**APD 4059**

**Input:**
- Drive up to Four 350 Ω Bridges
- Adjustable Excitation Power Supply
- Sense Lead Compensation
- One Minute Setup for Hundreds of I/O Ranges
- Non-Interactive Zero and Span
- Full 3-Way Input/Output/Power Isolation
- Input and Output LoopTracker™
- Output Test or Calibration Resistor Options

**Output:**
- 0-1 V to ±10 V or 0-2 mA to 4-20 mA (Sink or Source)
- Full 3-Way (input, output, power) isolation makes this model only 100 Ω minimum

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

**Excitation Voltage**
- Switch Selectable: 0-10 VDC in 1 V increments
- Maximum Output: 10 VDC maximum at 120 mA
- Fine Adjustment: ±5% via multi-turn potentiometer
- Stability: ±0.01% per °C

**Sense Lead Compensation**
- Better than ±0.01% per 1 °C 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
- Voltage: 10 mA max.
- Bipolar Voltage (±10 mA max.): ±5 VDC or ±10 VDC
- Current: 0-2 mA to 0-20 mA
- Compliance, drive at 20 mA: 20 V, 1000 Ω drive
- Current output can be selectively wired for sink or source

**Output Calibration**
- Multi-turn zero and span potentiometers
- ±15% of span adjustment range typical
- Zero offset switch: ±100% of span in 15% increments

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

**Output Ripple and Noise**
- Less than 10 mVrms ripple and noise

**Linearity**
- Better than ±0.1% of span

**Ambient Temperature Range and Stability**
- –10°C to +60°C operating ambient
- Better than ±0.02% of span per °C stability

**Response Time**
- Nominal time at 63.2% of step change
- Standard: 70 milliseconds (14.3 Hz)
- DF option: Special response time, DF10 (10 milliseconds or 100 Hz up to DF5000 (5 seconds). Faster than standard response times will cause output noise levels to be greater than standard specifications.

**Isolation**
- 1200 Vrms min.
- Full isolation: power to input, power to output, input to output

**APD 4059 D**
- Field configurable. Specify the following if factory is to set switches
- Bridge mV/V or mV range
- Excitation voltage

**APD 4059**
- Field configurable. Specify following if factory is to set switches
- Output range
- Power type (V or mA)

**Options—add to end of model number**
- M01: Switch with built-in calibration resistor
- Specify resistor value.
- M02: Switch for external calibration resistor
- DF: Special response time. Add DF to model number followed by value in milliseconds (10 to 4000)

**Outputs**
- 0-1 V to ±10 V or 0-2 mA to 4-20 mA

**Input LoopTracker LED**
- Test switch for calibration resistor
- Zero and span for output

**Output LoopTracker LED**
- Internal/External
- Calibration Resistor Options
- Connect up to 4 load cells

**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

**Specifications**
- Dimensions: 80.9 mm x 4.62” H x 4.81” D
- 22.5 mm x 117 mm H x 122 mm D
- Height includes connectors
- Power: Standard: 85-265 VAC, 50/60 Hz or 60-300 VDC
- Option: 9-30 VDC (either polarity) or 10-32 VAC
- Power: 2 to 5 Watts depending on number of load cells

**Applications**
- Load Cell Weighing Systems and Scales
- Strain Gauge Pressure Sensors and Transducers
- Tanks, Scales, Exhuuster Melt Pressure, Crane Loads

**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;
- mV/V sensitivity x excitation voltage = total mV range

**Input Impedance**
- 200 kΩ typical

**Compliance, drive at 20 mA:**
- 20 V, 1000 Ω drive

**DC Output Ranges**
- Voltage (10 mA max.)
- 0-1 VDC to 0-10 VDC
- Bipolar Voltage (±10 mA max.): ±5 VDC or ±10 VDC
- Current: 0-2 mA to 0-20 mA

**Output Type (V or mA)**
- APD 4059 85-265 VAC, 60-300 VDC
- Model only

**Excitation Voltage**
- 100 dB minimum
- See Wiring Diagrams on Page 3

**Contact Factory for Assistance**

**For 4-wire or 6-wire load cells.**

**Trim pots for up to 4 strain gauges.**

**SG-EQ4**

**SG-EQ4-BOXPG7**

**Internal/External Calibration Resistor Options**

**Sink/Source Versatility**
- For maximum versatility the APD 4059 milliamp output can be selectively wired for sinking or sourcing. This allows connection to any type of mA input receiving device.

