

# BLU-C Series

## Battery Load Unit

- Lightweight – 17 kg (37.5 lbs) to 22 kg (48.5 lbs)
- Powerful – discharge power up to 42,0 kW
- Voltage measurement range: 5,25 - 800 V DC
- Discharge current – up to 300 A DC
- Real-time test parameters monitoring on 7 inch touch screen display
- Easily expandable for larger banks using BXL extra load units
- Enables testing batteries while in service
- Test resume feature in case of interrupted power supply



### Description

Batteries are crucial part to the overall reliability of a substation. During the power outage many electric power objects/systems, such as power plants and generator excitation systems, should continue operating using batteries. Inability of a battery string to provide a sufficient voltage/power supply to protection circuits may lead to catastrophic consequences to the substation equipment. Therefore, it is necessary batteries to be inspected regularly in order to monitor their condition and maximize their lifetime. The essential and most reliable test for a condition assessment of a battery health is the capacity measurement test. The best way to measure battery capacity is to perform a discharge test.

DV Power BLU-C Battery Capacity Tester is the latest DV Power solution for comprehensive battery capacity measurement. This universal instrument is applicable to any battery string (lead-acid, lithium-ion, nickel-cadmium based or other) with voltages up to 800 V DC.

The BLU-C capacity tester simplifies battery testing in multiple ways. The instrument provides monitoring of discharge parameters (graphical and numerical) on 7 inch touch screen display. Parameters such as battery voltage, capacity, test current / power / resistance and elapsed time can be monitored in real time. As an addition, the instrument enables measurement and monitoring of cell parameters (voltage/intercell voltage/temperature), which makes it a complete stand-alone discharge test system. The capacity tester can also be used with DV-B Win software, enabling detailed numerical and graphical presentation of key parameters, including report creating in various formats.

Using the BLU-C device, the capacity test is performed in an accurate, user-friendly way in accordance to actual standards for battery testing (IEEE 450-2010 / 1188-2005 / 1106-2015, IEC 60896-11/22 and other relevant standards).

Discharging can be performed at constant current, constant power, constant resistance or in accordance with a pre-selected load profile. If battery needs to supply its load continuously, the discharge test can be conducted by measuring and taking into account the load current during the test.

The BLU-C provides the discharge current of up to 300 A and is applicable to up to 800 V battery voltages.

When a required discharge current or power exceeds the capacity of a single BLU-C device, several BLU-C devices can be connected in parallel. Alternatively, External Load Units BXL Series can also be used to increase discharging capacity. Overview of BLU-C maximum currents for various battery voltage ranges is presented in tables below.

Battery voltage	6 V		12 V		24 V		48 V		60 V	
Min-Max voltage (V)	5,25	7,05	10,5	14,1	21,0	28,2	42,0	56,4	52,5	70,5
BLU300C max. current (A)	55		115		185		220		220	
BLU400C max. current (A)	20		40		80		150		200	
BLU500C max. current (A)	55		115		185		220		220	
BLU600C max. current (A)	20		40		80		150		200	
BLU800C max. current (A)	25		50		100		100		100	

Battery voltage	110 V		120 V		220 V		240 V		480 V		640 V	
Min-Max voltage (V)	96,3	129,3	105,0	141,0	192,5	258,5	210,0	300,0	300,0	500,0	564,0	800,0
BLU300C max. current (A)	150		140		75		70		-		-	
BLU400C max. current (A)	300		300		150		150		-		-	
BLU500C max. current (A)	150		140		75		70		40		-	
BLU600C max. current (A)	300		300		150		150		65		-	
BLU800C max. current (A)	100		100		100		100		50		40	

