BLU-C Series

Battery Load Unit

- Operating voltage range: 3,0 (0,0)* - **800 V DC**
  *** Total discharge down to 0 V available with ZVD module**
- Discharge current - up to **300 A DC**
- Discharge power - up to **42,0 kW**
- 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

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) with BVS system, 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 / IEEE 1188-2005 / IEEE 1106-2015, IEC 60896-11/22 and other relevant standards).

Additionally, when combined with Zero Voltage Discharge Module ZVD, BLU-C enables **full battery discharge down to 0 V**, required before battery recycling.

Discharging can be performed at constant current, constant power, constant resistance, constant voltage or in accordance with a pre-selected load profile. The discharge test can be carried out on online batteries as well (connected to its load). By measuring the total or load current by a DC probe, BLU-C enables keeping the total current / power constant during the test.

When a required discharge current or power exceeds the capacity of a single BLU-C device, several BLU-C devices of identical models can be connected in parallel. Alternatively, External Load Units BXL Series can also be used to increase discharging capacity.

Models Overview

Model	BLU100C	BLU200C	BLU300C	BLU400C	BLU500C	BLU570C	BLU600C	BLU700C	BLU800C
Imax (A)	150	300	220	300	220	100	300	260	100
Umax (V)*	300	300	300	300	500	570	500	700	800
Pmax (kW)	20	42	20	42	20	30	42	42	32
BVS functionality**	NO	NO	YES	YES	YES	YES	YES	YES	YES
Parallel operation***	NO	NO	YES	YES	YES	YES	YES	YES	YES

* Maximum operating voltage.
** Individual cell voltage monitoring feature.
*** Parallel operation of 2 or more same model BLU-C units without external current measurement

Batt. voltage (V)			**Maximum currents (A) to 1.85 V / cell**							
Nom.	Min / Max	**BLU100C**	**BLU200C**	**BLU300C**	**BLU400C**	**BLU500C**	**BLU600C**	**BLU570C**	**BLU700C**	**BLU800C**
3,6	3,2	-	-	-	-	-	-	-	50	-
	4,2									
6	5,55	40	50	55	50	55	50	20	50	20
	7,05									
12	11,1	100	100	115	100	115	100	40	60	40
	14,1									
24	22,2	150	200	185	200	185	200	80	120	80
	28,2									
48	44,4	150	200	**220**	200	**220**	200	100	120	100
	56,4									
60	55,5	150	200	**220**	200	**220**	200	100	120	100
	70,5									
110	101,75	120	**300**	150	**300**	150	**300**	100	**240**	100
	129,25									
120	111,0	120	**300**	140	**300**	140	**300**	100	**260**	100
	141,0									
220	203,5	75	150	75	150	75	150	100	100	100
	258,5									
240	222,0	70	150	70	150	70	150	100	110	100
	282,0									
420	388,5	-	-	-	-	40	65	50	80	50
	493,5									
480	444,0	-	-	-	-	-	-	50	70	50
	564,0									
600	555,0							-	60	50
	705,0									
640	592,0	-	-		-			-	-	40
	752,0									
Weight (kg / lbs)		18,9 / 41.6	28,5 / 62.7	18,9 / 41.6	28,5 / 62.7	18,9 / 41.6	28,5 / 62.7	20,8 / 45.8	28,0 / 61.7	20,8 / 45.8

Application

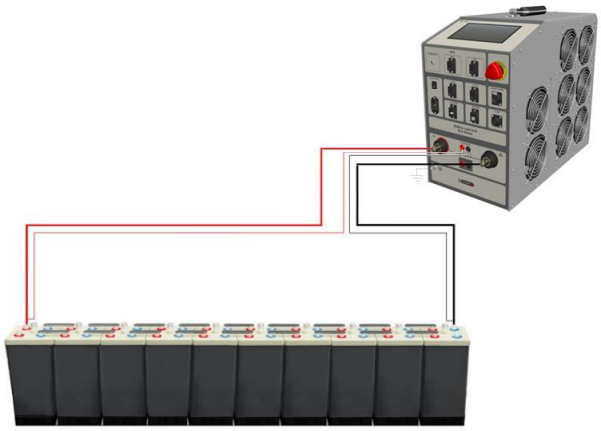
Typical application is measuring the capacity of batteries up to 800 V DC. Additionally, BLU-C & ZVD system enables full discharge of the battery (down to 0 V DC).
BLU-C can be applied to batteries that can be found in (but not limited to):

