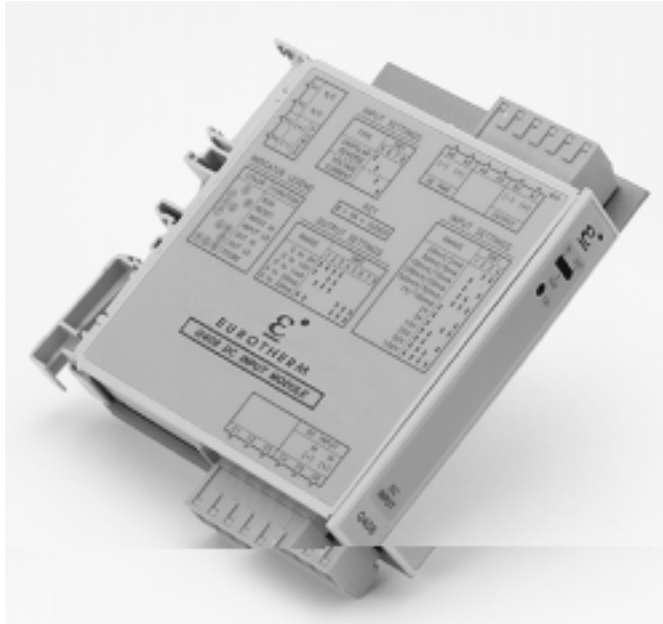




Frequency Input, Field Configurable Isolator

Model Q478-0C00



Provides an Isolated DC Output in Proportion to an Input Frequency Signal

- Protects Equipment and Prevents Ground Loops with 1800V Isolation
- Easy Field Configurable Input Ranges from 2Hz to 10,000Hz
- Five (5) Field Configurable Output Ranges: 0-5V, 0-10V, 0-1mA, 0-20mA, 4-20mA
- Advanced TouchCAL™ Technology for Simplified Ranging
- SnapLoc™, Plug-in terminals for Low MTTR
- High Density DIN Rail Mounting
- 150mV to 150V Input Amplitude Level
- Flexible DC Power Supply Accepts 9 to 30VDC
- ASIC Technology for High Reliability
- Lifetime Warranty



DESCRIPTION

The model Q478 is a DIN rail mount, frequency input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for variable frequency drives, magnetic pickups, turbine flowmeters, and other pulse or frequency output transducers.

The input of the Q478 can be configured for any frequency span from 2Hz to 10,000Hz. The input amplitude threshold sensitivity can be adjusted from 150mVp to 10Vp to ensure accurate frequency measurement and minimize transient noise related errors. The maximum input amplitude is 150 Vrms. The output can be set for either 0-5V, 0-10V, 0-1mA, 0-20mA or 4-20mA.

Advanced digital technology allows the Q478 to be field configured for virtually any frequency input to DC signal output within the ranges specified. Calibration utilizes TouchCAL™ technology where the user simply applies the minimum and maximum input frequencies, touching a recessed button to configure the correspond-

ing minimum and maximum output range.

Another feature of the Q478 is a 10VDC excitation source (20mA max.) common to the input. This can be used as a signal source for relay contacts or as an excitation source for open collector type proximity sensors. The Q478 is DC powered and will accept any power between 9 and 30VDC.

APPLICATION

The Q478 field configurable, frequency input signal conditioner is useful in eliminating ground loops and interfacing pulse output transducers, such as turbine flow meters and magnetic pickups, to data acquisition and control systems.

Advanced digital technology, combined with exclusive ASIC technology, provides a stable output at low frequencies for higher accuracy, and three-way isolation which completely eliminates ground loops from any source.

TOUCHCAL TECHNOLOGY

The Q478 utilizes TouchCAL technology which greatly simplifies

configuration. To set the input frequency range, the user pushes the CAL button to enter the calibration mode. The high input frequency is applied first, while the INPUT LED is lit, and the CAL button is pushed to store the value. The low input frequency is then applied and pushing the CAL button again stores the low frequency input.