## Application

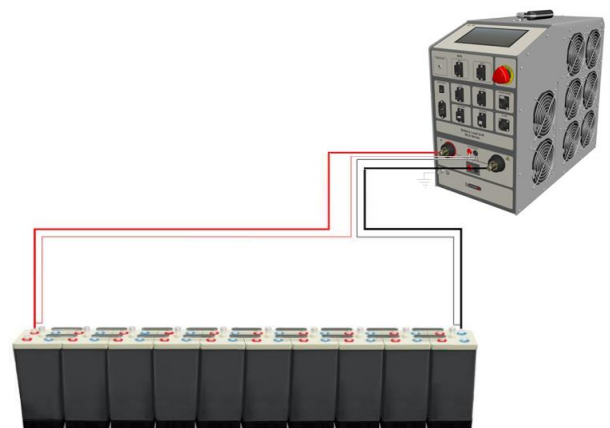
Typical application is measuring the capacity and full voltage of the batteries that serve as a backup power supply in (but not limited to):

- Power plants
- Telecommunication systems
- Generator excitation systems
- Substations
- Protection and control systems

## Connecting BLU-C to Battery

### Single mode

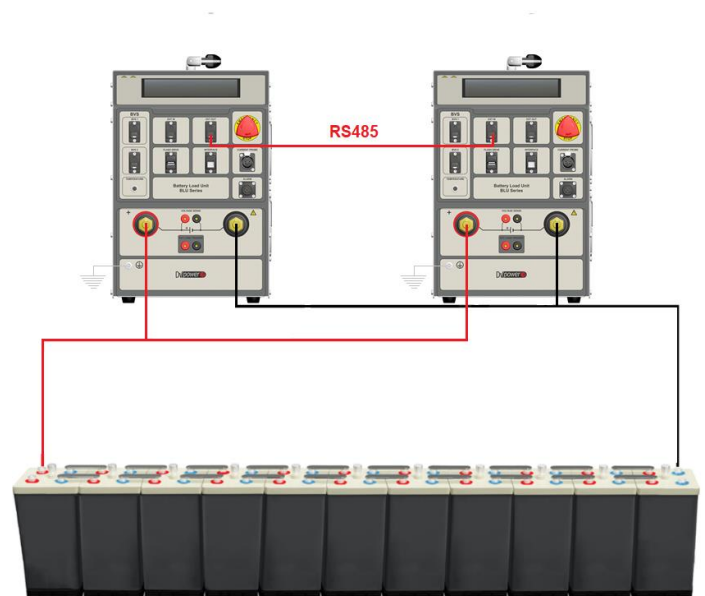
The BLU-C device can be connected to any battery test object by using a set of current cables and, optionally, a set of voltage sense cables. To maximize the accuracy and measurement repeatability, all clamps must have good connection to the battery terminals while any crossing between the cables should be avoided. The BLU-C displays an appropriate message if connection between a cable clamp and the corresponding battery terminal is not established.



### Parallel discharge test mode

In case the required discharge current or power exceeds the capacity of a single BLU-C device, several (up to ten) devices can be connected in parallel.

Connection between BLU-C devices is established by using Ethernet ports and RS485 communication. The communication is based on a MASTER-SLAVE principle – arbitrary selected device is set as MASTER while all the other BLU-C devices should be set as SLAVE units. In the parallel connection the MASTER will discharge as much energy as possible; the remaining energy (discharge current / discharge power) will be discharged on the first SLAVE unit in a chain. If MASTER and the first SLAVE does not have capacity to cover the discharge requirements, the remaining energy will be discharged on the next SLAVE in a chain, etc.



