Automated Precision Ratio Transformer

- Remotely programmable via standard IEEE-488 interface
- Standard Resolution to 0.1 ppm
- Optional Resolution to 0.01 ppm
- Terminal Linearity 0.9 ppm
- Wide bandwidth — 10 Hz to 20 kHz
- Standard 0.35 V/Hz, 350 V Max
- Optional 2.5 V/Hz
- Overload protection
- Front panel display for easy set up and operation

The PRT-73 Automated Precision Ratio Transformer meets or exceeds all of the requirements for a calibration standard in precision measurement applications. It is easily integrated into systems for either automated or manual calibration of ratio dividers, transformer standards, synchro/ resolver standards, transformers, calibrators, and voltmeters.

The PRT-73 is fully programmable via a standard IEEE-488 interface. Storing calibration procedures in the system controller increases the repeatability of measurements. The PRT-73 increases calibration throughput while maintaining data integrity by allowing measurements to be taken without operator intervention. A local switch allows operators to change from remote programming to front panel operation, providing precise control in delicate null balancing situations. Calibration certificates are easily printed using data collected from the PRT-73.

A convenient menu mode provides easy access to IEEE-488 address and setup commands. Address and string terminators are displayed on the front panel and are changed using front panel switches.

This seven decade AC voltage divider gives 0.1 ppm resolution for ratio settings from -0.0010000 to 1.0009999, and terminal linearity of 0.9 ppm. It performs over a wide range of frequencies from 50 Hz to 20 kHz with maximum input voltage of 0.35 V/Hz up to 350 V. For greater flexibility, the Low Frequency Option extends voltage capability to 2.5 V/Hz from 10 Hz to 1 kHz. This option expands ratio measurement capabilities to include 150 V at 60 Hz and adds another transformer, improving resolution to 0.01 ppm.

Specifications

Linearity Error (3-Terminal)

0.35 V/Hz Range: 50 Hz to 1.0 kHz: ±0.9 ppm for settings 0.1 to 1.0000999;
±[0.9 $\sqrt{(10 \times \text{setting})}$ + 0.01] ppm For settings 0.01 to 0.1:
200 Hz to 1 kHz: ±[0.9 $\sqrt{(10 \times \text{setting})}$ + 0.01] ppm For settings -0.001 to 0.01:
50 Hz to 200 Hz: ±[0.9 $\sqrt{(100 \times \text{setting})}$ + 0.01] ppm For settings -0.001 to 0.01:
1.0 kHz to 20 kHz: Multipy 1.0 kHz values by a factor of f^2, where f = frequency in kHz

2.5 V/Hz Range: 50 Hz to 400 Hz: ±(1 ppm + 0.9 ppm x setting)
400 Hz to 1 kHz: Multiply 50 Hz to 400 Hz values by factor of (f/400)2, where f = frequency in Hz
10 Hz to 50 Hz: Multiply 50 Hz to 400 Hz values by factor of 50/f, where f = frequency in Hz

Linearity errors are given in parts per million (ppm) of input. Verification of linearity errors is traceable to N.I.S.T. uncertainty of 0.5 ppm of input.

Number of Decades	0.35 V/Hz Range: Seven	2.5 V/Hz Range: Eight
Resolution	0.35 V/Hz Range: 0.1 ppm of input	2.5 V/Hz Range: 0.01 ppm of input
Range	0.35 V/Hz Range: -0.0010000 to +1.0009999	2.5 V/Hz Range: -0.00010000 to +1.00009999
Frequency Range	50 Hz to 20 kHz standard	10 Hz to 1 kHz (2.5 V/Hz)
Maximum Phase Shift	0.35 V/Hz Range: 10 Hz to 100 Hz: 50 µrad to 5 mrad @ 100 Hz 100 Hz to 20 kHz: 50 µrad at 1 kHz to 1 mrad at 20 kHz Multiply specifications x 4 for 2.5 V/Hz option	
Maximum Input Voltage	0.35 V RMS/Hz, 350 V maximum	2.5 V RMS/Hz, 350 V maximum (optional)
Maximum Input Current	For best performance no DC current should be permitted. DC input of 20 µA will decrease AC input voltage rating about 10 % and increase distortion slightly; 200 µA causes near saturation of core and serious errors.	
Input Impedance	0.35 V/Hz Range: > 40 kΩ, 50 Hz to 1 kHz 2.5 V/Hz Range: > 100 kΩ, 10 Hz to 100 Hz Above 100 Hz: 100 kΩ decreasing with frequency Applies for inputs > 10 VRMS	
Input Inductance	0.35 V/Hz: Approx. 100 to 400 H, depending on excitation 2.5 V/Hz: Approx. 700 H to 2.1 kH depending on excitation	
Output Current	100 mA maximum	
Input Capacitance	0.35 V/Hz Range: 2 nF typical	2.5 V/Hz Range: 12 nF typical
Output Series Inductance	0.35 V/Hz Range: 2 µH to 30 µH	2.5 V/Hz Range: 2 µH to 70 µH
Output Series Resistance	0.35 V/Hz Range: 400 mΩ to 7 Ω	2.5 V/Hz Range: 500 mΩ to 12 Ω
Dimensions	**Height** 135 mm (5.31 in)	**Width** 435 mm (17 in) **Depth** 513 mm (20 in)
Weight	13.8 kg (30 lb)	
Environmental		
Temperature	Operating: +15 °C to +30 °C (+59 °F to +86 °F)	Storage: 0 °C to +50 °C (+32 °F to +122 °F)
Relative Humidity	Operating: 20 % - 50 % (non-condensing)	Storage: 15 % - 80 % (non-condensing)
Included Accessories	Manual	P/N 70581
	Power Cord	P/N 24077
	Z540 Compliant Calibration with Certificate and Data for PRT-73	P/N OPT-Z540
Optional Accessories	Rack Mount Kit	P/N 70192
	2.5 V/Hz Option	P/N 70161
	Rear Panel Terminal Opt.	P/N 70193