ACTIONI/Q®

MODEL Q498

DC Input, Field Configurable Multi-Function Math Module

Installation and Calibration Instructions

WIRING CONNECTIONS

Power can be applied in one of two ways, either by means of an IQ Rail adapter (see the Accessories section of the Q498 data sheet), in which case the pins labeled P3 and P4 will apply the power through the adapter. If the IQ Rail adapter is not utilized, power is applied via the connector labeled "B" on the top rear of the unit. Pin B1 is for the positive (+) 9-30VDC and pin B2 is for the common (-).

The Analog Inputs, DC Voltage and Current are applied using the connector labeled "C" on the bottom front of the unit. Each channel has its own separate voltage or current input. Either channel can be set independently for voltage or current.

The Frequency Input is applied on the connector labeled "D" on the bottom rear of the unit. There are two inputs shown. One is marked IN LOV for voltages of 150mVp to 5Vp (50Vrms max). The other is marked IN HIV for voltages of 0.5Vp to 20Vp (150Vrms max). Only one can be connected at a time. There are not two separate frequency inputs. The Frequency Input Common is D4 and the position terminal is D5, or D6.

The outputs and the Discrete function are applied to the connector labeled "A" on the top front of the Q498. Pin A1 is for the positive terminal (+) of the Voltage or Current output. The Voltage Return is on pin A3 while the Current Return is on pin A2. Pin A3 is also the Common Return (-) for the Discrete (digital) Input and Output as well as the Frequency Output. Several wires can be twisted together for the various commons as long as the combined wire size does not exceed the 12 AWG limit of the terminal. The Discrete Output (+) is on pin A4 while the Discrete Input (+) is on pin A6. The Frequency Output (+) is on pin A5.

The default settings are 4-20mA input on Analog Channel 1 (pins C1/C2) and 4-20mA output from the Analog Output (pins A1/A2). The frequency and digital inputs and outputs are not active. The Output Math equation for the Analog Output is set as follows: A=1, F1(x)="+", B=0, F2(x)="+", C=0, D=1

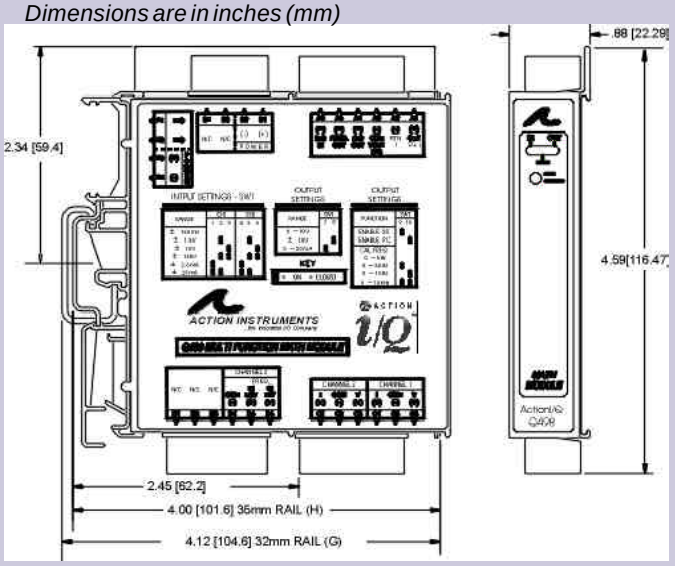
The serial port connection for using the software is located below the DIP switch shown in the photo in the SWITCH SETTINGS section. The cable is provided with the C698 software option. Please refer to the software for further explanation.

The terminal connections are defined in the following table:

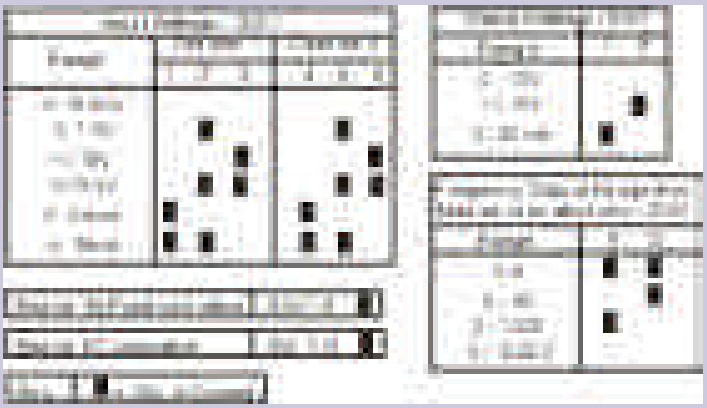
A1: Output(+) Voltage & Current A2: Current Output(-) A3: Vout, Dig(I/O), FreqOut Com(-) A4: Discrete Output(+) A5: Frequency Output(+) A6: Discrete Input(+)	C1: Input 2 Current C2: Input 2 Common C3: Input 2 Voltage C4: Input 1 Current C5: Input 1 Common C6: Input 1 Voltage	P1: Not Used P2: Not Used P3: DC Power(+) P4: DC Power(-) Use P3 & 4 or B1 & 2 for power connection.
B1: DC Power(+) B2: DC Power(-) B3: Not Used B4: Not Used	D1: Not Used D2: Not Used D3: Not Used D4: Frequency Input Common D5: Frequency Input (Lo voltage) D6: Frequency Input (Hi voltage)	

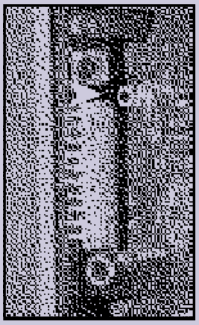
DIMENSIONS

Dimensions are in inches (mm)



SWITCH SETTINGS





CALIBRATION

(See the SPECIFICATIONS section for the Default Settings)

For best results, calibration should be performed in the operating environment, 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 Q498 output is recommended.

1. For the optimum results, install the module on to a piece of DIN rail or the I/Q Rail mounting accessories 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 on the data sheet.

2. Connect the analog input being calibrated (usually starting with Ch. 1) to a calibrated DC source and the analog output to a voltage or current meter. A frequency source should be connected to the frequency input and a frequency counter to the frequency output. Apply power and allow the system to reach thermal equilibrium (approx. 1 hour).

The Q498 can be calibrated by either of two methods, manually, as described in this procedure, or via the C698 configuration software utility. For software calibration, first set the DIP switch position SW1-10 to ON to enable PC Calibration. Refer to the information in the Help files of the software for the correct procedure.

While performing a manual calibration, refer to the flow charts in Figures 1.A & 1.B.

3. Because the Q498 has multiple inputs, calibration is a little more involved than just setting up a single channel input module. The user must first select which input is to be calibrated, and then perform the calibration on that input. While it is not mandatory, less button-pushing is involved if all inputs are calibrated before moving on to calibrate the output. To start the process, the Green LED should be on.

4. Press and hold the calibration button for 4 seconds. The Green LED should be lit and the Yellow LED should be flashing. From this point, to calibrate channel 1, press and hold the button down again for 4 seconds. The Red and Yellow LED's should be lit indicating you are ready to calibrate the input.

5. Press the button once. The Yellow and Green LED's should be lit.

6. Apply the maximum input signal. Press the button once. The Yellow LED should be lit.

Note: After any calibration step, if you decide the value input was incorrect, you can abort by pressing the button and holding for 4 seconds. This will take you back to normal operation without saving the new data. You then step back through the flow chart to get back to where you were in your calibration.

