Adjustable Excitation Power Supply
One Minute Setup for Hundreds of I/O Ranges
Removable Plugs for Faster Installation
Input and Output LoopTracker® LEDs
Output Test or Calibration Resistor Options

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

Strain Gauge Input Ranges
Minimum range: 0 to 5 mV
Maximum range: 0 to 1200 mV
Minimum sensitivity: 0.5 mV/V
Maximum sensitivity: 120 mV/V
Millivolt output range is determined by the sensitivity of the sensor (mV/V) and the excitation voltage applied.

mV/V sensitivity × excitation voltage = total mV range

Input Impedance
1 MΩ 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
Maximum output: 10 VDC maximum at 30 mA
Drive capability: One 100 Ω bridge at 10 VDC
Switch selectable: 0-10 VDC in 1 V increments
Fine adjustment: ±2.5% via multilithum potentiometer
Stability: ±0.01% per °C

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

DC Output Ranges
Minimum Maximum Voltage:
- 0-1 VDC 0-10 VDC (10 mA max)
- 4-20 mADC

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
Potentiometer adjustable 0-100% of span
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
70 milliseconds typical (14.3 Hz)
DF option: 10 millisecond response time
Contact factory if setting is beyond this range

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

Options—add to end of model number

M01 Switch with built-in calibration resistor. Specify resistor value.

M02 Switch for external calibration resistor.

R Input/output reversal, such as 20-4 mA output

Df 10 millisecond response time, or consult factory.

DF option will cause output noise levels to be greater than ±0.02% of span per °C stability

Conformal coating for moisture resistance

LoopTracker
API exclusive 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 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 proportional to 0 to 100% of output span.

The output test is not available with the M01 or M02 options. A calibration resistor switch replaces the test button.

Dimensions
0.89" W x 4.62" H x 4.81" D
22.5 mm W x 117 mm H x 122 mm D

Height includes connectors

Connect mA Output for Sink or Source
Connect One 100 Ω to 10,000 Ω Bridge, 0.5 mV/V to 120 mV/V, 1-10 VDC Excitation

Bridge mV/V or mV range
Excitation voltage

Field configurable. Specify the following if factory is to set switches

Field configurable. Specify follow-

Model Input Output Power
APD 4058 Field configurable. Specify the following if factory is to set switches
Bridge mV/V or mV range
Excitation voltage
85-265 VAC or 60-300 VDC

APD 4058 D

Connect One 100 Ω to 10,000 Ω Bridge, 0.5 mV/V to 120 mV/V, 1-10 VDC Excitation

Bridge mV/V or mV range
Excitation voltage

Field configurable. Specify follow-

Accessory—order as separate line item
API BP4 Spare removable 4 terminal plug, black

1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com © 10-18
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.

Precautions

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’usager pour toute question.

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.

Range Selection

It is generally easier to select ranges before installing the module on the DIN rail. The tables listed 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 I/O 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

Excitation Voltage Setup Switch A

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 need to be precisely trimmed 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.

Offset Switch C

Offset switch C allows canceling or taring of non-zero deadweight to get zero output when a load is on the platform.

- Compensate for tare weights or scale deadweight to get zero output after installation the fine adjust potentiometer may need to be precisely trimmed this voltage, if desired.

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

Offset switch C allows canceling or taring of non-zero deadweight to get zero output when a load is on the platform.

Precautions

1. Switch C does not interact with any other switch and is the only switch needed to correct 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 “0” results in no offset.
2. To RAISE the output zero, rotate switch C from “1” thru “9”, 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.

I/O Range Selection B, C, D, E

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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.
M01 Option: Internal Calibration Resistor
The APD 4058 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 4058 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 4058. 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
When no sense leads are used, jumper terminals 6 and 12.

With Sense Leads
Some bridges or load cells have one or two sense leads. Sense leads allow the APD 4058 to compensate for leadwire resistance effects. 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 9-24 VDC.

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 wiring DC power supplies in common with output and unit power.

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

Module Power
Check model/serial number label for module operating voltage. Use a multi-meter to check for voltage at the device’s input terminals. Typical voltage may be 9-24 VDC.

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

Current sourcing output switch E set to “I”
Module powers mA output loop

Voltage output switch E set to “V”

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

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

APD 4058
Strain Gauge to DC Isolated Transmitter

APD 4058
Strain Gauge to DC Isolated Transmitter

Module Power
Cu 80/75°C 13
14 AWG max.

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

To achieve optimum results, the system should be calibrated using an accurate bridge simulator, pressure calibrator, or calibration weights depending on the application.

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 4058 for the exact voltage desired.
3. With the input set at zero or the minimum, adjust the front Zero pot for a zero or low-end output (for example, 4 mA for a 4-20 mA output or -10 V with a ±10V 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 input at maximum, and then adjust the Span pot for the exact maximum output desired. The Span control should only be adjusted when the input signal is at its maximum.

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.

Calibration with Resistor Options M01 or M02
Use this calibration procedure if your APD 4058 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 4058. The resistance is specified by the sensor 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 4058 for the exact voltage desired.
3. With the input set at zero or the minimum, adjust the Zero potentiometer on front of the APD 4058 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 4058 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.

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.

Typical Wiring Color Codes for Load Cells
Always consult manufacturer. Exceptions and/or custom wire colors exist!

<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>
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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 4058 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.

Green LoopTracker® 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 level 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, this may indicate a problem with module power or signal input wiring.

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.