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

Connecting BLU-C to Battery

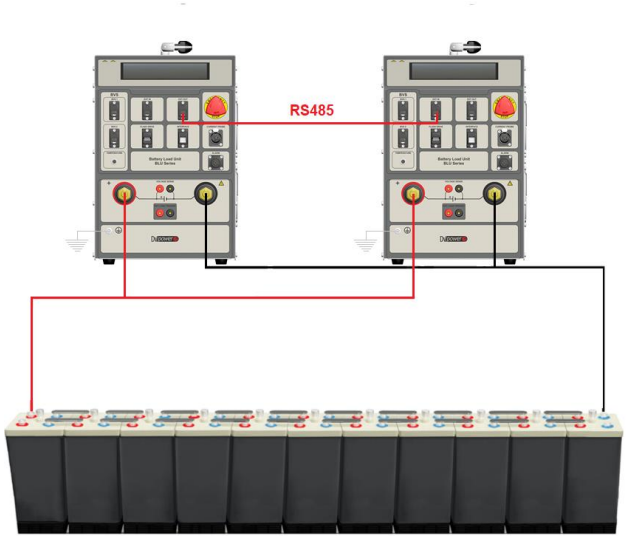
Single mode

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. Only identical models can operate in parallel discharge mode.
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 chaine. 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.



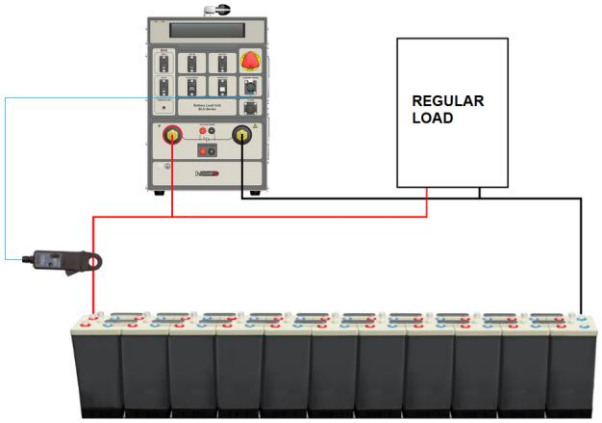
* BLU100C & BLU200C models do not support testing in parallel discharge mode

Current Probe mode

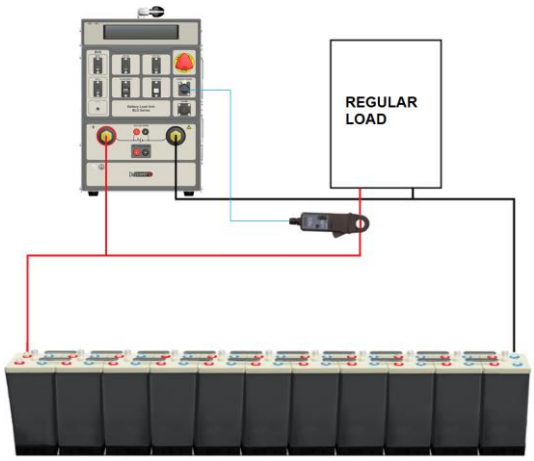
If the battery needs to supply its regular load continuously, the load current should be taken into account during the discharge test. Also, testing high-capacity battery strings may require engaging additional load units (such as Extra Load BXL or any other load units). In both cases, the current probe 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***)



BLU-C + ZVD for Total Discharge (to 0 V)

Zero Voltage Discharge Module ZVD Series is specially designed external module enabling full battery discharge (down to 0 V). It is designed to operate in a system with BLU (or BLU-C) providing total discharge of batteries with voltage up to 800 V DC.

The total battery discharge is required in the battery recycling process. It is important to discharge a battery completely before entering the recycling process, because the battery can contain some remanent energy. That remanent energy can be dangerous and create problems during the disassembling of a battery or even during its transportation. In order to prevent that, we created the ZVD Series enabling a full battery discharge.

A single discharge down to 0 V will not extract all the energy from the battery. Once the discharge is finished, battery voltage will rise to some non-zero value, confirming there is still energy in the batery. The phenomenon is called the battery voltage rebound.

