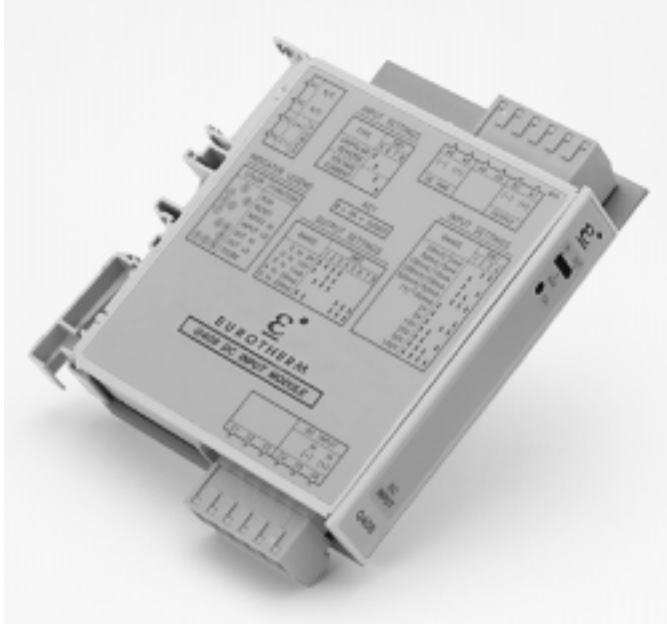




# Bridge Input, Field Configurable Signal Conditioner Model Q448-0C00



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

- Adjustable Bridge Excitation 1 to 10V with up to 120mA drive
- Eleven Field Configurable Input Ranges from 10mV to  $\pm 200\text{mV}$  (0.5mV/V to  $>50\text{mV/V}$ )
- Five Field Configurable Output Ranges: 0-5V, 0-10V, 0-1mA, 0-20-mA and 4-20mA
- TouchCAL Technology for Easy Non-Interactive Zero and Span Adjustments
- SnapLoc™, Plug-IN Terminals for Low MTTR
- Flexible Power Supply Accepts 18 to 30VDC
- ASIC Technology for High Reliability
- Lifetime Warranty



### DESCRIPTION

The model Q448 is a DIN rail mount, bridge or strain-gage input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for bridge or strain-gage input applications from 0.5mV/V to over 50mV/V.

Low-cost microprocessor technology has enabled replacement of zero and span adjustment potentiometers with push-button, "TouchCAL™" technology. In essence, the thermal drift and mechanical variability of the potentiometers have 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.

The field configurable input of the Q448 can be set via DIP switches for any one of 11 voltage ranges from 10mV to  $\pm 200\text{mV}$  (see Table 1). The field configurable output is linear to the input and can be set for either 0-5V, 0-10V, 0-1mA or 4-20mA.

TouchCAL technology enables precise calibration and 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 push button 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.

Advanced digital technology combined with exclusive ASIC technology allows the Q448 to be field configured for virtually any Bridge input to DC output within the limits specified. Calibration utilizes "TouchCAL" technology where the user simply configures the desired input excitation and millivolt range via switches, then applies the minimum and maximum input signals, touching a recessed button to store range values.

The Q448 will accept power between 18 and 30VDC; typically a 24VDC source is used.

### TOUCHCAL™ TECHNOLOGY

The Q448 utilizes TouchCAL technology which greatly simplifies calibration. Once the unit is configured via DIP switches, the push-button is used to precisely calibrate the minimum and maximum levels.

To calibrate the input level within the DIP switch configured range, the user simply applies the high input signal and pushes

the CAL button. The low input signal is then applied and pushing the CAL button again stores the low input signal. Note, 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. One green LED, labeled RUN, is used for diagnostics to indicate that power is on, and it will flash quickly if the input signal is above the configured range or slowly if the input signal is below range. The RUN LED is continuously on when the unit is functioning within the configured range.

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

This flexibility, combined with an adjustable (1 to 10VDC) bridge excitation source, provides the user a reliable, accurate instrument to isolate and condition virtually any bridge or strain-gage input.



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## APPLICATION

The Q448 field configurable, 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 small, millivolt, bridge signals.

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

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

## CONFIGURATION

A major advantage of the Q448 is its wide ranging capabilities and ease of 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

The DC power input accepts any DC source between 18 and 30V, typically a 24VDC source is used (see Accessories).

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

Regarding other I/O ranges, refer to Table 1 for input range (SW1) switch settings, Table 2 for input mode settings, Table 3 for excitation level and Table 4 for output ranges (SW2). For quick and easy calibration mode reference, see the step-by-step flow chart in Figure 1.

1. With power off, snap off the face plate by lifting the right edge, away from the heat sink. Then, slide the heat sink forward and off the module.

