

# Models 702 & 722 Frequency Conditioners

## Superb Performance and Unmatched Usefulness



Unexcelled instruments for frequency, magnetic and optical encoders and frequency output speed, flow and velocity sensors

- **1 millisecond response time**
- **10 mV peak-peak sensitivity; 200 kHz or 400 kHz bandwidth**
- **accepts uni-directional and bi-directional (quadrature) inputs**
- **6 digit engineering unit display with legends and 0.01% resolution**
- **real-time cross channel calculations and math operations**
- **20 built-in data acquisition and control functions**
- **includes protected 5V and 12V sensor power**
- **RS232, RS422 or RS485 serial communication**
- **user assignable logic inputs and outputs**
- **auto-scaled  $\pm 5V$  and/or  $\pm 10V$  analog outputs**
- **no pots, batteries, fans, maintenance, or external power supplies**

These instruments are full featured frequency conditioner/readouts; the Model 702 handles one and the Model 722 handles two inputs. Both provide fast, accurate data for each channel. Built-in are 20 useful processing functions and 20 real-time digital calculations. They make the Model 702/722 powerful production and performance test analyzers with easily configured characteristics. You needn't write code or add hardware to be up-and-running a productive test.

The alphanumeric display can publish measured and computed data, units of measure and test status. During setup, it guides you with English language prompts. There are no manual adjustments. Calibration is simple; enter the full scale in engineering units and auto-cal provides 0.01% resolution and  $\pm 5V$  and/or  $\pm 10V$  analog outputs at full scale. Keystrokes access measured data, derived data, stored data, limit status, and/or I/O status without test disruption. User set values may be password protected, when needed.

Input uni-directional or quadrature signal(s). Magnitude is output for both types and direction is output for quadrature inputs. 10 mV through TTL levels are accepted and protected to 130 Vrms. Frequency is processed in a period mode with proprietary algorithms for fast response and 0.01% resolution at any full scale. Software selectable threshold levels and signal filters provide the highest possible signal to noise ratio.

Select either RS232, RS422, or RS485 communications to remotely acquire data, and setup and control the instrument modes. User configurable logic I/O's can be linked to input actions and output events. When used in its State Mode, Event Driven Tests can be done – without special hardware or software – see AN7000 for details. Included software remotely controls all instrument functions from a Windows based PC. It displays, plots and saves real-time data, does X-Y plots, and will also save and download the instruments setup parameters.

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# Model 702/722 Specifications

