

TORKEL 840/860 Battery Load Units



- Batteries can be tested “in service”
- Unit adjusts to include load currents in the test parameters
- User adjustable alarm and shutdown points to avoid excessive discharge
- Easily expandable for larger battery banks using TXL extra load units
- View test parameters/results “real time” as testing progresses using TORKEL WIN software
- Easily save results to a PC for analysis, report generation and storage

Description

Batteries in power plants and transformer substations must provide the equipment they serve with standby power in the event of a power failure. Unfortunately, however, the capacity of such batteries can drop significantly for a number of reasons before their calculated life expectancy is reached. This is why it is so important to check batteries at regular intervals, and the only reliable way of measuring battery capacity is to conduct a discharge test.

TORKEL™ 840 - UTILITY is used for battery systems ranging from 12 to 250 V – often encountered in switchgear and similar equipment. Discharging can take place at up to 110 A, and if higher current is needed, two or more TORKEL 840 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.

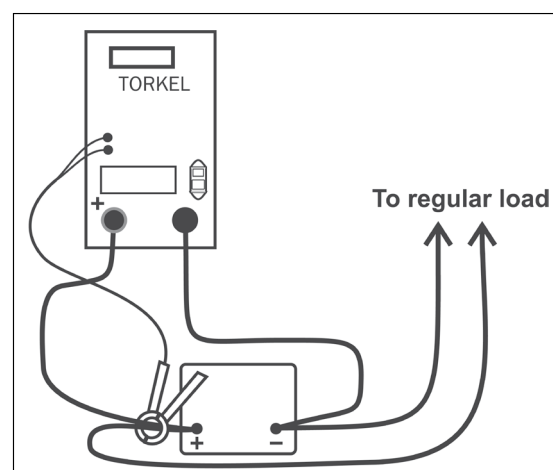
TORKEL 860 - MULTI is designed primarily for people who travel from place to place to maintain battery systems having different voltages. It features excellent discharging capacity plus a broad voltage range and outstanding portability – a unique combination.

TORKEL 860 is used for systems ranging from 12 to 480 V, and discharging can proceed at up to 110 A. If higher current is desired, two or more TORKEL 860 units or extra load units, TXL, can be linked together. Discharging can take place at constant current, constant power, constant resistance or in accordance with a pre-selected load profile.

Application example

Testing can be carried out without disconnecting the battery from the equipment it serves. Via a DC clamp-on ammeter, TORKEL measures total battery current while regulating it at a constant level.

The TORKEL is connected to battery, the current and the voltage alarm level 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. The total voltage curve and the readings taken at the end of the test are stored in TORKEL Later, using the TORKEL Win program, you can transfer these readings to your computer for storage, printout or export. If your PC is connected to TORKEL during the test, TORKEL Win builds up a voltage curve on the screen in real time and displays the current, voltage and capacity readings. You can also control the test using TORKEL Win.



Features and benefits

1. **Display**
2. **External measurement input** used to measure current in an external path by means of a clamp-on ammeter or a current shunt.
3. **Keys** for operation and settings.
4. **Alarm output** equipped with a relay contact for triggering an external alarm device.
5. **Start/Stop input** used for starting and stopping discharging from an external device. Galvanically isolated.
6. **Indicating lamps**. Operating, Stop/Limit
7. **TXL output** used for control of TXL Extra Loads. Galvanically isolated.
8. **Serial port** used for connection to a PC or other controlling equipment.
9. **Voltage controlled circuit breaker** that connects / disconnects the loading circuits in TORKEl from the battery.
10. **Positive current connection** for battery being tested.
11. **Input for sensing voltage** at the battery terminals.
12. **Negative current connection** for battery being tested.
13. **Mains connector**, equipped with ON/OFF switch.

Application examples with TORKEl/TXL systems

TORKEl and TXL can be combined into systems to match up for different battery capacities. Here are two examples, you can find more in the section Battery Testing Accessories.

