

TOR KEL 900-series Battery Load Unit



- 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
- BVM cell monitor control integrated in the system

DESCRIPTION

The TOR KEL™ 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 TOR KEL 900, it becomes a complete, stand-alone, discharge test system.

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

The high discharge capacity of TOR KEL 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 TOR KEL 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, TOR KEL measures the total battery current while regulating it at a constant level. Battery systems can be plus or minus grounded or free floating.

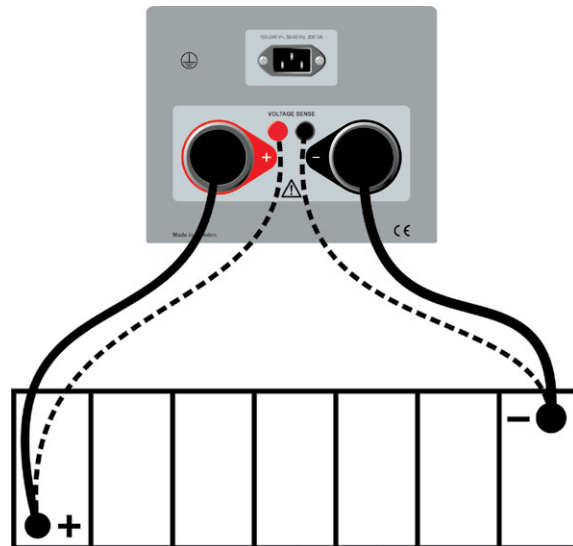
The test results can be presented and edited on a PC using the included PC software "TOR KEL Viewer".

MODEL OVERVIEW

TOR KEL	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

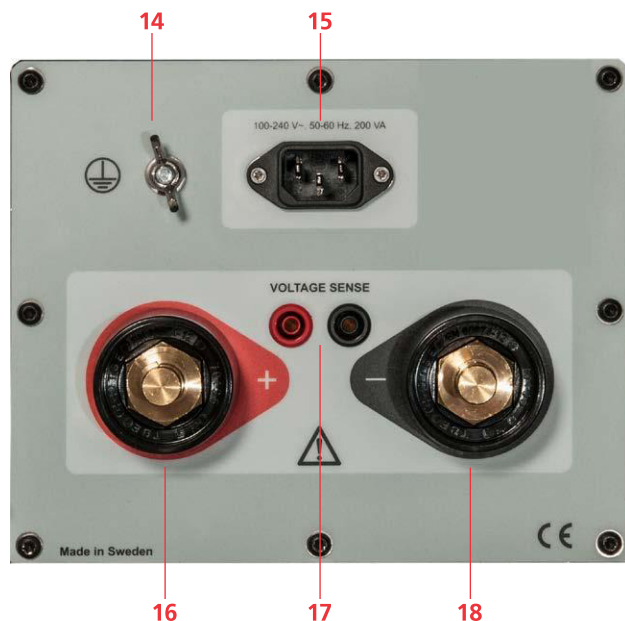
The TOR KEL is connected to battery, the current and the voltage alarm levels are set. After starting the discharge, TOR KEL keeps the current constant at the preset level. When the voltage drops to a level slightly above the final voltage, TOR KEL issues an alarm. If the voltage drops so low that there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

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} ≤ 1V**
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 service of the instrument.
10. **EMERGENCY STOP**
Push to stop.
Reset by turning it cloch-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).

SPECIFICATIONS TORHEL 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
37 kg (82 lbs) incl. large transport case

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 ±(0.5% of reading +0.1 A)

Resolution 0.1 A

Internal current measurement

Range

TORHEL 910 0 to 110 A

TORHEL 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 MΩ

Voltage measurement

Voltage 0 to 500 V DC

Inaccuracy ±(0.5% of reading +0.1 V DC)

Resolution 0.1 V

Sample rate 10 Hz, Values are saved when change is >10 mV

Time measurement

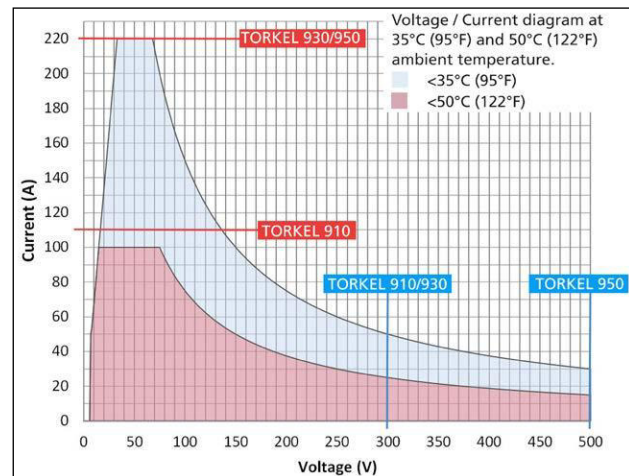
Inaccuracy ±0.1% of reading ±1 digit

Load section

Battery voltage 7.5 V to 300 V¹⁾/500 V²⁾

Power 15 kW (max)

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



Constant I

Range

TORHEL 910 0 to 110.0 A

TORHEL 930/950 0 to 220.0 A

Inaccuracy ±(0.5% +0.2 A)

