DRTS 64

isa

The new generation of advanced test equipment for Relays, Energy meters, Transducers and Power quality meters

- Testing all relay technologies: electromechanical, solid state, numerical and IEC61850

- Manual control with color display

- Simultaneously available: 6 Current and 4 Voltage plus 1 battery simulator outputs

- High current outputs: 6 x 32 A, 3 x 64 A,1 x 128 A

- High power outputs: 6 x 430 VA, 3 x 860 VA, 1 x 1000 VA

- High accuracy outputs: better than 0.05%

- IEC61850 protocol interface

- USB and Ethernet interface

- Pen drive interface

- Internal GPS and IRIG-B interface for end-to-end tests

- Advanced testing and data management software TDMS

- Complete library of relays from the major manufacturers

- Highest quality, safety and reliability

- Worldwide high quality technical support in 100 countries

A P P L I C A T I O N

DRTS 64 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 64 SPECIFICATIONS

DRTS 64 is the leading edge most powerful and accurate relay, energy meters (class 0.1) and transducers test set manufactured by ISA. The locally and PC controlled test set generates high precision (0.05% accuracy) signals using multiple DSP technology.

Four hardware configurations are available:

- **DRTS 66: with 6 Current 6 Voltage generators plus 1 battery simulator.**
- **DRTS 64: with 6 Current and 4 Voltage generators plus 1 battery simulator.**
- **DRTS 34: with 3 Current and 4 Voltage generators plus 1 battery simulator.**
- **DRTS 33: with 3 Current and 3 Voltage generators plus 1 battery simulator.**

Its powerful current outputs (3 x 64 A at 860 VA) and voltage outputs (3 x 300 V at 100 VA) allow to test any type of relays including old electromechanical relays.

The test sets integrate the IEC61850 protocol interface for testing relay with Ethernet-based substation communication protocol.

OPERATOR INTERFACE

DRTS 64 can be operated directly from the front panel by means of a large color graphical display, a rotary selector, a keypad and function keys.

Two PC interfaces, USB and Ethernet, allow to control the test set with the advanced testing software TDMS.
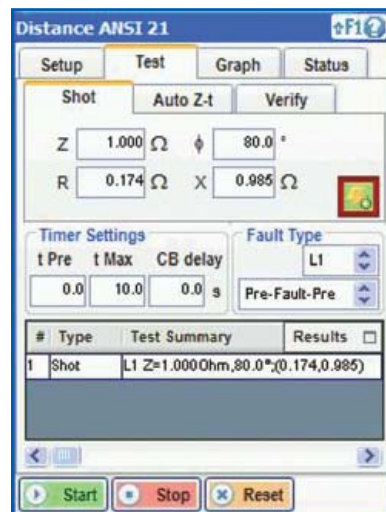
TDMS software is a powerful software package for testing Protective relays, Watt-hour meters, Transducers and Power quality meters, in transmission, distribution and power generation. TDMS provides data management for acceptance and maintenance testing activities.
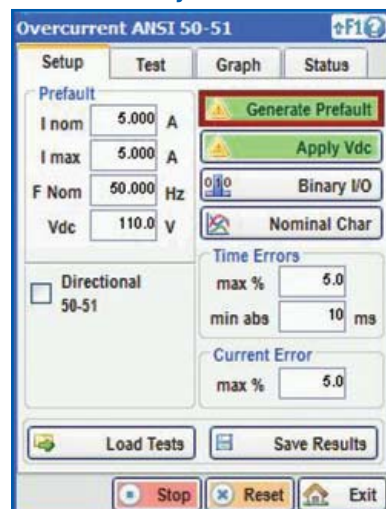
Local Control

Manual test setup
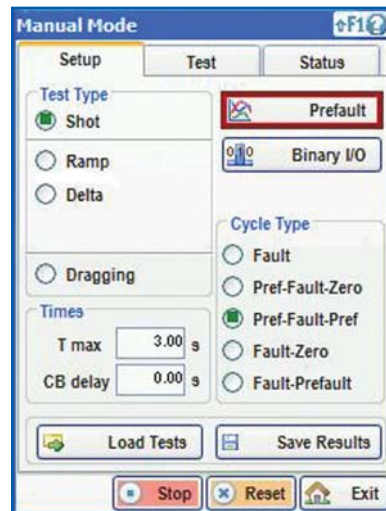
Distance relay test setup

