MASTER METER

Multi function three-phase measuring instrument

- One single instrument for all substation measurements
- Versatile instruments with built-in timer and phase angle meter
- Battery and line operated
- Menu driven options

APPLICATION

MASTER METER is an ideal instrument for use in electrical network maintenance, and it is designed to perform fast and accurate checking of protective relay and meter installations during their commissioning and in routine maintenance.

MASTER METER allows 42 different measurements and it incorporates 7 measuring instruments in one:

3-phase Multi-Meter

Power-Meter

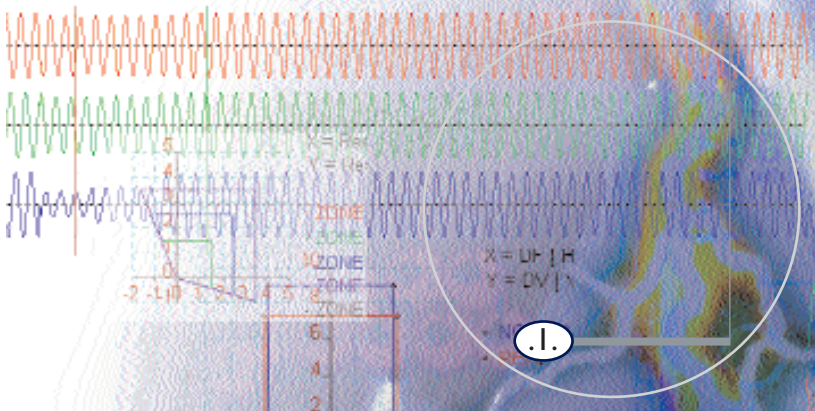
Digital Timer

Phase angle Meter

Frequency Meter

Harmonic Analyser

Transducer calibrator



MASTER METER SPECIFICATION

Measurements

AC Voltage Measurements

3 Input.
Ranges: 0 to 9.999 - 99.99 - 300.0 V (phase voltages).
With auto-range.
Type of measurement: RMS.
Accuracy: ± 0.5% of the measure ±0.1% of the range, for phase to neutral voltages; ± 1% of the measure ± 0.2% of the range, for phase to phase voltage.

AC and DC Voltage measurement

1 Input.
Ranges: 0 to 99.9 - 300 V, with auto range.
Type of measurement: true RMS.
Accuracy: ±1% of the measurement ±0.2% of range.

AC Current measurements

3 Inputs .
Ranges: 0 to 9.999 - 80.00 A, with auto range.
Type of measurement RMS.
Accuracy: ±0.5% of the measurement ±0.1% of range, for phase currents; ±1% of the homopolar current.

Inputs by 3 clip-on CT's, with the following characteristics:
. Ratio: 1000/1;
. Current range: up to 150 A;
. Wire diameter: 12 mm max.

AC or DC Current measurement

Ranges: 0 to 20.0 mA - 9.99 A - 20.0 A.
With auto range.
Accuracy: ±1% of the measurement ±0.2% of range.

Frequency measurement on V1 and I1

Range : 40.00 - 70.00 Hz.
Accuracy: ±0,02 Hz, for an input at least 10% of the range.

Phase Angle measurement

Ranges: from 0° to 360° or ±180°.
Graphic display: by means of six vectors.
Accuracy: ±1°.

Power measurements and connections check

Ranges: 0 to 9.999 - 99.99 - 999.9; unit of measurement W or kW, for measures of W, P, Q, with auto range.
Power factor range: 0 to 1.00.
Number of digits: Four, with floating point.
Accuracy: ±1% of the measurement ±0.2 % of range, clip-on transformers included.

Resistance measurement

Ranges: 0 to 9.99 - 99.9 - 200 kOhm.
Number of digits: three, with floating point.
Accuracy: ±2% of the measurement ±0.5% of range.

DC current generator (for transducer calibration)

Current output: adjustable between 0.5 and 5 mA,
Maximum load: From zero to 2 kOhm.
Range of measurement: 5.00 mA.

Type of measurement: true RMS.
Number of digits: three, with floating point.
Accuracy: ±1% of the measurement ±0.2% of range.