Resolution 0.1 A

Ripple max 0.5 A peak

Constant R

Range 300 mΩ to 3 kΩ

Inaccuracy ±1% typical

Resolution 100 mΩ

Constant P

Range 0 to 15 kW

Inaccuracy ±1% typical

Resolution 10 W

Inputs

+ 7.5 to 300 V¹⁾ 7.5 to 500 V²⁾

- 0 V

I EXT ≤ 1 V 1 V DC, 300 V DC to ground

VOLTAGE SENSE Impedance to the current terminals is >1 MΩ

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, ±7% max 100 mA

Communication ports

BVM1 BVM2 USB connection for BVM units

 USB connection for USB memory

SERVICE For service of the instrument

1) TORHEL 910 and 930

2) TORHEL 950

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 265x460x750 mm (10.4" x 18.1" x 29.5")
Weight 13 kg (29 lbs) 21.4 kg (47 lbs) with transport case

Cable sets
for TXL830/850 2 x 3 m (9.8 ft), 70 mm², 270 A, with female plug/clamp. Max. 100 V. 5 kg (11 lbs)
for TXL865/870/890 2 x 3 m (9.8 ft), 25 mm², 110 A, with female plug/lug. Max. 480 V. 3 kg (6.6 lbs)

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 selector ¹⁾

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.

OPTIONAL ACCESSORIES

Extra loads



Extension cables



BVM - Battery Voltage Monitoring



Sensing leads



Clamp-on-probe



PowerDB

PC software for BVM and TOR KEL 800 / 900-series. For BVM and TOR KEL 800 series it works for controlling, data management and report handling, for TOR KEL 900-series only for data management and reporting.

INCLUDED ACCESSORIES – TORHEL 910

Cable set

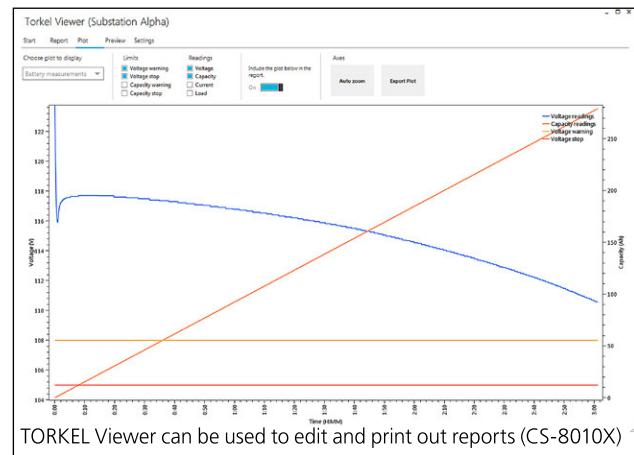


INCLUDED ACCESSORIES – TORHEL 930/950

Cable set



TORHEL Viewer



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	GD-00360
	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	GD-00360
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	GD-00360
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	
Optional accessories	
Transport case Large for TORKEl and standard cables	GD-00955
TXL830 Extra load	
Incl. Cable set GA-09550, *)	BS-59093
TXL850 Extra load	
Incl. Cable set GA-09550, *)	BS-59095
TXL865 Extra load	
Incl. Cable set GA-09550, *)	BS-59096
TXL870 Extra load	
Incl. Cable set GA-00550, *)	BS-59097
TXL890 Extra load	
Incl. Cable set GA-00550, *)	BS-59099
*) Control cables 2 x 2 m (6.5 ft) Transport case GD-00055	

Item	Cat. No.
Cable set	
2 x 3 m, 25 mm ² , female/clamp. 110A. 3.0kg (6.6 lbs)	GA-00550
Extension cable	
Extension for GA-00550, 2x3m, 25 mm ² , male/female	GA-00552
Cable set, high rating	
2 x 3 m, 70 mm ² , female/fork. 270A. 5.0 kg (11 lbs)	GA-09550
Extension cable, high rating	
Extension for GA-09550, 2x3m, 70 mm ² , male/female	GA-09552
Sensing lead set	
For measuring voltage at battery terminals. 2 x 5 m (16.4 ft)	GA-00210
DC clamp-on probe, 1000 A	
To measure current in external circuit	XA-12991
BVM	
Incl. Dolphin clips, Power & signal connectors, Power supplies, Connection cables and Carrying case	
BVM150 , System of 16 BVM units	CJ-59092
BVM300 , System of 31 BVM units	CJ-59093
BVM600 , System of 61 BVM units	CJ-59096
BVM special 600 V , System of 46 BVM units ³⁾	
Incl. Dolphin clips, Power & signal connectors, Opto couplers, Power supplies, Connection cables and Carrying case.	CJ-59198
BVM, Single unit	
Incl. Control cable black RJ45 0.5m (1.6 ft)	CJ-59090
Extension cable	
Extension lead for connecting BVM unit to battery, 0.5 m (1.6 ft)	04-30050
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
Size: 670x400x510 mm, (26.4x15.7x20.1")
Weight incl. TORKEl (no cables) 31.9kg (70 lbs)



2) Transport case **Large**, GD-00955, with space for cable set GA-00550
Size: 795x400x510 mm, (31.3x15.7x20.1")
Weight incl. TORKEl and cables 35 kg (77 lbs).