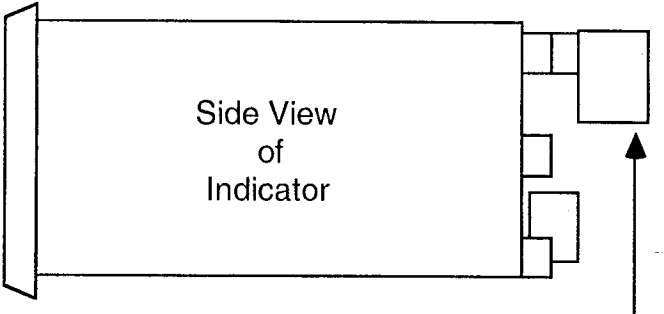
Input Connections to multi-input option.



Connect OUTPUT to Indicator input or to INPUT 6 of another multi-input card for a series connection. Observe proper polarity of terminals.

Note: If the multi-input option will be used to switch current loop type inputs, it may be desirable to install diodes on each channel to maintain the loop continuity of disengaged channels. Use 1N4002 DIODES. They can be installed in the terminal block screw terminals or soldered onto the circuit board, pads are provided.





Use screws at bottom to secure or loosen wire connections

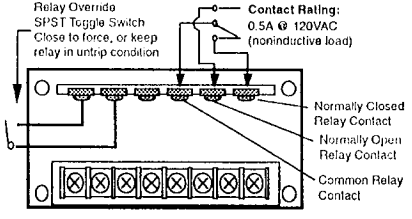
Alarm Option Wiring

Connections to the alarm option are provided by blade terminals accessible at the back of the instrument. Female connectors are supplied to wire the alarm option into your system. (See drawing below.)

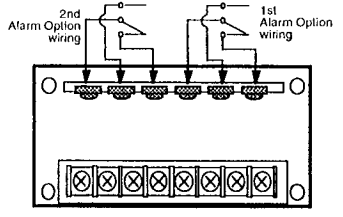
The relay override connection (single alarm version only) is provided to prevent relay closure. A switch closure can be used to acknowledge and silence alarms that otherwise would be maintained by the alarm option relay contacts.

WARNING!

Dangerous voltages are exposed at the screw terminals. Always remove power before working in this area for rewiring, disassembly, and all other activities that involve proximity to electrical circuitry.



Single Alarm Unit Wiring



Dual Alarm Unit Wiring

Operation

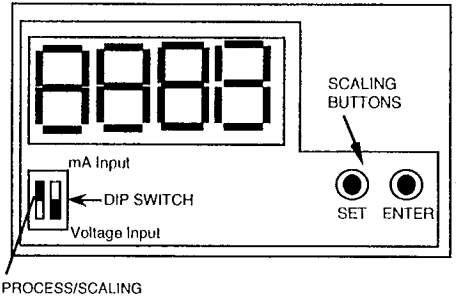
Power

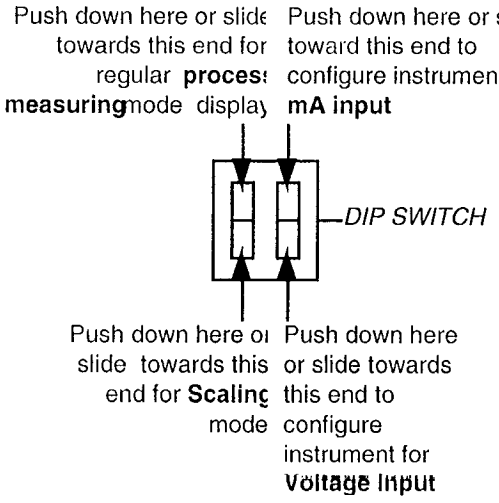
Power is applied to the indicator as long as it is plugged into an active power source. To remove power, turn off the main switch or unplug the instrument. Do NOT unscrew power leads while the instrument is plugged into the main.

Selecting mA or Volts Input Mode

To select between mA or Volts input mode, snap off the front panel lens to gain access to the display board. Behind the display is a DIP switch used to set the indicator's input measuring mode.

Note: This switch may be either a rocker type (press down on appropriate end) or a slider type (slide toward appropriate end). The drawings detail the adjustment activities:





Calibrating & Scaling the Display

Scaling the indicator to display in your desired engineering units requires simulation of two different input VALUES (typically the lowest input and the highest input) and using the two, "SET" and "ENTER" Buttons to scroll the Digital Display.