**LoopTracker**
- All inclusive features include two LoopTracker LEDs (green for input, red for output) that vary in intensity with changes in the process input and output signals. These provide a quick visual picture of your process loop at all times and can greatly aid in saving time during initial startup and/or troubleshooting.

**Output Test**
- An API exclusive feature includes the test button to provide a fixed output (independent of the input) when held depressed. The output test button greatly aids in saving time during initial startup and/or troubleshooting. The test output level is potentiometer adjustable from 0 to 100% of output span.

**Test Output Level**
- The output test is not available with the M01 or M02 options.

**Correction Resistor Switch**
- A calibration resistor switch replaces the test button.

---

**Applications Link**

api-usa.com/apps

**See Diagrams on Page 3**

**File E145968**

**api-usa.com**

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Precautions

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

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

Précautions

ATTENTION! Tout le câblage doit être effectué par un électricien ou ingénieur en instrumentation qualifié. Voir le diagramme pour désignations des bornes et des exemples de câblage. Consulter l'usine pour assistance.

ATTENTION! Éviter les risques de choc! Fermez le signal d'entrée, le signal de sortie et l'alimentation électrique avant de connecter ou de déconnecter le câblage, ou de retirer ou d'installer le module.

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. See api-usa.com for latest product information. Consult factory for your specific requirements.

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

Electrical Connections

See wiring diagrams. Observe polarity. If the output does not function, check wiring and polarity.

* Do not make any connections to unused terminals or use them as wiring junctions for external devices. This may cause permanent damage to the module!

Range Selection

It is generally easier to select ranges before installing the module on the DIN rail. The tables list available settings for excitation voltages, ranges and offsets. Any custom range settings will be listed on the module's serial number label

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
Switch D: Output range
Switch E: Set to "V" for voltage output or "I" for current output

Determine how much output in millivolts the load cell will produce at full load. Multiply the manufacturer’s mV 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 of 0 to 30 mV for load variations from 0 to 100%.

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

Switch A Excitation Voltage

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.

<table>
<thead>
<tr>
<th>Excitation</th>
<th>Switch A</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V</td>
<td>A</td>
</tr>
<tr>
<td>9 V</td>
<td>9</td>
</tr>
<tr>
<td>8 V</td>
<td>8</td>
</tr>
<tr>
<td>7 V</td>
<td>7</td>
</tr>
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<td>6 V</td>
<td>6</td>
</tr>
<tr>
<td>5 V</td>
<td>5</td>
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<tr>
<td>4 V</td>
<td>4</td>
</tr>
<tr>
<td>3 V</td>
<td>3</td>
</tr>
<tr>
<td>2 V</td>
<td>2</td>
</tr>
<tr>
<td>1 V</td>
<td>1</td>
</tr>
<tr>
<td>0 V</td>
<td>0</td>
</tr>
</tbody>
</table>

I/O Range Selection Switches B, D, E

1. From the table below, find the rotary switch combination that matches your I/O ranges and set rotary switches B and D.

2. For taring, deadweight, zero offset, or a bipolar sensor refer to the “Offset Switch C” section at right. Otherwise set switch C to zero.

3. Set switch E to “V” for voltage output or “I” for current output.

4. 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 deadweights or other sensor offsets such as:

- Compensate for tare weights or scale deadweight to get zero output when the load is on the platform.
- Compensate for low-output sensors (e.g., less than 1 mV) that may have large zero offsets. Switch C can realign the zero control so it has enough range to produce a 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 V.

1. Switch C does not interact with any other switch and is the only switch needed to correct zero offsets. Its only purpose is to adjust or cancel effects of the low end of the input range not corresponding nominally to 0 mV. Setting this switch to “O” results in no offset.

2. To RAGE the output zero, rotate switch C from “1” thru “7”, until the Zero control can be set for your application.

3. To LOWER the output zero, rotate switch C from “9” thru “F”, until the Zero control can be set for your application.

4. If switch positions are changed, repeat the calibration procedure on the last page.

Settings for Push-Pull Load Cells

The input range can be thought of as a percentage scale. Zero percent of the signal range will be a negative number for push-pull load cells. The high end of the signal will be a positive number. Add these together to get the span (100% of the total signal range).