Harmonics measurements

On voltage and current inputs the following are measured:
. Total harmonic distortion;
. Components from the 2nd to the 13th harmonic.
Ranges: from 0 to 99.9%.
Number of digits: Three, with floating point.
Accuracy: ±5% of the measurement ±1% of range.

Timer

Input : from 24 to 300 V, a.c. or d.c.
Type of measurement:
. Duration of a contact;
. Delay between contact and voltage on V1, V2, V3;
. Delay between the selected input V1 or I1) and the contact;
. With the last selection: hold of the selected measures at the trip time; it is also possible to reread and transmit them to the serial interface.
Measurements hold: Voltages, currents, angles, power.
Retention of values: 100 ms before, during, and after the trip.
Range: 0 to 9999.999 s.
De-bounce: 0.5 ms on D.C. input; 2.5 ms on A.C. input.
Accuracy: ±0.1% of the measurement ±1 ms, for an a.c. input; ±0.1% of the measurement ±3 ms, for a d.c. input.

Primary Parameters

Possibility to enter CT and PT ratio for primary parameters reading:
. CT ratio KCT: primary up to 9999 A; secondary 1 or 5 A;
. PT ratio KPT: Primary up to 999 kV; secondary up to 999 V.

Display

Large LCD Graphic Display: 240 X 64 dots.

Back-lighted.

Refresh period: every second; every four seconds for the harmonics.

Keypad

Keypad: 16 keys, with mechanical answer.

Serial interface

Serial interface characteristics:
. Type: RS232;
. Available signal: TX;
. Data Format: 8 bits, even parity, 1 stop bit;
. Speed: 9600 baud;
. Isolated from the measurement sockets.

Power supply

Power supply: Sealed leaded re-chargeable battery.

Lasting time: 40 hours, with backlight switched on for 20% of the time.

Battery recharger: Included, both from mains and 12V car battery.
The feeder, rated 230 Vca to 9 Vcc, 1 A.

Battery level indicator on the menu display.

Case

Robust aluminium case with hinged cover and handle.

Weight and dimensions

Weight: 9.5 kg.

Dimensions: 360 (l) x 160 (h) x 320 (d) mm.

Accessories supplied with the unit

Three clip-on transformers, with three 2 m long cables.

2 meters car-lighter connection cable.

Three pair of coloured cables for connection to the voltage inputs, 2 m long.

One cable jumper to connect the three voltage neutrals.

One pair of black cables, 2 m long, for the connection to Contact input.

One serial interface cable.

One connector 9 to 25 ways, for the connection to the printer.

Operating manual.

Option available upon request

Option AV/1 to measure the angle between six voltages with no common point. With this option the current inputs are used for the measurement of the additional voltages:
. Input voltages (B): three, with no common point among them;
. Voltage range: from 10 V to 500 V;
. Angles measurement: the additional voltage angles are displayed as currents. Angles metered: V1B-V1A; V2B-V1B; V3B-V1B;
. Angles error: max 2 degrees, with VB = 110 V;
. Metering of B voltages: 250 V are displayed as 25 A;
. The accessory AV/1 is contained into a plastic box, with 6+6 safety plugs: six for the connection to the B voltages; six for the connection to the M.M.;
. Connection to the voltages to be metered by means of six cables, 2 m long, supplied;
. Connection to the M.M. by means of the current measurement cables, supplied.

APPLICABLE STANDARDS

Electromagnetic compatibility

Directive no. 89/336/CEE dated May 3, 1989, modified by the directive 92/31/CEE dated May 5, 1992.
Applicable Standards:
EN 50081-2; EN 50082-2; EN 55011; EN 61000-3-3; EN 50082-2; ENV 50140; ENV 50141; ENV 50204; IEC 1000-4-2; IEC 1000-4-4; IEC 1000-4-6; IEC 1000-4-8.

Low voltage directive

Directive n.73/23/CEE, modified by the directive 93/68/CEE.
Applicable standards, for a class I instrument, pollution degree 2, Installation category II:
CEI EN 61010-1. In particular:
. Operating temperature:
0 - 45°C; storage: -25°C to 70°C.
. Relative humidity:
10 - 80% without condensing.

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