

Model 73

Precision Ratio Transformer

- Remotely programmable via standard IEEE interface
- 0.5 ppm terminal linearity
- Resolution to 0.1 ppm
- Wide bandwidth - 10 Hz to 20 kHz
- 0.35 V/Hz, 350 V Max. (2.5 V/Hz option available)
- Overvoltage protection
- Front panel display for easy set up and operation



The Model 73 Precision Ratio Transformer (PRT) offers superior performance for automated or manual AC calibration of ratio dividers, transformer standards, synchro standards, transformers, calibrators and voltmeters. It meets all the requirements for use as a calibration standard in precision measurement applications and calibration laboratories.

With a terminal linearity better than 0.5 ppm, this seven-decade AC voltage divider gives you 0.1 ppm resolution for ratio settings from -0.0010000 to 1.0009999.

Programmable IEEE-488 Operation

Fully programmable with a standard IEEE-488 interface, the Model 73 is easily integrated into automated calibration systems. Programmability increases measurement repeatability when calibration procedures are stored in the system controller. Entire series of measurements can be made without operator intervention, increasing calibration throughput while maintaining data integrity. Calibration certificates are produced quickly and easily using data collected from the Model 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. A local switch allows operators to return instrument control from the remote programming mode to the front panel, providing precise control in delicate null balancing situations.

Systems Compatibility

The IEEE-488 interface transforms the Model 73 from a benchtop calibration standard to a computer-controllable systems instrument. Programmable string terminators adapt the Model 73 to a variety of system configurations.

The ability to operate in an uncontrolled temperature environment means that the Model 73 can be put to work both inside and outside the lab without compromising performance or test specification requirements.

Low Frequency, High Voltage Option

The Model 73 performs over a wide frequency range from 50 Hz to 20 kHz with maximum input voltage of 0.35 V/Hz. For greater flexibility in

calibration applications, the Low Frequency Option extends voltage capability to 2.5 V/Hz for operation at higher signal levels from 10 Hz to 1 kHz.

The 2.5 V/Hz Low Frequency Option converts the Model 73 to an eight-decade transformer and expands measurement capabilities to such applications as calibration of synchro-resolver standards and ratio measurements up to 150 V at 60 Hz. The additional transformer is switched in series with the seven-decade transformer, yielding an additional digit of resolution: 8-1/2 digits or 0.01 ppm of input.

Meeting Today's Calibration Needs

Today's calibration laboratory requires standards that offer higher calibration throughput and flexibility to calibrate a wide range of instruments. The Model 73 is designed with these needs in mind. It operates over a wide range of input voltages and frequencies and meets the most demanding measurement applications with full programmability, systems compatibility, simple operator interface, overvoltage protection and an extended low frequency option.

Specifications

Linearity Error (3-Terminal)

0.35 V/Hz Range:

50 Hz to 1.0 kHz: ± 0.5 ppm for settings 0.1 to 1.0000999;

$[0.5 \sqrt{(10 \times \text{setting})} + 0.01 \text{ ppm}]$

for settings 0.01 to 0.1.

200 Hz to 1 kHz:

$[0.5 \sqrt{(10 \times \text{setting})} + 0.01 \text{ ppm}]$

for settings -0.001 to 0.01.

50 Hz to 200 Hz:

$[0.5 \sqrt{(100 \times \text{setting})} + 0.01 \text{ ppm}]$

for settings -0.001 to 0.01.

2.5 V/Hz Range:

50 Hz to 400 Hz:

$\pm(1 \text{ ppm} + 0.5 \text{ ppm} \times \text{Ratio})$

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 kHz values

by factor of $50/f$, where

f = frequency in kHz.

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 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 VRMS/Hz, 350 V maximum

2.5 VRMS/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 (5.25 in.)

Width: 435 mm (17 in.)

Depth: 513 mm (20 in.)

Weight

13.8 kg (30 lbs)

Environmental

Temperature

Operating: 59°F - 86°F

(15°C - 30°C)

Storage: -32°F - 122°F

(0°C - 50°C)

Relative Humidity

Operating: 20%-50% (non-condensing)

Storage: 15%-80% (non-condensing)

Order Information

| Model 73 Precision Ratio Transformer | Part Number |
|--------------------------------------|-------------|
| 2.5 V/Hz Option | 30073 |
| Rackmount Kit | 70161 |
| Rear Panel Terminals Option | 70192 |
| | 70193 |

ESI reserves the right to change specifications and other product information without notice.