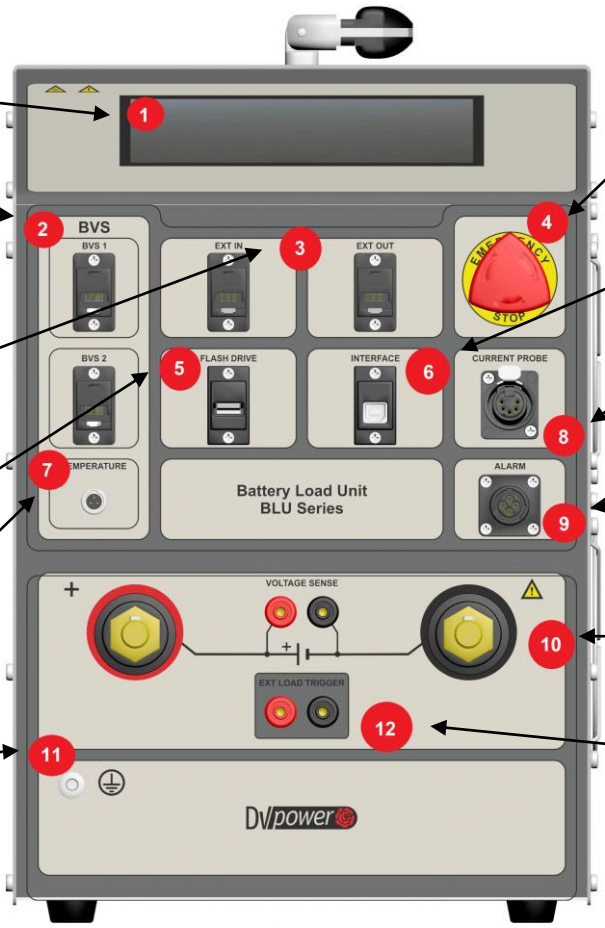
BLU & ZVD system improves the discharge process by discharging the battery in 2 steps:

Step 1: Efficient (up to 60 A) and controlled (current is constant down till 0 V is reached) discharge until battery voltage drops to 0 V.

Step 2: ZVD short-circuits the battery to remove the remaining energy.

Benefits and Features

- Battery capacity measurement by conducting a discharge test, in compliance with corresponding IEEE, IEC and other relevant standards
- Full battery discharge (down to 0 V) when additional ZVD module is used
- *Constant I*, *Constant P*, *Constant R, Constant U* 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)
- Temperature controlled discharge process
- Parallel operation feature for identical models (*not provided for the BLU100C & BLU200C models*)
- Enables testing batteries while in service
- Test settings can be modified during the test
- Ambient and cell temperature measurement feature
- 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



1 - Display - 7'' color touch screen display

2 – Connection for BVS modules *for cell voltage / intercell voltage measurement (not provided for BLU100C and BLU200C model)*

3 - External input (EXT IN) and external output (EXT OUT) used for BLU-C-BLU-C parallel operation *(not provided for BLU100C and BLU200C models)*

5 - Flash drive - used for transferring BLU memory data into an external memory stick + SBC / firmware upgrade

7 – Ambient Temperature Measurement.

11 - ***Protective Earth Connector*** - protective earth connector used to connect to protective ground (PE)

4 - ***Emergency STOP button*** - used when unexpected or unwanted action occurs.

6 - ***Interface*** – *USB, RS232 or Ethernet communication with a PC*

8 - ***Current probe*** - measuring load current using the external current probe.

9 - ***Alarm output*** - used for triggering external alarm buzzer.

10 - ***Current and Voltage terminals*** - current and voltage test cable terminals

12 - ***External Load trigger*** - used for triggering BXL external load units

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 areresented in the table below.

