

TORHEL 900-series

Battery Load Unit

Megger[®]



- Batteries can be tested in service
- Dynamic discharge technology – full power at all voltages
- Safety in all details, e.g. detection of blocked airflow
- Real time monitoring during test
- Easy report function and calibration
- Easily expandable for larger battery banks using TXL extra load units
- Battery cell monitor control integrated in the system
- Can be used with Lead-Acid, Ni-Cd and other battery types

DESCRIPTION

The TORHEL™ 900 series is used to perform load/discharge testing which is the only way to determine battery systems actual capacity. Together with the optional cell voltage logger, BVM, connected directly to the TORHEL 900, it becomes a complete, stand-alone, discharge test system.

TORHEL comes in three models, 910, 930 and 950, see table below.

The high discharge capacity of TORHEL gives the opportunity to shorten the test time. Discharging can take place at up to 220 A, and if higher current is needed, two or more TORHEL units or extra load units, TXL, can be linked together. Tests can be conducted at constant current, constant power, constant resistance or in accordance with a pre-selected load profile.

Testing can also be carried out without disconnecting the battery from the equipment it serves. Via a DC clamp-on probe, TORHEL measures the total battery current while regulating it at a constant level. Battery systems can be plus or minus grounded or free floating.

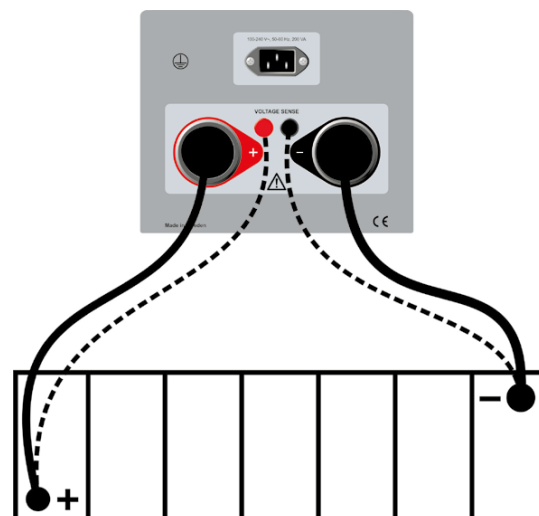
The test results can be presented and edited on a PC using the included PC software "TORHEL Viewer".

MODEL OVERVIEW

TORHEL	910	930	950
Current (max)	110 A	220 A	220 A
Voltage (max)	300 V	300 V	500 V
BVM functionality	No	Yes	Yes
Charging measurement	No	Yes	Yes
Full report functionality	No	Yes	Yes

APPLICATION EXAMPLE

The TORHEL is connected to battery, the current and the voltage alarm levels are set. After starting the discharge, TORHEL keeps the current constant at the preset level. When the voltage drops to a level slightly above the final voltage, TORHEL issues an alarm. If the voltage drops so low that there is a risk for deep discharging the battery, TORHEL shuts down the test. If the power supply is interrupted the test will continue when power is restored. All values are stored in TORHEL and can easily be transferred via a USB-stick or ethernet cable to a PC for evaluation and print out.



Separate sensing cables (dashed lines) should be used to get accurate voltage measurements to offset the voltage drop caused by long current cables and/or high current.

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FEATURES AND BENEFITS

1. **TXL STOP**
Output used for stop discharging from an external device (e.g. TXL). Galvanically isolated.
2. **SERVICE**
Connector for service purposes only.
3. **ALARM**
Output equipped with a relay contact for triggering an external alarm device.
4. **DC OUT**
9 V output for external current clamp.
5. **I_{EXT} ≤ 1 V**
Input used to measure current in an external path by means of a clamp-on probe or a current shunt.
6. **Display**
Touch screen 7"
7. **BVM1, BVM2**
USB connections for BVM units.
8. **USB connection**
For USB memory stick.
9. **Ethernet connection**
For reports connected to PC
10. **EMERGENCY STOP**
Push to stop.
Reset by turning it clock-wise
11. **Control knob**
For entering settings etc. Press to confirm a setting.
12. **Buzzer**
For alarms.
13. **ON/OFF switch**



14. 
Protective ground (earth) conductor terminal
15. **MAINS**
Connector for mains supply.
16. **+**
Connection terminal (+) for the battery (or other DC source).
17. **VOLTAGE SENSE**
Input for sensing voltage at the battery terminals.
Impedance to the battery current terminals is >1 MΩ.
18. **-**
Connection terminal (-) for the battery (or other DC source).

