

# 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

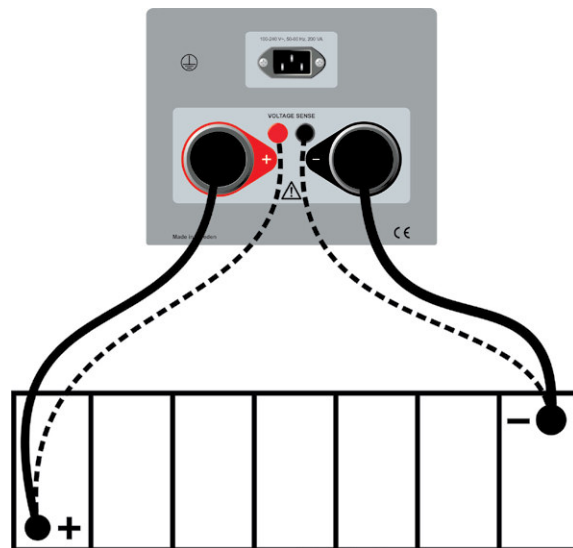
TOR KEL	910	930	950
Current (max)	110 A	220 A	220 A
Voltage (max)	300 V	300 V	500 V
BVM functionality	No	Yes	Yes
Charging measurement	No	Yes	Yes
Full report functionality	No	Yes	Yes

## 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.

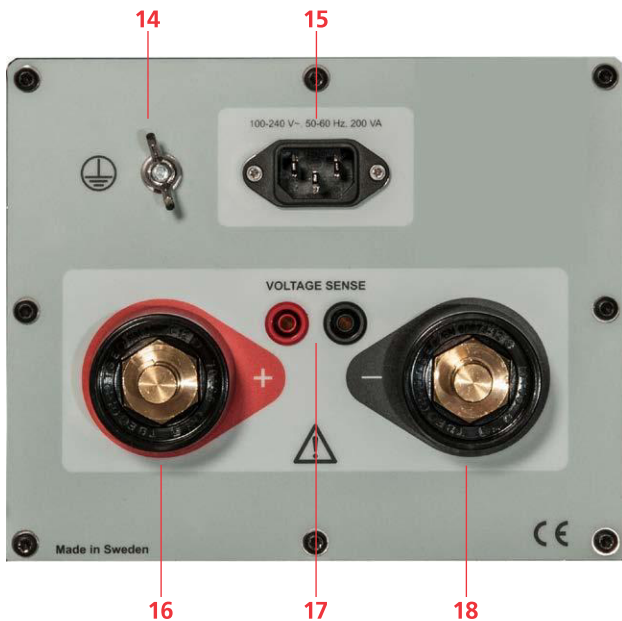
All values are stored in TOR KEL and can easily be transferred via an USB-stick to a PC for evaluation and print out.




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<sub>EXT</sub> ≤ 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

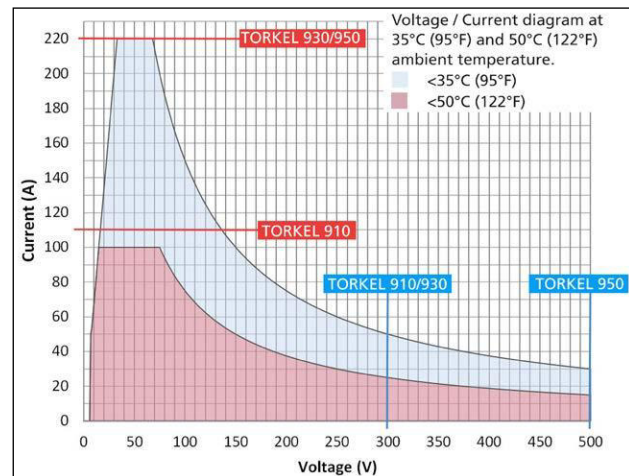
**Inaccuracy** ±0.1% of reading ±1 digit