The high and low input ranges are stored in non-volatile memory and correspond to the high and low output range which is selected via DIP switches.

To precisely adjust the output, the user adjusts the input frequency while the OUT LED is lit until the desired output level is achieved. The output levels are locked-in by pushing the CAL button. Diagnostic LEDs show the operation mode of the device.



EUROTHERM

DIAGNOSTIC LEDs

The Q478 utilizes three diagnostic LEDs. One is the dual function LED signal monitor. This green LED indicates DC power and input signal status. Active DC power is indicated by an illuminated LED. If the input signal is 10% more than full scale range, the LED will flash at 8Hz. Below 0% the flash is 4Hz.

The yellow IN LED, when on, denotes input programming modes. The red OUT LED, when on, denotes output programming modes (see Configuration, Calibration and Figure 1 for details).

CONFIGURATION

A major advantage of the Q478 is its wide ranging capabilities and ease of configuration. The Q478 enables virtually 99% zero and span adjustability. Any 2Hz range from 0 to 10,000Hz can be converted to a full scale output signal (e.g. 0-2Hz/4-20mA or 9998-10,000Hz/4-20mA).

Unless otherwise specified, the factory presets the Model Q478 as follows:

Input Range: 0 to 1000Hz
Sensitivity: 1V RMS
Output Range: 4 to 20mA

Note: "Sensitivity" refers to the noise rejection level or the trigger threshold of the input.

For other I/O ranges, refer to Table 1 for output range (SW2, 1 through 8) switch settings and to Table 2 for sensitivity switch setting (SW2, 9 & 10). 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 heatsink. Then, slide heatsink forward and off the module. Note, the output switch block (SW2) is located under the heat sink. Choose the desired output voltage/current range from Table 1 and set positions 1-8 of SW2.

2. Set the input sensitivity switch (SW2, 9 & 10) to LO for input ampli-

tudes between 150mVp and 50Vrms, with noise rejection to 1Vp or, to HI for input amplitudes between 500mVp and 150Vrms, with noise rejection up to 10Vp.

CALIBRATION

For best results, calibration should be performed in the operating installation, allowing at least one hour of 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 Q478 output is recommended, along with a 1 hour warm up period.

Note: An I/QRail is an optional accessory to power the modules. A two, four or eight position rail is available. See Ordering Information.

1. Install the module on a piece of DIN rail and the I/QRail mounting combination. See the I/QRail data sheet for details.

2. Connect the input to a calibrated frequency source and the output to a voltage or current meter. Apply power and allow the system to reach thermal equilibrium (approx 1hour).

3. Adjust the input frequency to the desired maximum and observe that the output has increased and is sensing the input. If this is not observed, turn the sensitivity potentiometer in a counterclockwise direction until the output changes proportionally to the input.

4. With the green LED on press the CAL button for 5 sec. to enter the calibration mode. The yellow and green LEDs should now be on.

5. Input the maximum desired frequency (if not done already) and press the CAL button to store. The yellow LED should now be the only LED on.

6. Input the minimum desired frequency and press the CAL button to store. The green and red LEDs should now be on.

Note: The most reliable way to input 0Hz is to short circuit the input pins (C5 & C6).

7. To precisely adjust the maximum output, adjust the input frequency until the output reads within $\pm 0.1\%$ of the maximum selected output range. This typically occurs near 90% of the HI

input frequency. Press the CAL button to store the value. The red LED will now be on.

8. To precisely adjust the minimum output, lower the input frequency until the output reads within $\pm 0.1\%$ of the minimum selected output. This typically occurs near 10% of the HI input frequency. Press the CAL button to store the value. The yellow and Red LEDs should be on. The green LED should be dim.

9. Press the CAL button one final time to exit the calibration mode. The green LED should now be on.

10. Check the minimum and maximum input-to-output calibration. Repeat steps 1 through 8 if calibration is not within desired specifications.