TORKEl 900-series Battery Load Unit

SPECIFICATIONS TORKEl 900-SERIES

Specifications are valid at nominal input voltage and an ambient temperature of +25°C, (77°F). Specifications are subject to change without notice.

Environment

Application field The instrument is intended for use in high-voltage substations and industrial environments.

Temperature

Operating 0°C to +50°C (32°F to +122°F)
Power derating at temperatures over +35°C (+95°F)

Storage & transport -40°C to +70°C (-40°F to +158°F)

Humidity 5% – 95% RH, non-condensing

Shock/Vibration/Fall

Instrument only ETSI EN 300 019-2-7 class 7M2

Instrument in transport case ISTA 2A

Altitude

Operating 3000 m (10000 ft)

Storage 10000 m (33000 ft)

Encapsulation class IP20

CE-marking

LVD 2014/35/EU

EMC 2014/30/EU

RoHS 2011/65/EU

General

Mains voltage 100 – 240 V AC, 50/60 Hz

Power consumption 200 W (max)

Power interruption 40 ms (max)

Protection Thermal cut-outs, Automatic overload protection, Emergency stop button

Dimensions 519x315x375 mm, (20.5" x 12.4" x 14.7")

Weight 19.5 kg (43.0 lbs) instrument
31.9 kg (70.3 lbs) incl. standard transport case
39,2 kg (86,4 lbs) incl. large transport case and cables

Display 7" LCD, Capacitive touch screen

Available languages Czech, English, French, German, Romanian, Russian, Spanish, Swedish

Number of test files 30 (max)

Test time 240 h (max)

Measurement section

Current measurement

Display range 0.0 to 2999.0 A

Basic inaccuracy $\pm(0.5\% \text{ of reading} + 0.1 \text{ A})$

Resolution 0.1 A

Internal current measurement

Range

TORKEl 910 0 to 110 A

TORKEl 930/950 0 to 220 A

Input for clamp-on probe

Range 0 to 1000 mV DC

mV/A-ratio 0.30 mV/A to 100.00 mV/A

Input impedance $>1 \text{ M}\Omega$

Voltage measurement

Voltage 0 to 500 V DC

Inaccuracy $\pm(0.5\% \text{ of reading} + 0.1 \text{ V DC})$

Resolution 0.1 V

Sample rate 10 Hz, Values are saved when change is $>10 \text{ mV}$

Time measurement

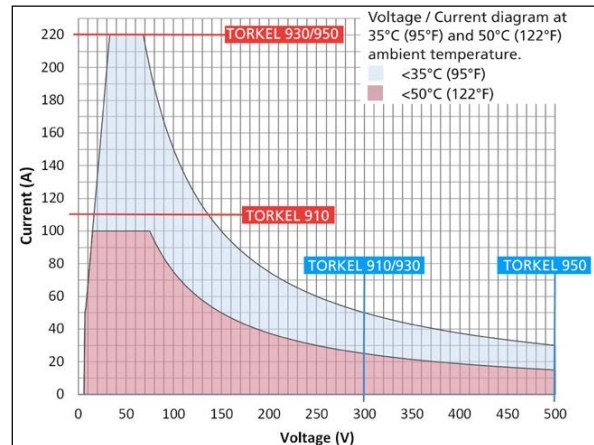
Inaccuracy $\pm 0.1\% \text{ of reading} \pm 1 \text{ digit}$

Load section

Battery voltage 7.5 V(3) to 300 V(1) / 500 V(2)