2. Note, the module has two eight position switch blocks, one for input and one for output.

3. Change Dip switches for desired ranges using Tables 1-4. Attach heatsink and face plate 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(s) 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 if desired. See the I/Q Rail data sheet for details.

*Note: An I/Q Rail is an optional accessory to deliver power to the modules. A two, four or eight position rail is available. 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 (approx.1 hour).

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 more than 5 seconds, until the yellow and Green LEDs are flashing.

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

4. When the yellow and green LEDs stop flashing, the yellow and red LEDs should be on. Push the CAL button momentarily, the yellow and green LEDs should now be on.

5. Apply the exact maximum input signal level desired, if not already applied, then push the CAL button to store. The yellow LED should now be on.

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

6. Apply the exact minimum input signal level desired, then push the CAL button to store. The green and red LED should now be on.

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

7. Adjust the input signal up, until the output is precisely at the desired maximum level (e.g. 20.00mA), then push the CAL button to store. The red LED should be on.

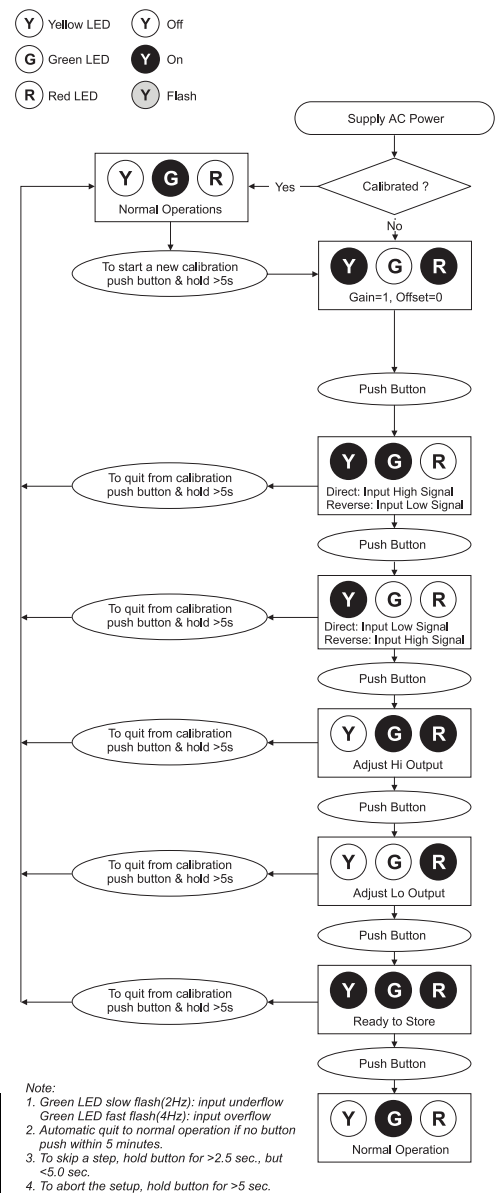
8. Adjust the input signal level down, until the output is precisely at the desired minimum level (e.g. 4.00mA), then push the CAL button to store. The yellow, green and red LEDs should now be on.

9. To finish calibration, push the CAL button one final time. The green LED should be on if the input is within the calibrated range.

## FACTORY ASSISTANCE

For additional information on calibration, operation and installation please contact your local Eurotherm Company.

Figure 1: Q448 Calibration Flow Chart.



