



Q448-0000



ACTIONI/Q® Q448 DC Powered Bridge Input Signal Isolator

Provides an Isolated DC Output in Proportion to a Bridge/Strain Gauge Input



- Adjustable Bridge Excitation
- Field Configurable Input Ranges
- Field Configurable Output Ranges
- TouchCAL Technology

- High Density DIN Rail Mounting
- Flexible DC Power Supply Accepts 18 to 30VDC
- SnapLoc™ Plug-in Terminals

Description

The Q448 is a DIN rail mount, DC powered bridge or strain gauge input signal conditioner with 1800VDC isolation between input, output and power. Advanced digital technology combined with ASIC technology allows the Q448 to be field configured for virtually any Bridge input to DC output within the limits specified. The input can be set via DIP switches for any one of 11 voltage ranges from 10mV to ±200mV (see Table 1). The output is linear to the input and can be set for either 0-5V, 0-10V, 0-1mA or 4-20mA, direct or reverse acting.

TouchCAL™ Technology

The Q448 utilizes TouchCAL technology which greatly simplifies calibration. Once the unit is configured via DIP switches, the pushbutton is used to precisely calibrate the minimum and maximum levels. The thermal drift and mechanical variability of the potentiometers has been removed and replaced with a digitally stable circuit. Additionally, the inherent zero and span interactivity of potentiometer based analog amplifier circuitry is removed, providing 100% non-interactive adjustment.

TouchCAL provides more than 90% offset of the zero value and adjustment down to 10% of the full scale input span for most of the 11 switch selectable input ranges. For example, the DIP switch configured 0-100mV input range could be calibrated via pushbutton for 0-40mV (i.e. 60% span reduction) or offset to a range of 60-100mV (i.e. 60% offset and 60% span reduction). If the output was configured for 0-10V, then 60-100mV input would correspond to the 0-10V full scale output. Thus, an input range such as 90-100mV is possible using the 0-100mV range. A TARE function is also provided to allow batch offsets (0285 and later firmware).

To calibrate the input within the DIP switch configured range, simply apply the high input signal and push the CAL button. The low input signal is then applied and pushing the CAL button again stores the low input signal (these steps are reversed for reverse mode operation).

The high and low input levels are stored in nonvolatile memory and correspond to the high and low output levels. These output levels are precisely adjusted using the input signal.

Diagnostic LEDs

The Q448 has three diagnostic LEDs. The green (RUN) LED is used for diagnostics to indicate that power is on. It will flash quickly if the input signal is above the calibrated range or slowly if the input signal is below range. It is on continuously when the unit is functioning within the calibrated range.

The yellow (IN) LED is on while calibrating the input and the red (OUT) LED is on while calibrating the output.

Application

The Q448 bridge input signal conditioner is useful in isolating ground loops and interfacing bridge sensors to data acquisition and control systems. Three-way isolation completely eliminates ground loops from any source. Isolation protects expensive SCADA systems from ground faults and provides filtering for noise reduction which can be a significant problem with millivolt bridge signals.

Wide ranging flexibility allows the user to easily zero out dead-loads in weighing systems or configure bipolar input ranges for tension-compression or vacuum-pressure bridge applications.

High density DIN rail mounting offers an extremely compact solution for saving valuable panel space.

Configuration

The Q448 can be configured for input ranges from 10mV to +/- 200mV, with 90% input offset, or it will adjust down to 10% of fullscale input span (except on 10mV, +/-5mV range where maximum offset or gain adjustment is 50%).

Unless otherwise specified, the factory presets the Model Q448 as follows:

- Input Setting: 0 to 50mV
- Input Range: 0 to 30mV (3mV/V)
- Excitation: 10V
- Operation: Direct
- Output: 4 to 20mA

For other I/O ranges, refer to the tables below.

WARNING: Do not change switch settings with power applied. Severe damage will result!