#### Load section

**Battery voltage** 7.5 V to 300 V<sup>1)</sup>/500 V<sup>2)</sup>

**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 V<sup>1)</sup> 7.5 to 500 V<sup>2)</sup>

**-** 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 mm<sup>2</sup>, 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 mm<sup>2</sup>, 110 A, with female plug/lug. Max. 480 V. 3 kg (6.6 lbs)

### Load section

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

### Internal resistance, 3-position selector

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

### Maximal currents, 3-position selector<sup>1)</sup>

#### Position 1

	Current	Voltage	Cells	Cell voltage
<b>TXL830</b>	100 A	27.6 V	12	2.3 V
28 V max	78.5 A	21.6 V	12	1.8 V
<b>TXL850</b>	100 A	55.2 V	24	2.3 V
56 V max	78.5 A	43.2 V	24	1.8 V
<b>TXL865</b>	93.7 A	248.4 V	108	2.3 V
260 V max	73.4 A	194.4 V	108	1.8 V
<b>TXL870</b>	50.1 A	248.4 V	108	2.3 V
280 V max	39.2 A	194.4 V	108	1.8 V
<b>TXL890</b>	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
<b>TXL830</b>	200 A	27.6 V	12	2.3 V
28 V max	156 A	21.6 V	12	1.8 V
<b>TXL850</b>	200 A	55.2 V	24	2.3 V
56 V max	156 A	43.2 V	24	1.8 V
<b>TXL865</b>	49.2 A	248.4 V	108	2.3 V
260 V max	38.5 A	194.4 V	108	1.8 V
<b>TXL870</b>	50.1 A	124.2 V	54	2.3 V
280 V max	39.2 A	97.2 V	54	1.8 V
<b>TXL890</b>	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
<b>TXL830</b>	300 A	27.6 V	12	2.3 V
28 V max	235 A	21.6 V	12	1.8 V
<b>TXL850</b>	300 A	55.2 V	24	2.3 V
56 V max	235 A	43.2 V	24	1.8 V
<b>TXL865</b>	115 A	13.8 V	6	2.3 V
14 V max	90 A	10.8 V	6	1.8 V
<b>TXL870</b>	100 A	124.2 V	54	2.3 V
140 V max	74.8 A	97.2 V	54	1.8 V
<b>TXL890</b>	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 TORKEL 800 / 900-series. For BVM and TORKEL 800 series it works for controlling, data management and report handling, for TORKEL 900-series only for data management and reporting.

