

DRTS 66

The new generation of advanced test equipments 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 6 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
- End to end test with GPS or IRIG-B
- 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 66 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 66

DRTS 66 SPECIFICATIONS

DRTS 66 is the leading edge most powerful and accurate relay, energy meters (class 0.2) and transducers test set manufactured by ISA. The locally and PC controlled test set generates high precision (0.05% accuracy) digital signal using multiple DSP's technology.

Three 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: 3 Current and 4 Voltage generators plus 1 battery simulator.

Its powerful current outputs (3 x 64 A at 860 VA) and voltage outputs (4 x 300V at 100 VA) allows 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

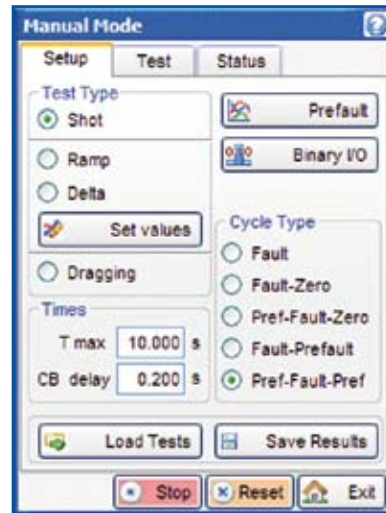
DRTS 66 can be operated directly from the front panel by means of a large color graphical display, a rotary selector, a keypad and function keys.

Two PC interfaces, USB and Ethernet allow to control the test set with the advanced testing software TDMS.

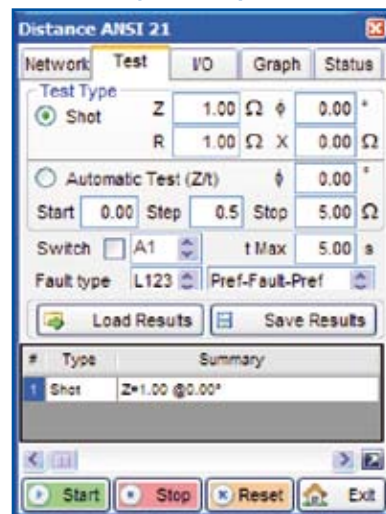
TDMS software is a powerful software package for testing Protective relays, Watt-hour meters, Transducers and Power quality meters, in transmission, distribution and power generation. TDMS provides data management for acceptance and maintenance testing activities.

Local Control

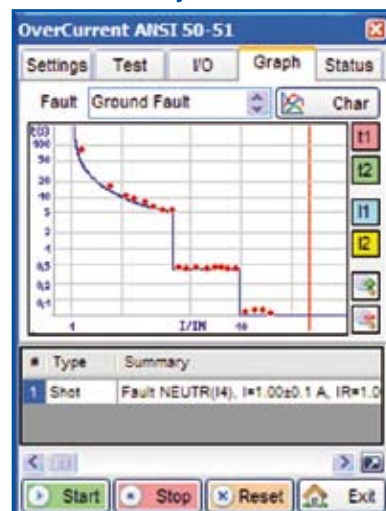
Manual test setup



Distance relay test setup



Over-current relay test result



TECHNICAL SPECIFICATION

CURRENT GENERATORS

Current Outputs

| DRTS 66 / DRTS 64 | DRTS 34 |
|--------------------|-------------------|
| 6 x 0 ... 32 A AC | 3 x 0 ... 32 A AC |
| 3 x 0 ... 64 A AC | 1 X 0 ... 96 A AC |
| 1 x 0 ... 128 A AC | |

Output Power

Typical values

| DRTS 66 / DRTS 64 | DRTS 34 |
|---------------------|---------------------|
| 6 x 430 VA at 32 A | 3 x 420 VA at 32 A |
| 3 x 860 VA at 64 A | 1 x 1000 VA at 64 A |
| 1 x 1000 VA at 64 A | |

- Accuracy: typical $\pm 0.025\%$ of the value $\pm 0.0015\%$ of the range, guaranteed 0.04% of the value $\pm 0.02\%$ of the range.
- Distortion: 0.05% Typical - 0.15% guaranteed
- Resolution: 1 mA at 32 A
- Connections: 4 mm banana sockets

VOLTAGE GENERATORS

Voltage Outputs

| DRTS 66 | DRTS 64 / DRTS 34 |
|-----------------|-------------------|
| 6 x 0 ... 300 V | 4 x 0 ... 300 V |
| 1 x 0 ... 600 V | 1 x 0 ... 600 V |