With the front lens removed and the mA/V switch in the position compatible with your input...

Step 1: Hook up a DC milliamp or Voltage source (Calibrator or actual Transducer), capable of supplying a low scale and full scale input, to the appropriate rear panel screw terminals on the indicators.

Step 2: Set the "PROCESS/SCALING" switch to the SCALING position. The word "LO" will appear on the display.

Step 3: a) Simulate the low scale input (e.g. 4 mA)

b) Push the "ENTER" Button

c) Use the "SET" Button to change the value of the flashing digit. When the flashing digit is correct, push the "ENTER" Button. The flashing digit will now move to the next right hand digit. Continue until all digits are correct with the rightmost digit still flashing.
(e.g. □□□□—Still flashing)

d) Push both "SET" and "ENTER" buttons at the same time to program in this scale factor. In other words, when the indicator receives a process input signal identical to the simulated (calibration) one it will display the same value shown now..
(e.g. 4 mA = 0000)

Note: While the indicator is calibrating itself "oo" will appear in the display. After a few seconds it will return to display "HI" (go to step 4) or "Err" (see error message table).

Step 4: With "HI" displayed...
Change the input to simulate +Full scale (High)
(e.g. 20mA).

Step 5: Repeat Steps as shown in Steps 3b, 3c, 3d changing the digits to represent the Full Scale desired display (e.g. 7500). When complete, the indicator will then go decimal point position.

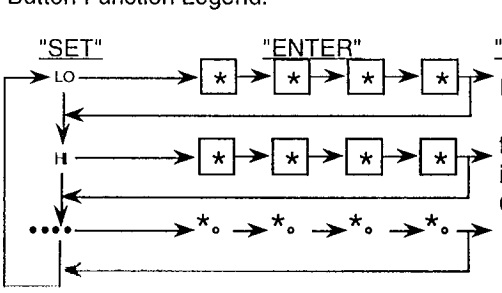
Step 6: With decimal points displayed...
a) Push "SET" button until desired position is displayed.
b) Push "SET" and "ENTER" buttons at the same time to program into memory.

Step 7: Return the "PROCESS/SCALING" switch to the PROCESS position. Replace the front lens. Remove the calibrator from the input terminals.

Notes: 1) Pushing both the "SET" and "ENTER" button at the same time always causes the indicator to recalibrate itself to the given input and what is on the display at that moment. As a protective measure, if scaling changes are made and not terminated this way no recalibration will occur, previous values will remain.

2) As a further protective measure, the "SET" and "ENTER" buttons are not functional unless the PROCESS/SCALING switch is in the SCALING position.

Button Function Legend:



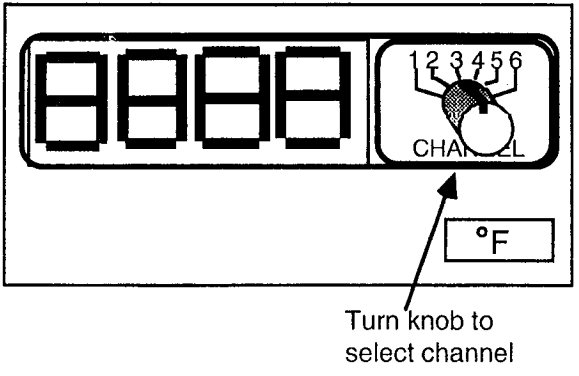
* Use "SET" key to change value of flashing digit or decimal point

Error Message Table

MESSAGE DISPLAYED	DURING CALIBRATION/SCALING MODE		DURING NORMAL PROCESS MEASURING MODE	
	CAUSE	CURE	CAUSE	CURE
Err1	Slope error. Same values entered for both "LO" and "HI"	"LO" and "HI" values Must be different. Push "set" button and re-enter for "LO" and "HI" values.	N/A	
Err2	Slope error. Too many display counts for too little input voltage or current	Push "SET" button. Reduce the number of display counts for the given input. example: Reduce 700.0 to 700	N/A	
OL-OL	Overloaded input or display. Input exceeds specification	Check input voltage or current. Must be within 0-10VDC 0-20mA	Input exceeds maximum specification or display is beyond -999 or 9999	Check input voltage or current. for over range or break/open circuit.
----	Internal A/D overload.	Turn power off, wait 25 seconds, and turn power on again. If problem persists, call repair department	Internal A/D overload	Turn power off, wait 25 seconds, and turn power on again. If problem persists, call repair department

Using the Multi-Input Option

Select the input you wish to display by turning the front panel selector switch. The knob's index mark indicates the selected input as labeled on the front panel lens.

