

URNS RATIO METER 4167F

TRANSFORMER MEASURING DEVICES

Full automated high precision transformers turns ratiometer. Can be expanded for Capacitive Voltage Transformers Tests.

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PRECISION INSTRUMENTS

OVERVIEW

The great advantage of the 4167F compared to many of the other instruments on the market is its simple set-up.

In most cases the required parameters must be looked up in tables on the basis of the vector group and the code number of the transformer to be measured, and set up at the instrument by means of rotary switches or keys. This often results in a wrong set-up or uncertainty regarding the set-up since some of the tables are confusing.

Such a manual set-up is not necessary with the 4167F transformation ratio measuring instrument. You simply type in the vector group with the keys.

The only thing you have to do is to connect the transformer being off-line to the device and release the measurement; all three phases are measured consecutively, all connecting and short circuited procedures at the primary and secondary voltage sides are performed automatically before each measurement. Of course it is also possible to measure just one phase, e.g. H2.

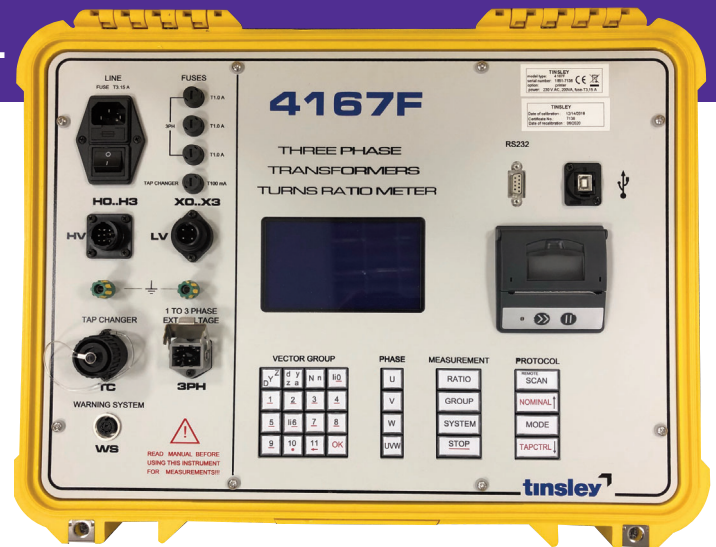
An adjustable set value permits the display of an error or deviation of the measured transformation ratio. Further, an automatic control of the tap changer is provided. In this case all phases and taps are measured consecutively, and all the results are stored inside the instrument (using the transformer specific memory), printed (if a printer is connected), and transferred to the PC (if connected).

Using the internal memory all results for all taps are written to a transformer specific area.

Furthermore, the transformer specific set point values, the vector group and additional information describing the transformer (e.g. serial number, location ...) are read from the memory when selected and displayed on the LCD. If set point values are present, an OK / NOT OK message with the corresponding information is displayed.

The transformer specific data can be easily programmed via a connected personal computer but it is also possible to input the transformer specific data via the internal keyboard.

The 4167F transformation ratio measuring instrument is connected to the H.V. and L.V. sides via four connections each. It also powers the test object at selected voltage, supplied by an internal isolating



transformer. However, an external excitation using different voltages and frequencies is also possible.

A special feature is the possibility to use three phase measuring voltage. Transformers have phase angles of $n \cdot 30^\circ$ where n is the vector number 0 to 11. Because all measurements are single phase all results will be 0° or 180° too together with eventually phase errors.

But there are some special transformers with phase angles of $n \cdot 30^\circ \pm (0^\circ \dots 15^\circ)$, e.g. 127.5° . To get this value (and not $0/180^\circ$) one need a three phase source to feed the transformer. A 3-phase line voltage is used for this purpose.

The 4167F is supplied in a robust carrying case. All connections are provided at the front of the instrument and are locked in order to avoid unplugging during a measurement. An alarm set (a red lamp is on during the measurement) can also be supplied.