Over-current relay test result

TECHNICAL SPECIFICATION

CURRENT GENERATORS
Current Outputs

DRTS 64
6 x 0 ... 32 A AC
3 x 0 ... 64 A AC
1 x 0 ... 128 A AC

Output Power

Typical values

DRTS 64
6 x 430 VA at 32 A
3 x 860 VA at 64 A
1 x 1000 VA at 64 A

- Accuracy: typical ±0.02% of the value ±0.01% of the range; guaranteed 0.04% of the value ± 0.01% of the range.
- Distortion: 0.05% Typical; 0.15% guaranteed
- Resolution: 0.1 mA at 32 A
- Connections: 4 mm banana sockets

VOLTAGE GENERATORS
Voltage Outputs

DRTS 64
4 x 0 ... 300 V
1 x 0 ... 600 V

- Ranges: 12.5 V and 300 V.

Output Power

Typical values

DRTS 64
3 x 100 VA at 125 ... 300 V
4 x 85 VA at 125 ... 300 V
1 x 200 VA at 125 ... 300 V
1 x 200 VA at 600 V

- The output V4 can be selected via software to act as an independent voltage output, or ,via software, the output can be selected to be: $V_0 = (\mathbf{V_1+V_2+V_3})/3$ or $V_0 = (\mathbf{V_1+V_2+V_3})/1.73$ (bolded stays for vector sum).

- Accuracy: Typical ±0.025% of the value ± 0.01% of the range; guaranteed ±0.06% of the value ± 0.015% of the range.
- Distortion: 0.05% Typical; 0.15% guaranteed.
- Resolution: 0.4 mV at 12.5 V; 10 mV at 300 V.
- Connections: 4 mm banana sockets.

OTHER GENERATOR CHARACTERISTICS
Output Frequency

Currents and Voltages output frequency: 0 to 3000 Hz. For the voltage: 3 kHz at 60 V; 2 kHz at 100 V; 700 Hz at 300 V.
Transient: 0 to 5000 Hz.
Possibility to program 12 different frequencies on all outputs.
Maximum frequency error: 0.5 ppM.
Resolution: < 5 µHz.

Phase Angle

Range: - 360° ... +360°.
Resolution: 0.001°.
Accuracy (voltages and currents) 50/60 Hz: 0.1° typical, 0.2° guaranteed.

Battery Simulator

0…260 V DC / 1 A.
Power: 50 W or 1 A.
Accuracy: 2%.
Connections: 4 mm banana sockets.

Low Level Signal Outputs (optional)

Number of outputs: 6.
Full range voltage output: 7.26 Vrms.
Output current: 5 mA max.
Resolution: 0.43 mV.
Accuracy: 0.015% typical; 0.05% guaranteed.
Frequency bandwidth: DC to 20 kHz.
Connection: Multipole connector, rear side.

Binary Inputs

Number of inputs: 12 inputs.
Galvanic isolations: six groups of two inputs each, with six common points isolated among them.
Inputs characteristics: potential-free or with voltage, from 4.5 to 300 V DC (24 to 230 V AC). When the Transcope option is present, the maximum voltage is 600 V DC (425 V AC).
Selection of the type of input: Voltage clean; 5 V; 24 V; 48 V; 100 V.
Trigger conditions: N.O./N.C./Edge/boolean, independent for

each input.

Timer range: Infinite.

Timer resolution: 0.01 ms.

Timer accuracy: 0.001% of the measure ± 0.1 ms.

Sample rate: up to 10 kHz; with the Transcope option up to 50 kHz.

Connections: 4 mm banana sockets.

Counter Inputs

Number of inputs: 2

Frequency range for pulses: 0 to 100 kHz.

Connections: 4 mm banana sockets.

Binary Outputs Relays

Number of binary outputs: 4, make and break.

Type: Potential free timed relays.

Characteristics of the contacts with a resistive load:

. AC: 300 V; 8 A; 2400 VA;

. DC: 300 V; 8 A; 50 W.

. Programmable time delay: from 0 to 999,999.999 s.

. Connections: 4 mm safety banana sockets.

Binary Outputs Transistors (optional)

Number: 4

Type: transistor, open collector outputs, voltage clean, connected to a dedicated connector.

Characteristics of the outputs: 24 V, 5 mA.