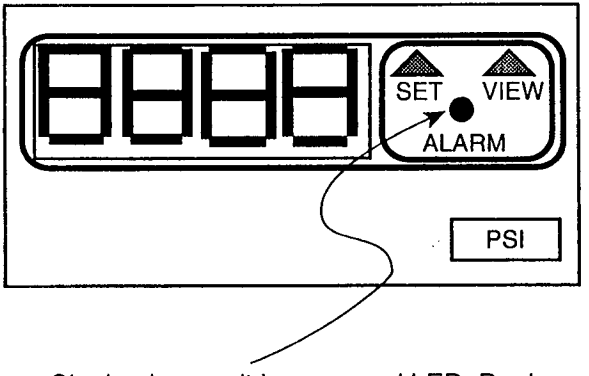


Using the Alarm Options

The Alarm LED indicators will turn on and the corresponding relay output will change state when an alarm condition exists. The LED will turn off and the relay will reset automatically when the alarm limit is no longer exceeded.

The alarm option uses two front panel buttons, "**SET**" and "**VIEW**," to setup and view the alarm trip point.

To examine the current limit value, press the "**VIEW**" button. For dual alarm versions, hold the "**VIEW**" button for 3 seconds to see the second limit value. Releasing the button returns you to the measurement mode.



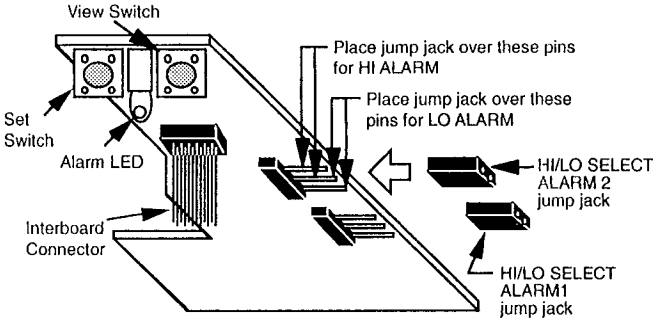
Single alarm unit has one red LED. Dual alarm unit has one yellow and one red.

Programming the Limit Value(s):

1. Press "**VIEW**" and "**SET**" buttons at the same time. The current limit value is displayed, ready to be programmed. For dual alarm versions, program the second limit value by holding the "**VIEW**" button for 3 seconds (until the display changes to show second value) then, with the **VIEW** button still held, press the "**SET**" button. Follow steps 2-5 below. (**Note**: During the process of changing the limit value, the instrument is still taking readings and performing alarm checking against the current limit value.)
2. Select the digit to be changed by pressing the "**VIEW** " button as required. The current selection is indicated by a blinking digit.
3. Change the blinking number location by pressing the "**SET**" button.
4. Repeat steps 2 and 3 as necessary to set a new limit value.
5. After you finish changing the limit value, pressing the "**VIEW**" and "**SET**" buttons at the same time to return to the measurement display mode. The newly programmed limit value is now in effect and stored in the non-volatile memory.

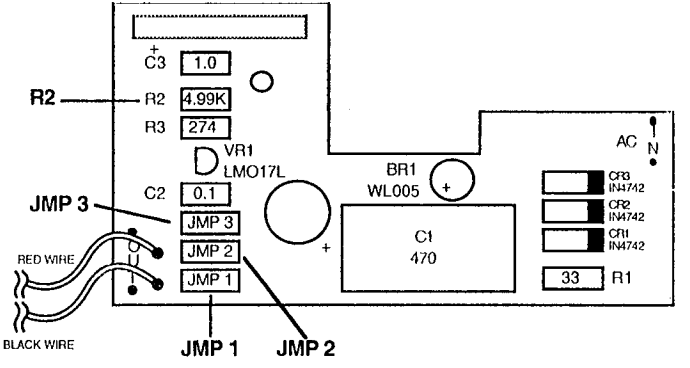
To Configure for a HI or LO Alarm:

1. Snap off the front panel lens.
2. Locate the jump jack on the board behind the **"VIEW"** button.
3. Place the jump jack over the appropriate pair of pins for a desired alarm action. See the drawing below for details.