Parameters Measured

- String and cell voltage, cell (electrolyte)/ambient temperature, DC current measurement using current clamps.
- Simultaneous string voltage and DC current measurement
- Bluetooth communication with external Density Meter

Measurement range

- String / Cell Voltage: ± 600 V DC
- Current / Intercell voltage: ± 1 V DC

Data Transfer: Bluetooth and USB to PC

Combining BLU-C and BVS

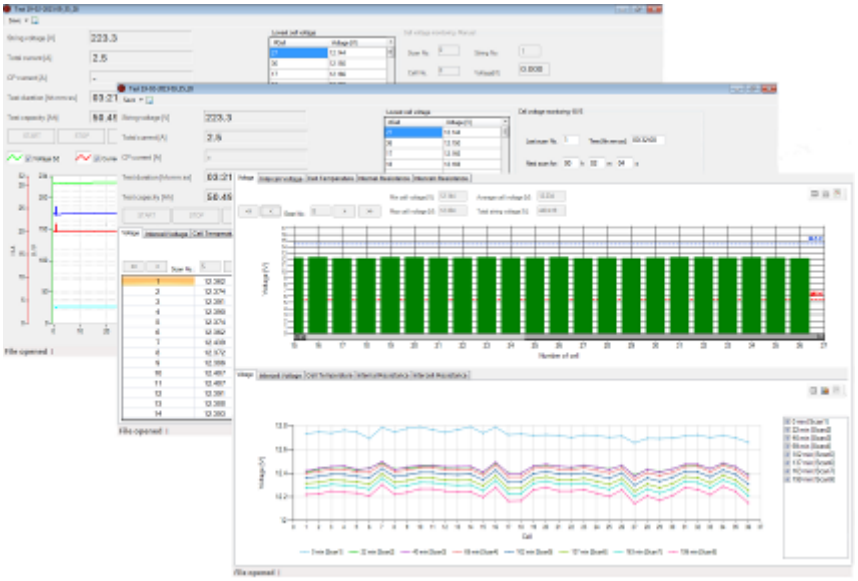
DV Power battery voltage supervisor – BVS, is an accurate battery voltage monitoring system that monitors the state of health of battery systems. It records important battery parameters such as battery voltage, inter-cell connection voltage, and ambient temperature. Because of that, it can be a support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

Dimensions and Weights

Model	Dimensions	Weight
BLU100C (without acc.)	520 x 265 x 412 mm 20.5 x 10.5 x 16.2 in	18,9 kg 41.6 lbs.
BLU200C (without acc.)	590 x 280 x 600 mm 23.2 x 11.0 x 23.6 in	28,5 kg 62.7 lbs
BLU300C (without acc.)	520 x 265 x 412 mm 20.5 x 10.5 x 16.2 in	18,9 kg 41.6 lbs.
BLU400C (without acc.)	590 x 280 x 600 mm 23.2 x 11.0 x 23.6 in	28,5 kg 62.7 lbs
BLU500C (without acc.)	520 x 265 x 412 mm 20.5 x 10.5 x 16.2 in	18,9 kg 41.6 lbs.
BLU600C (without acc.)	590 x 280 x 600 mm 23.2 x 11.0 x 23.6 in	28,5 kg 62.7 lbs
BLU570C (without acc.)	520 x 260 x 436 mm 20.5 x 10.2 x 17.1 in	20,8 kg 45.8 lbs.
BLU700C (without acc.)	590 x 280 x 600 mm 23.2 x 11.0 x 23.6 in	28,0 kg 61.7 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

Measurement

Internal current measurement

Model	Range	Resolution
BLU100C	0 – 300 A DC	0,1 A
BLU200C	0 – 400 A DC	0,1 A
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
BLU570C	0 – 200 A DC	0,1 A
BLU700C	0 – 400 A DC	0,1 A
BLU800C	0 – 200 A DC	0,1 A

Current measurement

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

Internal voltage measurement

Type	Range	Res.
Battery voltage	**BLU100C/BLU200C/BLU300C/ BLU400C**: 0 – 300 V DC **BLU500C/ BLU600C**: 0 – 500 V DC **BLU570C**: 0 – 570 V DC **BLU700C**: 0 – 700 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)

Time measurement

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

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 – 9999,9 Ah / 0,1 Ah
- Time: 00h:00m:00s - 23h:59m:59s / 1 sec

Input for current probe

- Range: 0 – 1 V DC
- Input impedance: > 1 MΩ

Communication with PC

- USB
- RS232 (optional)
- Ethernet (optional)

Load section

- Battery voltage
  5,25* – 300 V: BLU100C/ BLU200C, BLU300C/ BLU400C
  5,25* – 500 V: BLU500C/ BLU600C
  5,25* – 570 V: BLU570C
  3,0* – 700 V: BLU700C
  5,25* – 800 V: BLU800C
  * Total discharge down to 0 V available with ZVD module
- Power:
  BLU100C/ BLU300C/ BLU500C: 20 kW (max)
  BLU200C/ BLU400C/ BLU600C/ BLU700C: 42 kW (max)
  BLU570C: 30 kW (max)
  BLU800C: 32 kW (max)
- Discharge modes:
  Constant current / power / resistance; current, power or resistance profile mode

