DMD4059
DMD4059-DC
Strain Gauge to DC Isolated Transmitter
M-5000/0219

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMD4059</td>
<td>85-265 VAC, 50/60 Hz or 60-300 VDC</td>
</tr>
<tr>
<td>DMD4059-DC</td>
<td>9-30 VDC or 10-32 VAC</td>
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</table>

Description
The DMD4059 accepts an input from one to four strain gauges, bridge sensors, load cells, or pressure transducers. It filters, amplifies, and converts the resulting millivolt signal into the selected DC voltage or current output that is linearly related to the input.

The full 3-way (input, output, power) isolation makes this module useful for ground loop elimination and signal isolation.

The adjustable excitation power supply generates a stable source of voltage to drive from one to four 350 Ω (or greater) devices. Sense lead circuitry is included to cancel the effects of leadwire resistance.

Input, output, excitation and zero offset (up to ±100% of span) are field configurable. Non-interactive zero and span simplifies calibration.

A 20 VDC loop excitation supply for the output can be selectively wired to power passive mA devices.

A green input LED and a red output LED vary in intensity with changes in the process input and output signals.

An output test button provides a fixed output (independent of the input) when held depressed. The test output level is potentiometer adjustable from 0 to 100% of output span.

Strain Gauge Input Ranges
100 Ω to 10,000 Ω bridges at 10 VDC
Up to four 350 Ω bridges at 10 VDC
Minimum: 0 to 5 mV range 0.5 mV/V sensitivity
Maximum: 0 to 400 mV range 40 mV/V sensitivity
Millivolt output range is determined by the sensor sensitivity (mV/V) and the excitation voltage:

\[ \text{mV/V sensitivity} \times \text{excitation voltage} = \text{total mV range} \]

Input Impedance
200 kΩ typical

Common Mode Rejection
100 dB minimum

Calibration Resistor Options
M01 option: Switch with calibration resistor inside module. Specify resistor value.
M02 option: Switch for external (load cell) calibration resistor.

Excitation Voltage
Switch Selectable: 0-10 VDC in 1 V increments
Maximum Output: 10 VDC maximum at 120 mA
Drive Capability: Up to four 350 Ω bridges at 10 VDC
Fine Adjustment: ±5% via multi-turn potentiometer
Stability: ±0.01% per °C

Sense Lead Compensation
Better than ±0.01% per 1 Ω change in leadwire resistance
Maximum leadwire resistance: 10 Ω with 350 Ω at 10 VDC

LoopTracker
Variable brightness LEDs for input/output loop level and status

Output Test
Sets output to test level when pressed
Adjustable 0-100% of span
Not available with M01 or M02 options

Output Ripple and Noise
Less than 10 mV peak-peak ripple and noise

Linearity
Better than ±0.1% of span

Ambient Temperature Range and Stability
Better than ±0.02% of span per °C stability

Response Time
1200 V/us min.
Full isolation: power to input, power to output, input to output

Housing and Connectors
IP 40, requires installation in panel or enclosure
For use in Pollution Degree 2 Environment
Mount vertically to a 35 mm DIN rail
Four 4-terminal removable connectors
14 AWG max wire size

Dimensions
0.89” W x 4.62” H x 4.81” D

Power
Standard: 85-265 VAC, 50/60 Hz or 60-300 VDC
D option: 9-30 VDC (either polarity) or 10-32 VAC

WARNING: This product can expose you to chemicals including nickel, 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
Range Selection
Rotary switches and a slide switches on the side of the module are used to select input and output ranges to match your application.

Switch A: Excitation voltage
Switch B: Input range
Switch C: Input offset (see table on next page)
Switch D: Output range
Switch E: Set to “V” for voltage output or to “I” for current output

It is generally easier to select ranges before installing the module on the DIN rail. The tables below list available settings, ranges, and offsets. The module side label lists common ranges. Determine how much output in millivolts the load cell will produce at full load. Multiply the manufacturer’s mV/V sensitivity specification by the applied excitation voltage.

For example, a load cell rated for 3 mV/V sensitivity using 10 VDC excitation will produce an output from 0 to 30 mV for load variations from 0 to 100%

3 mV/V sensitivity X 10 VDC excitation = 30 mV range

Excitation Voltage Setup
Refer to the sensor manufacturer’s recommendations to determine what excitation voltage to use.

Set Excitation rotary switch A to desired excitation voltage.

After installation the excitation fine adjust potentiometer may be used to precisely trim this voltage, if desired.

I/O Range Selection B, C, D, E
1. From the table below, find the rotary switch combination that matches your I/O ranges and set rotary switches B, C, and D.
2. Set switch E to “V” for voltage output or “I” for current output.
3. For ranges that fall between the listed ranges use the next highest setting and trim the output signal with the zero and span potentiometers as described in the Calibration section.

Using Offset Switch C
Offset switch C allows canceling or taring of non-zero dead-weights or other sensor offsets such as:

- Compensate for tare weights or scale deadweight to get zero output when a load is on the platform.
- Compensate for low-output sensors (e.g., less than 1 mV/V) that may have large zero offsets. Switch C can realign the zero control so it has enough range to produce the desired zero output.
- Raising the offset to allow calibration of bipolar sensors such as ±10 mV.
- Lowering the offset to compensate for elevated input ranges such as 10-20 mV.

Signal Input Terminals
Connect up to 4 strain gauges or load cells. See manufacturer’s specifications for wiring designations and wire color-coding. Polarity must be observed when connecting inputs.

