

- **Multi-function test set designed for testing protection relays, watt-hour meters (option)**
- **Lightweight**
- **High accuracy: better than 0.1%**
- **3 current and 3 voltage outputs**
- **Transient playback and harmonics generation**
- **End to end test of line protection**
- **USB and RS232 port**

**A P P L I C A T I O N**

**BER 3 can test all the following relays**

<b>RELAY TYPE</b>	<b>IEEE NO</b>
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



## BER 3 SPECIFICATION

### Three phase AC/DC current outputs

#### AC/DC current outputs

	CURRENT A	POWER VA	RESOLUTION	ACCURACY
3 X	0...12.5	40	760 $\mu$ A	0.1%
3 X	0...1.25		100 $\mu$ A	0.1%
3 X	0...0.125		10 $\mu$ A	0.1%
1 X	0...25	80	1.5 mA	0.1%
1 X	0...12.5	80	760 $\mu$ 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  $\pm 0.001$  A/s and  $\pm 999$  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 d.c. to 2000 Hz; transient 4 kHz.

### Three phase AC/DC voltage outputs

#### AC/DC voltage outputs

	CURRENT A	POWER VA	RESOLUTION	ACCURACY
3 X	0...125	40	7.6 mV	0.1%
3 X	0...12.5		760 $\mu$ V	0.1%
3 X	0...1		100 $\mu$ 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  $\pm 0.001$  V/s and  $\pm 999$  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.

### Angles

Phase angle range:  $0^\circ - 360^\circ$ .

Angle resolution:  $0.01^\circ$ .

Angle accuracy:  $\pm 0.1^\circ$ .

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 all selections except the last one, other outputs generate the pre-fault frequency.

Maximum frequency error: 50  $\mu$ Hz (1 ppm).

Resolution: 100  $\mu$ Hz.

Rate of change programmable between  $\pm 0.001$  Hz/s and  $\pm 999$  Hz/s.

Capable of generating waveform with a superimposed harmonic distortion.

### Time measurements

Binary inputs: 8 inputs, clean or with voltage from 4 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 2,000  $\mu$ s; software controlled.

Timer range: 0 - 999,999.9999 s (277 hours);

Resolution: 0.1 ms.

Timer accuracy: 0.01% of reading  $\pm 0.1$  ms.

### 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.

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

### Accessories supplied with the unit

Protective carrying bag.  
Power supply cable.  
Set of test leads.  
Serial interface cable and USB cable.  
Serial port adapter, 9 to 25 way.  
Connectors for AC Sources output, Binary Inputs/Outputs.  
Instruction and maintenance manuals.

## OPTIONAL ACCESSORIES

### IO-6432 Digital input and output expansion



The option IO-6432 increases the number of logic inputs and outputs that can be monitored by DRTS.  
The option adds to inputs and outputs that are located in DRTS.  
The IO-6432 is fitted internally the DRTS unit.

### IO-6432 Specification

Number of inputs: 64, by 4 groups of 16.  
Inputs: logic, voltage from 5 to 130 V DC; maximum load current 3 mA.  
Input and output groups are isolated from each other; they are also isolated from the rest of the instrument, from the mains supply and from the ground.  
It is possible to separately program each input as Normally Open or Normally Closed or Disabled.  
It is possible to separately program the timer stop of each programmed input as Trip or Reset.  
Logic input time measurement resolution: 1 ms.  
Logic input time measurement accuracy: 2 ms.  
Number of outputs: 32, in 4 groups of 8.  
Type of outputs: open collector closing to zero; maximum voltage 130 V; minimum current capability 15 mA.  
It is possible to separately program each logic output as Normally Open or Normally Closed.  
It is possible to separately delay each logic output with respect to currents and voltages.  
Delay range: 0 to 9999.99 s.  
Logic output time accuracy: 1 ms.

### Optional GPS synchronizer



External module for synchronization of two BER 3 sets via GPS system, for end to end test of differential relays.  
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  $\mu$ s.  
Two test sets synchronized with GPS produce the maximum error of 50  $\mu$ s.  
Power supply: 110/220 V AC.  
The option includes the antenna and connection cables.

Weight: 1.7 kg.  
 Dimensions: 150 x 100 x 240 mm.  
 Case: plastic case.

### Optional transit case

Optional Protector-type plastic heavy duty transit case for air transport and for rough trips, available for BER 3 external amplifiers.

## 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 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.

### Ordering information:

CODE	MODULE
10163	BER 3 3 x I 0 ... 12,5 A 3 x V 0 ... 125 V
10015	TDMS - Test & Data Management Software

### Option for BER 3

CODE	MODULE
18150	Protector Air Transport Case
15150	Set of Test cables
10161	GPS Synchronizer
99153	IN 1 CDG - Option for 1A High burden relays

## BER 3 ACCESSORIES



BER 3 - Heavy Duty Transport Case



BER 3 - Plastic Carry Bag



BER 3 - Standard Tests Leads



RS232 and USB Communication cables