For example, if a load cell has a 1.5 mV/V sensitivity with 10 V excitation, the range for push-pull will be –15 mV to +15 mV. This is a span of 30 mV and we would select 30 mV as our input range. If the range does not match up with what is in the table, select the next highest input range setting.

For push-pull applications it is common to use a ±5 V or ±10 V output setting. Use the table below to find your switch settings.

We also need to use “Offset Switch C” to bring the negative end of our input range up by 50% to 0 mV. The closest setting is position “B” 45%. This can be adjusted to 50% with the zero potentiometer when output calibration is done.

--

Precautions, Range Setup

APD 4059

Electrical Connections

See wiring diagrams. Observe polarity. If the output does not function, check wiring and polarity.

Do not make any connections to unused terminals or use them as wiring junctions for external devices. This may cause permanent damage to the module!

Range Selection

It is generally easier to select ranges before installing the module on the DIN rail. The tables list available settings for excitation voltages, ranges and offsets. Any custom range settings will be listed on the module’s serial number label.

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
Switch D: Output range
Switch E: Set to “V” for voltage output or “I” for current output

Determine how much output in millivolts the load cell will produce at full load. Multiply the manufacturer’s mV 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 of 0 to 30 mV for load variations from 0 to 100%.

3 mV/V sensitivity x 10 VDC excitation = 30 mV range
**Wiring, Installation, Calibration**

**APD 4059**

**M01 Option: Internal Calibration Resistor**

The APD 4059 M01 has a user-specified internal calibration resistor. A switch on the front of the module allows switching of the APD’s internal calibration resistor in or out of the circuit. The sensor manufacturer should provide the percentage of full-scale output for the transducer when using the APD’s internal resistor for calibration.

**M02 Option: Load Cell Calibration Resistor**

The APD 4059 M02 has provisions for a load cell with its own calibration resistor. A switch on the front of the module allows switching of the load cell internal calibration resistor in or out of the circuit. Refer to the load cell manufacturer’s specifications and the wiring diagram when connecting a transducer with its own internal calibration resistor.

The transducer’s calibration resistor wires are connected to terminals 5 and 11 on the APD 4059. If the transducer only has one calibration resistor wire, connect it to terminal 5.

**Input**

Refer to strain gauge manufacturer’s data sheet for wire color-coding and identification. Polarity must be observed when connecting inputs. **CAUTION:** Do not miswire the load cell and never short the excitation leads together. This will cause internal damage to the module.

**No Sense Leads:** If no sense leads are used, jumper terminals 6 and 12.

**With Sense Leads:** Some bridges or load cells have one or two sense leads. This allows compensation for leadwire resistance. Connect the sense leads if used. Polarity must be observed. Never jumper terminals 6 and 12 when using sense leads.

**Output**

Polarity must be observed when connecting the signal output. If your device accepts a current input, determine if it provides power to the current loop or if it must be powered by the APD module. Use a multi-meter to check for voltage at the device’s input terminals. Typical voltage may be 0-24 VDC.

**Module Power**

Check model/serial number label for module operating voltage to make sure it matches available power. Connect power last. When using DC power, either polarity is acceptable, but for consistency with similar API products, positive (+) can be wired to terminal 13 and negative (–) can be wired to terminal 16. Connect I/O wiring before power wiring.

**CAUTION:** To maintain full isolation avoid wiring DC power supplies in common with output and unit power.

**Mounting to a DIN Rail**

Install module vertically on a 35 mm DIN rail in a protective enclosure away from heat sources. Do not block air flow. 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.

---

**Output Wiring**

- **Current Sinking output switch E set to “I”**
  - **External device provides power to output loop**
  - **Do not make connections to unused terminals!**

- **Current sourcing output switch E set to “I”**
  + **20 V at terminal 4**

---

**With Sense Leads**

- **M02 option for load cell with built-in cal. resistor. Connect to terminals 5 and 11**

- **No Sense Leads**
  - **M02 option for load cell with built-in cal. resistor. Connect to terminals 5 and 11**

---

**Module Power**

13. Power AC or DC –
14. Earth Ground
15. Power AC or DC –
Cu 60/75°C conductors 14 AWG max.

**Δ * Do not make connections to unused terminals!**

---

1 strain gauge shown. Connect up to 4 in parallel if all leads are equal length. Unequal length leads or strain gauges with calibration variances may require sum box SG-EQ4 to aid in equalization.

Shield wires should be grounded at one end only.

