OMEGA™ 1 YEAR WARRANTY MADE IN USA

4-20 mA Loop Powered Pressure Transmitters

DPG1000L, DPG1001L, DPG1100L, DPG1101L

DPG1000L, DPG1001L | DPG1100L, DPG1101L | DPG1000L, DPG1001L, Ranges >2000 | DPG1100L, DPG1101L, Ranges >2000

INSTRUCTION SHEET

M4890/0818

DPG1000L 4-20 mA Loop Powered
DPG1001L 4-20 mA Loop Powered, High Accuracy
DPG1000L 4-20 mA Loop Powered, NEMA 4X
DPG1101L 4-20 mA Loop Powered, High Accuracy, NEMA 4X

Ranges and Resolution

Resolution is fixed as indicated below
3-1/2 digit model ranges are limited by number of display digits: 2, 20, 200, and 2000 ranges display 1.999, 19.99, 199.9, and 1999.

psig Gauge reference pressure
psig vacuum Vacuum gauge, minus sign not used
psia Absolute reference (open port reads atmospheric pressure, reads zero at full vacuum)

Available Ranges

15.00 psig vacuum ‡
30.0 inHg vacuum ‡
±15.0 psig ‡
3.00 psig ‡
5.00 psig ‡
15.00 psia
15.00 psig
30.0 psia †
30.0 psig †
60.0 psig
100.0 psia
100.0 psig
199.9 psig
300 psig †
500 psig
1000 psig (1KG)
1999 psig (2KG)
3000 psi (3KG) *
5000 psi (5KG) *

Bold Standard ranges. Contact Omega Engineering or other engineering units such as kPa, atm, bar, mbar, inHg, mmHg, inH_2O, ftH_2O, torr, kg/cm^2, cmH_2O, oz/in^2.

‡ DPG1001L , DPG1101L (high accuracy) not available in 3 psi, 5 psi, vacuum, or bipolar ranges.

† DPG1001L , DPG1101L (high accuracy) applies to output only due to limitation of 3-1/2 digit display.

* 4 digit range. All others 3-1/2 digit

Accuracy

Includes linearity, hysteresis, repeatability
DPG1000L, DPG1100L: ±0.25% of full scale ±1 LSD
DPG1001L, DPG1101L: ±0.1% of full scale ±1 LSD
±0.1% accuracy not available with 3 psig, 5 psig, absolute, vacuum, or bipolar ranges
Sensor hysteresis: ±0.015% FS, included in accuracy
Sensor repeatability: ±0.01% FS, included in accuracy

Display

Resolution is fixed. Some ranges may not use all display digits.
Ranges to 1999: 3-1/2 digit LCD, 1/2" digit height
3 readings/sec. nominal display update
Ranges >2000: 4 digit LCD, 0.4" digit height with 5 character 0.25" H alphanumeric lower display
4 readings/sec. nominal display update

Power

Any DC supply/loop resistance that maintains 8-32 VDC at gauge terminals.

May be operated as a 4-20 mA loop transmitter or a DC powered pressure indicator.

Reverse polarity protected. Designed for continuous operation. 3 ft long, 2-conductor 22 AWG cable with stripped wire ends

Output Characteristics

Ranges to 1999: Analog output, 50 msec. typical response time
Ranges 2000-up: 12,000 counts over sensor range
Updated approximately 16 times per second

Low Loop Warning

Ranges to 1999: Colon appears on display at approximately 7.8 VDC. Below 7.8 VDC erratic operation may occur.
Ranges 2000-up: All decimal points flash. Below 7.8 VDC erratic operation may occur and gauge may shut off.

