

# ACTIONI/Q<sup>®</sup> Q408

## DC Powered DC Input Multi-Channel Isolator

Provides 1 or 2 Fully Isolated DC Output  
Signals in Proportion to 1 or 2 DC Inputs



### Benefits

- 1800V Isolation
- Field Configurable Input Ranges
- Field Configurable Output Ranges
- Touch CAL™ Technology
- High Density DIN Rail Mounting
- SnapLoc™ Plug-In Terminals
- Flexible 9 to 30VDC Power Supply
- ASIC Technology

### Description

The model Q408 is a DC powered, DIN rail mount, DC input signal conditioner, with 1800V isolation between input, output and power. The field configurable inputs and outputs provide flexible, wide ranging capability for DC current and voltage signals.

The Q408 is available as a single channel signal conditioner (1 input/1 output) or a multi-channel signal conditioner (2 inputs/2 outputs). All models maintain the high 1800V isolation level from channel to channel, as well as input to output to power.

### TouchCAL Technology

Action has simplified setpoint calibration. Using a pushbutton instead of potentiometers, improvements in calibration resolution and reliability are realized due to the elimination of the potentiometers' mechanical variability. 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 analog amplifier circuitry is removed, providing 100% non-interactive adjustment.

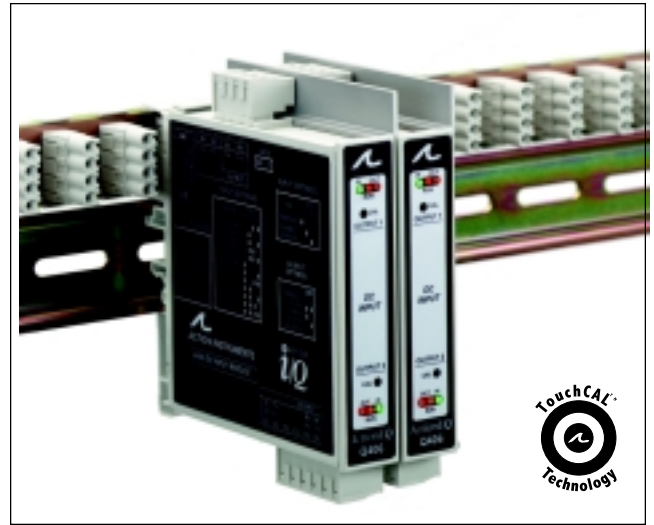
The field configurable input of the Q408 can be set via DIP switches for any one of 12 voltage ranges from 10mV to 100V or 6 current ranges from 1mA to 100mA (see Table 1). The field configurable output is linear to the input and can be set for either 0-5V, 0-10V, 0-1mA or 4-20mA.

### Application

The ActionI/Q Q408 field configurable isolator is useful in eliminating ground loops, converting signal levels, and providing signal drive. The field configurable, wide ranging capabilities ensure maximum flexibility for most DC to DC applications, minimizing spare parts requirements.

### Diagnostic LEDs

The Q408 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.



## Configuration

The Q408 can be configured for input ranges from 10mV to 100V or 1mA to 100mA, with >90% input offset or it will adjust down to <10% of fullscale input span (except on 20mV/2mA range where maximum offset or gain adjustment is 50%).

Unless a specific custom calibration is specified, the factory presets the Q408 as follows:

Input Range: 20mA (Current on)  
 Input Configuration: Unipolar  
 Calibrated Input: 4-20mA  
 Operation: Direct (Reverse off)  
 Calibrated Output: 4-20mA

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 heatsink. Slide the heatsink forward and off the module.

2. The single channel module has two eight position switch blocks, one for input and one for output. The dual output modules have a second board behind the heatsink. Gently lift this board away from the main board, rocking it back while lifting. The one input, two output module has one ten position switch block for input and channel 1 output, along with a two position switch for the second output. The two input, two output module has two ten position switch blocks, one for each channel.

