

Universal Frequency Module

MCR Series



Model MCR-F

\$324

Basic Unit

- ✓ Four Basic Module Types: Current or Voltage Output, Isolated and Nonisolated
- ✓ Voltage and Current Configurable Outputs: 0-5 V, 0-10 V or 0-20 mA, 4-20 mA
- ✓ 7 DIP Switch Selectable Input Frequencies, from 0-50 Hz to 0-100 kHz
- ✓ Input Signal Types: PNP/NPN, Dry Contact, NAMUR, Frequency Generator
- ✓ 0.1% FS Accuracy
- ✓ ±20% FS Zero/Span Adjustment

The MCR-F Universal Frequency transducer converts any type of industrial frequency signal input range to standard analog process signals. Devices such as proximity sensors and magnetic speed switches can be utilized as frequency input devices.

The MCR-F Universal Frequency transducer family includes isolated and nonisolated versions. Each Model must be specified for either current or voltage signal outputs. The voltage and current output modules are signal (jumper) selectable. Voltage output module signal outputs are either 0-5 V dc or 0-10 V dc. Current modules are selectable for either 0-20 mA or 4-20 mA signal outputs.

The optional isolation of the MCR-F Universal Frequency module is achieved by use of a dc/dc converter on the 24 Vdc input circuit. Isolation of the input signal/output signals is accomplished by optical isolators. A maximum frequency range of 0-100 kHz provides a broad band of conversion application possibilities.

All adjustments are located behind a side door cover. Easy to follow setup and wiring instructions are



A/IN



A/OUT



Shown actual size.

located on the modules's 3-sided instruction labeling.

Internal calibration reference frequencies are jumper selectable for module field calibration. A wide ±20% zero/span adjustment provides excellent output resolution. All MCR-F Universal Frequency modules snap onto standard flat DIN-rail.

Module Isolation

MCR-F Universal Frequency modules are available in isolated or nonisolated versions.

Isolation will eliminate measurement errors due to ground loops and input signal noise. The dc/dc isolation converter is located on the incoming module power circuit. this effectively isolates the module's incoming 24 V dc power from the input/output signal circuits. Optical isolation is

accomplished by the use of opto couplers placed across the frequency rotation circuits and the four input circuits.

NPN/PNP Open Collector Input

One of the more popular types of frequency input devices are proximity sensors. Most proximity sensors are NPN or sinking open collector outputs. The MCR-F Universal Frequency module can also accept PNP or sourcing proximity sensor inputs. When using some types of PNP sensors a ¼ watt, 10 k resistor may be needed to provide a larger voltage swing for the input sensing circuit.

Dry Contact Input

Magnetic pickup sensors, relay contact and limit switches are all possibilities for the dry contact frequency input.

The MCR-F Universal Frequency module produces a 1.25 mA current sensing circuit. At 1.25 mA dirty or oxidized contacts can still be monitored for open or closed status.

Frequency

MCR-F Universal module accepts frequency input signals from frequency

generator sources or rotational encoders. Output terminals can be utilized for rotational or signal state. Signals with a pure positive amplitude produce a +24 V dc signal. Signals with a pure negative signal produce a 0 V output state.

The minimum pulse width is 1 μ s. Voltage signal levels can range from 1 Vdc to 40 Vdc.

Namur Sensor Input

A NAMUR sensor functions by setting up an oscillating analog circuit without amplification. The MCR-F Universal Frequency module converts the NAMUR analog signal to a digital signal. Based on the current consumption change of the NAMUR sensor circuit, the MCR-F Universal Frequency module provides the correct power for the NAMUR circuit to function.

Output

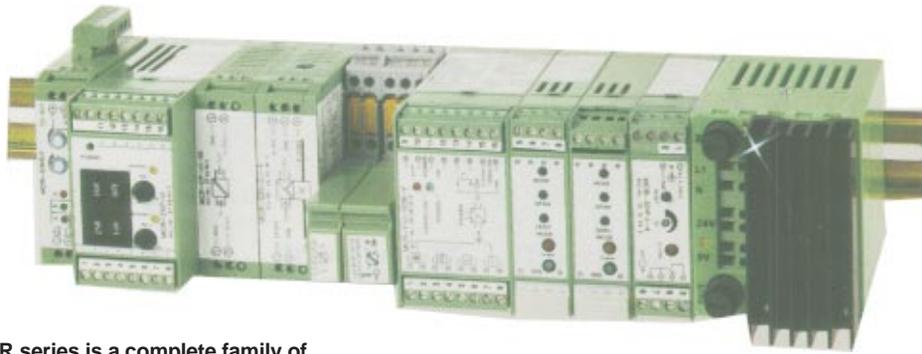
Sampling/Conversion Time

The MCR-F Universal Frequency modules's frequency to analog conversion rate is based on the DIP switch selected input frequency settings. The following conversion rates are typical.