Test Function

TEST button, when depressed sets loop current and display to output test level, independent of pressure input, to allow testing of system operation.
Output test adjustment: 0-100% or range

Calibration

Ranges to 1999: Front zero, span and test potentiometers
Non-interactive zero and span, ±10% range
Internal potentiometers: Loop 4 mA and 20 mA
Ranges 2000-up: User set pass code for calibration mode
zero, midpoint, span as required for each range

Process Connection and Material

1/4" NPT male
Sensor and all wetted parts are 316L stainless steel

The DPG1000L/DPG1100L series is a 2-wire pressure transmitter with a digital display. It is powered by the 4-20 mA current loop and produces an analog output signal. The output is filtered to improve noise immunity. It may also be connected to a low voltage DC supply for use as a pressure indicator.

Ranges up to 1999 have a 3.5 digit display and true analog output. Ranges 2000 and above are microprocessor based and use a 4 digit display with an alphanumeric lower display. The output is a 12,000 count analog 4-20 mA signal updated approx. 16 times per second.

Models are designed for continuous operation. Warm-up time is negligible. The display will show the system pressure/vacuum and the loop current will be proportional to the system pressure/vacuum; 4 mA = Zero or low end, 20 mA = Span, full-scale or high end.

The TEST button, when depressed, switches the display and output loop to a preset level determined by the setting of a Test potentiometer. This is useful for testing the 4-20 mA output signal without having to alter system pressure.

Housing

Standard: Epoxy powder coated aluminum case and rear cover, ABS/polycarbonate bezel, polycarbonate label, front and rear rubber gaskets

NEMA 4X: UV stabilized ABS/polycarbonate case and gasketed rear cover with six captive stainless steel screws. polycarbonate label

Weight

Gauge: 9 ounces, shipping weight: 1 pound (approximate)

Overpressure, Burst, Vacuum

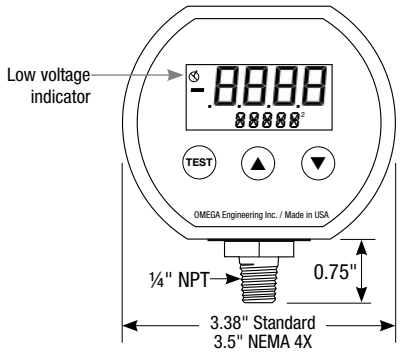
3000 psig sensor: 5000 psig overpressure, 10,000 psi burst
5000 psig sensor: 7500 psig overpressure, 10,000 psi burst
All other sensors: 2 X sensor range overpressure
All other sensors: 4 X sensor range burst
>2X overpressure will permanently damage sensor

Vacuum service: ±15 psig, 15 psia, 15 psig, 30 psia, 100 psig, 100 psia, 200 psig sensors. Vacuum on all others will permanently damage sensor

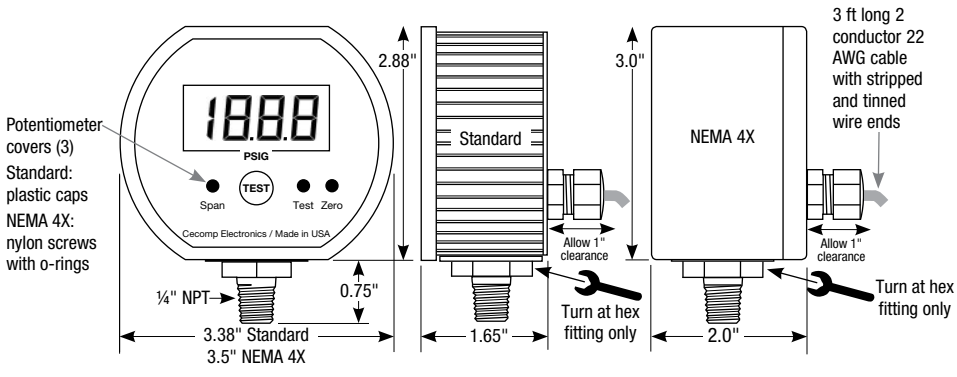
4 digit ranges (3000 psi, 5000 psi)
112.5% full scale out-of-range display: 1– – – or 1 –.–.–.–
Under-range display (non-vacuum sensors): –Err