3. For single channel modules, choose the desired input, function and output range from Table 1, 2, and 3. For multi-channel modules, use Table 4. Set the dip switches for the desired I/O.

## Calibration

*Note: For best results, calibration should be performed with the intended output load, in the operating environment, mounted on a DIN rail, allowing at least one hour for thermal equilibrium of the system.*

1. Install the module on to a piece of DIN rail and the I/Q Rail mounting combination. See the I/Q Rail Data sheet for details.

*Note: An I/Q Rail is required to deliver power to 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 (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).

4. When the yellow and green LEDs stop flashing, the yellow and red LEDs will be on. Push the CAL button momentarily (the yellow and green LEDs will be on).

*Note: To quit the calibration mode and reset the unit, push the CAL button and hold for more than 5 seconds. Or, wait for more than two minutes and the unit will timeout and reset itself to the previously stored calibration.*

5. Apply the maximum input signal level desired, and push the CAL button to store (the yellow LED will be on).

6. Apply the minimum input signal level desired, and push the CAL button to store (the green and red LED will be on).

7. Increase the input 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).

8. Decrease the input 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).

9. Push the CAL button one final time to store the calibration data. The green LED will be on if the input is within the calibrated range.

Table 1: Input Range Settings for Single Channel Modules

Ranges		Selector SW1			
Voltage	Current	1	2	3	4
20mV	2mA			■	■
50mV	5mA		■		
100mV	10mA		■		■
200mV	20mA		■	■	
500mV	50mA		■	■	■
1V	100mA	■			
2V		■			■
5V		■	■	■	■
10V		■	■		
25V		■	■	■	■
50V		■	■	■	■
100V		■	■	■	■

Key: ■ = 1 = ON or Closed

Table 2: Input Function Settings for Single Channel Modules

Type	Selector SW1			
	5	6	7	8
Unipolar	■	-	-	-
Bipolar		-	-	-
Reverse	-	■	-	-
Direct	-	-	-	-
Current	-	-	-	■
Voltage	-	-	-	■

Key: ■ = 1 = ON or Closed; - = n/a

Table 3: Output Range Settings for Single Channel Modules

Ranges	Selector SW2							
Output	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

Table 4: I/O Range & Function Settings for Dual Channel Modules

Ranges		Selector SW1 or SW2*									
Voltage	Current	1	2	3	4	5	6	7	8	9	10
20mV	2mA			■	■						
50mV	5mA		■								
100mV	10mA		■		■						
200mV	20mA		■	■							
500mV	50mA		■	■	■						
1V	100mA	■									
2V		■			■						
5V		■		■	■						
10V		■	■								
25V		■	■	■							
50V		■	■	■	■						
100V		■	■	■	■						
Unipolar						■					
Voltage							■				
Current								■			
Output		1	2	3	4	5	6	7	8	9	10
0 to 5V										■	■
0 to 10V										■	
0 to 1mA											■
4 to 20mA											

Key: ■ = 1 = ON or Closed  
 \*Applies to dual channel model

*Note that 0-20mA output is NOT available on multichannel units. Note also that Reverse Action is NOT available on multichannel units.*

