

Protection Relay Test Set and Measurement System

- Multi-function test set designed for testing protection relays, watt-hour meters, transducers, meters
- Lightweight
- High accuracy: better than 0.1%
- Up to 6 current and 6 voltage outputs plus auxiliary DC supply
- Transient playback and harmonics generation
- End to end test of line protection
- USB and RS232 ports

A P P L I C A T I O N

DRTS can test all the following relays

RELAY TYPE	IEEE NO
Distance relay	21
Synchronizing device	25
Under/over-voltage relay	27/59
Directional Power relay	32
Field relay	40
Reverse phase current relay	46
Phase sequence voltage relay	47
Incomplete sequence relay	48
Instantaneous over-current relay	50
Inverse time over-current relay	51
Power factor relay	55
Voltage balance relay	60
Ground detector relay	64
Directional over-current relay	67
Phase angle out of step relay	78
Automatic reclosing relay	79
Frequency relay	81
Pilot wire receiver relay	85
Lockout relay	86
Differential protection relay	87
Voltage directional relay	91
Power directional relay	92
Tripping relay	94



DRTS SPECIFICATION

Three phase AC/DC current outputs

AC/DC current outputs

	CURRENT A	POWER VA	RESOLUTION	ACCURACY
3 X	0...12.5	40	760 μ A	0.1%
3 X	0...1.25		100 μA	0.1%
3 X	0...0.125		10 μ A	0.1%
1 X	0...25	80	1.5 mA	0.1%
1 X	0...12.5	80	760 μ A	0.1%

- Three current sources with a common neutral.
- Independent adjustment of current outputs.
- Duty cycle: continuous.
- Waveform resolution: 24 bit.
- Capable of stepping or ramping the current.
- Rate of change programmable between ± 0.001 A/s and ± 999 A/s.
- Output accuracy: $\pm 0.1\%$ of the value $\pm 0.02\%$ of the range.
- Distortion: 0.1% total maximum.
- Automatic protection for overloads.
- Output frequency: from DC to 2000 Hz; transient 4 kHz.

Three phase AC/DC Voltage outputs

AC/DC voltage outputs

	VOLTAGE V	POWER VA	RESOLUTION	ACCURACY
3 X	0...125	40	7.6 mV	0.1%
3 X	0...12.5		760 μV	0.1%
3 X	0...1		100 μ V	0.1%
1 X	0...250	80	15.2 mV	0.1%
1 X	0...125	80	7.6 mV	0.1%

- Three independent voltage sources, with a common neutral.
- Independent adjustment of voltage outputs.
- Duty cycle: continuous.
- Waveform resolution: 24 bit
- Capable of stepping or ramping the voltage.
- Rate of change programmable between ± 0.001 V/s and ± 999 V/s.
- Voltage accuracy: $\pm 0.1\%$ of the value $\pm 0.02\%$ of the range.
- Distortion: 0.1% total maximum.
- Automatic protection for overloads and counter-feed.
- Output frequency: from DC to 2000 Hz; transient 4 kHz.

Fourth voltage output

The fourth voltage output can be selected by a switch to act as:

- Auxiliary DC voltage supply;
- Zero-sequence component $V_0 = (V_1+V_2+V_3)/3$ (vector sum).

DC voltage supply characteristics:

- Range: 0 to 130 V DC;
- Power: 40 W, continuous duty;
- Accuracy: 0.5%.

Zero sequence characteristics:

- Range: 0 to 125 V;
- Power: 40 VA, continuous duty;
- Accuracy: 0.5%.

Angles

Phase angle range: $0^\circ - 360^\circ$. Angle resolution: 0.01° .

Angle accuracy: typical $\pm 0.02^\circ$; maximum $\pm 0.05^\circ$.

Rate of change programmable between $\pm 0.1^\circ$ and $\pm 999^\circ/s$.

Output frequency

Frequency range: from DC (0 Hz) to 1999.9999 Hz.

Transient 4 kHz.

Capable of selecting the output frequency on:

- V1 only;
- I1 only;
- All voltages (V1-V3);
- All outputs.

With the first three selections it is possible to have a second frequency on other outputs.

Maximum frequency error: 50 μ Hz (1 ppm).

Resolution: 0.1 mHz.

Rate of change programmable between ± 0.001 Hz/s and ± 999 Hz/s.

Capable of generating waveform with a superimposed harmonic distortion.

Time measurements

Digital inputs: 8 inputs, clean or with voltage from 4.5 to 250 V AC/DC, separated in two groups of 4, with two common points isolated at 1 kV AC.

Selectable sensing voltage: 5 V; 24 V; 48 V; 100 V; software controlled.

Selection of input debounce: from 0 to 2 ms; software controlled.

Timer range: 0 - 999,999.9999 s (277 hours); resolution: 0.1 ms.

Timer accuracy: 0.025% of the measure ± 0.1 ms, for input changes lasting more than 1 ms.

Counter inputs

These inputs allow testing energy meters, with high frequency outputs.

Number of inputs: 2; with no common zero point.
Frequency range: 0 to 50 kHz.

Auxiliary outputs

Four timed auxiliary output contacts.

Characteristics of contacts with a resistive load:

- . Maximum voltage: 250 V AC; 125 V DC;
- . Maximum current: 5 A.

Range of programmable delay: from 0 to 999.99 s.

Low Level Signal Outputs

The purpose of these low voltage outputs is to test protection relays that use transducers such as Rogowsky coils and voltage dividers; for this simulation low voltage outputs are necessary.

Number of outputs: 6.

Full range voltage output: 0...7.26 V rms.

Full range current output: 0...7.26 or 0...0.726 V rms.

Output current: 5 mA max.

