BALTO MODULAR
DC High Current Circuit Breaker Tester



- **New – Balto Modular Control unit for standalone DC protection relay testing**
- **New – Portable DC High Current Circuit Breaker Tester – for testing DC High Speed Circuit Breakers**
- **Modular design - can be extended for future needs**
- **Power source from batteries and ultra-caps**
- **Current rising slope according to IEC 61992-2 (Traction Power Substations) and IEC 60077-2 (Rolling Stock)**
- **Measures Trip Current (Ids); Opening Time, Contact Resistance and Secondary Injection testing for Relays**
- **USB and Ethernet RJ45 Interfaces**
- **BALTO Win – Communication software for PC**
- **Generates PDF reports on board**
- **Optional clamp connection for high speed circuit breakers**
- **Registered International Patents**

DESCRIPTION

Railway operators involved in the service and maintenance of the railway network are challenged with testing DC high speed circuit breakers and in particular when it comes to the control and the adjustment of the threshold circuit breaker trip current, known as Ids, and when comparing results to the circuit breaker OEM specification.

The solution is the Megger Balto. Designed with the user in mind this innovative mobile Megger Balto system is useable for up to 40000 A which meets the challenges of the manufacturers and users of DC high speed circuit-breakers. The Megger Balto DC High Current Circuit Breaker Tester was developed to generate very high and precise DC test currents in order to carry out functional tests on DC high speed circuit-breakers. These very high currents are injected in the main circuit of DC high speed circuit-breakers and allow control of the entire circuit including the measurement elements, current converters and protection relays.

FEATURES

To meet the needs of the market, Megger provides the innovative Megger Balto Modular system based on the requirements of the DC high speed circuit-breakers' manufacturers and from various railway networks managers and users.

Each Megger Balto Modular complete system consists of a...

- **Control Unit** – the operator terminal
- **Current Generator(s)** – the power source or power unit– up to 5 units
- **Trolley** - housing batteries, ultra-caps and battery charger.
- **Cable Set** – Connection to the test piece

The Megger Balto Modular

- Supports from 4000 A and extended up to (5x 4000 A Current Generators) 20000 A and up to 40000 A in a Master/Slave configuration
- Uses the 4000 A Current Generator
- Uses the Trolley and Battery Pack 8000, 12000, 20000 A

Each system is modular and can be extended:

- All the modules are portable, and the entire system is transportable to site on the convenient trolley and battery pack
- The system is easy to setup and straightforward to connect to the asset

User safety is paramount and the Megger Balto Modular system provides the automated monitoring of the system and temperature guarding of the ultra-caps.

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In addition the system also provides….

- Automatic recognition of the Current Generators
- Auto diagnostic – Control and calibrate of current measurement per Current Generator
- Current increase management
- Accurate display of measurements

The Megger Balto Modular system provides a number of Standard Test Modes….

Standard Test Modes

- Automatic mode with quick test
  - Quick test to determine approximate Circuit Breaker Trip Current - Ids.
  - Automatic test with current increase slope according to IEC 61992-2 (Traction Power Substations) and IEC 60077-2 (Rolling Stock) for accurate testing of Ids
  - Graphical display of measurement results
- Manual mode
  - Measurement of the DC high speed circuit-breakers opening time
  - Test of the DC protection
  - Calibration of the external devices
- Voltage drop measurement
  - Voltage drop measurement according to the DC high speed circuit-breakers manufacturer's procedure

APPLICATIONS

The Megger Balto System was developed for specific applications in the railway field, namely:

- Tests of DC high speed circuit-breakers for sub-stations and their protections
- Tests of DC high speed circuit-breakers in locomotives, train sets, subways, undergrounds and tramways
- Tests of electromagnetic contactors (control and main) in tramways and trolleybuses

The Megger Balto system can also be used for other applications where very high currents are required e.g. mining, steel factories, marine and solar.

SPECIFICATIONS

Power supply

Mains input	120 VAC 60 Hz
	230 VAC 50 Hz
Power consumption	120 VAC 60 Hz - 7.20 A
	230 VAC 50 Hz - 3.50 A

Power supply voltage

Batteries and ULTRA-caps 12 VDC – 15.7 VDC

Power cord	CEE 7/7 Plug to IEC 60320 C13, 2 m, 10 A, 250 VAC

Available ranges

System 4000 A - 20000 A per 4000 A unit

System master/slave 24000 A, 32000 A, 40000 A

Complete Modular System

Weight:	249 kg (548 lbs) for configuration with 5 Current Generator 4000 A, excl. power cables
Max. No. of Current	Generators: 5 (10 in master/slave configuration.)
Duration of injection:	2-5 sec
Accuracy of results:	1.5%

Control Unit

Offers the following features:

- Operator Terminal – Operation, control and management
- Communication interfaces
- Auxiliary supplies

Weight:	16.4 Kg
Dimensions:	500 x 480 x 230 mm
Functionality: and CPU	HMI (Human machine Interface)
Screen Type:	TFT touchscreen
Diagonal:	14.5 cm (5.7")
Resolution:	640 x 480 pixels