1. With power off, snap off the faceplate by lifting the right edge away from the heat sink. Slide off the metal heatsink.
2. Note that the module has two eight position switch blocks, one for input and one for output.
3. Choose the desired ranges from Tables 1-4. Return the heatsink to its original position and attach the faceplate before beginning calibration.

Calibration

For best results, calibration should be performed in the operating installation, allowing at least one hour for thermal stability of the system. If pre-calibration on a test bench is preferred, then an output load equal to the input impedance of the device connected to the Q448 output is recommended, along with a 1 hour warm up period.

1. For best results install the module on to a piece of DIN rail or the I/Q Rail mounting accessory. See the I/Q Rail data sheet for details.

Note: An I/QRail is required to power the modules. See ordering information.

2. Connect the input to a calibrated DC source and the output to a voltage or current meter. Apply power and allow the system to reach thermal equilibrium (approximately 20 minutes).

3. Adjust the input signal to the desired maximum and observe that the green LED is on or flashing. Push the CAL button and hold it down for six flashes of the yellow LED (until the yellow and green LEDs are flashing), then release the button.

Note: To quit the calibration mode and reset the unit, push the CAL button again and hold for more than 5 seconds. Or wait for more than two minutes and the unit will time-out and automatically reset to the previously stored calibration.

Note: For the reverse operating mode (SW1-6 closed), input the minimum signal in step 4 of calibration.

4. The yellow and red LEDs will be on. Push the CAL button. Apply the maximum input signal level desired and push the CAL button to store. The yellow LED will now be on.

Note: For the reverse operating mode (SW1-6 closed), input the maximum signal in step 5 of calibration.

5. Apply the minimum input signal level desired and push the CAL button to store. The green and red LED will now be on.

6. Adjust the input signal while monitoring the output signal until the output is at the desired maximum level (e.g. 20.00mA), then push the CAL button to store (the red LED will be on).

7. Adjust the input signal while monitoring the output signal until the output is at the desired minimum level (e.g. 4.00mA), then push the CAL button to store (the yellow, green and red LEDs will be on).

8. To finish calibration, push the CAL button once again. The green LED will be on if the input is within the calibrated range.

Note: The TARE function is enabled by depressing the TARE/(CAL) until the yellow LED flashes at least once and less than six times. The input present at that time will be used as the TARE value and the output will be the minimum output when the module was calibrated.

Table 1: Input Range Settings

Input Range	Selector SW1				
	1	2	3	4	5
0 to 10mV	■			■	■
0 to 20mV		■	■		■
0 to 50mV		■	■	■	■
0 to 100mV	■				■
0 to 200mV	■			■	■
-5 to 5mV	■				
-10 to 10mV	■			■	
-20 to 20mV		■	■		
-50 to 50mV		■	■	■	
-100 to 100mV	■				
-200 to 200mV	■			■	

Key: ■ = 1 = ON or Closed

Table 2: Direct or Reverse Setting

Operation	SW1
Direct	6
Reverse	■

Key: ■ = 1 = ON or Closed

Table 3: Bridge Excitation Settings

Excitation Voltage	SW1	
	7	8
9.8 to 10.1V	■	
4.8 to 5.2V		
0 to 10V	■	■
0 to 2.5V		■

Key: ■ = 1 = ON or Closed

Table 4: Output Range Settings

Output Range	Selector SW2							
	1	2	3	4	5	6	7	8
0 to 5V	■	■	■	■				
0 to 10V	■		■	■				
0 to 1mA		■	■	■				
4 to 20mA						■	■	■
0 to 20mA	■	■			■		■	■