## Current Probe mode

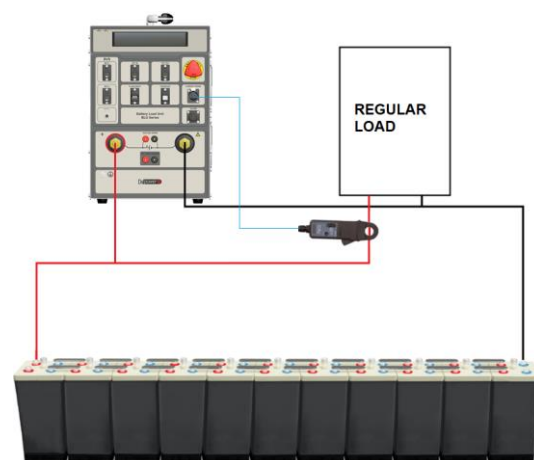
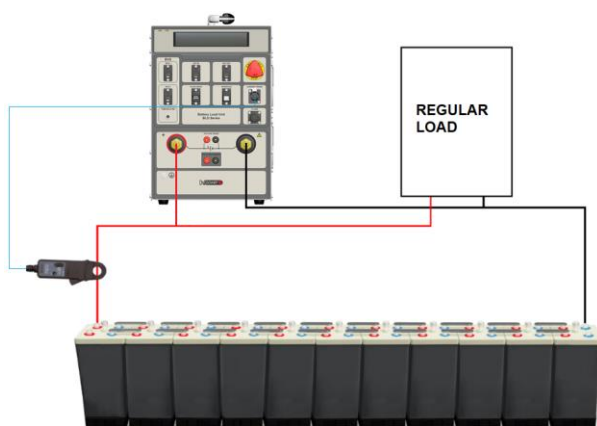
If the battery needs to supply its regular load continuously, the load current should be taken into account during the discharge test. Also, testing high-capacity battery strings may require engaging additional load units (such as Extra

Load BXL or any other load units). In both cases, the current probe should be used to enable BLU-C to regulate the total current / power.

The current probe can be connected in one of the following ways:

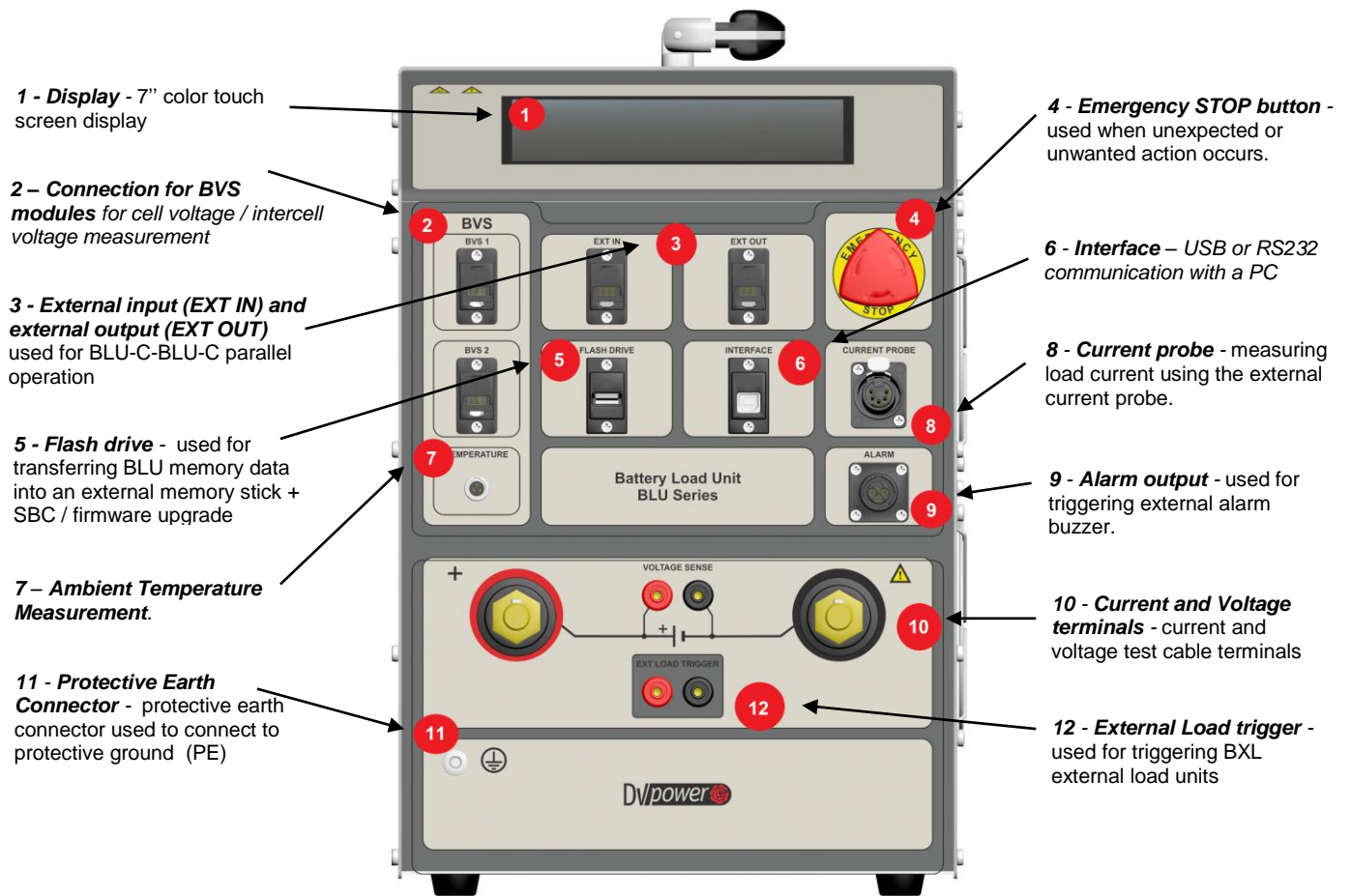
1. To measure the total discharge current (**Battery current mode**)

