# User's Guide

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# DMD-475 Bridgesensor
## AC Powered Signal Conditioner

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

## Description

The Model DMD-475 is a self contained, AC powered signal conditioner for bridge type instrumentation. It contains a precision instrumentation amplifier with isolated, filtered output and a highly regulated, low noise, adjustable output bridge excitation source. The unit is completely encapsulated for use in rugged environments.

## Features

- Complete Strain Gage Bridge Signal Conditioner
- Isolated 10 Volt Output
- Bridge Balance with 80% Tare Offset Capability
- Excitation Supply Capable of Driving Four Load Cells
- AC Powered
- Rugged Epoxy Encapsulated Design

## Applications

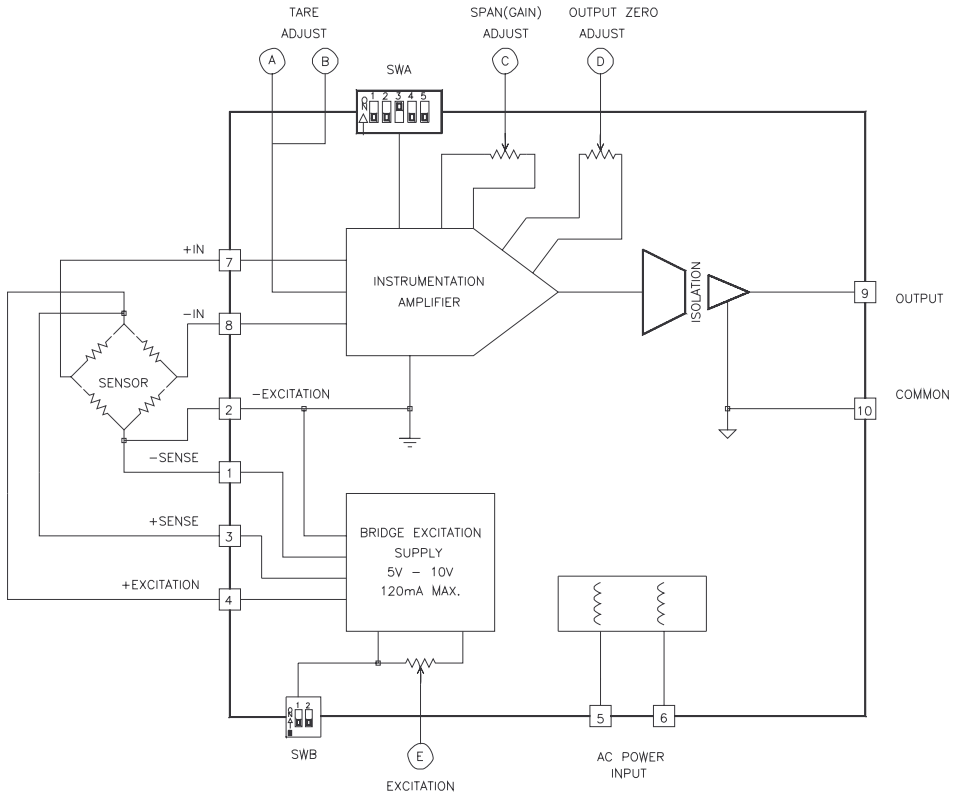
- Weighing with Load Cells
- Low Frequency Strain Measurements
- Process Control Pressure Transducers
- Can Be Used With All Types of Low Output Sensors

## Specifications

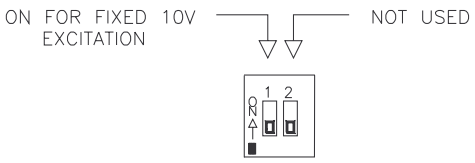
NOTE: Unless otherwise noted, specifications apply after one hour warm up at 25°C ambient. Temperature coefficients apply between 0°C and 55°C ambient.