Key: ■ = 1 = ON or Closed

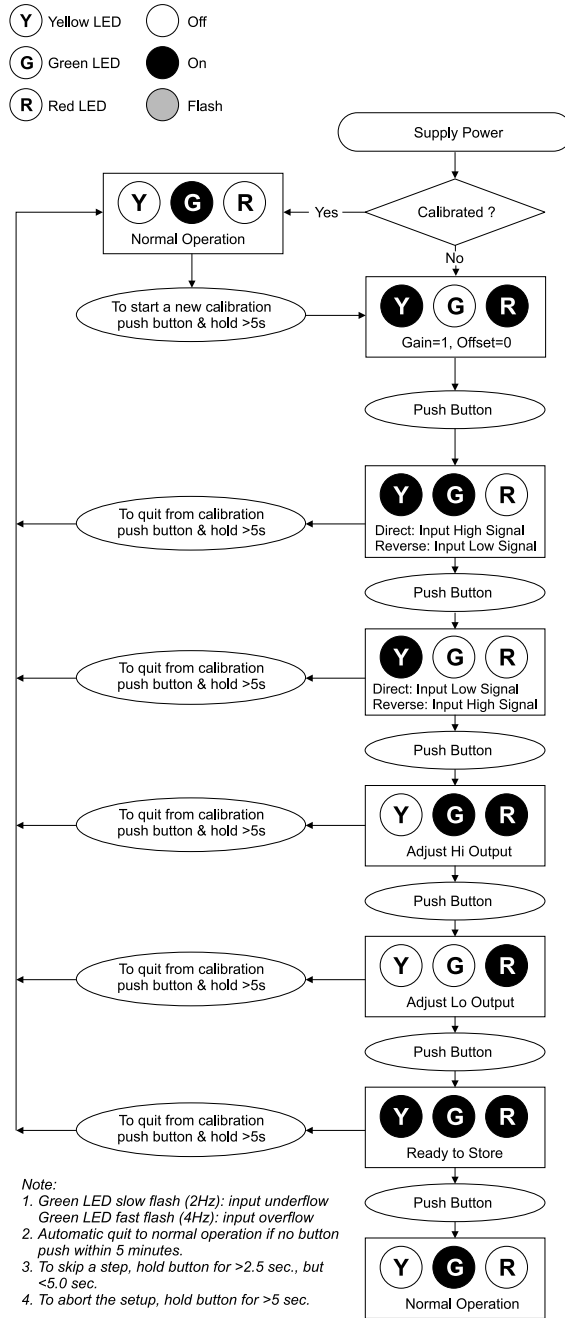


Figure 1: Q448 Calibration Flow Chart

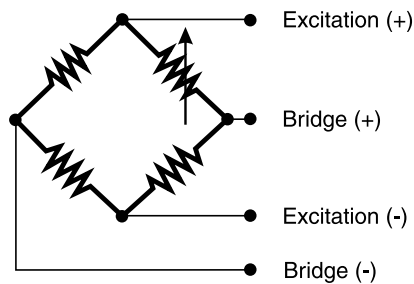


Figure 2: Bridge Reference Designations

Specifications

Input:

- Voltage:
 - Full Scale Range: 10mV to ± 200 mV (Table 1).
 - Impedance: >1 M ohm
 - Overvoltage:
 - Intermittent 400V, max.; Continuous 264V, max.
- Common Mode (Input to Ground):
 - 1800VDC, max.
- Pushbutton Adjustment:
 - Effective zero offset: $>90\%$
 - Effective span turn down: $>90\%$ except for 10mV & ± 5 mV range in which 50% is max. zero offset and span turndown
- Operation: direct or reverse acting

Output:

- Voltage:
 - Output: 0-5V, 0-10V
 - Impedance: <10 ohms
 - Drive: 10mA, max. (1K ohms, min. @ 10V)
- Current:
 - Output: 0-1mA, 0-20mA, 4-20mA
 - Impedance: >100 K ohms
 - Compliance:
 - 0-1mA; 7.5V, max. (7.5K ohms, max.)
 - 0-20mA; 12V, max. (600 ohms, max.)
 - 4-20mA; 12V, max. (600 ohms, max.)