Constant current (Const I)

Model	Range
BLU100C	0 – 150 A DC (20 kW)*
BLU200C	0 – 300 A DC (42 kW)*
BLU300C	0 – 220 A DC (20 kW)*
BLU400C	0 – 300 A DC (42 kW)*
BLU500C	0 – 220 A DC (20 kW)*
BLU600C	0 – 300 A DC (42 kW)*
BLU570C	0 – 100 A DC (30 kW)*
BLU700C	0 – 260 A DC (42 kW)*
BLU800C	0 – 100 A DC (32 kW)*
ZVD module	0 – 60 A

* Maximum discharge power

Typical accuracy: ± (0,5% of reading + 0,2 A)

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

Constant resistance (Const R)

Model	Resistance
BLU100C	0,1 – 3 000 Ω
BLU200C	0,1 – 3 000 Ω
BLU300C	0,1 – 3 000 Ω
BLU400C	0,1 – 3 000 Ω
BLU500C	0,1 – 5 000 Ω
BLU600C	0,1 – 5 000 Ω
BLU570C	0,2 – 5 700 Ω
BLU700C	0,1 – 7 000 Ω
BLU800C	0,2 – 8 000 Ω

- Typical accuracy: ± 1%
- Resolution: up to 0,01 Ω

Constant power (Const P)

Model	Range	Res. (max)
BLU100C	0 – 20 kW*	0,01 kW
BLU200C	0 – 42 kW*	0,01 kW
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
BLU570C	0 – 30 kW*	0,01 kW
BLU700C	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: ±1%
- Ripple: max 0,2 kW

Available languages

- English, German

Warranty

- 3 years + additional 1 (one) year upon registration on DV Power official website (www.dv-power.com).

STOP parameters

- Battery voltage
- Capacity
- Test time

Environment conditions

- Operating temperature:
  -20 °C to +55 °C / -4 °F to +131 °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
- Electromagnetic Compatibility:
  - Directive 2014/30/EU (CE conform)
    Applicable standard: EN 61326-1
- CAN/CSA-C22.2 No. 61010-1
- 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

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

BLU-BLU Communication cable

Cell Voltage module CVM

Transport case for BLU100C / BLU300C / BLU500C

Transport case for BLU200C / BLU400C / BLU600C / BLU700C

Transport case for BLU570C / BLU800C

Cable bag

Order Info

Instrument	Article No
Battery Load Unit BLU100C	BLU100C-N-00
Battery Load Unit BLU200C	BLU200C-N-00
Battery Load Unit BLU300C	BLU300C-N-00
Battery Load Unit BLU400C	BLU400C-N-00
Battery Load Unit BLU500C	BLU500C-N-00
Battery Load Unit BLU570C	BLU570C-N-00
Battery Load Unit BLU600C	BLU600C-N-00
Battery Load Unit BLU700C	BLU700C-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 35 mm^2 (9.84 ft, 2 AWG) with alligator clamps (A4) isolated (*for BLU100C* model)	C2-03-35VA4I
Current cables 2 x 3 m 50 mm^2 (9.84 ft, 0 AWG) with alligator clamps (A4) isolated (*for BLU300C, BLU500C* and *BLU700C*)	C2-03-50VA4I
Current cables 2 x 3 m 70 mm^2 (9.84 ft, 00 AWG) with alligator clamps (A4) isolated (*for BLU200C, BLU400C* and *BLU600C*)	C2-03-70VA4I
Current cables 2 x 3 m 25 mm^2 (9.84 ft, 4 AWG) with alligator clamps (A4) isolated (*for BLU570C and BLU800C*)	C2-03-25VA4I
Cable bag	CABLE-BAG-00