Voltage Reconfiguration of Excitation Option

In applications where the standard 24VDC supply is too high, a stable, reduced supply voltage can be achieved by replacing jumpers on the DC excitation board as determined by Table 1. The location of Jumpers 1 through 3 and resistor R2 is shown in the figure below.



Nominal DC Output Voltage (VDC)	Replace R2 With a 1/4W, 1% Metal Film Resistor (Ω)	Calculated DC Output Voltage (VDC)	Replace JMP1 With a 1/2W, 5% Resistor (Ω)	Replace JMP2 With a 1/2W, 5% Resistor (Ω)	Replace JMP3 With a 1/2W, 5% Resistor (Ω)
5	806	5.008	100	100	100
6	1.02k	6.005	100	100	82
7	1.24k	7.031	100	100	62
8	1.43k	7.917	100	100	43
9	1.65k	8.942	100	100	20
10	1.87k	9.968	100	100	N/C
11	2.10k	11.040	100	82	N/C
12	2.32k	12.066	100	62	N/C
13	2.55k	13.138	100	43	N/C
14	2.74k	14.024	100	20	N/C
15	2.94k	14.956	100	N/C	N/C
16	3.16k	15.982	82	N/C	N/C
17	3.40k	17.101	62	N/C	N/C
18	3.57k	17.893	43	N/C	N/C
19	3.83k	19.106	20	N/C	N/C
20	4.02k	19.991	N/C	N/C	N/C

Notes:

Formula: R2 (ohms) = (Volt – 1.25) / 0.00466

Round to the nearest 1% resistor value.

N/C = No change.

Table 1.

Specifications

Functional

Input Range:

mA: 0-20mADC

Voltage: 0-10VDC

Sensitivity:

Maximum: 200μV/count; 0.4μA/count

Minimum: 1 count

Input Impedance:

mA: 5Ω

Voltage: ≥1MΩ

A/D Read Rate:

2 per second nominal

Power:

115VAC ±10%, 50-60Hz; 230VAC ±10%, 50-60Hz

Switch selectable

Alarm Relay Contact Rating:

0.5A @ 120VAC (noninductive load); Form C

Excitation Option:

30mA @ 24VDC

Performance Specifications

Reference Operating Conditions (ROC):

±10% line voltage

23 ±2 °C ambient temperature

<80% RH non-condensing

Accuracy (at ROC): 0.02% RDG, ±1 count

Noise Rejection:

NMRR: ≥ 60 dB @ 50/60 Hz, ±0.1 Hz

CMRR: ≥ 120 dB @ 50/60 Hz, ±.0.1 Hz with 250Ω unbalance

Overload Protection:

Power lead to ground: 1500VDC or AC RMS

Across inputs:

Voltage:Up to 250VDC or VAC for 1 minute, +V to -V

mA: Up to 150 mADC or mAAC for 1 minute, +I to -I

Stability With Temperature:

Zero: 1μV/°C

Span: 0.01% rdg/°C

Stability With Time: 10 counts/year max.

Repeatability: ±1 count

Environmental/Physical Specifications

Operating Range:

Temperature: 5 to 45 °C

Relative Humidity: 10-80% RH non-condensing

Storage Range:

-40 to 65 °C

Power:

115VAC ±10%, 50-60Hz

230VAC ± 10%, 50-60Hz

Size:

Bezel: 96mm W x 48mm H

Case: 92mm W x 40mm H x 136mm D

Maximum Weight:

454 kg/1 lb

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service 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 our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our 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. However, 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 or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

We are glad to offer suggestions on the use of our various products. Nevertheless, OMEGA only warrants that the parts manufactured by it will be as specified and free of defects.

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SPECIAL CONDITION: Should this equipment be used in or with any nuclear installation or activity, buyer will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the equipment in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA ENGINEERING Customer Service Department. Call toll free in the USA and Canada: 1-800-622-2378, FAX: 203-359-7811; International: 203-359-1660, FAX: 203-359-7807.

BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, YOU MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OUR 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.

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

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems you are having with the product.

FOR **NON-WARRANTY** REPAIRS OR **CALIBRATION**, consult OMEGA for current repair/ calibration charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair/calibration,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems you are having with the product.

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