Note 1: To skip steps 7 and 8 (output adjustment), press CAL button two times after step 6.

Note 2: Removing power to the unit at anytime before Step 8 will restore previous settings and calibration.

OPTIMAL SENSITIVITY

If the amplitudes of the input frequency are within the sensitivity parameters (i.e. 150mVp - 1Vp for LO and 0.5Vp - 10Vp for HI), then the sensitivity parameters can be set for optimum noise rejection.

1. Set the input near midrange (50% input) or to a frequency that exhibits the minimum pulse amplitude.

2. Turn the sensitivity pot (SENS) clockwise (CW) until the output drops to minimum.

3. Turn the sensitivity pot counterclockwise (CCW) a turn or two until the output returns to the previous level.

4. Run the input through the full frequency range to make sure that the pulses are sensed at both the low and high input frequencies. If the output drops out during this test, when the input freq. $> 0\%$ then turn the sensitivity pot counterclockwise another turn or two until the output picks up. Repeat to validate sensitivity settings.

FACTORY ASSISTANCE

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

WARNING: Do not attempt to change any DIP SWITCH settings while power is applied. Severe damage will result!

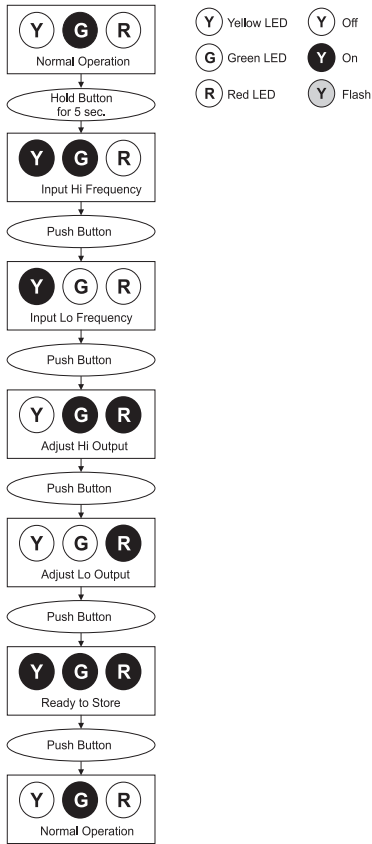


Figure 1: Q478 Calibration Flow Chart

Table 1: Output Switch Settings (SW2, 1 through 8)

	1	2	3	4	5	6	7	8
0-5V	█	█	█	█				
0-10V	█		█	█				
0-1mA		█	█	█				
4-20mA						█	█	█
0-20mA	█	█				█	█	█

KEY █ = ON = CLOSED

WARNING: Do not attempt to change any switch settings with power applied. Severe damage may occur!