Power 15 kW (max)

Load patterns Constant current, constant power, constant resistance, current or power profile



Constant I

Range

TORKEl 910 0 to 110.0 A

TORKEl 930/950 0 to 220.0 A

Inaccuracy $\pm(0.5\% + 0.2 \text{ A})$

Resolution 0.1 A

Ripple max 0.5 A peak

Constant R

Range 300 m Ω to 3 k Ω

Inaccuracy $\pm 1\%$ typical

Resolution 100 m Ω

Constant P

Range 0 to 15 kW

Inaccuracy $\pm 1\%$ typical

Resolution 10 W

Inputs

+ 7.5 to 300 V¹⁾ 7.5 to 500 V²⁾

- 0 V

I EXT $\leq 1 \text{ V}$ 1 V DC, 300 V DC to ground

VOLTAGE SENSE Impedance to the current terminals is $>1 \text{ M}\Omega$

Outputs

ALARM

Relay contact 28 V DC, 8 A, 240 V AC, 8 A
Devices higher than Cat II must not be attached

TXL STOP

Relay contact 250 VDC, 0.28 A, 28 VDC, 8 A, 250 VAC, 8 A
9 V DC 9 V DC, $\pm 7\%$ max 100 mA

Communication ports

BVM1 BVM2 USB connection for BVM units

USB connection for USB memory

For reports connected to PC

1) TORKEl 910 and 930 2) TORKEl 950

3) On sw from R02G. Min voltage is 2V

TORTEL 900-series Battery Load Unit



SPECIFICATIONS TXL830/850/865/870/890

Specifications are valid at nominal input voltage and an ambient temperature of +25°C, (77°F). Specifications are subject to change without notice.

Environment

Application field The instrument is intended for use in high-voltage substations and industrial environments.

Temperature

Operating 0°C to +40°C (32°F to +104°F)
Storage & transport -40°C to +70°C (-40°F to +158°F)
Humidity 5% – 95% RH, non-condensing

CE-marking

LVD 2014/35/EU
EMC 2014/30/EU
RoHS 2011/65/EU

General

Mains voltage 100 – 240 V AC, 50/60 Hz
Power consumption 75 W (max)
Protection Thermal cut-outs, automatic overload protection
Dimensions
Instrument 210x353x600 mm (8.3" x 13.9" x 23.6")
Transport case 710 x 310 x 520 (28" x 12.2" x 20.5")
Weight Instrument 13 kg (29 lbs) 21,4 kg (47 lbs) with transport case

Load section

	Voltage (DC) max.	Current max.	Power max.
TXL830	28 V	300 A	8.3 kW
TXL850	56 V	300 A	16.4 kW
TXL865	260 V (98 A max)	117 A	25.5 kW
TXL870	280 V (56 A max)	112 A	15.8 kW
TXL890	480 V (32 A max)	62 A	15.4 kW

Internal resistance, 3-position selector

	Position 1	Position 2	Position 3
TXL830	0.275 Ω	0.138 Ω	0.092 Ω
TXL850	0.55 Ω	0.275 Ω	0.184 Ω
TXL865	2.65 Ω	5.05 Ω	0.12 Ω
TXL870	4.95 Ω	2.48 Ω	1.24 Ω
TXL890	14.10 Ω	7.05 Ω	3.52 Ω

Maximal currents, 3-position selector¹⁾

Position 1

	Current	Voltage	Cells	Cell voltage
TXL830	100 A	27.6 V	12	2.3 V
28 V max	78.5 A	21.6 V	12	1.8 V
TXL850	100 A	55.2 V	24	2.3 V
56 V max	78.5 A	43.2 V	24	1.8 V
TXL865	93.7 A	248.4 V	108	2.3 V
260 V max	73.4 A	194.4 V	108	1.8 V
TXL870	50.1 A	248.4 V	108	2.3 V
280 V max	39.2 A	194.4 V	108	1.8 V
TXL890	32.3 A	469.2 V	204	2.3 V
480 V max	26.0 A	367.2 V	204	1.8 V