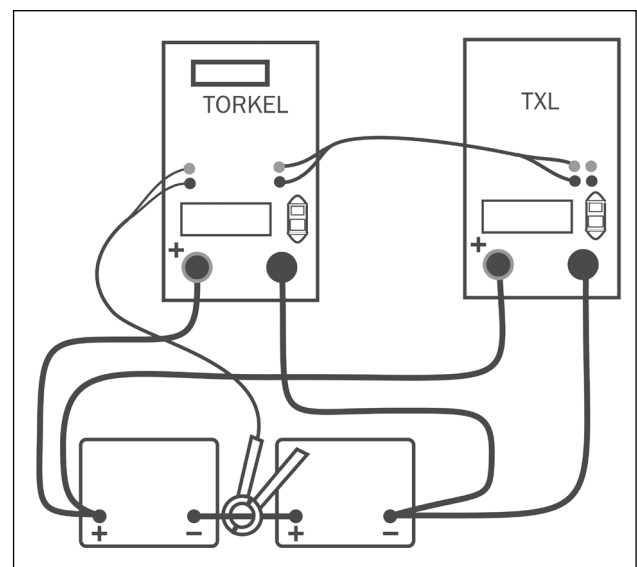
These resistive extra loads do not perform any regulating functions. They are designed for use together with TORKEl Battery Load Units. Their purpose is to provide higher load currents for use in constant current or constant power tests. Together, TORKEl and the TXL Extra Loads form a system that can discharge batteries with currents of up to several kA. TXL Extra Loads are connected directly to the battery, and TORKEl measures the total current using a clamp-on ammeter.

TXL Extra Loads are shut down automatically when TORKEl is stopped.

TORKEl/TXL-systems examples

Max. constant current (A)	Number of TORKEl-units	Number of TXL-units
<i>TORKEl 840/860 + TXL830, 24 V battery (12 cells)1)</i>		
263	1	1
670	2	2
1005	3	3
<i>TORKEl 840/860 + TXL850, 48 V battery (24 cells)1)</i>		
264	1	1
909	2	3
<i>TORKEl 840/860 + TXL870, 110 V battery (54 cells)1)</i>		
188	1	1
532	2	4
845	2	8
<i>TORKEl 840/860 + TXL870, 120 V battery (60 cells)2)</i>		
194	1	1
557	2	4
895	2	8
<i>TORKEl 840/860 + TXL870, 220 V battery (108 cells)1)</i>		
94	1	1
266	2	4
423	2	8

1) Discharge from 2.15 V to 1.8 V per cell
2) Discharge from 2.15 to 1.75 V per cell



TORKEl and the extra load TXL

Specifications TORKEl 840/860

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

Environment

<i>Application field</i>	The instrument is intended for use in high-voltage substations and industrial environments.
<i>Temperature</i>	
<i>Operating</i>	0°C to +40°C (32°F to +104°F)
<i>Storage & transport</i>	-40°C to +70°C (-40°F to +158°F)
<i>Humidity</i>	5% – 95% RH, non-condensing

CE-marking

<i>EMC</i>	2004/108/EC
<i>LVD</i>	2006/95/EC

General

<i>Mains voltage</i>	100 – 240 V AC, 50/60 Hz
<i>Power consumption (max)</i>	150 W
<i>Protection</i>	Thermal cut-outs, automatic over-load protection
<i>Dimensions</i>	
<i>Instrument</i>	210 x 353 x 700 mm (8.3" x 13.9" x 27.6")
<i>Transport case</i>	265 x 460 x 750 mm (10.4" x 18.1" x 29.5")
<i>Weight</i>	21.5 kg (47.4 lbs) 38 kg (83.8 lbs) with accessories and transport case.
<i>Display</i>	LCD
<i>Available languages</i>	English, French, German, Spanish, Swedish

Measurement section

Current measurement

<i>Display range</i>	0.0 – 2999 A
<i>Basic inaccuracy</i>	±(0.5% of reading +0.2 A)
<i>Resolution</i>	0.1 A

Internal current measurement

<i>Range</i>	0 – 270 A
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Input for clamp-on ammeter

<i>Range</i>	0 – 1 V
<i>mV/A-ratio</i>	Software settable, 0.3 to 19.9 mV/A
<i>Input impedance</i>	>1 MΩ

Voltage measurement

<i>Display range 0.0 – 60 V</i>	
<i>Basic inaccuracy</i>	±(0.5% of reading +0.1 V)
<i>Resolution</i>	0.1 V
<i>Display range 0.0 – 500 V</i>	
<i>Basic inaccuracy</i>	±(0.5% of reading +1 V)
<i>Resolution</i>	0.1 V

Time measurement

<i>Basic inaccuracy</i>	±0.1% of reading ±1 digit
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Load section