Colors shown are an example only. See manufacturer’s specifications for wiring designations.

**To maintain full isolation, avoid combining power supplies in common with input, output, or unit power.**

**Basic Calibration**

The Zero, Span, and Excitation potentiometers are used to calibrate the output. This calibration procedure does not account for offsets or tare weights. If your system has an offset, tare weight or deadweight, refer to the Offset Switch procedure.

**Note:** Perform the following calibration procedure any time switch settings are changed.

1. **Apply power to the module and allow a minimum 20 minute warm up time.**
2. **Using an accurate voltmeter across terminals 10 and 12, adjust the Excitation voltage potentiometer on front of the APD 4059 for the exact voltage desired.**
3. **With the input set at zero or the minimum, adjust the front Zero pot this way eliminates calibration errors in the display instrumentation.**
4. **Perform the following calibration procedure any time switch settings are changed.**

**Push-Pull Calibration**

1. **Apply power to the module and allow a minimum 20 minute system warm up time.**
2. **Using an accurate voltmeter across terminals 10 and 12, adjust the Excitation voltage potentiometer on front of the APD 4059 for the exact voltage desired.**
3. **With the input set at zero or the minimum, adjust the front Zero pot this way eliminates calibration errors in the display instrumentation.**
4. **Perform the following calibration procedure any time switch settings are changed.**

**Pull-Pull Calibration**

1. **Apply power to the module and allow a minimum 20 minute system warm up time.**
2. **Using an accurate voltmeter across terminals 10 and 12, adjust the Excitation voltage potentiometer on front of the APD 4059 for the exact voltage desired.**
3. **With the input set at zero or the minimum, adjust the front Zero pot this way eliminates calibration errors in the display instrumentation.**
4. **Perform the following calibration procedure any time switch settings are changed.**

**Push-Pull Calibration**

1. **Apply power to the module and allow a minimum 20 minute system warm up time.**
2. **Using an accurate voltmeter across terminals 10 and 12, adjust the Excitation voltage potentiometer on front of the APD 4059 for the exact voltage desired.**
3. **With the input set at zero or the minimum, adjust the front Zero pot this way eliminates calibration errors in the display instrumentation.**
4. **Perform the following calibration procedure any time switch settings are changed.**

**Pull-Pull Calibration**

1. **Apply power to the module and allow a minimum 20 minute system warm up time.**
2. **Using an accurate voltmeter across terminals 10 and 12, adjust the Excitation voltage potentiometer on front of the APD 4059 for the exact voltage desired.**
3. **With the input set at zero or the minimum, adjust the front Zero pot this way eliminates calibration errors in the display instrumentation.**
4. **Perform the following calibration procedure any time switch settings are changed.**

---

**Type of Device for Output**

<table>
<thead>
<tr>
<th>Type of Device for Output</th>
<th>Term.</th>
<th>+ Term.</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA (current) input device that powers the current loop. Switch E set to “I”.</td>
<td>2 (−)</td>
<td>3 (+)</td>
</tr>
<tr>
<td>mA (current) input device that is passive. APD module provides the loop power. Switch E set to “I”.</td>
<td>3 (−)</td>
<td>4 (+ 20 V)</td>
</tr>
<tr>
<td>Measuring/recording device accepts a voltage input. Switch E set to “V”.</td>
<td>3 (−)</td>
<td>4 (+)</td>
</tr>
</tbody>
</table>

---

**Shield wires should be grounded at one end only!**

**No Sense Leads:**

- **M02 option for load cell with built-in cal. resistor. Connect to terminals 5 and 11**

---

**With Sense Leads**

- **M02 option for load cell with built-in cal. resistor. Connect to terminals 5 and 11**

---

**Module Power**

13. Power AC or DC –
14. Earth Ground
15. Power AC or DC –
Cu 60/75°C conductors 14 AWG max.

**Δ * Do not make connections to unused terminals!**
**Calibration, Operation, Diagnostics, Load Cell Information**

**Calibration with Resistor Options M01 or M02**

Use this calibration procedure if your APD 4059 was ordered with a calibration resistor or if your sensor has its own internal calibration resistor.

Note: Perform the following calibration procedure any time switch settings are changed.

The M01 option uses a resistor installed internally in the APD 4059. The resistance is specified by the transducer manufacturer. The M02 option is specified when the transducer incorporates an internal calibration resistor. The transducer must be connected per the manufacturer’s specifications.