2. To measure the current of all loads, except the BLU-C current (**Load current mode**)



## Benefits and Features

- Battery capacity measurement by conducting a discharge test, in compliance with corresponding IEEE, IEC and other relevant standards
- *Constant I*, *Constant P* and *Constant R* operation modes
- Several Load profile operation modes: *Load profile I*, *Load profile P* and *Load profile R*, enable simulating load characteristics variation during a discharge test
- Real-time test parameters monitoring on 7 inch touch screen display, including Voltage / Time and Capacity / Time graphs
- Cell parameters measurement and monitoring (voltage/intercell voltage/temperature)
- Parallel operation feature
- Enables testing batteries while in service
- Test settings can be modified during the test
- Test resume feature in case of interrupted power supply
- Results saved in the internal memory can be downloaded to u USB and transferred to a PC for analysis and report generation
- Adjustable alarm and shutdown parameters for preventing excessive discharge




## Cell Voltage Measurement Feature

### Combining BLU-C and BVR22

Battery Voltage Recorder Series BVR22 is a lightweight, user-friendly, rechargeable handheld device intended for individual battery cell voltage and temperature measurement

while the battery is either in online or offline mode. When used in a system with the BLU-C device it serves as an efficient supplement to the battery capacity testing.

Options and features of the BVR22 model are presented in the table below.



	<p><b>Parameters Measured</b></p> <ul style="list-style-type: none"> <li>- String and cell voltage, cell (electrolyte)/ambient temperature, DC current measurement using current clamps.</li> <li>- Simultaneous string voltage and DC current measurement</li> <li>- Bluetooth communication with external Density Meter</li> </ul> <p><b>Measurement range</b></p> <ul style="list-style-type: none"> <li>- String / Cell Voltage: <math>\pm 600</math> V DC</li> <li>- Current / Intercell voltage: <math>\pm 1</math> V DC</li> </ul> <p><b>Data Transfer:</b> Bluetooth and USB to PC</p>
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## Combining BLU-C and BVS

DV Power battery voltage supervisor – BVS, is an accurate battery voltage monitoring system that monitors the state of health of battery systems. It records important battery parameters such as battery voltage, inter-cell connection voltage, and ambient temperature. Because of that, it can be a support tool for BLU during

capacity testing. There are two types of DV Power battery voltage supervisors:

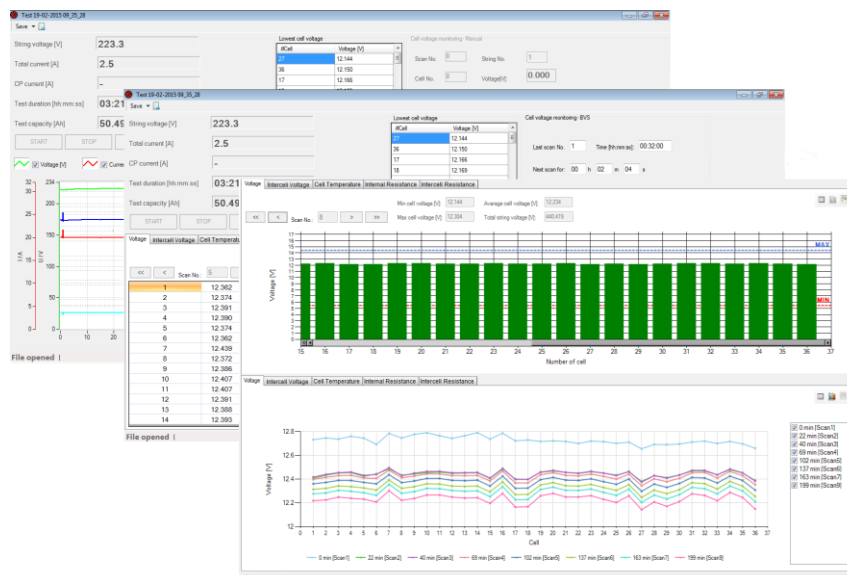
- BVS – One cell voltage module measures 1 cell
- BVS-4 – One cell voltage module measures 4 cells

Series	BVS	BVS-4
Picture		
No. of Measured Cells	One module measures one cell	One module measures four cells
Inter-cell Connection Voltage	✓	✗
Cell Temperature	YES (one temperature channel per cell)	YES (one temperature channel per 4 cells)
Ambient Temperature	✓	✓

## DV-B Win Software

The DV-B Win software is included in the purchase price, and all its updates are free of charge. Using the DV-B Win software a test can be controlled, performed and observed from a PC (or notebook), and the results can be saved directly on a PC (or notebook). Communication between the BLU and a PC (or notebook) is achieved through a USB cable. Using DV-B Win the results can be arranged and printed for a report in a selectable format as an XLS, PDF,

Word, or RTF format. Also, the possibility of importing other types of data format (jpg, png, doc) into standardized DV-B Win report is provided, as well as exporting the numerical and graphical results from DV-B Win into customizable report. Additionally, the software provides a possibility of setting extra parameters (cell voltage, string voltage, capacity and time) for alarming and ending the test.



## Technical Data

### Mains Power Supply

- Connection according to IEC/EN60320-1; C320
- Voltage:  
90 V – 264 V AC, 50 / 60 Hz, single-phase
- Input power:  
200 W (BLU-C), 400 W (BLU-C + BVS)
- Fuse 5 A / 250 V, type F

### Measurement

#### Internal current measurement

Model	Range	Resolution
BLU300C	0 – 300 A DC	0,1 A
BLU400C	0 – 400 A DC	0,1 A
BLU500C	0 – 300 A DC	0,1 A
BLU600C	0 – 400 A DC	0,1 A
BLU800C	0 – 200 A DC	0,1 A

#### Dimensions and Weights

Model	Dimensions	Weight
BLU300C (without acc.)	520 x 265 x 412 mm 20.5 x 10.5 x 16.2 in	17,0 kg 37.5 lbs.
BLU400C (without acc.)	590 x 280 x 600 mm 23.2 x 11.0 x 23.6 in	22,0 kg 48.5 lbs.
BLU500C (without acc.)	520 x 265 x 412 mm 20.5 x 10.5 x 16.2 in	17,0 kg 37.5 lbs.
BLU600C (without acc.)	590 x 280 x 600 mm 23.2 x 11.0 x 23.6 in	22,0 kg 48.5 lbs.
BLU800C (without acc.)	520 x 260 x 436 mm 20.5 x 10.2 x 17.1 in	20,8 kg 45.8 lbs.
CVM	66 x 28 mm x 139 mm 2.6 in x 1.1 in x 5.5 in	0,14 kg 0.3 lbs

#### Internal voltage measurement

Type	Range	Res.
Battery voltage	BLU300C: 0 – 300 V DC BLU400C: 0 – 300 V DC BLU500C: 0 – 500 V DC BLU600C: 0 – 500 V DC BLU800C: 0 – 800 V DC	0,1 V
Cell voltage	± 30 V DC	1 mV
Intercell connection voltage	± 50 mV DC	1 μV