Optional	Article No
Zero Voltage Discharge Module ZVD	BLU-ZVDMxx-0
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
Cell Voltage Module CVM	BVS-CVMNC-00
Cell Voltage Module CVM-4	BVS-CVM4N-00
Current cables 2 x 5 m xx mm^2 with alligator clamps (A4)	C2-05-xxVA4I
Current cables 2 x 10 m xx mm^2 with alligator clamps (A4)	C2-10-xxVA4I
Extension current cables 2 x xx m xx mm^2 (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 BLU-BLU parallel operation 3 m (9.84 ft)	CP-03RJ45-00
Cable set for BLU-BXL simultaneous triggering	PO-02-01BPBP
PT100 temperature indicator	TI-000-PT100

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BLU-T SERIES

Battery Load Units

- Operating voltage range: **0,9 (0,0)* – 70,5 V DC**
  *Total discharge down to 0 V available with ZVD module
- Lightweight – starting from 12,8 kg (28.2 lbs)
- Powerful – discharge power of up to **19,2 kW**
- Discharge current – up to **350 A DC**
- Easily expandable for larger banks using BXL-T extra load unit
- Discharge test of single Lead-acid, Ni-based and Li-ion cell
- Adjustable alarm and shutdown parameters for preventing excessive discharge
- Enables testing batteries while in service
- Detailed test analysis using DV-B Win software
- Test resume feature in case of interrupted power supply

Description

The Battery Load Units – BLU-T series are stand-alone or PC-controlled battery capacity test set, based on a state-of-the-art technology, using the most advanced power electronics solutions with coolers and fans integrated into device.
The BLU-T series devices provide the discharge current of up to 350 A and are applicable to up to 70.5 V battery voltages.
The BLU-T series devices are lightweight solutions developed to meet customer's wide ranging test procedures (standardized as well as customized). Using a BLU-T 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).

Additionally, when combined with Zero Voltage Discharge Module ZVD, BLU-T enables **full battery discharge down to 0 V**, required before battery recycling.

Discharging can be performed at constant current, constant power, constant resistance or in accordance with a pre-selected load profile. The discharge test can be conducted even in case a battery remains connected to the load – by measuring and taking into account the load current during the process.
Values of voltage, current / power / resistance, capacity and elapsed time are displayed on touch screen display during the test. The instrument will keep the preset current / power / resistance constant during the test (no manual corrections during the test are required).
When a required discharge current or power exceeds the capacity of a single BLU-T device,

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several BLU220T devices can be connected in parallel. Alternatively, External Load Units BXL-T series can also be used to increase discharging capacity. Combined with Battery Voltage Supervisor BVS and Battery Voltage Recorders BVR, BLU-T series devices are powerful tool which enables performing comprehensive evaluation of batteries. Overview of the maximum currents for various battery voltage ranges with the minimum achievable cell voltage of 1,75 V is presented in the table below. Maximum currents available by using Extra Load unit BXL-T are also presented in the table.

		Maximum current (A)		
Battery voltage (V)		**BLU110T**	**BLU220T**	**BXL-T**
Nom.	**Min / Max**			
1,2	0,9	100	-	-
	1,5			
2,0	1,75	100	-	-
	2,35			
3,7	3,0	100	-	-
	4,2			
6	5,25	100	100	62
	7,05			80
12	10,5	150	200	125
	14,1			165
24	21,0	150	350	250
	28,2			330
48	42,0	150	350	241
	56,4			320
60	52,5	120	270	189
	70,5			250
Weight (kg / lbs)		12,8 / 28.2	15,1 / 33	12,5 / 28
Max Power (kW)		8,5	19,2	18

Application

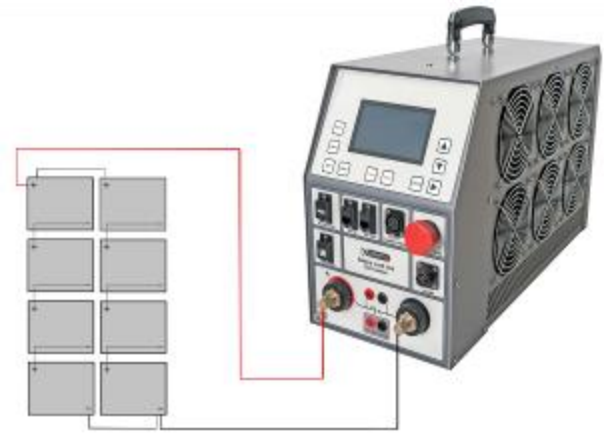
Typical application is measuring the capacity and full voltage of the batteries that can be found in telecommunication systems. Additionally, BLU & ZVD system enables full discharge of the battery (down to 0 V DC). However, BLU-T units can be applied to any battery with voltage not exceeding 70,5 V DC which can be found in (but not limited to):