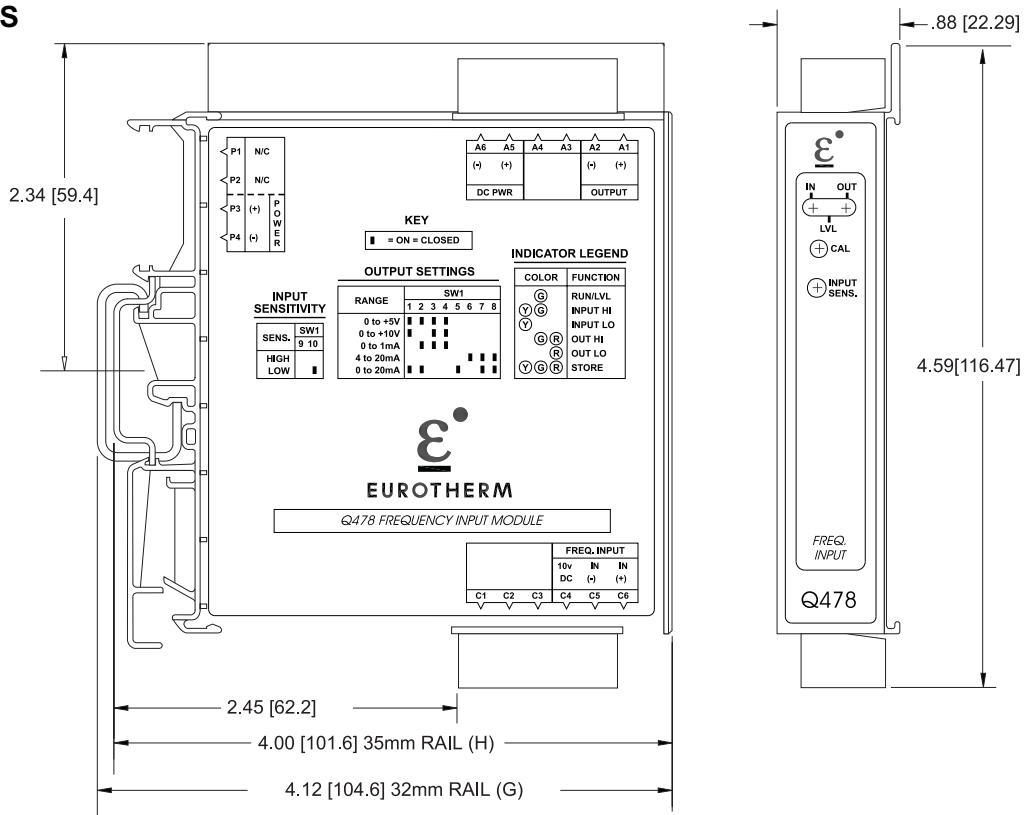
Table 2: Input Sensitivity Settings (SW2, 9 and 10)

SENS.	SW2	
	9	10
HIGH		
LOW		█

HI: 0.5-10Vp
150Vrms max.

LO: 150mVp-1Vp
50Vrms max.

DIMENSIONS
Inches (mm)



SPECIFICATIONS

Input

Frequency Input
Full Scale Range: 2 Hz to 10,000Hz.
Amplitude Range: 150mVp to 150Vrms
Impedance: >10K Ω
Overvoltage: 180Vrms, max.
Over-range: 20KHz, max.
Common Mode (Input to Ground): 1800V, max.
Zero Turn-Up: 99% of full scale range (9998Hz)
Span Turn-Down: 99% of full scale range (2Hz)

Output

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

Accuracy

$\pm 0.1\%$ of selected range at 25°C, including linearity, hysteresis

Stability

$\pm 0.025\%/^{\circ}\text{C}$ maximum of selected range.

Excitation Voltage

8VDC, 10mA maximum.

Response Time (10 to 90%)

500mSec., or 100 times the period of the full scale frequency.

Common Mode Rejection

DC: 100dB
>60Hz: 80dB

Isolation

1800VDC between input, output and power.

ESD Susceptibility

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

LED Indication (green)

LVL (green): lit when power is on;
Input < 107% then 8Hz flash
Input > -7% then 4Hz flash

IN (yellow): input range programming status

OUT (red): output range programming status

Humidity (Non-Condensing)

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

Temperature Range

Operating: 0 to 55°C (5 to 131°F)
Storage: -25 to 70°C (-13 to 158°F)

Power

2.5W max., 9 to 30VDC

Shipping Weight

0.50 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 Output (+)
A2 DC Output (-)
A3 Not Used
A4 Not Used
A5 DC Power (+)
A6 DC Power (-)
C1 Not Used
C2 Not Used
C3 Not Used
C4 Voltage Supply (+10VDC)
C5 Frequency Input (-)
C6 Frequency Input (+)
P1 Not Used
P2 Not Used
P3 DC Power (+)
P4 DC Power (-)

ACCESSORIES

All Q478 modules will 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: **Q478-0C00**
2. Specify optional I/QRail, type and quantity.
3. Optional Custom Factory Calibration;
specify **C620** with desired input and output range
4. Accessories: (see Accessories)

All Prices and Specifications subject to change without notice.

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