Short circuit protection.

Protection for voltages higher than 24 V.

Programmable time delay: from 0 to 999.999,999 s.

Timing accuracy with respect to test start: 50 µs.

Connections: multipole connector, rear side.

ANALOG DC MEASURING INPUTS

• **DC Current measuring input**

. Measuring ranges: ± 20 mA and ± 5 mA.

. DC accuracy, 20 mA: ± 0.02% of value ± 0.01% of range.

. DC accuracy, 5 mA: ± 0.05% of value ± 0.02% of range.

Connections: 4 mm banana sockets.

• **DC Voltage measuring input**

. Measuring range ± 10 V.

. DC Accuracy: ± 0.02% of value ± 0.01% of range.

Connections: 4 mm banana sockets.

NOTE: all specifications apply at 25 °C ± 2 °C.

AC specifications apply for sinusoidal waveform, and frequency between 48 and 62 Hz. Temperature drift: ± 0.01%/°C.

Current outputs derating at 115 V AC power supply.

INTERFACE CONNECTIONS

Type of interfaces: USB, Ethernet, IEC 61850, IRIG-B.

Characteristics of USB interface:

. Transmission rate: 3x minimum.

. Interface cable: 2 meters, included.

Characteristics of the ETHERNET interface:

. Connector type: RJ-45.

. Interface cable: 2 meters, included.

Characteristics of the IEC61850 interface (optional):

. Connector type: RJ-45.

. Interface cable: 2 meters, included.

Characteristics of the IRIG-B connection (optional):

. Fiber optic connector, ST type.

Internal memory

256 Mb internal memory suitable to store in the test set approximately 2.000 test results.

Pen drive interface

It allows saving and recalling local test setting and results.

DISPLAY - KEYPAD - FUNCTION KEYS - ENCODER

. One Encoder: digital rotary switch.

. One Keyboard: 12 keys. Data input as with mobile phones.

. Five Function keys.

. Display: 256 colours, type LED, graphic 320 x 240 pixels; dimension 5.7 inches.

POWER SUPPLY

- Mains power supply: 85 to 264 V AC, sinusoidal, single phase.

- Frequency: 45 to 65 Hz.

- Power consumption:

. at rest: less than 150 W;

. maximum load, 115 V supply: 1600 W;

. maximum load, 230 V supply: 2700 W.

Connection: Standard 16 A AC socket.

WEIGHT AND DIMENSIONS

Weight: 20 kg (39 lb).
Dimensions without the handle: 150 (h) x 466 (w) x 423 (d) mm (5.9 x 18.3 x 16.9").

ACCESSORIES SUPPLIED WITH THE UNIT

Protective carrying bag.
Set of test leads: 12 cables.
Power supply cable.
Ground connection cable.
USB and Ethernet cables.
Instruction and maintenance manuals.

APPLICABLE STANDARDS

Electromagnetic compatibility:
Directive 2004/108/EC. Applicable Standard : EN61326:2006.
Low voltage:
Directive 2006/95/EC (CE conform). Applicable standard, for a class I instrument, pollution degree 2, installation category II: CEI EN 61010-1.
Operating temperature: 0 - 50°C;
Storage: -25°C to 70°C.
Relative humidity : 5 - 95%, not condensing.
Applicable also to external amplifiers AMI 332 and AMI 632.

OPTIONAL ACCESSORIES

EXTERNAL AMPLIFIERS

AMI 332 - CURRENT AMPLIFIER 3X32A
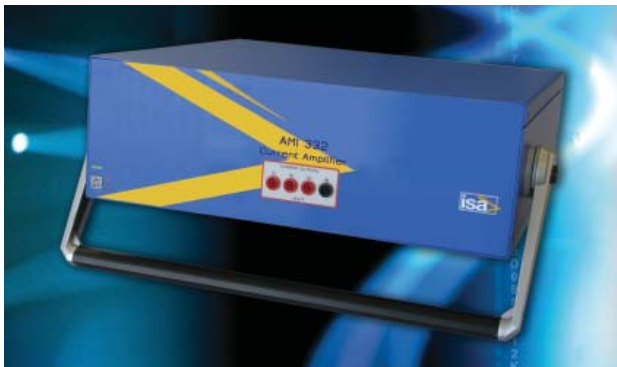
The three phase current amplifier AMI 332 is an additional device to DRTS 64. The option requires IRIG-B connection and output extension module on DRTS 64 and it includes three current generators at 32 A each. In connection with the DRTS 64, the option offers the following features:
. To control nine currents at 32 A each at the meantime, for the test of two-secondary transformer protection relays;
. To have a three phase generator at 96 A per phase;
. To have a single phase generator at 192 A.