#### Typical voltage measurement accuracy

- For BLU-C:  
±0,5% of reading ± 0,1 V (0 - 800 V DC)
- For BVS:  
±50 mV DC: ± (1% rdg + 1% F.S)  
±1 V DC: ± (0,1% rdg + 0,1% F.S)  
±30 V DC: ± (0,1% rdg + 0,1% F.S)

#### Temperature measurement

- Range: -20 °C to +80 °C (-4 °F to +176 °F)

#### Current measurement

- Display range: 0 – 2 999,9 A DC
- Basic accuracy: ± (0,5 % of reading + 0,1 A)
- Resolution: 0,1 A

#### Time measurement

- Typical accuracy:  
± 0,1% of reading ± 1 digit

#### Input for current probe

- Range: 0 – 1 V DC
- mV/A ratio: Software settable values:  
0,3 to 100 mV/A
- Input impedance: > 1 MΩ

#### Communication with PC

- USB
- RS232

#### Warranty

- 3 years

#### Display

##### Size

- 7 inch color touch screen display

##### Range / Resolution

- Current: 0 – 2 999,9 A DC / 0,1 A
- Voltage: 0 – 999,9 V DC / 0,1 V
- Capacity: 0 – 9999,9999 Ah / 0,0001 Ah
- Time: 00h:00m:00s - 23h:59m:59s / 1 sec

## Load section

- Battery voltage:  
5,25 – 300 V (BLU300C & BLU400C)  
5,25 – 500 V (BLU500C & BLU600C)  
5,25 – 800 V (BLU800C)
- Power:  
BLU300C & BLU500C: 20 kW (max)  
BLU400C & BLU600C: 42 kW (max)  
BLU800C: 32 kW (max)
- Discharge modes:  
Constant current / power / resistance; current, power or resistance profile mode

### Constant current (Const I)

Model	Range
BLU300C	1 – 220 A DC or (0,1 – 220 A DC) *
BLU400C	1 – 300 A DC or (0,1 – 300 A DC) *
BLU500C	1 – 220 A DC or (0,1 – 220 A DC) *
BLU600C	1 – 300 A DC or (0,1 – 300 A DC) *
BLU800C	1 – 100 A DC or (0,1 – 100 A DC) *

\* extended range can be provided on request.

Typical accuracy:  $\pm$  (0,5% of reading + 0,2 A)

- Resolution: 0,1 A
- Ripple: max 0,4 A peak

### Constant resistance (Const R)

Model	Resistance
BLU300C	0,1 – 300 $\Omega$ or (0,1 – 3 000 $\Omega$ ) *
BLU400C	0,3 – 300 $\Omega$ or (0,3 – 3 000 $\Omega$ ) *
BLU500C	0,1 – 500 $\Omega$ or (0,1 – 5 000 $\Omega$ ) *
BLU600C	0,3 – 500 $\Omega$ or (0,3 – 5 000 $\Omega$ ) *
BLU800C	0,2 – 800 $\Omega$ or (0,2 – 8 000 $\Omega$ ) *

\* extended range can be provided on request.

- Typical accuracy:  $\pm$  1%
- Resolution: up to 0,01  $\Omega$

### Constant power (Const P)

Model	Range	Resolution
BLU300C	0 – 20 kW*	0,01 kW
BLU400C	0 – 42 kW*	0,01 kW
BLU500C	0 – 20 kW*	0,01 kW
BLU600C	0 – 42 kW*	0,01 kW
BLU800C	0 – 32 kW*	0,01 kW

\* Instrument max. power derates at temperatures over +35°C (+95°F).

- Typical power accuracy measurement:  $\pm$ 1%
- Ripple: max 0,2 kW

### Available languages

- English, German, French, Spanish, Polish

### STOP parameters

- End voltage (total battery voltage)
- Capacity
- Test time

### Environment conditions

- Operating temperature:  
-10 °C to +50 °C / 14 °F to +122 °F
- Storage & Transportation temperature:  
-40 °C to +70 °C / -40 °F to +158 °F
- Relative humidity: up to 95%, non-condensing
- Pollution degree: 2

### Shock/Vibration/Fall

- Instrument: ETSI EN 300 019-2-7 class 7M2
- Instrument in transport case: ISTA 2A

### Protection

- Thermal cut-outs and automatic overload protection
- Emergency Stop button
- Overcurrent, overheat and overvoltage protection

### Current probe specifications

Current probe	Ranges	mV/A – ratio	Supply
Current clamp 30/300 A*	30 A	10 mV / A	From the instrument
	300 A	1 mV / A	

\* 1 000 A current clamp can be provided on request.