**INCLUDED ACCESSORIES – TORHEL 910**

Cable set

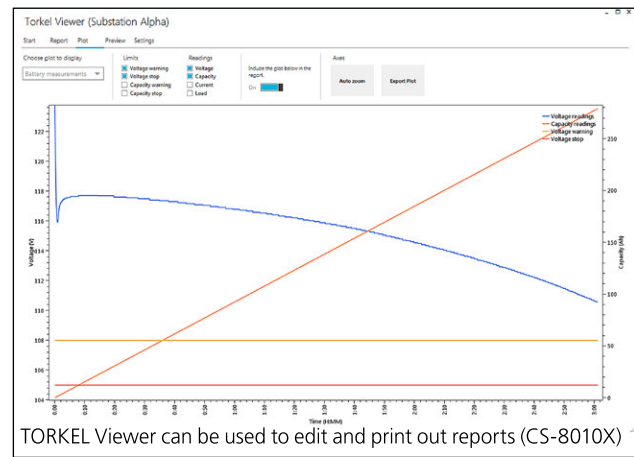


**INCLUDED ACCESSORIES – TORHEL 930/950**

Cable set



**TORHEL Viewer**



**ORDERING INFORMATION**

Item	Cat. No.
<b>TORTEL 910</b>	
Incl. transport case <b>Standard</b> <sup>1)</sup> and accessories:	
Mains cable	
Cable set, 2 x 3 m, 25 mm <sup>2</sup>	GA-00550
Soft case for cables	GD-00360
	CS-19190
Incl. transport case <b>Large</b> <sup>2)</sup> and accessories:	
Mains cable	
Cable set, 2 x 3 m, 25 mm <sup>2</sup>	GA-00550
	CS-19191
<b>TORTEL 930</b>	
Incl. transport case <b>Standard</b> <sup>1)</sup> and accessories:	
Mains cable	
Cable set, 2 x 3 m, 70 mm <sup>2</sup>	GA-09550
Soft case for cables	GD-00360
TORTEL Viewer	CS-8010X
USB memory stick	HF-10020
	CS-19390
Incl. transport case <b>Large</b> <sup>2)</sup> and accessories:	
Mains cable	
Cable set, 2 x 3 m, 70 mm <sup>2</sup>	GA-09550
TORTEL Viewer	CS-8010X
USB memory stick	HF-10020
	CS-19391
<b>TORTEL 950</b>	
Incl. transport case <b>Standard</b> <sup>1)</sup> and accessories:	
Mains cable	
Cable set, 2 x 3 m, 70 mm <sup>2</sup>	GA-09550
Soft case for cables	GD-00360
TORTEL Viewer	CS-8010X
USB memory stick	HF-10020
	CS-19590
Incl. transport case <b>Large</b> <sup>2)</sup> and accessories:	
Mains cable	
Cable set, 2 x 3 m, 70 mm <sup>2</sup>	GA-09550
TORTEL Viewer	CS-8010X
USB memory stick	HF-10020
	CS-19591
Included in all models above: Ground cable, 5 m (16 ft) 2.5 mm <sup>2</sup>	
<b>Optional accessories</b>	
Transport case <b>Large</b> for TORTEL and standard cables	GD-00955
<b>TXL830 Extra load</b>	
Incl. Cable set GA-09550, *)	BS-59093
<b>TXL850 Extra load</b>	
Incl. Cable set GA-09550, *)	BS-59095
<b>TXL865 Extra load</b>	
Incl. Cable set GA-09550, *)	BS-59096
<b>TXL870 Extra load</b>	
Incl. Cable set GA-00550, *)	BS-59097
<b>TXL890 Extra load</b>	
Incl. Cable set GA-00550, *)	BS-59099
*) Control cables 2 x 2 m (6.5 ft) Transport case GD-00055	

Item	Cat. No.
<b>Cable set</b>	
2 x 3 m, 25 mm <sup>2</sup> , female/clamp. 110A. 3.0kg (6.6 lbs)	GA-00550
<b>Extension cable</b>	
Extension for GA-00550, 2x3m, 25 mm <sup>2</sup> , male/female	GA-00552
<b>Cable set, high rating</b>	
2 x 3 m, 70 mm <sup>2</sup> , female/fork. 270A. 5.0 kg (11 lbs)	GA-09550
<b>Extension cable, high rating</b>	
Extension for GA-09550, 2x3m, 70 mm <sup>2</sup> , male/female	GA-09552
<b>Sensing lead set</b>	
For measuring voltage at battery terminals. 2 x 5 m (16.4 ft)	GA-00210
<b>DC clamp-on probe, 1000 A</b>	
To measure current in external circuit	XA-12991
<b>BVM</b>	
Incl. Dolphin clips, Power & signal connectors, Power supplies, Connection cables and Carrying case	
<b>BVM150</b> , System of 16 BVM units	CJ-59092
<b>BVM300</b> , System of 31 BVM units	CJ-59093
<b>BVM600</b> , System of 61 BVM units	CJ-59096
<b>BVM special 600 V</b> , System of 46 BVM units <sup>3)</sup>	
Incl. Dolphin clips, Power & signal connectors, Opto couplers, Power supplies, Connection cables and Carrying case.	CJ-59198
<b>BVM, Single unit</b>	
Incl. Control cable black RJ45 0.5m (1.6 ft)	CJ-59090
<b>Extension cable</b>	
Extension lead for connecting BVM unit to battery, 0.5 m (1.6 ft)	04-30050
3) The TORTEL 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. TORTEL (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. TORTEL and cables 35 kg (77 lbs).