CURRENT GENERATORS	POWER
3 x 0 … 32 A AC	3 x 430 VA at 32 A AC
1 x 0 ... 96 A AC	1 x 1000 VA at 64 A AC

AMI 332 - Technical Specification

Accuracy: Typical 0.02% of the value ± 0.01% of the range; guaranteed 0.04% of the value ± 0.01% of the range.
Distortion: 0.05% Typical - 0.15% guaranteed.
Resolution: 1 mA.
Connections: 4 mm banana sockets.

AMI 632 - CURRENT AMPLIFIER 6X32A

The six phase current amplifier AMI 632 is an additional device to DRTS 64. The option requires IRIG-B connection and output extension module on DRTS 64 and it includes six current generators at 32 A each. In connection with the DRTS 64, the option offers the following features:
. To control twelve currents at 32 A each at the meantime, for the test of three windings transformer differential protection relays;
. To have a six phase generator at 64 A per phase;
. To have three phase generator at 128 A per phase;
. To have a single phase output at 256 A.

CURRENT GENERATORS	POWER
6x 0 … 32 A AC	6 x 430 VA at 32 A AC
3 x 0 … 64 A AC	3 x 860 VA at 64 A AC
1 x 0 … 128 A AC	1 x 1000 VA at 64 A AC

AMI 632 - Technical Specification

Accuracy: 0.02% of the value ± 0.01% of the range, Typical; 0.04% of the value ± 0.01% of the range, guaranteed.

Distortion: 0.05% Typical; 0.15% guaranteed.

Resolution: 1 mA.

Connections: 4 mm banana sockets.

Power supply for AMI 332 and AMI 632

- Mains power supply: 85V to 264 V AC, sinusoidal, single phase.
- Frequency: 45 to 65 Hz.
- Power consumption:
  . at rest: less than 150 W;
  . maximum load, 115 V supply: 800/1600 W;
  . maximum load, 230 V supply: 1300/2700 W.

Connection: Standard 16 A AC socket.

Accessories supplied with the units

Protective carrying bag.

Power supply cable.

Test leads kit.

Connection cable to DRTS 64.

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

The option IN2-CDG includes 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.

HPB 400 CURRENT BOOSTER

The option is aimed at testing old electro-mechanical overcurrent relays; in particular, at relays rated 1 A. The power output is so high that it can test even relays rated at less than 1 A . Other features:

• Primary current: 32 A.

• Secondary currents: 20 A, 4 A, 1 A.

• Accuracy: 0.5% at half burden; 1% at full burden.

• Connections: two safety sockets for the primary side; four safety sockets for the secondary side.

TRANSCOPE: ANALOG/DIGITAL RECORDER AND MEASUREMENT FUNCTION

Optionally the test set can be provided with the feature of measuring and recording the following:

. 10 voltages or currents (with clamps or external shunts) AC and DC meter and recorder;

. Phase angle, wattmeter, frequency, harmonics meter, power quality meter;

. Oscilloscope functions;

. Sequence of Event recorder (up to 10 digital inputs);

. Fault recording function.

Input characteristics:

- Five isolated groups of two input circuits each.
- Inputs ranges: 100mV; 1; 10; 100; 600 V.
- Input impedance: 500 kOhm, 50 pF.
- Measurement accuracy: ± 0.06% typical; ± 0.15% guaranteed.
. Sampling frequency: 5 kHz, 10 kHz, 20 kHz, 50 kHz, software selection.
. Total buffer size: 4 Mbytes.
. Maximum recording duration:
  .. at 5 kHz: 6 min for 1 input channel / 40 s for 10 input channels.
  .. at 50 kHz: 40 s for 1 input channel / 4 s for 10 input channels.

Connections: 4 mm banana sockets.

The option must be specified at order.

INTERNAL GPS SYNCHRONIZER

The GPS synchronizer is an internal module that allows to synchronize the test start of two DRTS 64 or different test sets.

. Maximum timing error with respect to nominal: ± 1 μs.