Environmental

Storage Temperature: –40 to 203°F (–40 to 95°C)
Operating Temperature: –4 to 185°F (–20 to 85°C)
Compensated Temperature: 32 to 158°F (0 to 70°C)



Ranges >2000



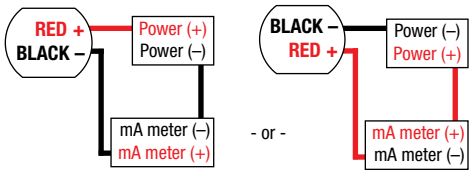
Installation Precautions

- ✔ Read these instructions before using the gauge. Configuration may be easier before installation. Contact the factory for assistance.
- ✔ These products do not contain user-serviceable parts. Contact us for repairs, service, or refurbishment.
- ✔ Gauges must be operated within specified ambient temperature ranges.
- ✔ Outdoor or wash down applications require a NEMA 4X gauge or installation in a NEMA 4X housing.
- ✔ Use a pressure or vacuum range appropriate for the application.
- ✔ Use fittings appropriate for the pressure range of the gauge.
- ✔ Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.
- ✔ For contaminated media use an appropriate screen or filter to keep debris out of gauge port.
- ✔ Remove system pressures before removing or installing gauge.
- ✔ Install or remove gauge using a wrench on the hex fitting only. Do not attempt to turn gauge by forcing the housing.
- ✔ Good design practice dictates that positive displacement liquid pumps include protection devices to prevent sensor damage from pressure spikes, acceleration head, and vacuum extremes.
- ☒ Avoid permanent sensor damage! Do not apply vacuum to non-vacuum gauges or hydraulic vacuum to any gauges.
- ☒ Avoid permanent sensor damage! NEVER insert objects into gauge port or blow out with compressed air.
- ⚠ Gauges are not for oxygen service. Accidental rupture of sensor diaphragm may cause silicone oil inside sensor to react with oxygen.
- ☒ NEVER connect the gauge wires directly to 115 VAC or permanent damage will result.

WARNING: This product can expose you to chemicals including lead, nickel and chromium, which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

All Models—Electrical Connections

Connect the 2-wire cable to an 8-32 VDC power source. The gauge will not operate with incorrect polarity. See the wiring examples below for connecting to a 4-20 mA current loop.



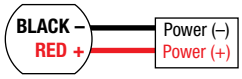
Select a loop power supply voltage and total loop resistance so that when the loop current is 20 mA, the gauge will have at least 8 VDC at its terminals. For correct operation, the gauge terminal voltage must not fall below 8 VDC. Too large a loop resistance will cause the gauge output to "limit" or saturate before reaching its full 20 mA output.

The minimum loop supply voltage may be calculated from the formula:

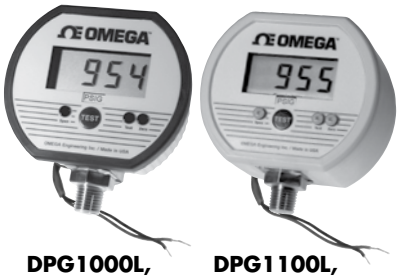
Vmin = 8V + (20mA x Total loop resistance)

If the terminal voltage of the gauge falls below about 7.8 VDC, erratic operation may occur. This is an indication that the loop supply/resistance may not allow adequate headroom for reliable operation. This should never occur in normal use. If it does, examine the loop supply/resistance.

If the 4-20 mA analog output is not required, the transmitter can be simply connected to any 8-32 VDC power supply.



DPG1000L, DPG1001L, DPG1100L, DPG1101L Series with Ranges to 1999



DPG1000L, DPG1001L **DPG1100L, DPG1101L**

Operation

Models are designed for continuous operation. Warm-up time is negligible.

When power is first applied, the gauge will power up and be ready for use. The display will show the system pressure or vacuum, and the loop current will be proportional to the system pressure/vacuum.