| | |
|---|---|
| **Isolation** | |
| Input to Output | 700 VDC<br>60pF |
| **Amplifier** | |
| **Gain** | |
| Adjustment Range | 200 to 2000 |
| Input for 10V Output | 5 mV to 50 mV |
| Linearity | ±0.005% of Full Scale |
| Temperature Stability | 50 PPM (0.005%/°C) |
| **Input Noise** | |
| .1 Hz to 10 Hz | 2µV P-P |
| **Input Offset** | |
| Temperature Coefficient | 0.5µV/°C typical |
| **Tare Adjustment Range** | |
| Bridge Balance | -3mV to +25mV |
| Referred to Input | Equals 80% F.S. of 3mV/V cell |
| Temperature Coefficient | 1µV/°C typical |
| **Input Resistance** | |
| Differential and Common Mode | 1000 megohm |
| **Common Mode Rejection** | |
| DC to 60Hz | 90 dB minimum |
| **Common Mode Input** | 0 to +5 Volts maximum |
| **Output** | |
| **Zero Adjust** | 0 or +2 Volts |
| Temperature Coefficient Referred to Output | 0.3mV/°C typical |
| **Output Voltage Range** | -3 to +10 Volts |
| Current | 5 mA maximum |
| Frequency Response, -3dB | 10 Hz, 2 pole |
| Response Time<br>Rise Time 10% to 90%<br>To 0.1% of Final Value | <br>35 ms<br>90 ms |
| **Bridge Supply** | |
| **Voltage Adjustment Range** | 5 to 10 Volts |
| Temperature Coefficient | 100 PPM typical |
| Fixed | 10.2V ±2.5% |
| Temperature Coefficient | 60 PPM typical |
| **Load Current** | 0 to 120 mA |
| **Regulation - Load and Line** | 0.02% maximum |
| **Output Noise** | |
| 120 Hz Bandwidth | 1 mV RMS, maximum |
| **Power Input** | 115 VAC, ±10V 50/60 Hz @ 6 VA |
| Optional | 100, 220 or 230 VAC, ±10% |
| **Line Isolation** | |
| Capacitance | 60 pF typical |
| Dielectric Withstand | 1100 Volts RMS |
| **Environment** | |
| Ambient Operating | -25°C to +55°C |
| Storage | -25°C to +85°C |
| **Weight** | 18 oz. (510 grams) |
| **Size** | 3.75" L x 2.0" W x 2.87" H<br>(9.53 cm x 5.1 cm x 7.62 cm) |

## MODEL DMD-475 Block Diagram

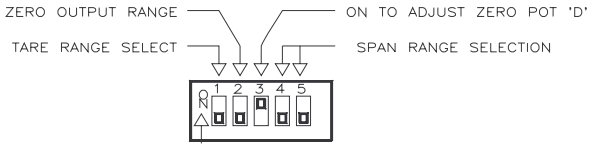



## SWB - Excitation Voltage




| SWB-1 | Excitation Voltage |
|---|---|
| ON | Fixed 10 Volts |
| OFF | Adjustable |

## SWA - Control Switch

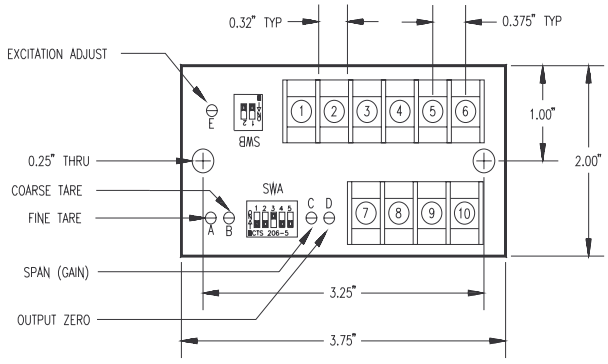



| SWA-1 | Tare Range |
|---|---|
| OFF | -3mV to +15 mV |
| ON | +15 mV to +25 mV |

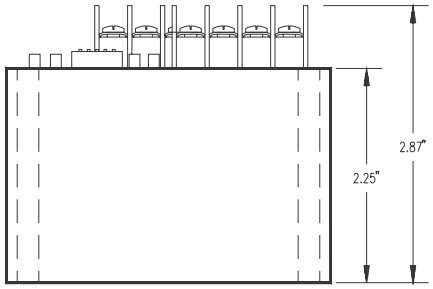
| SWA-2 | Zero Voltage |
|---|---|
| OFF | +2 V |
| ON | 0 V |

| SWA-4 | SWA-5 | Span Range |
|---|---|---|
| ON | ON | 40 mV to 50 mV |
| OFF | ON | 20 mV to 40 mV |
| ON | OFF | 10 mV to 20 mV |
| OFF | OFF | 5 mV to 10 mV |

## Mechanical Specifications




TOP VIEW




SIDE VIEW

| Terminal Strip Assignments | | | |
|---|---|---|---|
| Screw Terminal | Function | Screw Terminal | Function |
| 1 | -SENSE | 6 | AC |
| 2 | -EXCITATION | 7 | +SIGNAL |
| 3 | +SENSE | 8 | -SIGNAL |
| 4 | +EXCITATION | 9 | OUTPUT |
| 5 | AC | 10 | COMMON |

## Getting Started with the Model DMD-475

**1.** Excitation Supply. If remote sensing is not used, connect +Sense to +Excitation, terminal 3 to 4, and connect -Sense to -Excitation, terminal 1 to 2. These connections must be made to adjust the supply as in step 2.