**Table 1: Input Range Selector-Switch Settings**

	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 ■ = ON

**Table 2: Direct or Reverse Operation Setting**

SW1	
DIRECT	6
REVERSE	■

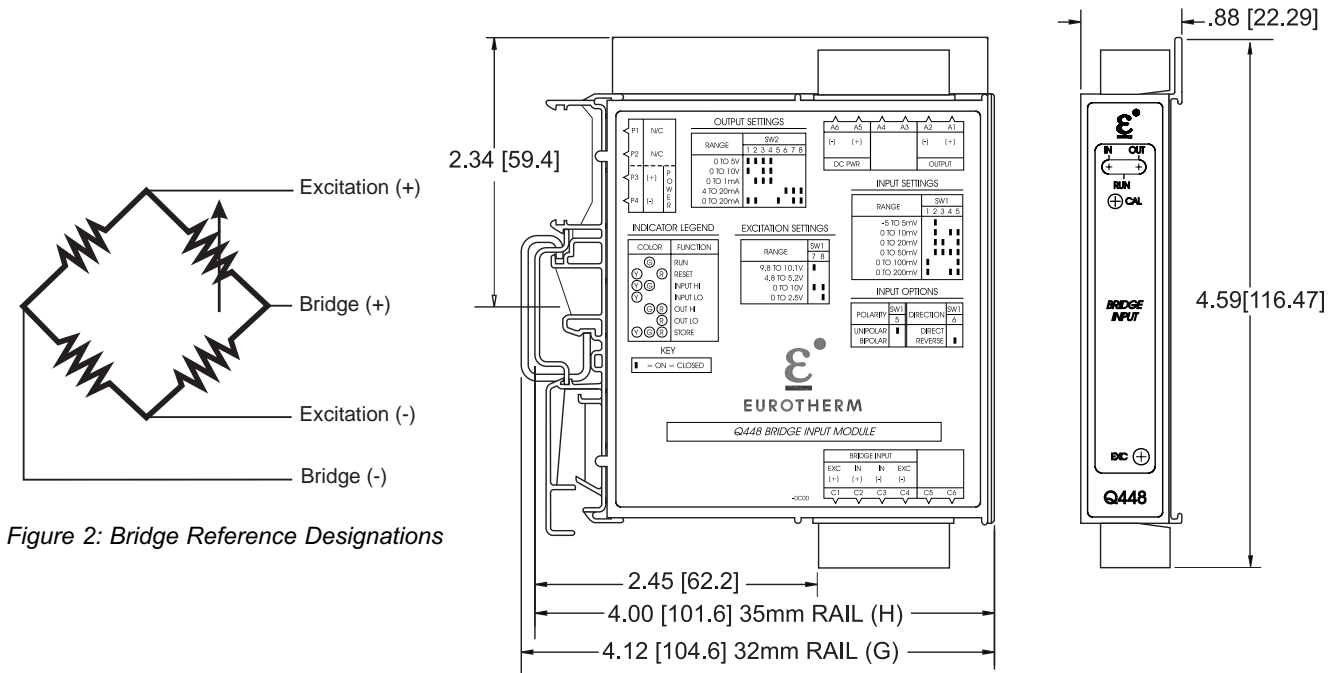
**Table 3: Bridge Excitation Selector-Switch Settings**

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

**Table 4: Output Range Selector-Switch Settings**

	SW 2							
	1	2	3	4	5	6	7	8
0 to 5V	■	■	■	■				
0 to 10V	■				■	■	■	
0 to 1mA			■	■	■			
4 to 20mA						■	■	■
0 to 20mA	■	■					■	■

KEY ■ = ON



**Figure 2: Bridge Reference Designations**

**Figure 3: Mechanical Dimensions for Q448**

## SPECIFICATIONS

### Input

Voltage Input  
Full Scale Range: 10mV to  $\pm 200\text{mV}$  (Table 1).  
Impedance:  $>1\text{M}\Omega$   
Overvoltage: intermittent 400V, max.; continuous 264V, max.  
Common Mode (Input to Ground): 1800VDC, max.  
Push-button Adjustment (inputs  $>10\text{mV}$ )  
Effective zero offset:  $>90\%$  (inputs  $>10\text{mV}$ )  
Effective span turn down:  $>90\%$   
10mV &  $\pm 5\text{mV}$  range: 50% is maximum zero offset and span turn down  
Operation: direct or reverse acting

### Output

Voltage Output  
Output: 0-5V, 0-10V  
Impedance:  $<10\Omega$   
Drive: 10mA, max.  
(1K $\Omega$ , min. @ 10V)  
Current Output  
Output: 0-1mA, 0-20mA, 4-20mA  
Impedance:  $>100\text{K}\Omega$   
Compliance:  
0-1mA; 7.5V, max. (7.5K $\Omega$ , max.)  
0-20mA; 12V, max. (600 $\Omega$ , max.)  
4-20mA; 12V, max. (600 $\Omega$ , 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%/°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%)

$<200\text{mSec.}$ , typical.

### Common Mode Rejection

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

### Isolation

1800VDC between input, output and power.

### EMC Compliance (CE Mark)

Emissions: EN50081-1  
Immunity: EN50082-2  
Safety: EN50178

### 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 $\Omega$  bridge), 4W max. (four 350 $\Omega$  bridges).

Range: 18 to 30VDC

### Shipping Weight

0.54 lbs.

### Wire Terminations

Screw terminals for 12-22 AWG

### Agency Approvals

CE Compliance per EMC directive 89/336/EEC and Low Voltage 73/23/EEC.

## TERMINAL CONNECTIONS

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

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## ACCESSORIES

All Q448 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-DC02** 2 Position I/QRail & DIN rail  
**IQRL-DC04** 4 Position I/QRail & DIN rail  
**IQRL-DC08** 8 Position I/QRail & DIN rail  
**G905** 24VDC Power Supply (0.5Amp)  
**H910** 24VDC Power Supply (1Amp)  
**H915** 24VDC Power Supply (2.1Amp)

## ORDERING INFORMATION

Specify:

1. Model: **Q448-0C00**;
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)

All Prices and Specifications subject to change without notice.

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