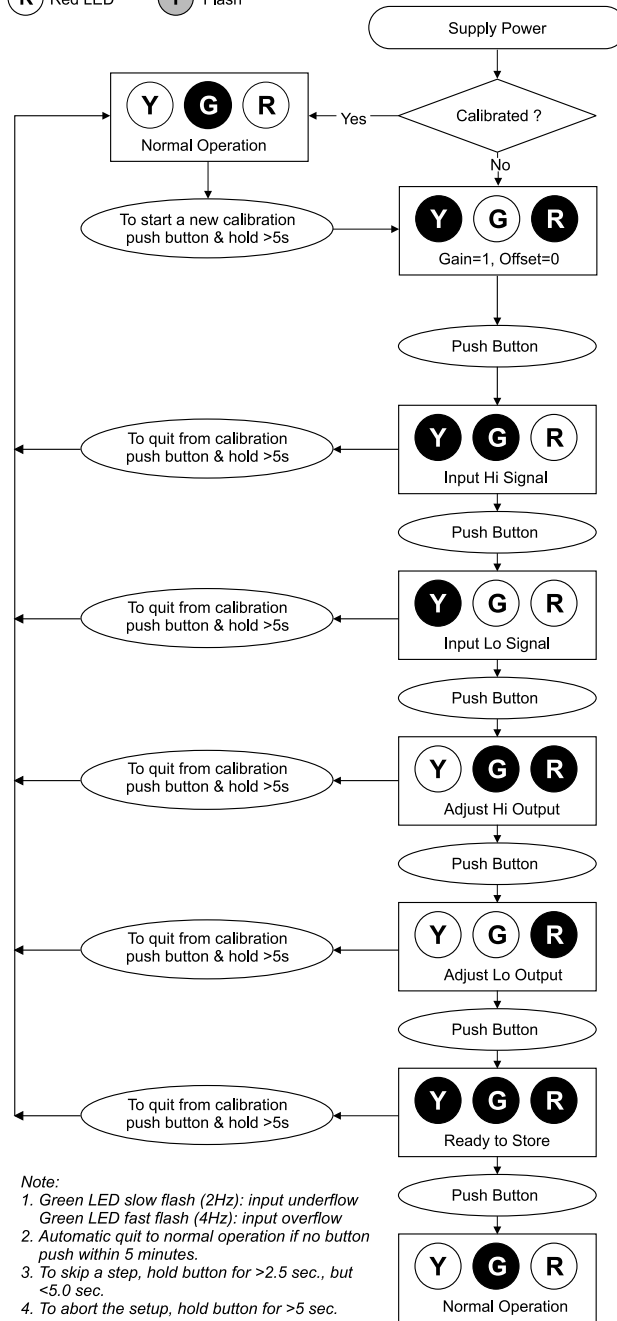
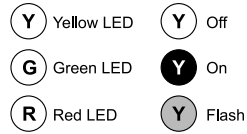


Figure 2: Q408 Calibration Flow Chart

## Specifications

### Input

#### Voltage

Range Limits: 10mV to 100V (see Table 1)  
Impedance:  $\geq 100k$  ohms  
Overvoltage: 200V continuous

#### Current

Range Limits: 1mA to 100mA  
Impedance: 20 ohms typical  
Overcurrent: 170mA, protected by self resetting fuse  
Overvoltage: 60V

#### Pushbutton Adjustment (inputs > 10mV)

Effective zero offset:  $\geq 90\%$   
Effective span turn down:  $\geq 90\%$  except for 20mV/2mA range where 50% is max. zero offset and span turndown

### Output

#### Voltage

Output: 0-5V, 0-10V  
Source Impedance: < 10 ohms  
Drive: 10mA max.

#### Current

Output: 4-20mA, 0-1mA (and 0-20mA on single output channel versions only)  
Source Impedance: > 100k ohms  
Compliance:

0-1mA: 7.5V max. (7.5k ohms)  
4-20mA: 12V max. (600 ohms)\*  
0-20mA: 12V max. (600 ohms)  
\*10V max. (500ohms) on dual output versions

### Output Accuracy

>2mA / >20mV input spans:  
 $\pm 0.1\%$  of full-scale input typical,  
 $\pm 0.2\%$  maximum  
<2mA / <20mV input spans:  
 $\pm 0.35\%$  of fullscale input typical,  
 $\pm 0.5\%$  maximum; including linearity, repeatability and hysteresis @23°C

### Output Ripple

<50% offset or span adjust:  
<0.1% off full scale span or 25mV RMS, whichever is greater  
>50% offset or span adjust:  
<0.2% of full scale span or 50mV RMS, whichever is greater.

