TORKEL 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 TORKEL™ 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 TORKEL 900, it becomes a complete, stand-alone, discharge test system.

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

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

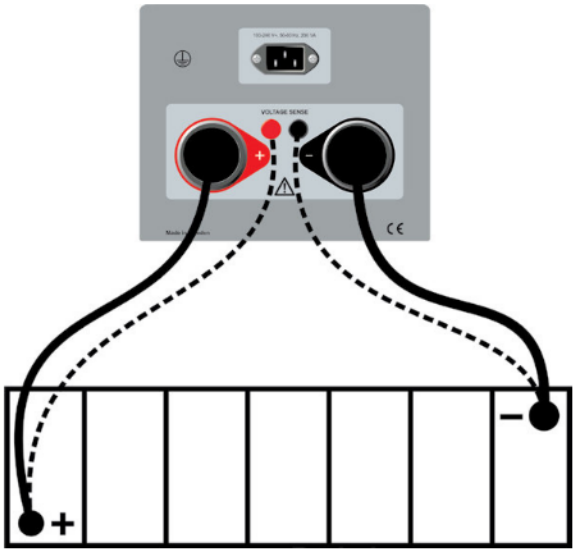
The test results can be presented and edited on a PC using the included PC software "TORKEL Viewer.

MODEL OVERVIEW

TORKEL	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

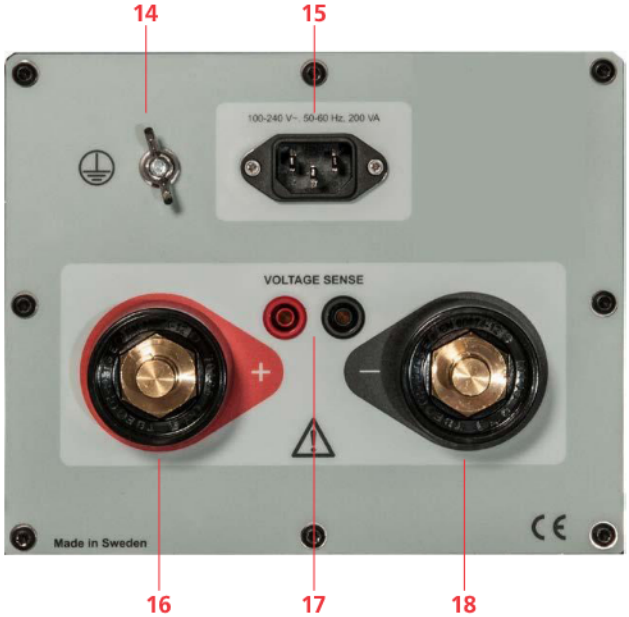
The TORKEL is connected to battery, the current and the voltage alarm levels are set. After starting the discharge, TORKEL keeps the current constant at the preset level. When the voltage drops to a level slightly above the final voltage, TORKEL issues an alarm.
If the voltage drops so low that there is a risk for deep discharging the battery, TORKEL shuts down the test. If the power supply is interrupted the test will continue when power is restored.
All values are stored in TORKEL 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 ≤ 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 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 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	519 x 315 x 375 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

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 MΩ

Voltage measurement

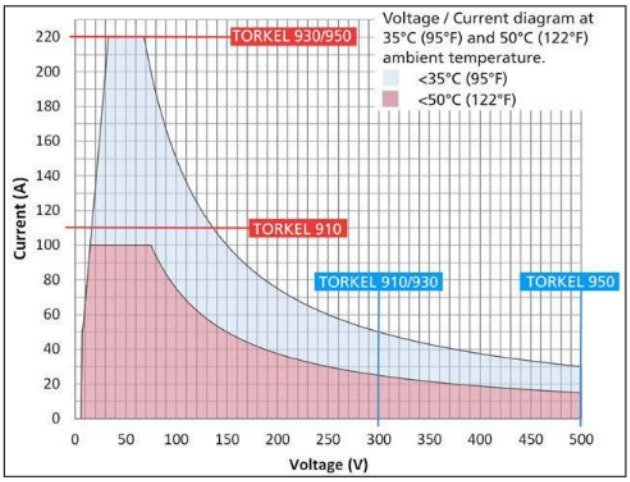
Voltage	0 to 500 V DC
Inaccuracy	±(0.5% of reading +0.1 V DC)
Resolution	0.1 V
Sample rate	10 Hz, Values are saved when change is >10 mV

