TORKEL 840™

TORKEL 860™

Battery Load Units

Programma® Products

TORKEL 840™/860™

Battery Load Units

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 the 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 output, constant resistance or in accordance with a pre-selected load profile.

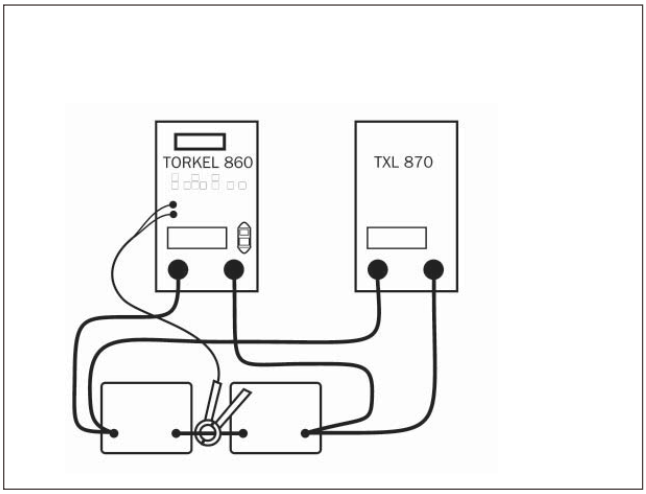
Application example

IMPORTANT!

Read the User's manual before using the instrument.

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.

1. Connect TORKEL to battery.
2. Set the current and start discharging. TORKEL keeps the current constant at the preset level.
3. When the voltage drops to a level slightly above the final voltage, TORKEL issues an alarm.
4. If the voltage drops low enough so that there is risk of deepdischarging 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 which runs on a PC under Windows®, 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.



TORKEL 860 and the extra loads TXL 870

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

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	Low Voltage Directive 73/23/ EEC am. by 93/68/EEC
EMC	EMC Directive 89/336/EEC am. by 91/263/EEC, 92/31/EEC and 93/68/EEC

General

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

Measurement section

Current measurement

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

Internal current measurement

Range	0 – 270 A

Input for clamp-on ammeter

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

Voltage measurement

Display range 0.0 – 60 V

Basic inaccuracy	±(0.5% of reading +0.1 V)
Resolution	0.1 V

Display range 0.0 – 500 V

Basic inaccuracy	±(0.5% of reading +1 V)
Resolution	0.1 V

Time measurement

Basic inaccuracy	±0.1% of reading ±1 digit

Load section

Max. battery voltage	288 V DC (TORKEL 840) 480 V DC (TORKEL 860)
Max. current	110 A
Max. power	15 kW
Load patterns	Constant current, constant power, constant resistance, current or power profile
Current setting	0-110.0 A (2999.9 A) [1]
Power setting	0-15.00 kW (299.99 kW) [1]
Resistance setting	0.1-2999.8 Ω
Battery voltage range, TORKEL 840	4 ranges, selected automatically at start of test
Battery voltage range, TORKEL 860	5 ranges, selected automatically at start of test
Stabilization (For internal current measurement)	±(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.
Delay until start	200 – 300 ms
Stop delay	100 – 200 ms
Battery	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

Final voltage	*Constant current*	*Constant power*
12 V battery (6 cells) [3]		
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] (TORKEL 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] (TORKEL 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

Cable set GA-00550

Ordering information

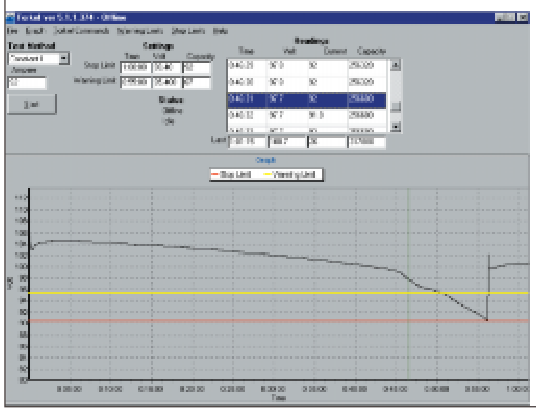
TORKEL 840	**Art.No.**
Complete with:	
Cable set GA-00550	
Transport case GD-00054	**BS-49094**
TORKEL 860	
Complete with:	
Cable set GA-00550	
Transport case GD-00054	**BS-49096**

Optional accessories

See section “Battery Testing Accessories”