<i>Max. battery voltage</i>	288 V DC (TORKEl 840) 480 V DC (TORKEl 860)
<i>Max. current</i>	110 A
<i>Max. power</i>	15 kW
<i>Load patterns</i>	Constant current, constant power, constant resistance, current or power profile
<i>Current setting</i>	0-110.0 A (2999.9 A) ¹⁾
<i>Power setting</i>	0-15.00 kW (299.99 kW) ¹⁾
<i>Resistance setting</i>	0.1-2999.8 Ω
<i>Battery voltage range, TORKEl 840</i>	4 ranges, selected automatically at start of test
<i>Battery voltage range, TORKEl 860</i>	5 ranges, selected automatically at start of test
<i>Stabilization (For internal current measurement)</i>	±(0.5% of reading +0.5 A)

	Battery voltage	Highest permissible current	Resistor element (Nominal values)
Range 1	10 – 27.6 V	110 A	0.165 Ω
Range 2	10 – 55.2 V	110 A	0.275 Ω
Range 3	10 – 144 V	110 A	0.55 Ω
Range 4	10 – 288 V	55 A	3.3 Ω
Range 5 ²⁾	10 – 480 V	55 A (max power 15 kW)	3.3 Ω

1) Maximum value for a system with more than one load unit
2) TORKEl 860

Inputs, maximal values

EXTERNAL CURRENT MEASUREMENT	1 V DC, 300 V DC to ground. Current shunt should be connected to the negative side of the battery
START/STOP	Closing/opening contact Closing and then opening the contact will start/stop Torkel. It is not possible to keep the contacts in closed position.
<i>Delay until start</i>	200 – 300 ms
<i>Stop delay</i>	100 – 200 ms
<i>Battery</i>	480 V DC, 500 V DC to ground
VOLTAGE SENSE	480 V DC, 500 V DC to ground
SERIAL	< 15 V
ALARM	250 V DC 0.28 A 28 V DC 8 A 250 V AC 8 A

Outputs, maximal values

START/STOP	5 V, 6 mA
TXL	Relay contact
SERIAL	< 15 V
ALARM	Relay contact

Discharging capacity, examples

12 V battery (6 cells)³⁾

Final voltage	Constant current	Constant power
1.80 V/cell (10.8 V)	0 – 50.0 A	0 – 0.54 kW
1.75 V/cell (10.5 V)	0 – 49.0 A	0 – 0.51 kW
1.67 V/cell (10.0 V)	0 – 46.0 A	0 – 0.46 kW

24 V battery (12 cells)³⁾

1.80 V/cell (21.6 V)	0 – 110 A	0 – 2.37 kW
1.75 V/cell (21.0 V)	0 – 110 A	0 – 2.31 kW
1.60 V/cell (19.2 V)	0 – 100 A	0 – 1.92 kW

48 V battery (24 cells)³⁾

1.80 V/cell (43.2 V)	0 – 110 A	0 – 4.75 kW
1.75 V/cell (42.0 V)	0 – 110 A	0 – 4.62 kW
1.60 V/cell (38.4 V)	0 – 110 A	0 – 4.22 kW

110 V battery (54 cells)³⁾

1.80 V/cell (97.2 V)	0 – 110 A	0 – 10.7 kW
1.75 V/cell (94.5 V)	0 – 110 A	0 – 10.4 kW
1.60 V/cell (86.4 V)	0 – 110 A	0 – 9.5 kW

120 V battery (60 cells)³⁾

1.80 V/cell (108 V)	0 – 110 A	0 – 11.9 kW
1.75 V/cell (105 V)	0 – 110 A	0 – 11.5 kW
1.60 V/cell (96 V)	0 – 110 A	0 – 10.5 kW

220 V battery (108 cells)³⁾

1.80 V/cell (194 V)	0 – 55 A	0 – 10.7 kW
1.75 V/cell (189 V)	0 – 55 A	0 – 10.4 kW
1.60 V/cell (173 V)	0 – 51.0 A	0 – 8.82 kW

240 V battery (120 cells)³⁾

1.80 V/cell (216 V)	0 – 55 A	0 – 11.9 kW
1.75 V/cell (210 V)	0 – 55 A	0 – 11.5 kW
1.60 V/cell (192 V)	0 – 55 A	0 – 10.5 kW

UPS battery (180 cells)³⁾ (TORTEL 860)