Do not apply vacuum unless model range is designated as vacuum, bipolar, or absolute reference. See specifications for sensors that can be used for vacuum service. Vacuum will damage 3 psig, 5 psig, 30 psig, 60, psig, 300 psig, and 500 psig sensors.

Gauge reference pressure ranges

4 mA = Zero or gauge port open to atmosphere
20 mA = Full-scale pressure

Gauge reference vacuum ranges

4 mA = Zero or gauge port open to atmosphere
20 mA = Full-scale vacuum

Bipolar (+/–) ranges

4 mA = Full vacuum
12 mA = Zero or gauge port open to atmosphere
20 mA = Full-scale pressure

Absolute reference ranges

4 mA = Full vacuum (0 on display)
20 mA = Full-scale pressure of the sensor used

Note that absolute gauges read atmospheric pressure with the gauge port open to atmosphere. Atmospheric pressure and thus the gauge reading, will vary continuously. For example a 15 psia sensor may read 14 psia depending on local barometric pressure and the effects of altitude.

Test Function

When the front-panel TEST button is held depressed, the display and loop current are switched, independent of the system pressure, to a test level determined by the setting of the Test potentiometer. This test mode will allow setup and testing of the current loop by switching to this test level whenever desired without having to alter the system pressure.

1. To set the test output level, remove the potentiometer cover.
2. Press and hold the front-panel TEST button.
3. Adjust the Test potentiometer to set the display and loop current to the desired test level.
4. Replace the potentiometer cover.

Calibration Preparation

Gauges are calibrated at the factory using equipment traceable to NIST. There is no need to calibrate the gauge before putting it into service.

Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures. Gauges can be returned to factory for certified calibration and repairs. NIST traceability is available.

Calibration intervals depend on your quality control program requirements and as-found data. Many customers calibrate their equipment annually.

The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure and/or vacuum over the full range of the gauge.

A vacuum pump able to produce a vacuum of 100 microns (0.1 torr or 100 millitorr) or lower is required for vacuum and absolute gauges.

Warning: application of vacuum to non-vacuum models may result in irreparable damage to the sensor.

Use a stable DC power supply and an accurate mA meter for calibration of loop powered transmitters.

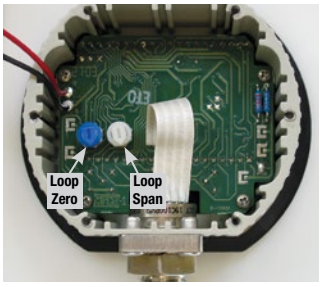
Allow the gauge to equalize to normal room temperature (about 20 minutes minimum) before calibration.

Calibration

1. See rear label of gauge for pressure range.
2. Remove the covers on the Zero and Span controls on the front of the gauge.
3. Loop-powered gauges must be connected to 8-32 VDC during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges.
4. Internal Zero and Span potentiometers adjust the agreement between the display and the analog output. These normally do not need to be adjusted. If the output does need adjustment, remove the rear cover to access the potentiometers. See image below.
5. Zero for gauge reference pressure or vacuum gauges: With the gauge port open to atmosphere, adjust the Zero potentiometer for a display indication of zero. Output should be 4.0 milliamps.

   Zero for absolute reference gauges: Apply full vacuum to the gauge. Adjust the Zero potentiometer for a display indication of zero. Output should be 4.0 milliamps.
6. Span for gauge reference pressure gauges and absolute reference gauges: Apply full-scale pressure and adjust the Span potentiometer for a display indication equal to full-scale pressure. Output should be 20.0 milliamps.

   Span for gauge reference vacuum gauges: Apply full vacuum to the gauge. Adjust the Span potentiometer for a display indication equal to full-scale vacuum. Output should be 20.0 milliamps.
7. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale and repeat calibration as needed to achieve best accuracy over desired operating range.
8. Replace the potentiometer covers, rear cover and screws, taking care not to pinch the wires between the case and the rear cover.



