THE NEW GENERATION OF ADVANCED TEST EQUIPMENTS FOR RELAYS, ENERGY METERS, TRANSUDCERS AND POWER QUALITY METERS.

www.isatest.com
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 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%
- IEC 61850 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

**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 electromechanical relays.

The test sets integrate the IEC 61850 protocol interface for testing relay with Ethernet-based substation communication protocol.

**APPLICATION**

DRTS 64 can test all the following relays

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

**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. It can also be operated by the optional Local Touch Control (touch screen) module that can be used attached or detached from the test set.
TECHNICAL SPECIFICATION

CURRENT GENERATORS
Current Outputs

<table>
<thead>
<tr>
<th>Current Outputs</th>
<th>DRTS 64</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRTS 64</td>
<td>6 x 0 ... 32 A AC</td>
</tr>
<tr>
<td></td>
<td>3 x 0 ... 64 A AC</td>
</tr>
<tr>
<td></td>
<td>1 x 0 ... 128 A AC</td>
</tr>
</tbody>
</table>

Output Power
Typical values

<table>
<thead>
<tr>
<th>Output Power</th>
<th>DRTS 64</th>
<th>Typical values</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRTS 64</td>
<td></td>
<td>3 x 100 VA at 125 ... 300 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 x 85 VA at 125 ... 300 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 x 200 VA at 125 ... 300 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 x 200 VA at 600 V</td>
</tr>
</tbody>
</table>

- 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: $V_0 = (V_1 + V_2 + V_3)/3$ or $V_0 = (V_1 + V_2 + V_3)/1.73$ (bolded stays for vector sum).
- Accuracy: Typical ±0.02% of the value ± 0.01% of the range; guaranteed ±0.04% of the value ± 0.01% of the range.
- Distortion: 0.015% Typical; 0.3% 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°.

RANGES: 12.5 V and 300 V.
Accuracy (voltages and currents) 50/60 Hz: 0.01° typical, 0.02° 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** *(option included in code 87170)*
- 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: M 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.

**INTERFACE CONNECTIONS**

- Type of interfaces: USB, Ethernet, IEC 61850, IRIG-B.
- **USB interface**
  - Transmission rate: 3x minimum.
  - Interface cable: 2 meters, included.
- **Ethernet interface**
  - Connector type: RJ-45.
  - Interface cable: 2 meters, included.
- **IEC61850 interface** *(optional)*
  - Connector type: RJ-45.
  - Interface cable: 2 meters, included.
- **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.
- 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:
  - Stand-by: 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 (44 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:

Low voltage:
Operating temperature: 0 - 55°C;
Storage: -25°C to 70°C.
Relative humidity: 5 - 95%, without internal condensation.
Altitude: < 2000 m.
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.

<table>
<thead>
<tr>
<th>CURRENT GENERATORS</th>
<th>POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 x 0 ... 32 A AC</td>
<td>3 x 430 VA at 32 A AC</td>
</tr>
<tr>
<td>1 x 0 ... 96 A AC</td>
<td>1 x 1000 VA at 64 A AC</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>CURRENT GENERATORS</th>
<th>POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 0 ... 32 A AC</td>
<td>6 x 430 VA at 32 A AC</td>
</tr>
<tr>
<td>3 x 0 ... 64 A AC</td>
<td>3 x 860 VA at 64 A AC</td>
</tr>
<tr>
<td>1 x 0 ... 128 A AC</td>
<td>1 x 1000 VA at 64 A AC</td>
</tr>
</tbody>
</table>

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 and 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 600 AND HPB 400 CURRENT BOOSTERS
These options are 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 for HPB 400:
- Primary current: 32 A.
- Secondary currents: 20 A; 4 A; 1 A.
Other features for HPB 600:
- Primary current: 2 x 32 A.
- Secondary currents: 20 A; 10 A; 4 A; 1 A.
For both options:
- 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 this feature to measure and record 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.
This option is to 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 other test sets.