1.70 V/cell (306 V)	0 – 38 A	0 – 15 kW
1.60 V/cell (288 V)	0 – 38 A	0 – 15 kW

UPS battery (204 cells)³⁾ (TORTEL 860)

1.80 V/cell (367 V)	0 – 34 A	0 – 15 kW
1.60 V/cell (326 V)	0 – 34 A	0 – 15 kW

³⁾ 2.15 V per cell when test starts

Specifications TXL850/870

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

EMC 2004/108/EC
LVD 2006/95/EC

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 (28.7 lbs)
21.4 kg (47.2 lbs) with transport case

Cable sets

for TXL850 2 x 3 m (9.8 ft), 70 mm², 270 A, with cable lug. Max. 100 V. 5 kg (11 lbs)

for TXL870 2 x 3 m (9.8 ft), 25 mm², 110 A, with cable clamp/lug. Max. 480 V. 3 kg (6.6 lbs)

Load section

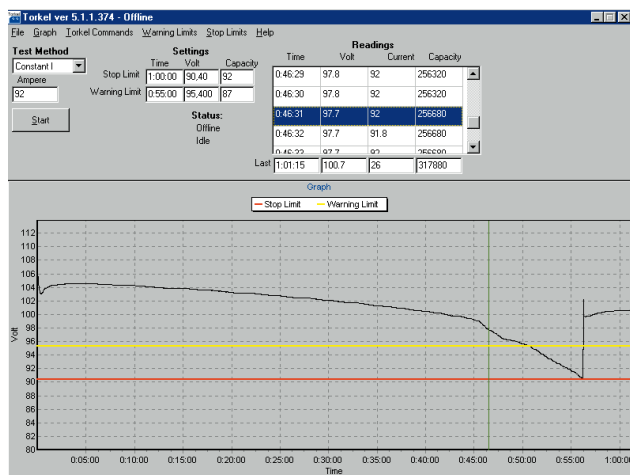
	TXL850	TXL870
<i>Max. voltage (DC)</i>	56 V	140 V/ 280 V
<i>Max. current</i>	300 A	112 A at 140 V 56 A at 280 V
<i>Max. power</i>	16.4 kW	15.8 kW

Internal resistance, 3-position selector

<i>Position 1</i>	TXL850	TXL870
<i>Current</i>	0.55 Ω	4.95 Ω
100 A	at 55.2 V (24 x 2.3 V)	–
78.5 A	at 43.2 V (24 x 1.8 V)	–
50.1 A	–	at 248.4 V (108 x 2.3 V)
39.2 A	–	at 194.4 V (108 x 1.8 V)
<i>Position 2</i>	TXL850	TXL870
<i>Current</i>	0.275 Ω	2.48 Ω
200 A	at 55.2 V (24 x 2.3 V)	–
156 A	43.2 V (24 x 1.8 V)–	–
<i>Position 3</i>	TXL850	TXL870
<i>Current</i>	0.184 Ω	1.24 Ω
300 A	at 55.2 V (24 x 2.3 V)	–
235 A	43.2 A (24 x 1.8 V)	–
100 A	–	at 124.2 V (54 x 2.3 V)
78.4 A	–	at 97.2 V (54 x 1.8 V)



TXL850


TORTEL Win PC software

- Shows the complete voltage curve
- Last recorded time, voltage, current and discharged capacity
- Scroll-window for all recorded values
- Remote control of TORTEL
- Report functions


Cable set GA-00550
Ordering information

Item	Art. No.
TORTEL 840 Complete with: Cable set GA-00550 Transport case GD-00054	BS-49094
TORTEL 860 Complete with: Cable set GA-00550 Transport case GD-00054	BS-49096
Optional	
TORTEL Win PC software	BS-8208X
Extra loads	
TXL850	BS-59095
TXL870	BS-59097
Cable sets	
Cable set for TXL850 2 x 3 m, 70 mm ² , with cable lug. Max 100 V 270 A. Weight: 5.0 kg (11 lbs)	GA-00554
Extension cable set, 110 A 2 x 3 m, 25 mm ² . Max 480 V Weight: 3.0 kg (6.6 lbs)	GA-00552
Sensing lead set Cable set for measuring voltage at battery terminals. 2 x 5 m (16.4 ft)	GA-00210
Clamp-on ammeters	
DC clamp-on ammeter, 200 A To measure current in circuit outside TORTEL	XA-12992
DC clamp-on ammeter, 1000 A To measure current in circuit outside TORTEL	XA-12990