DPG1000L, DPG1001L, Ranges 2000-up **DPG1100L, DPG1101L, Ranges 2000-up**

Power Up & Operation

Models are designed for continuous operation. Warm-up time is negligible.

When power is first applied, the gauge proceeds through a startup sequence as follows.

1. All active display segments are turned on for approximately 1 second.
2. The full scale pressure is indicated for approximately 1 second, while the engineering units are displayed for 1/2 second on the character segments and then FS (Full Scale) is displayed for 1/2 second on the character segments.
3. All active display segments are again turned on for approximately 1 second.

After initialization, the display and the loop current will correspond to the applied pressure. The output is linearly proportional to the pressure.

4 mA = Zero or gauge port open to atmosphere
20 mA = Full-scale pressure or vacuum, depending on range

Low Loop Voltage or Out-of-Range Indications

At power-up, if the available voltage is not sufficient, only the low power segment will be displayed indicating that loop resistance is too high or the loop power supply voltage is too low.

After successful power-up, if the loop voltage falls below the minimum required for reliable operation, the display will continue to indicate pressure with the low power segment blinking at a slow rate.

Pressure out-of-range indication

112.5% out-of-range display: 1 – – – or 1 –.–.–.– depending on model.

Test Function

When the front-panel TEST button is held depressed, the display and loop current are switched, independent of the system pressure, to a test level determined by the test setting.

This test mode will allow setup and testing of the current loop by switching to this test level whenever desired without having to alter the system pressure.

1. To set the test output level, press and hold the front-panel TEST button.
2. Press the ▲ or ▼ buttons to adjust the test output to the desired pressure setting.
3. Release the TEST button. The setting is stored in non-volatile memory.

When the TEST button is held depressed, the display and loop current are switched, independent of the actual pressure, to a level determined by the test setting. When the button is released, normal operation is resumed.

Calibration Preparation

Gauges are calibrated at the factory using equipment traceable to NIST. There is no need to calibrate the gauge before putting it into service.

Calibration intervals depend on your quality control program requirements and as-found data. Many customers calibrate their equipment annually.

Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures. Gauges may be returned to Omega for NIST traceabile calibration.

The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge.

A vacuum pump able to produce a vacuum of 100 microns (0.1 torr or 100 millitorr) or lower is required for vacuum and absolute gauges. Warning: application of vacuum to non-vacuum models will result in damage to the sensor.

Connect to a stable 8-32 VDC power supply during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.

Use an accurate mA meter for calibration of the 4-20 mA output.

Allow approximately 20 minutes for the gauge to equalize to normal room temperature before calibration.

Entering Calibration Mode

1. While pressing and holding the ▼ button, press the TEST button to enter the calibration mode. The upper section of the display will indicate CAL.
2. When all buttons are released, the upper section of the display will indicate _ _ _ _ with the left-most position blinking, and the lower section will indicate PASS. To exit and return to the normal operating mode, press and release the TEST button.
3. Enter the user-modifiable calibration pass code (3510 factory default).

   Use the ▲ and ▼ buttons to set the left-most digit to 3.

   Press and release the TEST button to index to the next position. The 3 will remain, and the second position will be blinking. Use the ▲ and ▼ buttons to select 5.

   Press and release the TEST button to index to the next position. 3 5 will remain, and the third position will be blinking. Use the ▲ and ▼ buttons to select 1.

   Press and release the TEST button to index to the next position. 3 5 1 will remain, and the fourth position will be blinking. Use the ▲ and ▼ buttons to select 0.
4. Press and release the TEST button to proceed with calibration.

If an incorrect pass code was entered, the gauge will to exit to the normal operating mode.

Upon successful calibration pass code entry, the upper display will indicate the applied pressure with the corresponding loop current through the gauge wires.