Resolution: 0.43 mV or 0.043 mV.

Accuracy: 0.1% of range. Distortion: 0.1%.

Optional AC/DC current and voltage measuring inputs

DC Current, Low Level

Measuring range: ± 20 mA DC.

Accuracy: 0.02% of range $\pm 0.01\%$ of value.

DC Voltage, Low Level

Measuring range ± 10 V DC.

Accuracy: 0.02% of range $\pm 0.01\%$ of value.

AC/DC Current measuring Input, High

Measuring range: ± 20 A.

AC accuracy: 0.2% of range $\pm 0.1\%$ of value.

DC accuracy: 0.1% of range $\pm 0.1\%$ of value.

AC/DC Voltage measuring Input, High

Measuring range ± 250 V.

AC accuracy: 0.1% of range $\pm 0.1\%$ of value.

DC accuracy: 0.05% of range $\pm 0.05\%$ of value.

Interface Connection

Type of interface: RS232 and USB.

Transmission rate: 19,200 baud.

Power supply

Mains power supply: 90 to 264 V AC single phase.

Frequency: 47 to 63 Hz.

Power consumption:

- . at rest: less than 100 W;
- . maximum load: 500 W.

Case

Aluminum, with carrying handle.

Weight and dimensions

Weight: 12 kg.

Dimensions: 170 (h) x 470 (w) x 320 (d) mm.

Accessories supplied with the unit

Protective carrying bag.

Power supply cable and ground connection cable.

Serial interface cable and USB cable.

Relay connection cables kit.

TDMS software and maintenance manuals.

OPTIONAL MODULES AND ACCESSORIES

IN2-CDG CURRENT BOOSTER FOR 1 A RATED HIGH BURDEN RELAYS



With DRTS the full power of 100 VA is available only at the current of 15 A. The option IN2-CDG by means of a set of three current transformers, with the following characteristics:

Primaries: 12.5 A and 15 A;

Secondaries: 0.5 A; 1 A; 2.5 A; 5 A;

Nominal power: 100 VA;

Current ratio error: 0.2.

Case: plastic.

For the single phase test of the CDG relay it is possible to have three times the above power, connecting current outputs in series.

GPS SYNCHRONIZER

The GPS synchronizer is an external module that allows to synchronize the test start of two DRTS.



Features:

- . 1 digital output 0-24 V DC, for synchronization.
- . 1 selector to program the following pulse intervals: 5 s; 10 s; 20 s; 30 s; 40 s; 60 s..

Maximum timing error with respect to nominal: 2 μ s.

- . Lights to confirm: power-on; Locked; Pulse available.
- . 1 START and STOP push-button.
- . Power supply: 110/220 V AC.

The option includes:

- . the antenna;
- . an extension cable for the antenna, 20 m long;
- . two cables, red and black, 2 m long, with banana terminations, for the connection to the test set trip input;
- . the power supply cable.

Weight: 1.7 kg.

Dimensions: 150 (w) x 100 (h) x 240 (d) mm.

Case: aluminium.

Two test sets synchronized with GPS produce the maximum error of 50 μ s.

SH 2003 ENERGY METERS UNIVERSAL SCANNING HEAD

SH 2003 is a scanning head that eases the test of energy meters. It is an universal scanning head because it can be used both with LED impulse electronic meters and Ferraris rotating disk meters. With rotating disk the sensor uses a green light beam that optimizes the recognition of any type of mark.

With LED recognition the following specification applies:

- . Impulse duration: more than 60 μ s.;
- . Impulse frequency: less than 500 Hz;
- . Light wavelength: 500 to 960 nm (red).

The option includes:

- . A support to keep the scanning head in front of the energy meter;
- . The cable, 2 m long, from the scanning head to the DRTS 6;
- . The power supply transformer, for the power of 220 V AC, to supply the scanning head.
- . Two safety banana plugs for the connection to DRTS.

TRANSIT CASE

Three options are available:

- . Heavy duty transit case (Discovery type) in black plastics, with handle and wheels.
- . Heavy duty transit case in aluminium, with handle and wheels.
- . Soft carrying bag.



STAND UP SUPPORT

The stand-up support allows using the test set in a stand-up position. This is very useful in case of too small room or no support for the test set. There is enough room for the power supply cord, and for the cooling air to flow in.

TESTING CABLES

This option includes 24 cables, with different colours, with banana plugs, 2 m long, that allow the connection to the relay under test.

APPLICABLE STANDARD

The test set conforms to the EEC directives regarding Electromagnetic Compatibility and Low Voltage instruments.

A) Electromagnetic Compatibility:

Directive 2004/108/EC (CE conform). Applicable standard: EN 61326:2006.

B) Low Voltage Directive:

Directive 2006/95/EC (CE conform).

. Applicable standards, for a class I instrument, pollution degree 2, Installation category II: CEI EN 61010-1.

In particular:

- . Inputs/outputs protection: IP 2X - CEI EN 60529.
- . Operating temperature: 0°C to 55°C;
storage: -25°C to 70°C.
- . Relative humidity: 5 - 95% without condensing.

ORDERING INFORMATION

CODE	MODULE
10150	DRTS 3 X 12.5 A - 4 X 125 V 1 x VDC output 0...130 V Standard set of test cables Soft carry bag TDMS - Test & Data Management Software

OPTIONAL ACCESSORIES

CODE	MODULE
15152	Analog AC/DC Measurement Module
98156	IN 2 CDG - Option for High Burden Relays
10161	GPS synchronizer
10162	SH 2003 energy meter universal scanning head
15150	Additional set of test cables
85150	Heavy duty transport case (Discovery type)
18150	Aluminium transport case
48150	Soft carrying bag
29170	Stand up support



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