The sensor manufacturer should provide the percentage of full-scale output for the transducer when using a calibration resistor. This is often 80% of maximum output.

1. Apply power to the module and allow a minimum 20 minute system warm up time.
2. Using an accurate voltmeter across terminals 10 and 12, adjust the Excitation voltage potentiometer on front of the APD 4059 for the exact voltage desired.
3. With the input set at zero or the minimum, adjust the Zero potentiometer on front of the APD 4059 for a zero or low-end output (for example, 4 mA for a 4-20 mA output).
4. The zero pot may also be adjusted for a zero reading on the output display instrumentation, e.g. control system or process indicator. Adjusting the zero pot this way eliminates calibration errors in the display instrumentation.
5. Set the APD 4059 Test toggle switch to the Test position. The calibration resistor is switched into the circuit to unbalance the bridge.
6. Adjust the span pot to the for the % output specified by the transducer manufacturer. This is often 80% of maximum output.
7. Return the Test switch to the opposite position and readjust the zero pot if necessary.

**Output Test Function**

Models with the M01 or the M02 option do not have a Test function. With either of these options the Test Cal. potentiometer is non-functional.

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 factory set to approximately 50% output. 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.

**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, etc. 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 APD 4059 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.

**Typical Wiring Color Codes for Load Cells**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>+ Exc.</th>
<th>– Exc.</th>
<th>+ Signal</th>
<th>– Signal</th>
<th>Shield</th>
<th>+ Sense</th>
<th>– Sense</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; D</td>
<td>Red</td>
<td>White</td>
<td>Green</td>
<td>Blue</td>
<td>Yellow</td>
<td></td>
<td></td>
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<tr>
<td>Allegany</td>
<td>Green</td>
<td>Black</td>
<td>White</td>
<td>Red</td>
<td>Bare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American/Amcell</td>
<td>Green</td>
<td>Black</td>
<td>White</td>
<td>Red</td>
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<td></td>
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<td>HBM</td>
<td>Green</td>
<td>Black</td>
<td>White</td>
<td>Red</td>
<td>Yellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HBM (PLC/SBE)</td>
<td>Red</td>
<td>Black</td>
<td>Green</td>
<td>White</td>
<td>Yellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Red</td>
<td>Black</td>
<td>Green</td>
<td>White</td>
<td>Bare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kubota</td>
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<td>Blue</td>
<td>Green</td>
<td>Yellow</td>
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<tr>
<td>LeBow</td>
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<td>Green</td>
<td>White</td>
<td>Bare</td>
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<td></td>
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<tr>
<td>Mettler Toledo</td>
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<td>Green</td>
<td>Black</td>
<td>Orange</td>
<td>Yellow</td>
<td>Red</td>
</tr>
<tr>
<td>National Scale</td>
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<td>Black</td>
<td>White</td>
<td>Red</td>
<td>Yellow</td>
<td>Blue</td>
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<tr>
<td>NCI</td>
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<td>Black</td>
<td>White</td>
<td>Green</td>
<td>Bare</td>
<td>Yellow</td>
<td>Blue</td>
</tr>
</tbody>
</table>

**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>Meter Lead</th>
<th>Negative Meter Lead</th>
<th>Meter Reading</th>
<th>Meter Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Exc.</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>+ Exc.</td>
<td>– Excitation Voltage</td>
<td>Excitation Voltage</td>
</tr>
<tr>
<td>– Sig.</td>
<td>– Sig.</td>
<td>Zero Volts</td>
<td>Excitation Voltage x Sensitivity</td>
</tr>
</tbody>
</table>

**Typical Wiring Color Codes for Load Cells**

Always consult manufacturer. Exceptions and/or custom wire colors exist!

<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>+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>+ Exc.</td>
<td>– Excitation Voltage</td>
<td>Excitation Voltage</td>
</tr>
<tr>
<td>– Sig.</td>
<td>– Sig.</td>
<td>Zero Volts</td>
<td>Excitation Voltage x Sensitivity</td>
</tr>
</tbody>
</table>

**RED LoopTracker Output LED**

Provides a visual indication that the output signal is functioning. It becomes brighter as the input and the corresponding output change from minimum to maximum. For current outputs, the RED LED will only light if the output loop current path is complete. For either current or voltage outputs, failure to illuminate or a failure to change in intensity as the process changes may indicate a problem with the module power or signal output wiring.