Bridge Excitation

1 to 10VDC, 120mA max. Current drive decreases at 10mA/V below 5V (e.g. 4V, 110mA max.)

Accuracy (Including Linearity, Hysteresis):

$\pm 0.1\%$ typical, $\pm 0.2\%$ maximum of selected input range at 25°C.

Stability:

$\pm 0.025\%/^{\circ}\text{C}$ typical, $0.05\%/^{\circ}\text{C}$ maximum, of selected full scale input range.

Output Noise (maximum):

0.1% of span, rms, or 10mV, whichever is greater.

Response Time (10 to 90%):

<200 ms, typical.

Ordering Information

Models & Accessories

Specify:

1. Model: **Q448-0000**;
2. Specify optional I/QRail, type and quantity.
3. Optional Factory Custom Calibration, specify **C620** - with desired input and output ranges.
4. Accessories: (see Accessories)

Accessories

Action/IQ modules mount on standard TS32 (model MD02) or TS35 (model MD03) DIN rail. In addition the following accessories are available:

MD02	TS32 DIN rail
MD03	TS35 x 7.5 DIN rail
IQRL-D002	2 Position I/QRail & DIN rail
IQRL-D004	4 Position I/QRail & DIN rail
IQRL-D008	8 Position I/QRail & DIN rail
WV905	24VDC Power Supply (0.5Amp)
H910	24VDC Power Supply (1Amp)
H915	24VDC Power Supply (2.3Amp)

Common Mode Rejection:

DC to 60Hz: 120dB, 100dB (0 -1mA, range)

Isolation:

800VDC between input, output and power.

LED Indication (green):

- Input Range (approx.)
 - $>110\%$ input: 8Hz flash
 - $<0\%$ input: 4Hz flash

Humidity (Non-Condensing):

- Operating: 15 to 95% @ 45°C
- Soak: 90% for 24 hours @ 65°C

Temperature Range:

- Operating: 0 to 55°C (32 to 131°F)
- Storage: -25 to 70°C (-13 to 158°F)

Power:

- Consumption:
 - 2.7W typical (one 350 ohm bridge)
 - 4W max. (four 350 ohm bridges).
- Range: 18 to 30VDC

Shipping Weight:

0.54 lbs.

Wire Terminations:

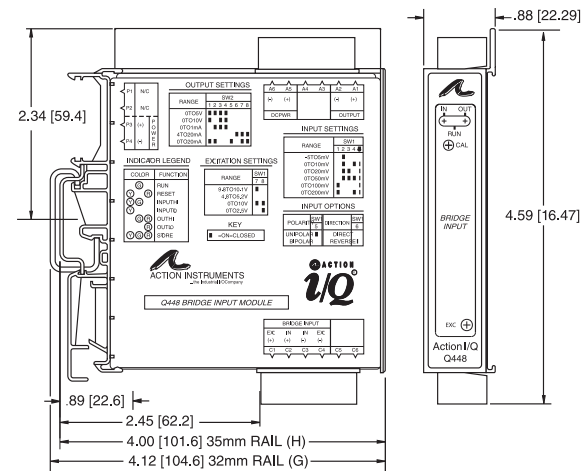
Screw terminals for 12-22 AWG

Agency Approvals:

- UL recognized per standard UL508 (File No. E99775).
- CSA certified per standard C22.2 No. 0-M91 and 142-M1987 (File No. LR42272-84).

Terminal	Connection	Terminal	Connection
A1	DC Output (+)	C3	Bridge Input (-)
A2	DC Output (-)	C4	Bridge Excitation (-)
A3	Not Used	C5	Not Connected
A4	Not Used	C6	Not Connected
A5	DC Power (+)	P1	Not Used
A6	DC Power (-)	P2	Not Used
C1	Bridge Excitation (+)	P3	DC Power (+)
C2	Bridge Input (+)	P4	DC Power (-)

Dimensions



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