The option includes:

- the antenna;
- an extension cable for the antenna, 20 m long.

The option must be specified at order.

EXTERNAL GPS SYNCHRONIZER

The GPS synchronizer is an external module that allows to synchronize the test start of two DRTS 64.

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 µs.

. 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.

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 us;

. Impulse frequency: less than 500 Hz;

. Duty cycle: 50%;

. 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 64;

. The power supply transformer, for the power of 220 V AC, to supply the scanning head.

IEC 61850 INTERFACE
IEC 61850-8

The standard IEC61850 describes the communication of devices in substations. IEC61850 messages coming from the devices connected to the substation network are also called GOOSE. GOOSE messages describe binary status signals over the substation network and are also used for relays tripping.

For relay testing applications within IEC61850 substations it is necessary to access these data.
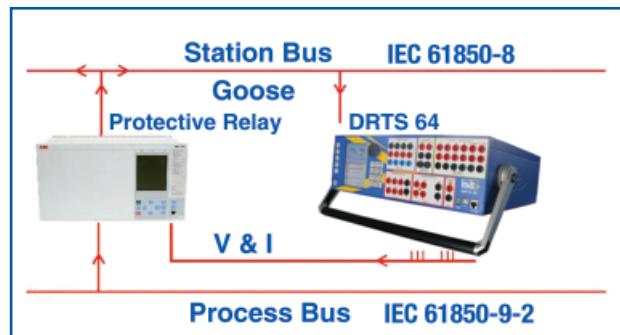
This new feature is performed by the ISA Automatic Relay Test Set DRTS 64. By means of a dedicated hardware and by the TDMS software, ISA DRTS 64 can expand its testing capabilities by handling IEC61850 messages.

The IEC61850 Interface option for DRTS 64 is required for relay testing with Ethernet-based substation communication protocol. The IEC61850 Interface is mounted on the front panel of DRTS 64. **The option must be specified at order.**

IEC 61850-9-2

The IEC 61850-9 option allows generating measurement messages on the system bus. The option and the associated software provide the following features:

. Possibility to inject Sampled Values on the system bus, corresponding to CT and VT measurements;

. Possibility to test relays connected to the system bus, by the generation of Sampled Values and the monitoring of the relay tripping, as described above.

The connection is performed via an optical fiber connector, mounted on the rear of the test set. **The option must be specified at order.**

RELAY CONNECTION CABLE KIT

This option can be added to the basic cable kit to provide connection to all test set sockets. It includes also 20 adaptors for terminal block connections and 3 jumpers to parallel current outputs.

Optional set of testing cables

Standard set of testing cables

TRANSIT CASE

Three options are available:

. Heavy duty transit case (Discovery type) in black plastics.
. Heavy duty transit case in aluminium.
. Soft carrying bag.

Heavy duty transport case

Heavy duty transport case in aluminium

Soft bag

Stand-up support

ORDERING INFORMATION

CODE	MODULE
35170	DRTS 64 6I/4V
30170	DRTS 64 6I/4V - with IRIG-B and output extension module
10015	TDMS - Test & Data Management Software

OPTIONAL ACCESSORIES

CODE	MODULE
87170	IRIG-B sincronization and outputs extension module
88170	Internal GPS receiver with antenna and cable *
89170	IEC61850-9-2 Protocol Interface - Sampled values *
83170	IEC61850-8 Protocol Interface - Goose
70170	HPB 400 current booster
98156	IN2-CDG - Current Booster for 1 A rated high burden relays
82170	TRANSCOPE - Analog/Digital recorder and measurement module
10161	GPS syncronizer - External module with antenna and cable
20162	SH 2003 energy meter universal scanning head
15170	Complete set of test leads
85170	Heavy duty transport case (Discovery type)
17170	Aluminium transport case
18170	Soft carrying bag
29166	Active AC/DC Current Clamp 2 A - 80 A
24156	Power Line synchronizer
19170	Stand-up support
13170	Zero power Thytronic thysensor cables set*
12170	Zero power ABB REF542PLUS & REF601 cables set*

EXTERNAL AMPLIFIERS

CODE	MODULE
80170	AMI 332 - 3I*
81170	AMI 632 - 6I*

NOTE*: Internal GPS, IEC61850-9-2, external amplifiers and Zero Power cables sets require code 87170- IRIG-B and output extension module.