Time measurement

Inaccuracy	±0.1% of reading ±1 digit

Load section

Battery voltage	7.5 V to 300 V[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	±(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[1] 7.5 to 500 V[2]
–	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 V DC, 0.28 A, 28 V DC, 8 A, 250 V AC, 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) TORKEL 910 and 930
2) TORKEL 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 — 210 x 353 x 600 mm (8.3" x 13.9" x 23.6")

Transport case — 265 x 460 x 750 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 28 V max	100 A	27.6 V	12	2.3 V
	78.5 A	21.6 V	12	1.8 V
TXL850 56 V max	100 A	55.2 V	24	2.3 V
	78.5 A	43.2 V	24	1.8 V
TXL865 260 V max	93.7 A	248.4 V	108	2.3 V
	73.4 A	194.4 V	108	1.8 V
TXL870 280 V max	50.1 A	248.4 V	108	2.3 V
	39.2 A	194.4 V	108	1.8 V
TXL890 480 V max	32.3 A	469.2 V	204	2.3 V
	26.0 A	367.2 V	204	1.8 V

Position 2

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

Position 3

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

1) The data examples apply to lead batteries.

OPTIONAL ACCESSORIES

Extra loads

Five extra loads available:
TXL830, TXL850, TXL865,
TXL870 and TXL890

BVM - Battery Voltage Monitoring

Enables automatic battery cell voltage logging during capacity tests
Up to 2x120 units can be used (Daisy-chain)
For complete information see the BVM data sheet

Clamp-on-probe

Clamp-on probe, 1000 A DC
To measure current in external circuit

Extension cables

Extension cable set (GA-00552)

Extension cable set, high rating (GA-09552)

Sensing leads

Sensing lead set (GA-00210)

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 – TORKEL 910

Cable set

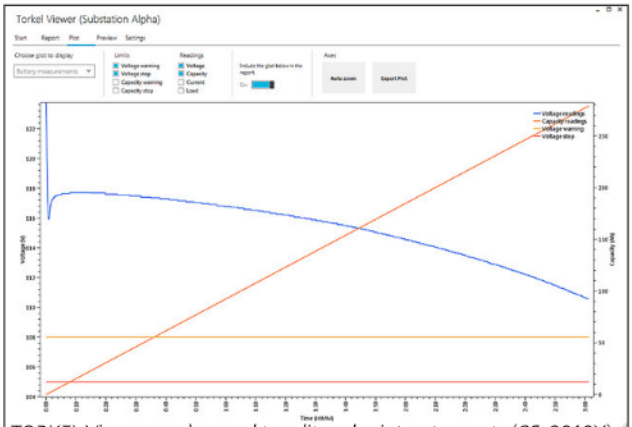
Cable set, 2 x 2 m (GA-00550)

INCLUDED ACCESSORIES – TORKEL 930/950

Cable set

Cable set, 2 x 2 m (GA-09550)

TORKEL Viewer



TORKEL Viewer can be used to edit and print out reports (CS-8010X)

ORDERING INFORMATION

Item	Cat. No.

TORKEL 910

Incl. transport case **Standard**[1] and accessories:

Mains cable	
Cable set, 2 x 3 m, 25 mm²	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 mm²	GA-00550

CS-19191

TORKEL 930

Incl. transport case **Standard**[1] and accessories:

Mains cable	
Cable set, 2 x 3 m, 70 mm²	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 mm²	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 mm²	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 mm²	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 mm²

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 mm², female/clamp. 110 A. 3.0 kg (6.6 lbs)	GA-00550
Extension cable Extension for GA-00550, 2 x 3 m, 25 mm², male/female	GA-00552
Cable set, high rating 2 x 3 m, 70 mm², female/fork. 270 A. 5.0 kg (11 lbs)	GA-09550
Extension cable, high rating Extension for GA-09550, 2 x 3 m, 70 mm², 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: 670 x 400 x 510 mm, (26.4 x 15.7 x 20.1")
Weight incl. TORKEL (no cables) 31.9 kg (70 lbs)

2) Transport case **Large**, GD-00955, with space for cable set GA-00550
Size: 795 x 400 x 510 mm, (31.3 x 15.7 x 20.1")
Weight incl. TORKEL and cables 35 kg (77 lbs).

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