Slower frequencies require a long sampling/averaging period which produce stable analog outputs.

Output Zero/Span and Calibration

Zero and span potentiometers provide a $\pm 20\%$ adjustment of the selected output signal. Zero and span allows for the full scaleable range of the output signal to be utilized. MCR-F current output modules utilize two separate zero adjustment pots. A jumper located under the two zero potentiometers enables a 0 mA baseline or 4 mA baseline.



The MCR series is a complete family of DIN rail signal conditioners for thermocouple, RTD, frequency, current, as well as setpoint alarm, isolation and threshold switch modules

Specifications

INPUT

Input Signals: Dry Contact, NPN/PNP, NAMUR, Frequency; jumper select

Input to Output Signal Isolation: Optocoupler 1 kV (optional)

Min/Max Signal Voltages: 1 Vdc to 40 Vdc

Maximum Voltage Level: ± 40 Vdc

Input Signal Waveform: Square, sinusoidal, triangle

Minimum Signal Impulse Period: 1 μ s

Input Transient Protection: Surge suppressor diodes

Input Frequency: 0-50 Hz to 0-100 kHz; DIP switch select

OUTPUT

Output Signals (Sourcing): 0 to 5 Vdc or 0 to 10 Vdc; 0 to 20 mA or 4 to 20 mA; jumper select

Output Line Resistance: Voltage settings $\geq 2k\Omega$; Current settings $\leq 500\Omega$

Input Signal Direction: PNP (0 V OFF, 24V ON)

Output Zero and Span Adjustments: $\pm 20\%$ of selected scale

General Specifications

Power Supply Voltage: 20 to 30 V dc

Power Supply Transient Protection: Surge suppressing diodes

Power Supply Isolation Input and Output: 1 kV dc/dc converter (optional)

Module Current Consumption: 60 mA

Operating Temperature: -20 to 65°C (-4 to 149°F)

Storage Temperature: -30 to 85°C (-22 to 185°F)

Accuracy: 0.1% Full Scale

Span Error: 0.06%

Zero Error: 0.04%

Linearization Error: 0.01%

Temperature Coefficient: $\leq 0.015\%/^{\circ}\text{C}$

Wire Size: 14 AWG max, 24 AWG min

Dimensions: 4.25" H x 1.77" W x 2.95" D (108 mm x 45 mm x 75 mm)

Mounting: 35 mm DIN Rail

Frequency Ranges/ Conversion Times/Resolutions

Range	Conversion Time	Resolution
0-50 Hz	1.8 sec	2.5%
0-100 Hz	1.8 sec	1.5%
0-1 kHz	1.8 sec	0.15%
0-5 kHz	0.36 sec	0.15%
0-10 kHz	0.18 sec	0.15%
0-50 kHz	0.036 sec	0.15%
0-100 kHz	0.018 sec	0.15%

To Order (*Specify Model Number*)

Model Number	Price	Description
MCR-F/U-100k/V	\$324	Nonisolated/voltage output
MCR-F/I-100k/V	324	Nonisolated/current output
MCR-F/U-100k/V-E	376	Isolated/voltage output
MCR-F/I-100k/V-E	376	Isolated/current output
Rail-35-2	15	35mm DIN Rail, 2 meter Length

Ordering Example: MCR-F/I-100k/V universal frequency module, nonisolated, with current output, \$324.

Model	Output	Isolation
MCR-f/U-100k/V	0-5, 0-10 Vdc	Nonisolated
MCR-f/I-100k/V	0-20, 4-20 mA	Nonisolated
MCR-f/U-100k/V-E	0-5, 0-10 Vdc	Isolated
MCR-f/I-100k/V-E	0-20, 4-20 mA	Isolated