### Response Time

200mSec, typical

### Stability

$\pm 0.025\%$  of fullscale/°C, max. (fullscale & zero)

### Excitation Voltage (optional)

24VDC, 20mA maximum

### Common Mode Rejection

120dB at DC, >90dB at 60Hz

### Isolation

$\geq 1800VDC$  or peak AC between input, output, power and channel to channel

### ESD Susceptibility

Capable of meeting IEC 801-2 level 3 (8kV)

### Humidity (non-condensing)

Operating: 15 to 95% RH @45°C  
Soak: 90% RH for 24 hours @60°C

### Temperature

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

### Power

2.5W max; 9-30VDC

### Wire Terminals

Socketed screw terminals for 12-22 AWG

### Agency Approvals

CSA certified per standard C22.2 (File No LR 42272).  
UL recognized per standard UL508 (File No. E99775).  
CE Mark pending.

Terminal	Connection	Terminal	Connection
A1	Channel 1 Out (+)	C3	Not Connected
A2	Channel 1 Out (-)	C4	Not Connected
A3	Channel 2 Out (+)	C5	Channel 1 In (-)
A4	Channel 2 Out (-)	C6	Channel 1 In (+)
A5	DC Power (+)	P1	Not Used
A6	DC Power (-)	P2	Not Used
C1	Channel 2 In (-)	P3	DC Power (+)
C2	Channel 2 In (+)	P4	DC Power (-)

## Models & Accessories

### Ordering Information

Specify:

1. Model:

**Q408-A000**: one input, one output DC Isolator

**Q408-A004**: two input, two output DC Isolator

2. Specify optional I/QRail, type and quantity.

3. Optional Factory Custom Calibration, specify **C620** - with desired input and output ranges.

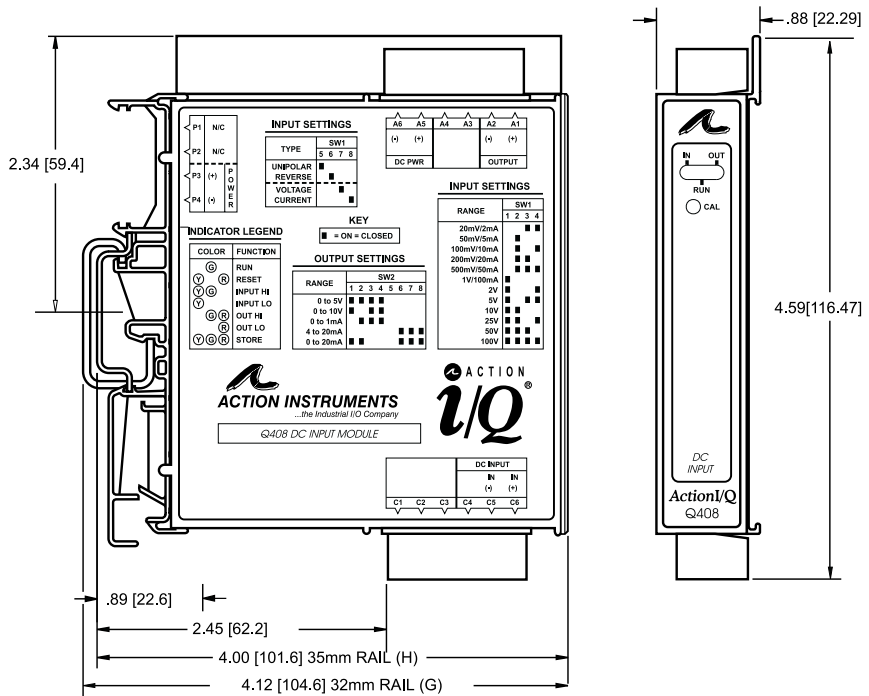
4. Accessories: (see Accessories)

### Accessories

All Action/I/Q 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)

## Dimensions



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