



Q501-1xxx (1 channel out)  
Q501-2xxx (2 channel out)

# ACTIONI/Q® Q501

## Loop Powered Multi-Channel DC Input Isolating, 2-Wire Transmitter

Provides One or Two Isolated 4-20mA Output Current  
Loops in Proportion to One or Two DC Inputs



- Multi-Channel Design
- Prevents Ground Loops
- Standard Input Ranges

- High Density DIN Rail Mounting
- SnapLoc™ Plug-in Terminals
- Output Loop Powered from 12 to 35VDC

### Description

The Q501 is a DIN rail mount, DC input, single or dual channel, two-wire transmitter. Each channel accepts a DC voltage or current input and provides an isolated 4-20mA output. Each channel is fully isolated (1800VDC) from input to output and channel to channel.

All I/Q modules feature SnapLoc plug-in screw terminals for easy installation and low Mean-Time-To-Repair (MTTR). Two or more modules can slide together and interlock for solid, high density mounting. This is accomplished by removing either the foot, or the adjacent unit's faceplate (for right-hand side or left-hand side mounting, respectively). The module to be attached will easily slide on to the side of the mounted unit.

### Application

DC input, two-wire transmitters are used to isolate and convert a DC voltage or current into a proportional 4-20mA signal. Two-wire transmitters are primarily used in remote locations near the sensor since they reduce the probability of signal errors and save wiring costs by utilizing the two power wires to send the 4-20mA signal. The current signal is usually monitored by a control system or displayed for an operator.

Typically, DC voltages or currents from various field instruments (e.g. level, flow, pressure and position sensors) are used to monitor and control a manufacturing process. Voltage signals can only run a short distance to a panel without errors caused by noise or lead resistance in the wires. These sensor (voltage) signal wires are usually terminated at the two-wire transmitter and converted into a 4-20mA signal which is highly immune to noise and not affected by lead resistance, both of which can cause significant errors in voltage signals transmitted over long distances.

The 1800VDC isolation capability of the Q501 prevents ground loops from causing errors in DC voltage or current signals and can reduce susceptibility to Radio Frequency Interference (RFI). Isolation also provides protection from high voltages and current spikes which can damage expensive Supervisory Control And Data Acquisition (SCADA) equipment, such as a PLC or DCS.

### Operation

The Q501 operates as a two-wire transmitter; each channel derives its power from a 12-35VDC source connected in series with the 4-20mA output loop. Typically a 24VDC source is used for power, allowing 12VDC (600 ohms @ 20mA) for other devices connected in series in the current loop. The outputs of the Q501 are isolated from the inputs and protected from reverse polarity. Zero and span pots are provided for each channel to calibrate the output to the input source (+/-5%).

Standard input ranges (see Table) are calibrated to rated accuracy. One range per module; one or two channels per module.

### Calibration

1. Connect the input to a calibrated DC source. Connect the output in series to a voltage source capable of supplying at least 20mA and a milliamp current meter.

Note: The voltage source (Vs) must be sufficient to accommodate all other device loads (RL) in the current loop:

$$V_s \geq 12 + (0.02R_L)$$

2. Set the calibrator to the specified minimum DC input value and adjust the zero potentiometer for 4mA output.

3. Set the calibrator to the specified maximum DC input value and adjust the span potentiometer for 20mA output.

4. Repeat steps 2 and 3, as necessary.

| Q501 Input Ranges |            |           |        |
|-------------------|------------|-----------|--------|
| 0 to 1 mA         | 0 to 50mV  | 0 to 1V   | +/-10V |
| 0 to 20mA         | 0 to 100mV | 0 to 5V   |        |
| 4 to 20mA         | 0 to 500mV | 1 to 5V   |        |
|                   |            | 0 to 10V  |        |
|                   |            | 0 to 100V |        |

\*Consult factory for non-standard ranges

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## Specifications

### Input:

Ranges: see Table

Impedance:

≥100K ohms (voltage inputs)

≤ 20 ohms (20mA Inputs),

≤ 400 ohms (1mA Inputs)

Protection: withstands up to 24VDC (current input), 120VAC (voltage input) without damage

### Output Range:

4-20mA

### Supply Voltage Range:

12 to 35VDC, each channel

### Output Accuracy:

≤ 0.1% of full-scale input typical, ≤ 0.2% max. @23°C including linearity, repeatability and hysteresis