Output Power

Typical values

| DRTS 66 | DRTS 64 / DRTS 34 |
|---------------------------|---------------------------|
| 3 x 100 VA at 125...300 V | 3 x 100 VA at 125...300 V |
| 4 x 85 VA at 125...300 V | 4 x 85 VA at 125...300V |
| 6 x 50 VA at 125...300 V | 1 x 200 VA at 125...300 V |
| 1 x 200 VA at 125...300 V | 1 x 200 VA at 600 V |
| 1 x 200 VA at 600 V | |

- One voltage output can be selected via software to act as an independent voltage output or via software the output can be selected to be: $V_0 = (\mathbf{V}_1 + \mathbf{V}_2 + \mathbf{V}_3)/3$ or $V_0 = (\mathbf{V}_1 + \mathbf{V}_2 + \mathbf{V}_3)/1.73$ (bolded stays for vector sum).
- Ranges: 12.5 V and 300 V.

- Accuracy: Typical $\pm 0.025\%$ of the value $\pm 0.01\%$ of the range, guaranteed $\pm 0.06\%$ of the value $\pm 0.015\%$ 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 μ Hz.

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 Output

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 \pm 0.1 ms.

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

Two inputs can be programmed as pulse counters.

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 socket.

Binary Outputs Transistors

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: 20 kHz.

Connections: multipole connector, rear side.

ANALOG DC MEASURING INPUTS

• DC Current measuring input

. Measuring ranges: \pm 20 mA and \pm 5 mA.

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

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

Connections: 4 mm banana sockets.

• DC Voltage measuring input

. Measuring range \pm 10 V.

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

Connections: 4 mm banana sockets.

NOTE: all specifications apply at 25 °C \pm 2 °C.

AC specifications apply for sinusoidal waveform and frequency between 48 and 62 Hz. Temperature drift: \pm 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 optional IEC61850 interface:

. Connector type: RJ-45.

. Interface cable: 2 meters, included.

Characteristics of the IRIG-B connection:

. Fiber optic connector, ST type.

Pen drive interface

It allows saving and recalling 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 inch.

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: 1800 W;

. maximum load, 230 V supply: 2700 W.

Connection: Standard AC socket.

WEIGHT AND DIMENSIONS

Weight: 18 kg (39,6 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: 14 cables.

Power supply cable.

Ground connection cable.

USB and Ethernet cables.

Instruction and maintenance manuals.

ENVIRONMENTAL

Operation temperature: 0° ... +50°C (+32 ... +122°F)

Storage temperature: -25° ... +70°C (-13 ... +158°F)

Humidity range: relative humidity 5 ... 95%, non-condensing

Vibration: IEC 60068-2-6 (20 m/s² at 10 ... 150 Hz)

Shock: IEC 60068-2-27 (15g/11ms half-sine)

Applicable also for external amplifiers AMI 332 and AMI 632.

APPLICABLE STANDARDS

Safety and electromagnetic compatibility:

EMC: the product adheres to the electromagnetic compatibility (EMC) Directive 2004/108/EC (CE conform).

Emission, Europe: EN 61326; EN 61000-6-4; EN 61000-3-2/3;

International: IEC 61326; IEC 61000-6-4; IEC 61000-3-2/3

Immunity, Europe: EN 61326; EN 61000-6-2; EN 61000-4-2/3/4/5/6/8/11;

International: IEC 61326; IEC 61000-6-2; IEC 61000-4-2/3/4/5/6/8/11.

Safety

The product adheres to the low voltage Directive 2006/95/EC (CE conform).

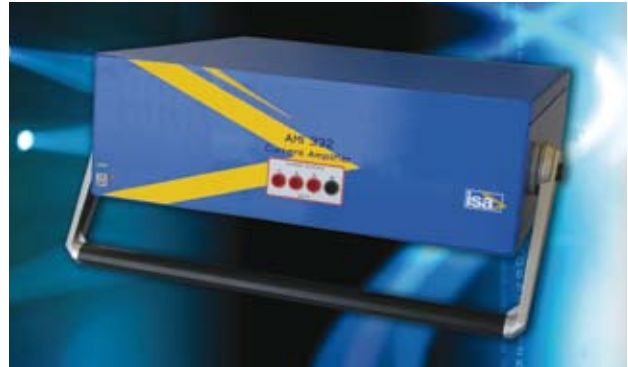
Europe: EN 61010-1. Insulation of PC and SELV interfaces complies with EN 60950-1; International: IEC 61010-1.