CAUTION: Never short the excitation leads together. This will cause internal damage to the module.

Some bridges may have one or two sense leads. See manufacturer’s specifications. Sense leads allow the DMD4059 to compensate for leadwire resistance effects. Observe polarity when connecting sense leads.

If no sense lead is used, jumper sense (+) terminal 6 and excitation (-) terminal 16 to terminal 13 and negative (–) can be wired to terminal 16.

Electrical Connections
Check white model/serial number label for module operating voltage to make sure it matches available power.

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. See diagram at right for terminal designations and wiring examples.

Avoid shock hazards! Turn signal input, output, and power off before connecting or disconnecting wiring. Connect I/O wiring before power wiring.

Module Power Terminals
When using DC power, either polarity is acceptable, but for consistency with similar products, positive (+) can be wired to terminal 13 and negative (–) can be wired to terminal 16.

Signal Output Terminals
The DMD4059 output can be wired to provide either a sinking or sourcing mA output. If your device accepts a current input, polarity must be observed when connecting outputs. Determine if it provides power to the current loop or if it must be powered by the DMD4059 module.

Use a multi-meter to check for voltage at your device’s input terminals. Typical voltage may be 9-24 VDC. See the wiring diagram for the appropriate connections.

For more Details and Instructions see Data Sheet
DMD4059 Series Strain Gauge to DC Isolated Transmitter

**Output Wiring**

Current sinking output switch E set to “I”

External device provides power to output loop

Current sourcing output switch E set to “I”

+20 V at terminal 4

Voltage output switch E set to “V”

**No Sense Leads**

Sensor shield wire (if equipped) should be grounded at one end only

Jumper 6 to 12 ONLY if sense leads are NOT used

**With Sense Leads**

Sensor shield wire (if equipped) should be grounded at one end only

**Module Power**

| 13 | Power AC or DC |
| 14 | Earth Ground |
| 16 | Power AC or DC |

**Device Connected to Output**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Terminal</th>
<th>Switch E</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (-)</td>
<td>4 (+)</td>
<td>V</td>
</tr>
<tr>
<td>2 (-)</td>
<td>3 (+)</td>
<td>I</td>
</tr>
</tbody>
</table>

**Output Test Function**

When the test button is depressed it will drive the output with a known good signal that can be used as a diagnostic aid during initial start-up or troubleshooting. When released, the output will return to normal.

The Test Cal. potentiometer can be used to set the test output to the desired level. It is adjustable from 0 to 100% of the output span.

Press and hold the Test button and adjust the Test Cal. potentiometer for the desired output level.

**Installation Precautions**

WARNING! Avoid shock hazards! Turn signal input, output, and power off before connecting or disconnecting wiring, or removing or installing module.

**Mounting to a DIN Rail**

The housing clips to a standard 35 mm DIN rail. The housing is IP40 rated and requires a protective panel or enclosure.

Do not block airflow. Allow 1” (25 mm) above and below housing vents for air circulation.

1. Tilt front of module downward and position against DIN rail.
2. Clip lower mount to bottom edge of DIN rail.
3. Push front of module upward until upper mount snaps into place.

**Removal**

1. Push up on the bottom back of the module.
2. Tilt front of module downward to release upper mount from top edge of DIN rail.
3. The module can now be removed from the DIN rail.

**Operation**

Strain gauges and load cells are normally passive devices that are commonly referred to as “bridges” due to their four-resistor Wheatstone bridge configuration. These sensors require a precise excitation source to produce an output that is directly proportional to the load, pressure that is applied to the sensor.

The exact output of the sensor (measured in millivolts) is determined by the sensitivity of the sensor (mV/V) and the excitation voltage applied.

An additional input, the sense lead, monitors the voltage drop in the sensor leads and automatically compensates the excitation voltage at the module in order to maintain a constant excitation voltage at the sensor.

The DMD4059 provides the excitation voltage to the sensors and receives the resulting millivolt signal in return. This input signal is filtered and amplified, then offset, if required, and passed to the output stage. Depending on the output configuration selected, a DC voltage or current output is generated.

The green input LED provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum.

If the LED fails to illuminate, or fails to change in intensity as the process changes from minimum to maximum, it is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum.

**Diagnostic Voltage Measurements**

Using a meter with at least 10 megohm input impedance, measure the voltage coming from the strain gauge at the locations shown.

Sensitivity is measured in mV/V.

<table>
<thead>
<tr>
<th>Positive Meter Lead</th>
<th>Negative Meter Lead</th>
<th>Meter Reading No pressure/load</th>
<th>Meter Reading Full pressure/load</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Exc.</td>
<td>– Exc.</td>
<td>Excitation Voltage</td>
<td>Excitation Voltage</td>
</tr>
<tr>
<td>+ Sig.</td>
<td>– Exc.</td>
<td>+½ Excitation Voltage</td>
<td>½ Excitation Voltage + (½ x Excitation Voltage x Sensitivity)</td>
</tr>
<tr>
<td>– Sig.</td>
<td>– Exc.</td>
<td>+½ Excitation Voltage</td>
<td>½ Excitation Voltage – (½ x Excitation Voltage x Sensitivity)</td>
</tr>
<tr>
<td>+ Sig.</td>
<td>– Sig.</td>
<td>Zero Volts</td>
<td>Excitation Voltage x Sensitivity</td>
</tr>
</tbody>
</table>
WARRANTY/DISCLAIMER

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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:

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.

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