### Encapsulation class / Ingress protections

- IP20

### Applicable Standards

- IEEE 450-2010, IEEE 1188-2005, IEEE 1106-2015, IEC 60896-11, IEC 60896-22 and other relevant standards



### Applicable Standards

- Safety
  - Low Voltage Directive: Directive 2014/35/EU (CE conform)  
Applicable standards, for a class I instrument, pollution degree 2, Installation category II: IEC EN 61010-1
- Electromagnetic Compatibility:
  - Directive 2014/30/EU (CE conform)  
Applicable standard: EN 61326-1
- CAN/CSA-C22.2 No. 61010-1

*All specifications herein are valid at ambient temperature of + 25 °C /+ 77°F and recommended accessories. Specifications are subject to change without notice.*

### Accessories



**Current cables**



**Extension cables**



**Sense cables with dolphin clips**



**Current clamp 30/300 A**



**Cable bag**



**Cable set for BLU-BXL simultaneous triggering**



**BLU-BLU Communication cable**



**Cell Voltage Measurement System (BVS)**

## Order Info

Instrument	Article No
Battery Load Unit BLU300C	BLU300C-N-00
Battery Load Unit BLU400C	BLU400C-N-00
Battery Load Unit BLU500C	BLU500C-N-00
Battery Load Unit BLU600C	BLU600C-N-00
Battery Load Unit BLU800C	BLU800C-N-00

Included Accessories	Article No
Windows based DV-B Win PC software including USB cable	
Mains Power cable	MPCxxA-xx-00
Ground (PE) cable	CABLE-GND-00
Transport case	HARD-CASE-xx

Recommended	Article No
Current cables 2 x 3 m 50 mm <sup>2</sup> (9.84 ft, 0 AWG) with alligator clamps (A4) isolated (for BLU300C and BLU500C)	C2-03-50VA4I
Current cables 2 x 3 m 70 mm <sup>2</sup> (9.84 ft, 00 AWG) with alligator clamps (A4) isolated (for BLU400C and BLU600C)	C2-03-70VA4I
Current cables 2 x 3 m 25 mm <sup>2</sup> (9.84 ft, 4 AWG) high voltage (3 kV) with alligator clamps (A4) isolated (for BLU800C)	C2-03-25HVA4I
Cable bag	CABLE-BAG-00

Optional	Article No
Battery External Load Unit BXL-A	BXL400X-A-00
Battery External Load Unit BXL-V	BXL400X-V-00
Battery Voltage Recorder BVR22	BVR22X-NN-00
Battery Voltage Supervisor BVS	BVS-CUNN-000
Cell Voltage Module CVM	BVS-CVMNC-00
Cell Voltage Module CVM-4	BVS-CVM4N-00
Current cables 2 x 5 m xx mm <sup>2</sup> with alligator clamps (A4)	C2-05-xxVA4I
Current cables 2 x 10 m xx mm <sup>2</sup> with alligator clamps (A4)	C2-10-xxVA4I
Extension current cables 2 x xx m xx mm <sup>2</sup> (xx ft, xx AWG)	E2-xx-xxVA3I
Sense cables 2 x xx m (xx ft) with banana plugs + dolphin clip	S2-xx-00BPDC
Current clamp 30/300 A power supplied from the instrument	CACL-0300-06
Current clamp 1 000 A with internal battery supply and adapter	CACL-1002-02
Cable for external alarm	CABLE-EXA-05
Cable for BLU-BLU parallel operation 3 m (9.84 ft)	CP-03RJ45-00
Temperature sensor for ambient temperature measurement 1,5 m	TP-2015-NTC0
Cable plastic case – medium size	CABLE-CAS-02

### IBEKO Power AB

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