Position 2

	Current	Voltage	Cells	Cell voltage
TXL830	200 A	27.6 V	12	2.3 V
28 V max	156 A	21.6 V	12	1.8 V
TXL850	200 A	55.2 V	24	2.3 V
56 V max	156 A	43.2 V	24	1.8 V
TXL865	49.2 A	248.4 V	108	2.3 V
260 V max	38.5 A	194.4 V	108	1.8 V
TXL870	50.1 A	124.2 V	54	2.3 V
280 V max	39.2 A	97.2 V	54	1.8 V
TXL890	35.2 A	248.4 V	108	2.3 V
480 V max	27.8 A	194.4 V	108	1.8 V

Position 3

	Current	Voltage	Cells	Cell voltage
TXL830	300 A	27.6 V	12	2.3 V
28 V max	235 A	21.6 V	12	1.8 V
TXL850	300 A	55.2 V	24	2.3 V
56 V max	235 A	43.2 V	24	1.8 V
TXL865	115 A	13.8 V	6	2.3 V
14 V max	90 A	10.8 V	6	1.8 V
TXL870	100 A	124.2 V	54	2.3 V
140 V max	74.8 A	97.2 V	54	1.8 V
TXL890	70.5 A	248.4 V	108	2.3 V
250 V max	55.2 A	194.4 V	108	1.8 V

¹⁾ The data examples apply to lead batteries.

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OPTIONAL ACCESSORIES

Extra loads



BVM - Battery Voltage Monitoring



Clamp-on-probe



Cable set Torkel 930/950



Extension cables



Sensing leads



Software

PowerDB is a PC software for BVM and TORHEL 800 / 900-series. For BVM and TORHEL 800 series it works for controlling, data management and report handling. For TORHEL 900-series only for data management and reporting.

TORHEL 900-series Battery Load Unit

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INCLUDED ACCESSORIES – TORHEL 910

Cable set



Cable set (GA-00550)

Ground Cable



Ground Cable (GC-30060)

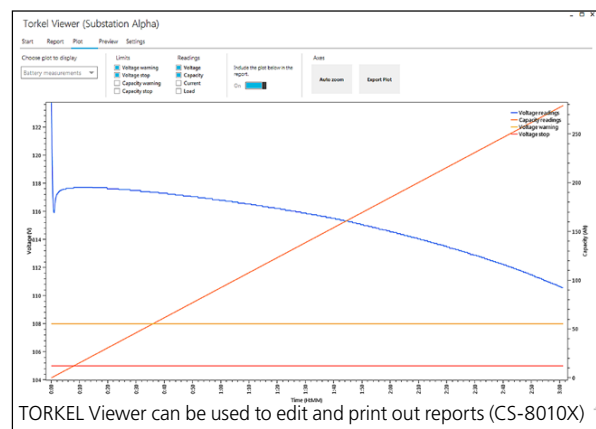
INCLUDED ACCESSORIES – TORHEL 930/950

Cable set



Cable set (GA-09550)

TORHEL Viewer



TORHEL Viewer is a free software, download at www.megger.com (search "TORHEL900" and submenu "Software"). Open the file and follow the instructions.

Please note that TORHEL Viewer can only be used with TORHEL930 and TORHEL950.

For TORHEL910, TORHEL Viewer cannot be used. A payable license fee for FW upgrade is needed. (E.g. material number CS-90010, "Upgrade Torkel 910 to 930")

ORDERING INFORMATION

Item Cat. No.

