

# Model 4167

## Digital Transformer Ratiometer

This mains operated, automatic Digital Transformer Ratiometer, measures the transformation ratio (primary to secondary turns ratio) and can also give an indication of any small phase difference between the high voltage and low voltage windings of transformers.

The ratiometer can be used in factory production test areas or other locations where a suitable supply voltage exists. The model 4167D operates accurately to turns ratios of 1000:1 for power transformers. While the extended range model 4167DH operates to 9990:1, for both power transformers and many types of current transformer.

The models 4167D and 4167DH, cover a wide automated reading range from 1:1 to 9990:1, are supplied fully calibrated and offer a basic accuracy of 0.1%. Each instrument features both parallel and serial interfaces enabling their use as part of a wide range of automated control and data logging systems.

In use the transformer is connected with the high voltage winding wired to the HV terminals of the instrument and the low voltage winding connected to the LV terminals. The transformer high voltage winding is then energised at normal line voltage (90 to 260V, 40 to 70Hz) even if the transformer under test has a much higher voltage rating. The ratio reading is indicated on a large 7 segment LED display and is fully automatic with no range changing or tedious balancing required.



#### Applications include:

- Power transformer ratios
- Potential transformers
- Current transformers
- Power utility sub-stations
- Routine plant maintenance and "Benchmarking" for fault finding
- Factory testing to international standards
- Tap changer transformer defects

#### Features

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Direct Ratio Reading from 1:1 to 9990:1

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High accuracy to 0.1%

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Resolution to 1 part in 10,000

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Display of phase difference indication and HV winding voltage

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PC interfaces (RS232; IEEE488; RS385; RS422)

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Bright red LED displays

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### Technical Data

The model 4167D and 4167DH Transformer Ratiometers measure transformer voltage ratio, give an indication of any phase difference, or applied energising voltage on power transformers and some current transformers

Incorporating two large bright LED displays. One display automatically provides the ratio value and the second can be selected to indicate phase difference or the energising voltage being supplied to the HV side of the transformer.



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In normal use, the high voltage winding of the transformer is energised by the user at AC. line voltage and connected to the ratiometer HV terminals. The low voltage winding (step down) is connected to the LV terminals of the ratiometer. The display of ratio and phase is then entirely automatic with no switching or other manual operation required by the user.

The model 4167D is suitable for transformer ratios to 1000:1 while the 4167DH, extended range version, provides accurate ratio to 9990:1 to cover voltage and current transformers. The automatic range changing facility enables the display to give the highest resolution for the ratio being measured e.g. ratios 1 to 100 show 10.00 to 99.99 etc.

### Measurement system

The measurement technique used is to measure the HV and LV winding voltages during several parts of the applied AC voltage

cycle to obtain in-phase and quadrature values. From these values the ratio and phase difference are calculated. The inputs to the ratiometer are isolated by transformers, fuses and surge absorbers, therefore the instrument should not be damaged by the very high voltages possible if the connections from the transformer being measured are accidentally reversed.

### Computer interfacing

A very flexible computer interface system is fitted allowing IEEE488, and serial RS232, RS422 and RS485 communication with the instruments.

When using another measuring instrument with a IEEE488 output the 4167D/ DH can operate as a controller. This converts the IEEE488 input from the second instrument to serial format enabling its control via the 4167D/DH serial interface.

### Specification

Range	1:1 to 9.999:1	10:1 to 99.99:1	100:1 to 300:1	100:1 to 999.9	1000:1 to 9990
Accuracy 4167D	0.1%	0.1%	0.1%	0.25%	-
Accuracy 4167DH	0.1%	0.1%	0.1%	0.25%	0.5%
Resolution 4167D & DH	0.001	0.01	0.1	0.1	1.0

### Overall range

4167D 1:1 to 1000:1

4167DH 1:1 to 9990:11

### Overall accuracy

4167D 0.1 to 0.25%

4167DH 0.1% to 0.5%

### Displays

2 X 5 digit 17mm red LED's

Ratio to 9999

Phase 0.000 to 198 with 0.001

Resolution (approx 0.050)

### Measurement voltage

HV input 90 to 260V (40 to 70Hz AC)

LV input 0.01 to 260V

### Inputs

2 pairs of HV and LV terminals mains:

90 to 260V universal 50-60Hz at 20VA

### Input protection

Front panel fuses and internal surge absorbers

### Outputs

IEEE 488 socket

RS232, RS422 or RS485 socket

**Dimensions** 470mm (w) x 150mm (h) 280mm (d)

**Weight** 8kg

### Accessories

Calibration certificate included

Model 4167T ratio test set optional



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**Tinsley**  
Precision Instruments

275 King Henry's Drive, New Addington, Croydon, CR0 0AE, England  
Telephone 44 (0) 1689 800799 Fax 44 (0) 1689 800405