<b>Frequency Input</b> .....	Any uni-directional or bi-directional (quadrature) source including self generating and zero velocity magnetic pickups, optical encoders, flowmeters, etc. When used with bi-directional sensors, the conditioner outputs both <u>direction</u> and <u>magnitude</u> .
Input Impedance and Configuration .....	Differential or single ended inputs. 100k $\Omega$ differential, 50k $\Omega$ single ended.
Input Threshold (keypad selectable) .....	10, 20, 50, 100, or 200mV pk-pk (between inputs) or TTL.
Maximum Voltage .....	$\pm 130$ VDC or 130 Vrms.
Input Signal Bandwidth .....	0.001 to 200kHz (10 to 200mV pk-pk threshold), 0.001 to 400kHz (TTL threshold).
Display Ranges and Resolution .....	Rangeless (use any F.S. Engineering Unit value) with 50% overrange. Resolution is 0.01% of F.S.
Low Pass Filter (keypad selectable) .....	20kHz (-3dB) or none. This filter is not available for TTL inputs.
Response Time .....	Greater of: 1 ms, typical (2 ms worst case) or the input pulse length.
Common Mode Rejection .....	80dB (60Hz), 55dB (0 to 10kHz).
Low Pass Filtering of Sampled Data .....	Unfiltered or 4 pole Bessel filter. Cutoff frequencies from 0.1 to 100 Hz in 1-2-5 steps.
Overall Accuracy .....	0.01% of F.S. @ +77 °F (+25 °C), 0.015% of F.S. @ +41 °F to +122 °F (+5 °C to +50 °C).
Excitation Supplies .....	+12V@125mA <sup>1</sup> or +5V@250mA <sup>1</sup> short circuit (current limit) and overvoltage (fuses) protected.
<b>Maximum Cable Length</b> .....	500ft.
<b>System Display</b>	
Type .....	2 line by 16 alphanumeric characters, each 0.2" wide by 0.3" high. Backlit LCD with adjustable contrast.
Views .....	Select either 2 Channels, 1 Channel with Limit Status, or 1 Channel with I/O Status.
Data Displayed .....	Select from Current, Max, Min, Spread, Held data and Tare value.
Data Format .....	Engineering units with 6 digits (1-2-5 format) and 5 character, upper/lower case, user-entered legend/descriptor.
<b>Number of Channels</b>	
Hardware .....	Supports one (Model 702) or two input channels (Model 722).
Calculated .....	One (CH3). Choose from 26 formulas based on CH1, CH2, and a constant.
<b>Response (per channel)</b>	
Data Sampling & Max/Min Update Rates .....	2000Hz (hardware channels), 50Hz (CH3 calculation).
Limit Checking Rate .....	1000Hz (hardware channels), 50Hz (CH3 calculation).
Logic I/O Response Time .....	1ms (hardware channels), 20ms (CH3 calculation).
Update Rate for each Analog Output .....	1000Hz.
<b>System Control</b> .....	All I/O functions can be OR'd in any combination. The <i>pattern</i> function adds ANDing capabilities.
Input Actions/channel .....	Logic inputs, outputs, and internal Matrix signals control following actions. Tare, Clear Tare, Hold, Clear Hold, Reset Max/Min, Clear Latched Limits, Check Limits, Do Max/Mins, Apply +CAL, Apply -CAL.
Output Events/channel .....	The following events drive Logic outputs and internal Matrix signals. HI Limit, NOT HI Limit, IN Limit, NOT IN Limit, LO Limit, NOT LO Limit, At Max, NOT At Max, At Min, NOT At Min.
Eight User-defined Patterns .....	Patterns drive Logic outputs and internal Matrix signals. Patterns are based on Logic inputs, outputs, and internal Matrix signals.
<b>State Machine Capability</b> .....	User enabled/disabled. Permits up to eight states and allows event driven testing. See AN7000 for details.
<b>Limit Checking</b> .....	Each channel has a HI and LO limit which may be latched or unlatched, absolute or signed, and with or without hysteresis. Select either Current, Max, Min, Spread or Held data for limit checking. Limit violations on any or all channels can be set to trigger backlight flashing in any of the display view modes.
<b>Four Logic Inputs</b> .....	Each with programmable destination, protected to $\pm 130$ VDC or 130Vrms.
Type .....	TTL compatible, Schmitt Trigger, low-true with 47k $\Omega$ pull-up. Input current is -100 $\mu$ A @ 0V.
<b>Six Logic Outputs</b> .....	Each with programmable source, short circuit (current and thermal limits) and overvoltage (fuse) protected.
Type .....	Open collector, low-true. Operating @ 24V (max) and 0.3A max sink current.
<b>Serial Communication Port</b> (user selectable as RS232, RS422, or RS485)	
BAUD Rate .....	300 to 38400. Maximum Cable Length: 4000ft (RS422/RS485), 50ft (RS232).
Maximum Number of Devices .....	32 (RS485), 1 (RS232/422).
120 $\Omega$ Termination Resistors (RS485) .....	User selectable for RXD and TXD.
RS422/485 Transceivers .....	Slew-rate limited, short circuit protected (current & thermal limits).
RS232 Drivers .....	Short circuit protected (current limit).
Serial I/O's .....	Use a 9 pin D connector. They are $\pm 15$ kV ESD protected and float (100k $\Omega$ ) with respect to Earth Ground.
Commands .....	Control of all modes, settings, and measurements.
<b>Non-Volatile Memory Storage for System Settings</b> .....	EEPROM, batteries are not used.
<b>External +5VDC Power</b> (on I/O connector) .....	250mA, short circuit (current limit) and overvoltage (1A fuse) protected.
<b>Dual Analog Outputs</b> .....	Each assignable to any channel present.
Output Impedance/Minimum Load Resistance .....	<1 $\Omega$ /10k $\Omega$ .
Full Scale .....	$\pm 5$ V or $\pm 10$ V (user selectable). Resolution is $\pm 2$ mV @ $\pm 5$ V F.S. or $\pm 4$ mV @ $\pm 10$ V F.S.
Overrange .....	$\pm 8.2$ V @ $\pm 5$ V F.S. or $\pm 13.5$ V @ $\pm 10$ V F.S.
Non-linearity .....	$\pm 2$ mV @ $\pm 5$ V F.S. or $\pm 4$ mV @ $\pm 10$ V F.S.
Overall Error (worst case, including temperature effects) .....	$\pm 5$ mV @ $\pm 5$ V F.S. or $\pm 10$ mV @ $\pm 10$ V F.S.
Filter .....	100Hz, 5 pole Bessel response low pass filter.
Protection .....	Short circuit (current limit) and overvoltage (0.25A fuse) protected.
<b>Size and Weight</b> .....	6.5" wide, 2.9" high, 8.7" deep. Weight is 3 pounds.
<b>Operating Temperature</b> .....	+41 °F to +122 °F (+5 °C to +50 °C).
<b>Input Power</b> .....	90VAC to 250VAC, 50/60Hz @ 25VA, max. Two 2A/250V fuses, line filter, and rear power switch.

- Notes:
1. Allowable total drain of the +10V and +15V supplies is 160 mA.
  2. The ratio expressed in decibels (dB), of Full Scale (F.S.) to peak noise. Measurements are made for a 1 minute interval using a 100 ohm source impedance.
  3. Both excitation voltages can be used simultaneously provided: 4.8 x (12V current) + (5V current)  $\leq$  700mA AND 12V current  $\leq$  125mA AND 5V current  $\leq$  250mA.
  4. Specifications are subject to change without notice.