**2.** Apply power to the Model DMD-475 and adjust the Excitation supply. Turn SWB-1 “ON” for a fixed 10 Volts. This will set the supply to 10.2 ±2.5% and provide the best temperature stability. For voltages between 5 and 10 Volts, place SWB-1 in the “OFF” position and set the Excitation Supply with potentiometer E. SWB-2 may be in either position.

**3.** Turn the power to the Model DMD-475 “OFF” and connect the load cell to the Model DMD-475 Excitation terminals and the Amplifier Inputs.

**4.** Turn on power to the DMD-475.

**5.** Turn SWA-3 “ON”. (To set output ZERO)

**6.** Select the expected full scale signal range according to the table with SWA-4 and SWA-5. If the output from the load cell is not known, set both SW-4 and SW-5 “ON” for the 40-50mV range.

**7.** Select required ZERO output range. SWA-2 “ON” for zero Volts or SWA-2 “OFF” for +2 Volts.

**8.** Adjust D potentiometer for 0 or +2 Volts.

**9.** Turn SWA-3 “OFF”. Expect output to change.

**10.** Apply no load or dead weight to load cell.

**11.** Adjust TARE potentiometers A and B for the same ZERO output set in Step 8. SWA-1 “OFF” provides a bridge output balance of -3mV to +15mV, and “ON” between +15mV and +25mV, referred to the amplifier input. This adjustment does not change the output of the bridge.

**12.** Apply full scale load and adjust SPAN (GAIN) potentiometer C for the desired full scale output. Set Range switches SWA-4 and SWA-5 as required.

**13.** Remove full scale load and check ZERO output. Adjust FINE TARE potentiometer A if required.

**14.** Recheck full scale as in Step 12.

**15.** End.

***Note:*** If the amplifier is used without using the DMD-475 Excitation Supply, the external power supply low side must be connected to the -EXCITATION pin 2 on the Model DMD-475, or one of the inputs must be tied to pin 2, -EXCITATION. This provides a DC return path for the finite amplifier input current.

## Amplifier

The amplifier is a true differential input, low drift Instrumentation Amplifier with less than 100pA input current. It has a common mode range of 5 Volts with respect to the - EXCITATION supply terminal and a minimum of 90dB rejection of the common mode voltage. The input amplifier and excitation supply are DC isolated from the AC line and the output.

## Tare Weight Compensation

The Model DMD-475 has two different zero controls. One is called the OUTPUT zero and can be set to 0 Volts or + 2 Volts with SWA-2. The other zero control is called TARE. SWA-1 allows the selection of one of two TARE ranges, -3mV to 15mV or +15mV to +25mV. Potentiometers are available for COARSE and FINE TARE adjustments.

## Connecting to a Sensor

Any amplifier has a finite input current which must have DC return path to the amplifier power supplies. This path is automatically provided when the Model DMD-475 Bridge Excitation Supply is used to excite the sensor. If an external supply is used, one side of the external supply must be connected to the Model DMD-475 -EXCITATION, Terminal 2. Be sure that the common mode voltage limits are observed. This would generally limit the external power supply to 10 Volts assuming that half the voltage would be common mode, as is the case when exciting a full bridge.

When the full scale output of a sensor is measured in millivolts, say 10 millivolts, care must be exercised in wiring systems. At 10 millivolts full scale, each microvolt ($10^{-6}$ Volts) contributes 0.01% of full scale output. Wire connections can generate microvolts of potential due to contact potentials. These will also be thermoelectric potentials and thus vary with temperature differences. All wires used in connecting up the DMD 475 should be of the same material. If any intervening connections are made such as a terminal block, the terminal block connecting points should have good thermal contact so they will always be at the same temperature and thus cancel each other.

## Transducer Excitation

The bridge excitation supply voltage is set by SWB-1 and potentiometer E. Set SWB-1 ON for a fixed 10 Volts. This will provide the best temperature stability. The supply can be adjusted between 5 and 10 Volts by setting SWB-1 OFF and adjusting potentiometer E. The supply will deliver up to 120mA current at any voltage setting to power up to four 350 ohm sensors.

# 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 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 which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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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:

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2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

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2. Model and serial number of product, and
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