Battery testing accessories

Item	Description	TORKEL 820	TORKEL 840/860	Art. No.
TORKEL 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 TORKEL • Report functions			
TORKEL Win		X	X	**BS-8208X**
TXL units	Extra loads 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.			
TXL830	TXL830 is intended for 24 V systems. Complete with cable set GA-00554 and transport case GD-00054. A DC clamp-on ammeter must be used to enable TORKEL 820 to measure the total current.	X		**BS-59093**
TXL850	TXL850 is intended for 48 V systems. Complete with cable set GA-00554 and transport case GD-00054. A DC clamp-on ammeter must be used to enable TORKEL 850 to measure the total current.	X	X	**BS-59095**
TXL870	TXL870 is intended primarily for 125 and 240 V battery systems. Complete with cable set GA-00550 and transport case GD-00054. A DC clamp-on ammeter must be used to enable TORKEL 870 to measure the total current.		X	**BS-59097**
Cable sets				
Cable set for TXL830 and TXL850	2 x 3 m, 70 mm^2, with cable lug. Max 100 V 270 A. Weight: 5.0 kg (11 lbs)	X	X	**GA-00554**
Extension cable set, 110 A	2 x 3 m, 25 mm^2. Max 480 V. Weight: 3.0 kg (6.6 lbs)		X	**GA-00552**
Sensing lead set	Cable set for measuring voltage at battery terminals. 2 x 5 m (16.4 ft)	X	X	**GA-00210**
Clamp-on ammeter				
DC clamp-on ammeter, 200 A	To measure current in circuit outside TORKEL	X	X	**XA-12792**
DC clamp-on ammeter, 1000 A	To measure current in circuit outside TORKEL	X	X	**XA-12790**



TORKEL Win showing total voltage curve

TXL870

Specifications TXL 830/850/870

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	
LVD	Low Voltage Directive 73/23/ EEC am. by 93/68/EEC
EMC	EMC Directive 89/336/EEC am. by 91/263/EEC, 92/31/EEC and 93/68/EEC

General	
Mains voltage	100 – 240 V AC, 50 / 60 Hz
Power consumption (max)	75 W
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 TXL830/850	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	*TXL830*	*TXL850*	*TXL870*
Max. voltage (DC)	28 V	56 V	140 V/ 280 V
Max. current	300 A	300 A	112 A at 140 V 56 A at 280 V
Max. power	8.3 kW	16.4 kW	15.8 kW

Internal resistance, 3-position selector

Position 1	*TXL830*	*TXL850*	*TXL870*
Current	0.275 Ω	0.55 Ω	4.95 Ω
100 A	at 27.6 V (12 x 2.3 V)	at 55.2 V (24 x 2.3 V)	–
78.5 A	at 21.6 V (12 x 1.8 V)	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)

Position 2	*TXL830*	*TXL850*	*TXL870*
Current	0.138 Ω	0.275 Ω	2.48 Ω
200 A	at 27.6 V	at 55.2 V (24 x 2.3 V)	–
156 A	at 21.6 V	43.2 V (24 x 1.8 V)	–

Position 3	*TXL830*	*TXL850*	*TXL870*
Current	0.092 Ω	0.184 Ω	1.24 Ω
300 A	at 27.6 V	at 55.2 V (24 x 2.3 V)	–
235 A	at 21.6 V	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)

TORKEL / TXL systems – examples

TORKEL 820 + TXL830, 12 V battery (6 cells)[1]		
Max. constant current (A)	***Number of TORKEL-units***	***Number of TXL-units***
234	1	1
571	1	4
918	2	6
TORKEL 820 + TXL830, 24 V battery (12 cells)[1]		
495	1	1
1170	1	4
1890	2	6
TORKEL 820 + TXL850, 48 V battery (24 cells)[1]		
499	1	1
1189	1	4
1918	2	6
TORKEL 840/860 + TXL830, 24 V battery (12 cells)[1]		
670	2	2
1005	3	3
TORKEL 840/860 + TXL850, 48 V battery (24 cells)[1]		
909	2	3
TORKEL 840/860 + TXL870, 110 V battery (54 cells)[1]		
188	1	1
532	2	4
845	2	8
TORKEL 840/860 + TXL870, 120 V battery (60 cells)[2]		
194	1	1
557	2	4
895	2	8
TORKEL 840/860 + TXL870, 220 V battery (108 cells)[1]		
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

Programma Electric AB
Eldarvägen 4
SE-187 75 TÄBY
Sweden

Tel +46 8 510 195 00
Fax +46 8 510 195 95
E-mail programma@ge.com
Internet www.gepower.com