KEY FEATURES

- ➔ Ratio range from 0.75 to 20,000 (ask for higher ratio values)
- ➔ Fully automated measurement
- ➔ Features market unique Vector Group Detection
- ➔ Measuring voltage from 8 V to 230 V
- ➔ Using 3-phase voltage for phase angles other than $0^\circ/180^\circ$
- ➔ Easy to handle tap changer automatic
- ➔ Internal memory stores all dates (Reading with 4167F-XFER)
- ➔ LC display (256 x 128 pixel) with backlight
- ➔ Easy input of vectorgroup and measuring conditions
- ➔ USB/RS232C port to get full instrument control
- ➔ Centronics printer port or build in printer (optional)
- ➔ Robust mobile case for field use
- ➔ Factory Certificate

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PRECISION INSTRUMENTS

RATIO MEASUREMENT

Total Range	0.75 – 20,000 : 1
Max. errors (0.75 .. 2,500)	$\pm 0.10\% \pm 1d @ 8V .. 230V$
Max. errors (2,501 .. 5,000)	$\pm 0.10\% \pm 1d @ 40V .. 230V$ $\pm 0.15\% \pm 1d @ 8V$
Max. errors (5,001 .. 10,000)	$\pm 0.10\% \pm 1d @ 80V .. 230V$ $\pm 0.20\% \pm 1d @ 8V .. 40V$
Max. errors (10,001 .. 15,000)	$\pm 0.15\% \pm 1d @ 80V .. 230V$ $\pm 0.30\% \pm 1d @ 8V .. 40V$
Max. errors (15,001 .. 20,000)	$\pm 0.30\% \pm 2d @ 160V .. 230V$ $\pm 1.00\% \pm 2d @ 40V .. 80V$
Measuring voltage	8 V, 40 V, 80 V, 160 V, 230 V or by external source (8V .. 240 V)
Measuring frequency	45 Hz – 65 Hz
Range selection	full automatic

PHASE ANGLE MEASUREMENT

Range (one phase)	- 9.9 ° to + 9.9 °
Range (three phase)	- 179.9 ° to + 180 °
Max. error	$\pm 0.1^\circ \pm 2$ digit
Mag.current measurement	1 mA – 2000 mA ± 1 mA

MULTIPLEXER

Connections HV	1U, 1V, 1W, 1N / H0,1,2,3 Amphenol
Connections LV	2U, 2V, 2W, 2N / X0,1,2,3 Amphenol
Connections ext. excitation	8 V – 240 V AC, STASEI 5
Error detection	Contact- and stability errors displays: HV / LV too low; bad line stability using front panel, via RS232 or chipcard shown on display, via RS232
Set point input	using front panel, via RS232 or IEEE - 488
Deviations	256 x 128 pixel LC display, backlight
Start of measurement	vectorgroup, actual phase, actual tap- position, ratio and deviation, phase angle and deviation, exiting current, deviation ref. to setpoints
Display	5 ... 20 s depending on line noise/distortion
Result format	ca. 2000 sets of data on internal memory direct or later on with 4167F-XFER - Program tested before each measurement
Measuring Time	USB, RS232C (full device control) printer (parallel, ANSI standard, optional)
Measurement Storage	Operating: -10° .. 50°C
Data Transfer	Storage: -20° ... 65°C
Correct Connections	0 ... 90% (Storage 95%) non condensing CE, IEC61010-1, ASTM D 999.75
Ports	490 x 400 x 190 mm (WxDxH, mobile ABS rugged case), approx. 10 kg without cables
Temperature	230VAC +10% -15% (196 - 250VAC) / 48..62Hz
Humidity	
EMC, Safety, Vibration	
Dimensions, Weight	
Power Supply	



AVAILABLE ENHANCEMENTS (OPTIONS)

- ➔ **CVT Test Adapter**
The CVT Test Adapter increases the ratio by a factor of max. 50 using high voltage up to 5kV. The adapter will be connected with the HV- and LVwinding terminals on the 4167F and two highvolt terminals to the Capacitive Voltage Transformer. The 4167F must have the CVT-Option installed.
- ➔ **Warning light**
The warning light flashes if voltage appears on the test object during measurement.
- ➔ **Software 4167F-XFER**
The program 4167F-XFER supports the transfer of stored measuring-data from the 4167F-parameter card to a text editor or a spreadsheet program.

AVAILABLE ACCESSORIES

- ➔ Cable HVK(AV) 4x4-pole, various length, amphenol jack and clamps (H_{0,1,2,3}).
- ➔ Cable LV(BV) 4x2-pole, various length, amphenol jack and clamps (X_{0,1,2,3}).

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