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MODEL 4040

FREQUENCY INPUT PANEL INSTRUMENT
[4000 SERIES]



STAND ALONE “INTELLIGENT” PANEL METER - COMBINES SENSOR SIGNAL CONDITIONER, USER DISPLAY & INTERFACE, AND A PROGRAMMABLE LOGIC CONTROLLER FOR APPLICATION SPECIFIC CONFIGURATIONS INVOLVING FREQUENCY GENERATING TRANSDUCERS

The Model **4040** Single-Channel Frequency Input Conditioner/Indicator/Controller is used for measurement of flow, rpm, and other phenomena that can be sensed by pulse transformer transducers with two-wire isolated windings (tachometer pickups, turbine flowmeters, etc.), transistor or logic-circuit drivers, “zerovelocity” (true digital output) sensors, and similar frequency generating transducers. The **4040** accepts an exceptionally wide range of waveshapes and voltage levels. Its analog-input threshold level is selectable to accommodate signals from 250 mV to 100 V, thus guaranteeing reliable triggering when the input is at the low end of the frequency range. Capacitive coupling of 0.1 μ F and/or 10 μ F is provided for low-frequency inputs, to eliminate false triggering by signal noise or any DC offset (positive or negative) that exists for the frequency signal. For “zerovelocity” sensors, nominal ± 5 V-DC excitation is supplied. When you know the manufacturer supplied full-scale rating of the frequency source (or the highest frequency expected to be measured), the Model **4040** can be quickly and easily calibrated by issuing a special command (FRQ) through the Interface Port or optional Model 10P80D Keyboard. A precise 2.048000-MHz crystal frequency reference ensures accuracy of all calibrations.

Functions Provided by the **4040** “STANDARD CONFIGURATION” & features:

- **A preprogrammed tare function** may be activated by a frontpanel button.
- **You can call to display the “live” tared input**, the maximum (most positive) value of tared input since last reset, the minimum (least positive) value of tared input since last reset, or the existing net difference between these maximum and minimum values.
- **real-time math processing** (including constants for K Factor conversion)
- **Internal 15-Segment Linearization:** Programmable from front panel or by computer-port command
- **active low-pass filtering** and user-selectable digital smoothing eliminate dynamic components arising from vibration, power impulses, etc., that might prevent stable digital conversion or control action

Superior Signal Conditioning, a 4000 instrument's internal scan cycle typically produces 1000 finished engineering-unit answers per second (this includes linearization, “ $y = mx + b$ ” scaling, limit comparison, cross-channel calculations, and other numeric processes). 16-bit A/D resolution with multipole per-channel analog filtering and selectable per-channel digital filtering yields rocksolid stability and a typical overall accuracy of 0.02%, following calibration by the user

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SPECIFICATIONS

Number of Inputs: One

Input Type: Any AC or unipolar pulse signal, grounded or floating, irrespective of waveform

Frequency Range: From 5% to 100% of 250, 500, 1000, or 2000 Hz; from 2% to 100% of 4, 8, 16, or 32 kHz

Threshold Level: Selectable to accommodate signals from 250 mV to 100 V

Dimensions: 2.84" W x 5.68" W x 9.50" D

Operating Temperature Range: 0° C to +50°C (+32° F to +122° F)

Storage Temperature Range: -40°C to +80°C (-40° F to +176° F)

Operating Humidity Range: 10 to 95% max., noncondensing

Instrument Weight: 3.5 lb (1.6 kg), approximate

Power

Voltage: 90-135 or 180-279 V-AC, selectable by rearpanel switch; optional 11-18 V-DC ("V" Option), 47-63 Hz

Consumption: 35 W max. (30 W max. for "V" Option)

A/D Conversion: 16-bit (± 32000 count); 1000 finished engineering-unit answers per second, typical

Digital Filtering: Per-channel quieting factor selectable from front panel or by computer-port command

Internal 15-Segment Linearization: Programmable from front panel or by computer-port command

Excitation Supplied (for "Zero-Velocity" sensors): Nominal ± 5 V-DC; ± 50 mA max.

Normal-Mode Range: ± 100 V operating; ± 200 V without instrument damage

Common-Mode Range: ± 100 V operating and without instrument damage

Common-Mode Rejection Ratio: -120 dB at 60 Hz; -60 dB at 1 kHz

Input Impedance: Differential: 400 k Ohms; Common-Mode: 100 k Ohms

Offset: Initial: $\pm 0.05\%$ of full scale; vs. Temperature: ± 25 ppm/°C; vs. Time: ± 20 ppm/month

Gain Accuracy: $\pm 0.02\%$ of full scale ± 1 count LSD

Gain Stability: Vs. Temperature: ± 40 ppm/°C; vs. Time: ± 20 ppm/month

Analog Filtering: 5-pole modified Butterworth filter, with characteristics selectable as "1," "2," or "3," as follows:

(1) -3 dB at 10 Hz; -60 dB at 75 Hz

Step Response Settling Time (Full-Scale Output)

To 1% of final value 40 ms

To 0.1% of final value 90 ms

To 0.02% of final value 150 ms

(2) -3 dB at 5 Hz; -60 dB at 35 Hz

Step Response Settling Time (Full-Scale Output)

To 1% of final value 65 ms

To 0.1% of final value 135 ms

To 0.02% of final value 220 ms

(3) -3 dB at 2.5 Hz; -60 dB at 20 Hz

Step Response Settling Time (Full-Scale Output)

To 1% of final value 150 ms

To 0.1% of final value 30 ms

To 0.02% of final value 450 ms

Ripple and Noise: For characteristics (1), readings are within the stated accuracy from 30% to 100% of the frequency range in use; for characteristics (2), from 15% to 100% of the range in use; for characteristics (3), from 10% to 100% of the range in use

Analog Output

Any scanned channel may be represented by the 4000 instrument's single analog output; Full-Scale Range: ± 10 V, microprocessor driven. Resolution: ± 1 mV Allowable Loading: 5 mA, maximum Accuracy: 0.05% of current voltage reading ± 2 mV Bandwidth: 40 Hz maximum, Single-ended, return to System Common

Communications

Serial: 9-pin RS232 standard; RS485 optional with "N" Option; standard baud rates from 300 through 153.6K for both RS232 and RS485; RS485 configuration allows operation as an individual datacollection "node" within a computer-controlled network