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 O-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 has to 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:
- injection of Sampled Values on the system bus, corresponding to CT and VT measurements;
- test of 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 has to 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

TRANSIT CASE
Three options are available:
- Heavy duty plastic transport case (Discovery type)
- Heavy duty transport case
- Soft carrying bag

PLCK POLARITY CHECKER MODULE
Checking the correct connection of CT’s and VT’s to protection relays is a problem because relays can be hundreds of meters away from the transformer. PLCK easily solves the issue. When this test is started, DRTS 64 generates a special, not sinusoidal waveform, which is injected into the connection cables. The polarity check is easily performed by connecting it at the relay site. PLCK has two lights: green and red. The green light turns on when the polarity is correct; the red light turns on when the polarity is wrong.
**OPTIONAL LOCAL TOUCH CONTROL**

With the optional Local Touch Control the unit can be easily controlled using the rugged touch screen and the Manual Control software applications. The Local Touch Control can be used attached or detached to the test set. When used attached to the test set the rugged Touch Local Control is fixed to the test unit by means of a robust hinged module. If detached from the test set the Local Touch Control unit can be easily managed as a rugged tablet touch screen controller.

**OPTIONAL ACCESSORIES**

<table>
<thead>
<tr>
<th>CODE</th>
<th>MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>87170</td>
<td>IRIG-B synchronization and outputs extension module</td>
</tr>
<tr>
<td>88170</td>
<td>Internal GPS receiver with antenna and cable *</td>
</tr>
<tr>
<td>89170</td>
<td>IEC61850-9-2 Protocol Interface - Sampled values *</td>
</tr>
<tr>
<td>83170</td>
<td>IEC61850-8 Protocol Interface - Goose</td>
</tr>
<tr>
<td>70170</td>
<td>HPB 400 current booster</td>
</tr>
<tr>
<td>71170</td>
<td>HPB 600 current booster</td>
</tr>
<tr>
<td>98156</td>
<td>IN2-CDG - Current Booster for 1 A rated high burden relays</td>
</tr>
<tr>
<td>82170</td>
<td>TRANSCOPE - Analog/Digital recorder and measurement module</td>
</tr>
<tr>
<td>10161</td>
<td>GPS synchronizer - External module with antenna and cable</td>
</tr>
<tr>
<td>20162</td>
<td>SH 2003 energy meter universal scanning head</td>
</tr>
<tr>
<td>15170</td>
<td>Complete set of test leads</td>
</tr>
<tr>
<td>85170</td>
<td>Heavy duty plastic transport case</td>
</tr>
<tr>
<td>17170</td>
<td>Heavy duty transport case</td>
</tr>
<tr>
<td>18170</td>
<td>Soft carrying bag</td>
</tr>
<tr>
<td>29166</td>
<td>Active AC/DC Current Clamp 2 A - 80 A</td>
</tr>
<tr>
<td>72170</td>
<td>Power Line synchronizer with optical fiber output</td>
</tr>
<tr>
<td>19170</td>
<td>Stand-up support</td>
</tr>
<tr>
<td>13170</td>
<td>Zero power Thytronic thysensor cables set*</td>
</tr>
<tr>
<td>12170</td>
<td>Zero power ABB REF542PLUS &amp; REF601 cables set*</td>
</tr>
<tr>
<td>41175</td>
<td>PLCK - Polarity checker</td>
</tr>
<tr>
<td>06170</td>
<td>Optional Local Touch Control</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>CODE</th>
<th>MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>45170</td>
<td>DRTS 66 6I/6V</td>
</tr>
<tr>
<td>35170</td>
<td>DRTS 64 6I/4V</td>
</tr>
<tr>
<td>22170</td>
<td>DRTS 34 3I/4V</td>
</tr>
<tr>
<td>10170</td>
<td>DRTS 33 3I/3V</td>
</tr>
<tr>
<td>40170</td>
<td>DRTS 66 6I/6V - with IRIG-B and output extension module</td>
</tr>
<tr>
<td>30170</td>
<td>DRTS 64 6I/4V - with IRIG-B and output extension module</td>
</tr>
<tr>
<td>20170</td>
<td>DRTS 34 3I/4V - with IRIG-B and output extension module</td>
</tr>
<tr>
<td>10015</td>
<td>TDMS - Test &amp; Data Management Software</td>
</tr>
</tbody>
</table>

**EXTERNAL AMPLIFIERS**

<table>
<thead>
<tr>
<th>CODE</th>
<th>MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>80170</td>
<td>AMI 332 - 3I*</td>
</tr>
<tr>
<td>81170</td>
<td>AMI 632 - 6I*</td>
</tr>
</tbody>
</table>

**NOTE**: Internal GPS, IEC61850-9-2, zero power set cables and external amplifiers require code 87170-IRIG-B and output extension module.

The document is subject to change without notice. Always refer to our technical specification for more detailed information and as formal contract document.