

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;
 $\pm [0.9 \sqrt{(10 \times \text{setting})} + 0.01]$ ppm for settings 0.01 to 0.1:
 200 Hz to 1 kHz: $\pm [0.9 \sqrt{(10 \times \text{setting})} + 0.01]$ ppm For settings -0.001 to 0.01:
 50 Hz to 200 Hz: $\pm [0.9 \sqrt{(100 \times \text{setting})} + 0.01]$ ppm For settings -0.001 to 0.01:
 1.0 kHz to 20 kHz: Multiply 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: $\pm (1 \text{ ppm} + 0.9 \text{ ppm} \times \text{setting})$
 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.

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|---------------------------------|--|---|
| 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 μ rad to 5 mrad @ 100 Hz 100 Hz to 20 kHz: 50 μ rad 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 μ A will decrease AC input voltage rating about 10 % and increase distortion slightly; 200 μ A causes near saturation of core and serious errors. | |
| Input Impedance | 0.35 V/Hz Range: > 40 k Ω , 50 Hz to 1 kHz 2.5 V/Hz Range: > 100 k Ω , 10 Hz to 100 Hz Above 100 Hz: 100 k Ω 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 μ H to 30 μ H | 2.5 V/Hz Range: 2 μ H to 70 μ H |
| Output Series Resistance | 0.35 V/Hz Range: 400 m Ω to 7 Ω | 2.5 V/Hz Range: 500 m Ω 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 $^{\circ}$ C to +30 $^{\circ}$ C (+59 $^{\circ}$ F to +86 $^{\circ}$ F) | Storage: 0 $^{\circ}$ C to +50 $^{\circ}$ C (+32 $^{\circ}$ F to +122 $^{\circ}$ F) |
| Relative Humidity | Operating: 20 % - 50 % (non-condensing) | Storage: 15 % - 80 % (non-condensing) |
| Included Accessories | Manual | P/N 70581 |
| | Power Cord | P/N 24077 |
| Optional Accessories | Rack Mount Kit | P/N 70192 |
| | 2.5 V/Hz Option | P/N 70161 |
| | Rear Panel Terminal Opt. | P/N 70193 |