7. Apply the minimum input signal. Press the button once. All three LED's should be lit.

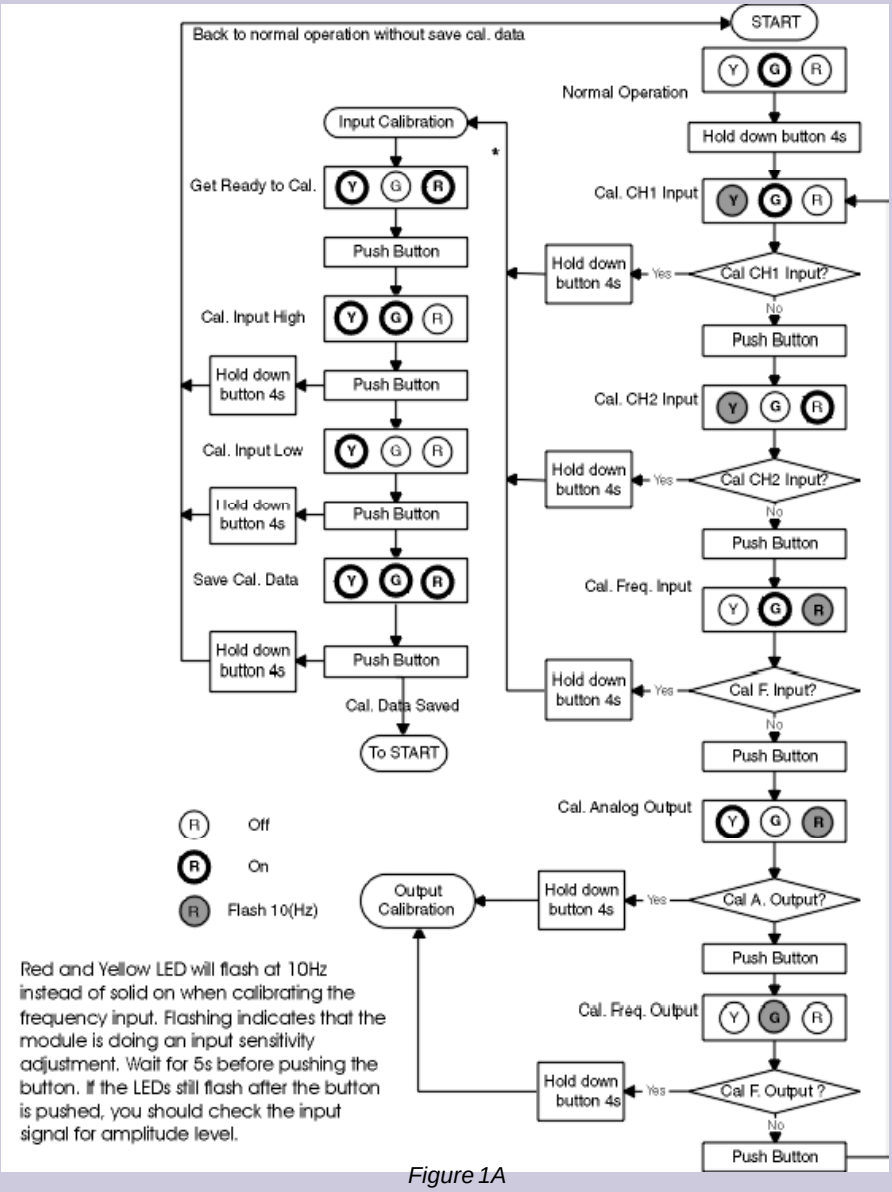


Figure 1A

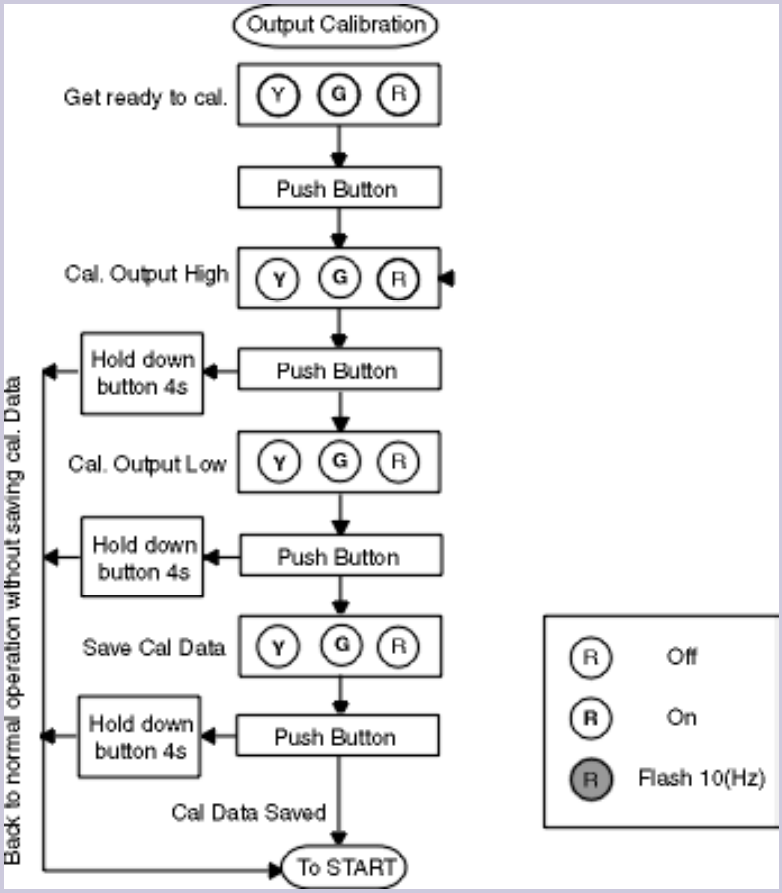


Figure 1B

8. Press the button one more time, the Channel 1 input data is saved and you are back to the beginning with the Green LED lit.

9. Press and hold the button for 4 seconds. The Green LED should be lit and the Yellow LED should be flashing. Press the button one more time and the Red LED should be lit and the Yellow LED should be flashing. From this point, to calibrate channel 2, press and hold the button down for 4 seconds. The Red and Yellow LED's should be lit.

10. Repeat steps 5 through 8.

11. After completing the analog input calibration, the Green LED is lit. Press and hold the button for 4 seconds. The Green LED should be lit and the Yellow LED should be flashing. Press the button twice and the Green LED should be lit and the Red LED should be flashing. You are now ready to calibrate the frequency input.

12. Press and hold the button for 4 seconds. The Red LED and Yellow LED's should be flashing, instead of being on solid as in the analog channels.

13. Repeat steps 5 through 8.

14. After completing the frequency input calibration, the Green LED is ON. Press and hold the button for 4 seconds. The Green LED should be lit and the Yellow led should be flashing. Press the button three times. The Yellow LED should be lit and the Red LED is flashing. You are now ready to calibrate the analog output.

15. Press and hold the button for 4 seconds. The Red and Yellow LED's should be lit.

16. Press the button once. The Red and Green LED's should be lit.

17. While monitoring the output, adjust the input (from either Ch1 or Ch2) up until the desired maximum output signal level is reached. Press the button once. The Red LED should be lit.

18. Monitor the output and adjust the input down until the desired minimum output signal level is reached. Press the button once. Al three LED's should be lit. Press the button once to save the data and you should be back to the Green LED lit.

19. Press and hold the button for 4 seconds. The Green LED should be lit and the Yellow LED should be flashing. Press the button 4 times until the Green LED is flashing. You are now ready to calibrate the frequency output.

20. Press and hold the button down for 4 seconds. The Red and Yellow LED's should be lit.Manually calibrating the output frequency requires first selecting the desired frequency output range with DIP Switch SW1, positions 9 & 10, as described in Figure 1B. These switch settings are not required if calibrating via the software utility. After the output frequency is calibrated, the switches can be reset to their previous settings for calibration method. Press the button one more time and the Red and Green LED's should be lit.

21. Set the input frequency to maximum. While monitoring the output of the frequency output channel with a frequency counter, lower the input until the desired maximum output is reached. Press the button once and the Red LED should be lit.

22. Set the input to minimum. While monitoring the output, raise the input until the desired minimum output value is reached. Press the button once and all three LED's should be lit.