Applicable also for 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 the DRTS 66. The option includes three current generators at 32 A each. In connection with the DRTS 66, 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 216 A.

AMI 332 - Technical Specification

| 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 |

Accuracy: Typical 0.02% of the value ± 0.01% of the range, guaranteed 0.04% of the value ± 0.02% 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 the DRTS 66. The option includes six current generators at 32 A each. In connection with the DRTS 66, 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 288 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 \pm 0.01% of the range, Typical
 0.04% of the value \pm 0.015% 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: 500/1000 W;
 - . maximum load, 230 V supply: 1000/2000 W.

Connection: Standard AC socket.

ACCESSORIES SUPPLIED WITH THE UNIT

- Protective carrying bag.
- Power supply cable.
- Test leads kit.
- Connection cable to DRTS 66 unit.

IN3-CDG CURRENT BOOSTER FOR 1 A RATED HIGH BURDEN RELAYS

The option IN3-CDG by means of a set of three current transformers, with the following characteristics:

- Primaries: 16/32 A;
- Secondaries: 0.5 A; 1 A; 2.5 A; 5 A;
- Nominal power: 100 VA;
- Current ratio error: 0.2%.

Case: plastic with handle.

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

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.

This option is to be specified at order.

Input characteristics:

- Five isolated groups of two input circuits;
- Inputs ranges: 100mV; 1; 10; 100; 600 V.
- Input impedance: 500 kOhm, 50 pF.
- Measurement accuracy: \pm 0.06% typical; \pm 0.015% guaranteed.
- . Sampling frequency: 5 kHz, 10 kHz, 20 kHz, 50 kHz, software selection.
- . Total buffer size: 4 Mbytes.
- . Maximum recording duration:
 - .. at 5 kHz: 13 min for 1 input channel / 80 s for 10 inputs channels.
 - .. at 50 kHz: 80 s for 1 input channel / 8 s for 10 inputs channels.

Connections: 4 mm banana sockets.

GPS SYNCHRONIZER

The GPS synchronizer is an external module that allows to synchronize test start of two DRTS 66.



Features are:

- . 1 digital output 0-24 V DC, for synchronisation.
- . 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 us.
- . 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.

SHA 6 ENERGY METERS UNIVERSAL SCANNING HEAD

SHA 6 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 66;

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



IEC 61850 INTERFACE

The standard IEC 61850 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 to these data.

This new feature is performed by ISA Automatic Relay Test Set DRTS 66. By means of a dedicated hardware and the TDMS software, ISA DRTS 66 can expand his testing capabilities by handling those IEC61850 messages.



The IEC61850 Interface option for DRTS 66 is required for relay testing with Ethernet-based substation communication protocol. The IEC61850 Interface is mounted on the back panel of the DRTS 66.

RELAY CONNECTION CABLE KIT

This option includes 18 cables, with different colours, with banana plugs, 2 m long, cross section 1.5 sq. mm, 20 adaptors for terminal block connection, 3 jumpers.

DRTS 66



DRTS 66 - Standard set of testing cables



DRTS 66 - Optional set of testing cables

TRANSIT CASE

The protection of DRTS 66 from delivery problems is provided by this robust transit case (Discovery type) in black plastics, that features the following:

- Molded-case construction;
- Handle on the top;
- Wheels;

The optional transit case is available for DRTS 66, DRTS 64, DRTS 34, AMI 332 and AMI 632 current external amplifiers.



DRTS 66 - Heavy duty transport case



DRTS 66 - Soft bag

ORDERING INFORMATION

| CODE | MODULE |
|-------|--|
| 40170 | DRTS 66 6I/6V |
| 30170 | DRTS 64 6I/4V |
| 20170 | DRTS 34 3I/4V |
| 10170 | DRTS 33 3I/3V |
| 10015 | TDMS - Test & Data Management Software |

OPTIONAL ACCESSORIES

| CODE | MODULE |
|-------|--|
| 83170 | IEC 61850 interface |
| 98156 | IN3-CDG - Current Booster for 1 A rated high burden relays |
| 82170 | Analog and digital recorder and measurement TRANSCOPE module |
| 10161 | GPS synchronizer |
| 20162 | SHA 6 energy meter universal scanning head |
| 15170 | Complete set of test leads |
| 85170 | Heavy duty transport case (Discovery type) |
| 29166 | Active AC/DC Current Clamp 2 A - 80 A |

EXTERNAL AMPLIFIERS

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

The document is subject to change without notice.