### Adjustability:

Front accessed 10 turn, ± 5% of span for zero and span, typical

Q501-1B00: 1 Channel; 4-20mA input; 4-20mA outputs  
Q501-1B01: 1 Channel; 0-20mA input; 4-20mA output  
Q501-1B02: 1 Channel; 0-1mA input; 4-20mA output  
Q501-1B03: 1 Channel; 0-10Vdc input; 4-20mA output  
Q501-1B04: 1 Channel; 0-5Vdc input; 4-20mA output  
Q501-1B05: 1 Channel; 1-5Vdc input; 4-20mA output  
Q501-1B07: 1 Channel; 0-500mVdc input; 4-20mA output  
Q501-1B08: 1 Channel; 0-1Vdc input; 4-20mA output  
Q501-1B09: 1 Channel; 0-100mVdc input; 4-20mA output  
Q501-1B11: 1 Channel; -10/10Vdc input; 4-20mA output  
Q501-1B13: 1 Channel; 0-100Vdc input; 4-20mA output

Q501-2B00: 2 Channel; 4-20mA inputs; 4-20mA outputs  
Q501-2B01: 2 Channel; 0-20mA inputs; 4-20mA outputs  
Q501-2B02: 2 Channel; 0-1mA inputs; 4-20mA outputs  
Q501-2B03: 2 Channel; 0-10Vdc inputs; 4-20mA outputs  
Q501-2B04: 2 Channel; 0-5Vdc inputs; 4-20mA outputs  
Q501-2B05: 2 Channel; 1-5Vdc inputs; 4-20mA outputs  
Q501-2B07: 2 Channel; 0-500mVdc inputs; 4-20mA outputs  
Q501-2B08: 2 Channel; 0-1Vdc inputs; 4-20mA outputs  
Q501-2B09: 2 Channel; 0-100mVdc inputs; 4-20mA outputs  
Q501-2B11: 2 Channel; -10/10Vdc inputs; 4-20mA outputs  
Q501-2B13: 2 Channel; 0-100Vdc inputs; 4-20mA outputs

## Ordering Information

### Models & Accessories

#### Specify:

1. Model: **Q501** (see above)
2. Channels: 1 or 2
3. Input Range: (see Table)
4. Accessories: (see Accessories)

### Accessories

Action/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  
**WV905** 24VDC Power Supply (500mA)  
**H910** 24VDC Power Supply (1 Amp)  
**H915** 24VDC Power Supply (2.3 A)

### Stability:

≤ 0.025%/°C of full-scale maximum

Meets IEC 801-2 level 2 (4kV)

### ESD Susceptibility:

Meets IEC 801-2 level 2 (4kV)

### Isolation:

1800VDC or peak AC between input and output and channel to channel

### Response Time:

100mSec typical (10 to 90%)

### Temperature:

Operating: -40 to 80°C (-40 to 176°F)

Storage: -40 to 80°C (-40 to 176°F)

### Humidity (non-condensing):

Operating: 15 to 90% (@45°C)

### Wire Terminals:

Socketed screw terminals for 12-22 AWG

### Weight:

0.34lbs

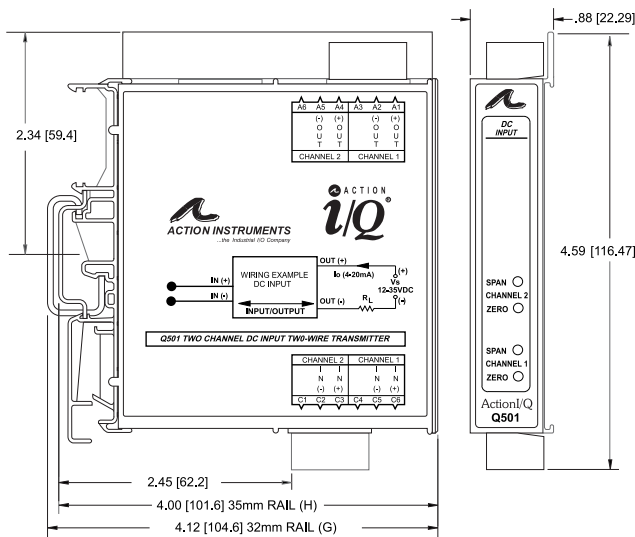
### Agency Approvals:

CSA certified per standard C22.2 (File No. LR42272).

UL recognized per standard UL508 (File No. E99775).

| Terminal | Connection                   | Terminal | Connection             |
|----------|------------------------------|----------|------------------------|
| A1       | Channel 1 Power & Output (+) | C1       | Not Connected          |
| A2       | Channel 1 Power & Output (-) | C2       | Channel 2 DC Input (-) |
| A3       | Not Connected                | C3       | Channel 2 DC Input (+) |
| A4       | Channel 2 Power & Output (+) | C4       | Not Connected          |
| A5       | Channel 2 Power & Output (-) | C5       | Channel 1 DC Input (-) |
| A6       | Not Connected                | C6       | Channel 1 DC Input (+) |

## Dimensions



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