23. Press the button one more time and you are back to the Green LED lit, normal operating condition.

SPECIFICATIONS

Analog Input Ranges	±150mV, ±1.5V, ±15V, ±150V
(Two Isolated Channels)	±2.5mA, ±25mA
Push-button Adjustment	Effective zero offset: ≥90%
	Effective span turn-down: ≥90%
Analog Maximum	
Overload (continuous)	200V DC for voltage inputs; 170mA DC and /or 60V DC maximum for current inputs (protected by self-resetting fuse)
Analog Output Ranges	0-20mA, 0-10V, -10 to +10V (adjustable)
Analog Output Drive	0-20mA: 12VDC compliance. (600Ω maximum)
	Voltage ranges: 10mA drive (1000Ω load minimum)
Analog Output Accuracy	±0.005% of the FS Input Range (±0.05% on 150 volts range), plus ±0.05% of the FS Output Range (±0.1% for output loads <200Ω)
Analog Stability	±0.005% of Full Scale/°C typical (±0.01% maximum) for zero and span
Analog Response Time	750mSec max. (10-90%)
Analog Input Impedance	≥ 100kΩ on voltage ranges > 1.5V,
	≥ 10MΩ on voltage ranges ≤ 1.5V
	70Ω typical (non-overload) on all current ranges
Analog Output Impedance	Less than 3Ω on voltage output ranges
	≥500kΩ on current output ranges
Frequency Input	One frequency input with two different voltage range inputs, LOV for 150mV to 50Vrms with noise suppression to 5Vp, or HIV for 0.5V to 150Vrms with noise suppression to 20Vp; 2Hz to 10kHz in software selectable ranges.
Frequency Output	2Hz to 10kHz in software selectable ranges
	Open collector pulled up through 20k to 18V, with 1mA drive
	Sinks up to 20mA through a load from a 24V external supply
Frequency Output Accuracy	±0.1%
Discrete Output	Open collector pulled up through 20k to 18V, with 1mA drive
	Sinks up to 20mA through a load from a 24V external supply
	Operation under software control
Discrete Input	Input active to Common, with soft pull-up (1mA) to +18V
	Operation under software control
Output Math	Vout = (A*CH1^{y} F1(x) B*CH2^{z} F2(x) C*CH3)/D
	Fout = (A*CH1^{y} F1(x) B*CH2^{z} F2(x) C*CH3)/D
	CH1: Output value contributed by channel 1 input only
	CH2: Output value contributed by channel 2 input only
	CH3: Output value contributed by frequency input only
	Where Fx(x) can be: +, -, *, /, Min, Max, Average, and y & z can be: 0, 1, 2, or ½
	The constants A-D can be any number from 0 to 255 (except D cannot be equal to 0).
	When using the square or square root functions, the relative input channel should be calibrated in the positive direction only.
Process Control Functions	Hi/Lo Select (Max/Min), Rate of Change Limiter, Track & Hold and 25-Point Linearization
	(25-point linearization only available on Analog Input
	Ch 1 and only effects the Analog Output channel. Also in this mode, the square and square root functions are not available.)
Default Settings	Analog Input 1 (Ch1): ±25mA range, set for 4-20mA
	Output: 0-20mA range, set for 4-20mA
	Math: (1*CH1 + 0*CH2 + 0*CH3)/1
	Analog Input 2 (Ch2): Not active (nulled by the math)
	Frequency: Not active (nulled by the math)
CMR (DC to 60Hz)	≥ 90dB for 60 Hz and 120 dB @ DC
Diagnostics	Green LED Indicator flashes for over-and under range
	Red LED flashing for output malfunction
	(Voltage short circuit or current open)
	Yellow LED indicates status of Discrete Output
Power Requirements	9-30VDC, 2.5 watts max
Power Supply Current	280mA max. @ 9VDC; limited to prevent in-rush currents from exceeding steady-state value. (At turn on, the unit appears as a capacitive load up to 100µF.)
Wire Terminal	Socketed screw terminals for 12-22 AWG
Isolation	Input to Input to Output to Power, 1800VDC
	(Analog Input 2 and the Frequency input are both considered Channel 2. The Frequency Input is isolated from Analog Input 1 but not from Analog Input 2. The Discrete Input is not isolated from the Discrete Output , but is isolated from the Analog and Frequency Inputs. All of the outputs are isolated from the Analog and Frequency Inputs.)
Size	DIN rail case (0.88" x 4.0" x 4.59")
Operating Temperature	0°C to +55°C (32 to 131°F)
Storage Temperature	-25°C to +70°C (-13 to 158°F)
Operating Humidity	15% to 95%RHNC at 45°C
Non-operating Humidity	90%RH at 65°C for 24 hours
Agency Approvals	
(EMC & Safety)	**CE** pending. **CSA** C22.2, No. 0-M91, 142-M1987 and **UL**508, pending
Minimum PC System	For the C698 Calibration Software: 100MHz CPU, 16MB RAM, 20MB hard disk space

FACTORY ASSISTANCE:

For additional information on calibration, operation and installation please contact Action's Technical Services Group.

大连爱克新仪器有限公司 www.actionio.com.cn

辽宁省大连市中山区七七街23号海鹰大厦403室 邮编：116001

电话： 0411-82650498 ：传真： 0411-82650478

Email: Sales@actionio.com.cn Support@actionio.com.cn

ACTION INSTRUMENTS
...the Industrial I/O Company