The lower display will alternate between CAL and the calibration region corresponding to the applied pressure (ZERO, +MID, +SPAN, –MID, or –SPAN).

Note: To store the calibration parameters and exit calibration mode at any time, press and hold the TEST button until the display indicates – – – – .

Loop Current Calibration

Loop current calibration coordinates the loop current to the display indication, and is performed independently of applied pressure. It requires a direct physical measurement of the loop current. See the wiring instructions.

Note: During any of the following calibration steps if the TEST button is held depressed for longer than 2 seconds, the display will change to indicate – – – – , and the gauge will exit the calibration mode when all buttons are released.

4 mA loop current calibration

Press the TEST button and release it when the display indicates LCAL.

The upper display segments will indicate the pre-configured pressure corresponding to a 4 mA loop current.

The lower display will alternate between CAL and 4 MA.

Use the ▲ and ▼ buttons to adjust the actual loop current to 4 mA.

20 mA loop current calibration

Press the TEST button and release it when the display indicates HCAL.

The upper display segments will indicate the pre-configured pressure corresponding to a 20 mA loop current.

The lower display will alternate between CAL and 20 MA.

Use the ▲ and ▼ buttons to adjust the actual loop current to 20 mA.

Pressure Calibration

The pressure calibration procedure simultaneously adjusts both the display indication and the loop current to correspond to the actual applied pressure.

Note: During any of the following calibration steps if the TEST button is held depressed for longer than 2 seconds, the display will change to indicate – – – – , and the gauge will exit the calibration mode when all buttons are released.

Zero calibration

Press the TEST button and release it when the display indicates CAL.

Apply zero pressure.

The lower display will alternate between CAL and ZERO.

Use the ▲ and ▼ buttons to adjust the upper display to indicate zero.

Span calibration

Apply full-scale pressure.

The lower display will alternate between CAL and +SPAN.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure.

Midpoint non-linearity calibration

Apply 50% full-scale positive pressure.

The lower display will alternate between CAL and +MID.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure.

Save and exit

To store the calibration parameters and exit calibration mode, press and hold the TEST button until the display indicates – – – – .

Change Calibration Pass Code

1. While pressing and holding the ▲ button, press the TEST button to enter the configuration mode. The upper section of the display will indicate CFG.
2. When all buttons are released, the upper section of the display will indicate _ _ _ _ with the left-most position blinking, and the lower section will indicate PASS. To exit and return to the normal operating mode, press and release the TEST button.
3. Enter factory pass code 1220
   Use the ▲ and ▼ buttons to set the left-most digit to 1.

   Press and release the TEST button to index to the next position. The 1 will remain, and the second position will be blinking. Use the ▲ and ▼ buttons to select 2.

   Press and release the TEST button to index to the next position. 1 2 will remain, and the third position will be blinking. Use the ▲ and ▼ buttons to select 2.

   Press and release the TEST button to index to the next position. 1 2 2 will remain, and the fourth position will be blinking. Use the ▲ and ▼ buttons to select 0.
4. Press and release the TEST button to proceed to the configuration parameters. Note: If an incorrect pass code was entered, the gauge will exit to the normal operating mode.
5. The upper display section will indicate the calibration pass code. The lower section will display UDPCD.
6. To change the calibration pass code, press and release either the ▲ or ▼ buttons. The first character of the pass code will begin to blink.

   Use the ▲ and ▼ buttons to set the blinking character to the desired value, then press and release the TEST button to move to the next character. Repeat for each character position.
7. When the calibration pass code is displayed with no characters blinking, press and release the TEST button to save the new pass code and restart the gauge.

   Note: To make a correction to the new calibration pass code before saving and restarting, press either the ▲ or ▼ buttons to return to the UDPCD code entry sequence.

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's 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 malfunctions, 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 having been 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 in which wear is not warranted, include but are 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 the company 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:

1. Purchase Order 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 relative to the product.

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

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. 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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