Secondary injection

- Outputs:
  - Voltage outputs : -60 mV/+60 mV...-10 V/+10 V
  - Current outputs : -20 mA...+20 mA and +4 mA...+20 mA
- Inputs:
  - Trip contact DC protection Relay
  - Trip contact (spare)

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- **Curves:**
  - Standard
  - User defined

Current Generator

Current converters:	DC/DC 4000 A
Weight per unit:	24.5 Kg
Dimensions:	700 x 430 x 160 mm

Trolley

- Control unit
- Current Generator 4000 A – 20000 A- Max. No. of Current Generators: 5 (10 in master/slave configuration providing 2x 20000 A = 40000 A)
- Batteries and chargers – Configured according to the system ordered
- Ultra-caps – Configured according to the system ordered

Dimension:	1100 x 700 x 750 mm
Energy compartments:	Batteries and Ultra caps
Chargers:	1 or 2, 20 A DC each
Max. Energy:	Approx. 1.5 kWh
Output voltage:	15.7 VDC
Earth cable cross-section:	2.5 mm^2
Max. No. of power units:	5

Output characteristics

Output voltage:	3.6 VDC - 4.71 VDC
Output current:	100 A - 4000 A up to 20000 A
Master/Slave:	Up to 40000 A
Duration of injection:	2-5 sec
Accuracy of results:	1.5%

Measures characteristic

Measure of the effective trip current Ids

Measure of the mechanical reaction time - opening time

Measure of the voltage drop

Environment

Application area: This test equipment is destined for applications in substations, electrical areas and industrial environments.

According harmonized document

EC directive

2006/42/EEC

LVD:	EN-IEC 61010-1:2010
EMC:	2004/108/EEC (EC EN61326-:2013)

Connections

Power supply cable: Standard

Output connections:

- High current flex cables, BALTO Modular Cable Set 1 - Power Supply Cables 4000 A; Power supply cable set - 240 mm^2; Length 2m Flex Conn Single
- From 20000 A up to 40000 A - Option: with Master-Slave
- Earth cable: 16 mm2

Software	Primary injection testing and calibration.
Optional:	Secondary injection testing.
On-screen keyboard:	QWERTY, AZERTY
Reporting:	PDF (standard), CVS (standard), XLS (optional).

Operating temperature

0 °C … +55 °C°

32 °F … +131 °F

Storage temperature

-20 °C ... +65 °C°

-13 °F … +149 °F

Humidity 5% - 95% non-condensing

Railway Standards/Railway applications/Fixed installations - DC switchgear

IEC 61992-1 Ed.2 - Part 1

IEC 61992-2 Ed.2 - Part 2

Railway applications/Electric equipment for rolling stock

IEC 60077-1 Part 1

IEC 60077-2 Part 2

Ingress Protection Rating IP20

Altitude	2000 m
Communication	Ethernet 100 base-TX and USB 2.0
Emergency stop	Stops all injections immediately
Interfaces languages	English, French, Dutch, German, Spanish, Italian, Chinese, Czech

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Systems Configuration

Balto Modular System	Current Output	System Extendable (with additional BALTO Modular Current Generator 4000 A)	Protection Relay Test Licence Key	Balto Win Software
BALTO Modular 4000-8	4000 A	8000 A	Optional	Optional
BALTO Modular 4000-12	4000 A	12000 A	Optional	Optional
BALTO Modular 4000-20	4000 A	20000 A	Optional	Optional
BALTO Modular 8000	8000 A	8000 A	Optional	Optional
BALTO Modular 8000-12	8000 A	12000 A	Optional	Optional
BALTO Modular 8000-20	8000 A	20000 A	Optional	Optional
BALTO Modular 12000	12000 A	12000 A	Optional	Optional
BALTO Modular 12000-20	12000 A	20000 A	Optional	Optional
BALTO Modular 16000-20	16000 A	20000 A	Optional	Optional
BALTO Modular 20000	20000 A	20000 A	Optional	Optional
BALTO Modular 24000-40	24000 A	40000 A	Optional	Optional
BALTO Modular 32000-40	32000 A	40000 A	Optional	Optional
BALTO Modular 40000	40000 A	40000 A	Optional	Optional

ORDERING INFORMATION

BALTO Modular 4000-8 **1013-638**

BALTO Modular 4000-8 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 8000 A, BALTO Modular Current Generator 4000 A, BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win

BALTO Modular 4000-12 **1013-640**

BALTO Modular 4000-12 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 12000 A, BALTO Modular Current Generator 4000 A, BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win

BALTO Modular 4000-20 **1013-643**

BALTO Modular 4000-20 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 20000 A, BALTO Modular Current Generator 4000 A, BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win

BALTO Modular 8000 **1013-639**

BALTO Modular 8000 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 8000 A, 2x BALTO Modular Current Generator 4000 A, 2x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win

BALTO Modular 8000-12 **1013-641**

BALTO Modular 8000-12 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 12000 A, 2x BALTO Modular Current Generator 4000 A, 2x BALTO Modular Cable Set 1- Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win