TORKEL 910

Incl. transport case **Standard**¹⁾ and accessories:

Mains cable		
Cable set, 2 x 3 m, 25 mm ²	GA-00550	
Soft case for cables	2012-180	CS-19190

Incl. transport case **Large**²⁾ and accessories:

Mains cable		
Cable set, 2 x 3 m, 25 mm ²	GA-00550	CS-19191

TORKEL 930

Incl. transport case **Standard**¹⁾ and accessories:

Mains cable		
Cable set, 2 x 3 m, 70 mm ²	GA-09550	
Soft case for cables	2012-180	
TORKEL Viewer	CS-8010X	
USB memory stick	HF-10020	CS-19390

Incl. transport case **Large**²⁾ and accessories:

Mains cable		
Cable set, 2 x 3 m, 70 mm ²	GA-09550	
TORKEL Viewer	CS-8010X	
USB memory stick	HF-10020	CS-19391

TORKEL 950

Incl. transport case **Standard**¹⁾ and accessories:

Mains cable		
Cable set, 2 x 3 m, 70 mm ²	GA-09550	
Soft case for cables	2012-180	
TORKEL Viewer	CS-8010X	
USB memory stick	HF-10020	CS-19590

Incl. transport case **Large**²⁾ and accessories:

Mains cable		
Cable set, 2 x 3 m, 70 mm ²	GA-09550	
TORKEL Viewer	CS-8010X	
USB memory stick	HF-10020	CS-19591

Included in all models above:

Ground cable, 5 m (16 ft) 2.5 mm ²	GC-30060
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Optional accessories

Transport case Standard , for TORKEL (no cables)	GD-00954
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Transport case Large for TORKEL and standard cables	GD-00955
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TXL830 Extra load

Incl. Cable set GA-09550, 2x3 m 70 m ² *)	BS-59093
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TXL850 Extra load

Incl. Cable set GA-09550, 2x3 m 70 m ² *)	BS-59095
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TXL865 Extra load

Incl. Cable set GA-00550, 2x3 m 25 m ² *)	BS-59096
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TXL870 Extra load

Incl. Cable set GA-00550, 2x3 m 25 m ² *)	BS-59097
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TXL890 Extra load

Incl. Cable set GA-00550, 2x3 m 25 m ² *)	BS-59099
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*) Control leads 2 x 2 m (6.5 ft), Transport case.
Mains cable

Item Cat. No.

Cable set

2 x 3 m, 25 mm ² , female/clamp. 110 A. 3.0 kg (6.6 lbs)	GA-00550
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Extension cable

Extension for GA-00550, 2x3 m, 25 mm ² , male/female	GA-00552
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Cable set

2x3m, 50 mm ² , female/clamp 220 A. 5.0 kg (11 lbs)	GA-00545
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Cable set, high rating

2 x 3 m, 70 mm ² , female/fork. 270 A. 5.0 kg (11 lbs)	GA-09550
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Extension cable, high rating

Extension for GA-09550, and GA-00545, 2 x 3 m, 70 mm ² , male/female	GA-09552
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Sensing lead set

For measuring voltage at battery terminals. 2 x 5 m (16.4 ft)	GA-00210
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DC clamp-on probe, 1000 A

To measure current in external circuit	XA-12991
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BVM

Incl. Dolphin clips, Power & signal connectors, Power supplies, Connection cables and Carrying case

BVM150 , System of 16 BVM units	CJ-59092
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BVM300 , System of 31 BVM units	CJ-59093
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BVM600 , System of 61 BVM units	CJ-59096
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BVM special 600 V, System of 46 BVM units³⁾

Incl. Dolphin clips, Power & signal connectors, Opto couplers, Power supplies, Connection cables and Carrying case.

BVM, Single unit	
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Incl. Control cable black RJ45 0.5m (1.6 ft)	CJ-59090
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Extension cable

Extension lead for connecting BVM unit to battery, 0.5 m (1.6 ft)	04-30050
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3) The TORKEL 950 can handle a maximum of 500 V. Battery systems over 500 V and up to 600 V can be tested with BVM and PowerDB application on a computer.

1) Transport case Standard ,	GD-00954
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Size: 670 x 400 x 510 mm, (26.4 x 15.7 x 20.1")

2) Transport case Large ,	GD-00955
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Size: 795 x 400 x 510 mm, (31.3 x 15.7 x 20.1")



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