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BALTO Modular 8000-20	**1013-644**
BALTO Modular 8000-20 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 20000 A, 2x BALTO Modular Current Generator 4000 A, 2x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular 12000	**1013-642**
BALTO Modular 12000 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 12000 A, 3x BALTO Modular Current Generator 4000 A, 3x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular 12000-20	**1013-645**
BALTO Modular 12000-20 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 20000 A, 3x BALTO Modular Current Generator 4000 A, 3x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular 16000-20	**1013-646**
BALTO Modular 16000-20 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 20000 A, 4x BALTO Modular Current Generator 4000 A, 4x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular 20000	**1013-647**
BALTO Modular 20000 - BALTO Modular Controller, BALTO Modular Trolley and Battery Pack 20000 A, 5x BALTO Modular Current Generator 4000 A, 5x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular 24000-40	**1013-648**
BALTO Modular 24000-40 - 2x BALTO Modular Controller, 2x BALTO Modular Trolley and Battery Pack 20000 A, 6x BALTO Modular Current Generator 4000 A, 6x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Master-Slave, 2x BALTO Mounting kit Power Modules - excl. BALTO Win	

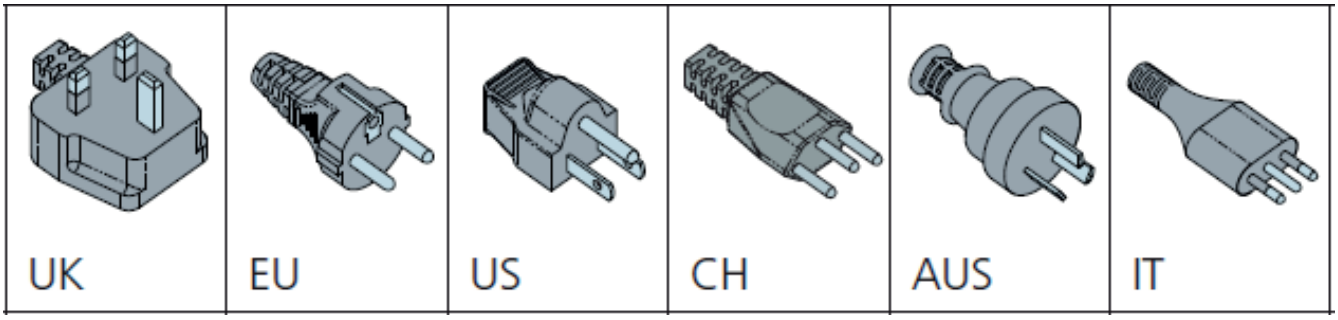
BALTO Modular 32000-40	**1013-649**
BALTO Modular 32000-40 - 2x BALTO Modular Controller, 2x BALTO Modular Trolley and Battery Pack 20000 A, 8x BALTO Modular Current Generator 4000 A, 8x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Master-Slave, 2x BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular 40000	**1013-650**
BALTO Modular 40000 - 2x BALTO Modular Controller, 2x BALTO Modular Trolley and Battery Pack 20000 A, 10x BALTO Modular Current Generator 4000 A, 10x BALTO Modular Cable Set 1 - Standard Cable, Protection Relay Test available with Licence Key (purchased separately), BALTO Master-Slave, 2x BALTO Mounting kit Power Modules - excl. BALTO Win	

BALTO Modular Control Unit	**1016-485**
Standalone Balto Modular Controller for DC protection relay testing - with EU mains lead (for other country plug types see below)	

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Important - Select Region for country specific power cord – All Balto Modular products include the EU plug type as standard.



Region	Description	Part Number
UK	Power Cords with UK Plug BS1363	**1013-660**
US	Power Cords with US Plug NEMA 15-5P	**1013-662**
CH	Power Cords with Switzerland Plug SEV1011	**1013-663**
CN/AUS	Power Cords with China/Australia Plug AS3112	**1013-664**
IT	Power Cords with Italy Plug CEI23-16	**1013-665**

For **BALTO Modular 24000-40**, **32000-40** and **40000** 2x power cords are required.

Accessories

BALTO Protection Relay Test Software License	**1013-658**
Licence Key to activate the Protection Relay Test Software	

BALTO Modular Current Generator 4000A	**1013-651**
BALTO Modular Current Generator 4000A - with BALTO Modular Cable Set 1 - Power Supply Cables 4000 A; Power supply cable set - 240 mm^2; Length 2 m Flex Conn Single	

BALTO Modular Cable set 1 - Standard Cable	**1013-652**
BALTO Modular Cable Set 1 - Power Supply Cables 4000 A; Power supply cable set - 240 mm^2; Length 2 m Flex Conn Single	

BALTO Extension cable set 1	**1013-653**
BALTO Modular and Compact Extension Cable Set 1 - Power Supply Cables 4000 A; Power supply cable set - 2 x 240 mm^2; Length 1 m	
Important note: the maximum current a BALTO Modular Current Generator can generate may decrease when extending the standard 2 m cables	

Description	Part number
BALTO Win Software	1013-654
BALTO Charge/Discharge Module	1013-901
BALTO Breaker Clamp	1013-655
BALTO Calibration tool	1013-656
BALTO 1 year extra warranty	1013-657

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