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

Connecting BLU-T to Battery

Single mode

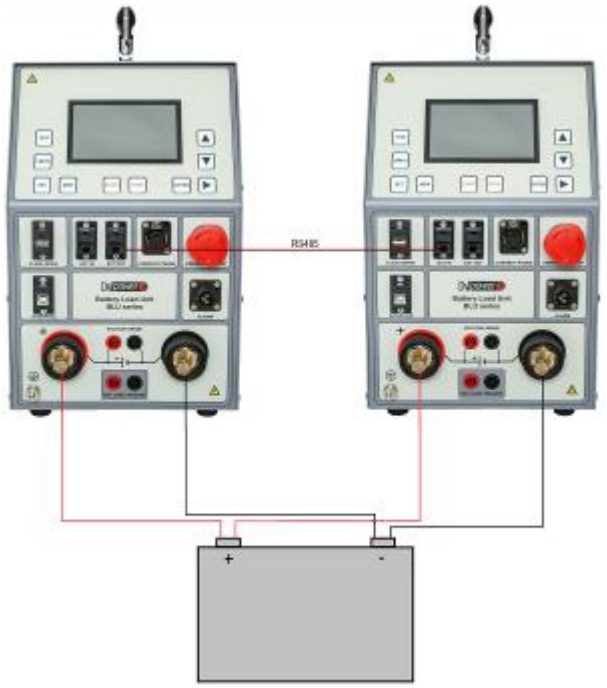
The BLU-T device can be connected to any battery test object by using a set of current cables and, optionally, a set of voltage sense cables. To maximize the accuracy and measurement repeatability, all clamps must have good connection to the battery terminals while any crossing between the cables should be avoided. The BLU-T 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 device, several (up to ten) devices can be connected in parallel.*

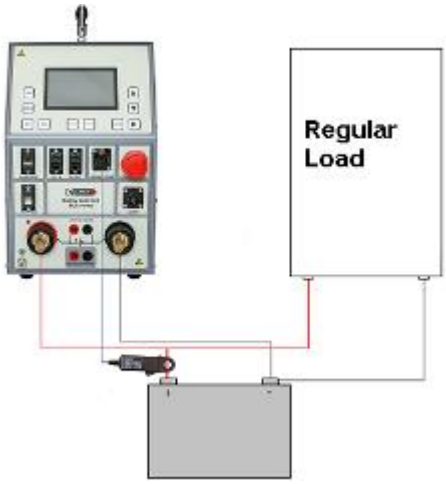
Connection between BLU devices is established by using Ethernet ports and RS485 communication. The communication is based on a MASTER-SLAVE principle – arbitrary selected device is set as MASTER while all the other BLU devices should be set as SLAVE units. In the parallel connection the MASTER will discharge as much energy as possible; the remaining energy (discharge current / discharge power) will be discharged on the first SLAVE unit in a chaine. 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.



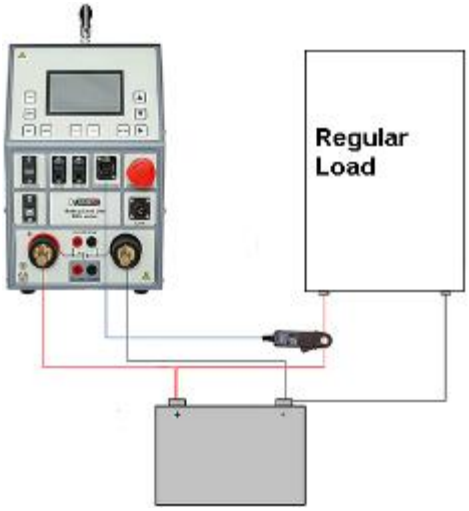
* BLU110T model do not support testing in parallel discharge mode.

Current Probe mode

In case the battery has to remain connected to the load, or an Extra Load BXL-T needs to be connected due to increase in discharge power, the discharge test needs to be carried out using the Current Probe CP MODE.



In this mode the measurement will be based either on the total battery current or a load current being measured by the DC current probe. The current probe connection point, for both modes, are illustrated in the figures below.



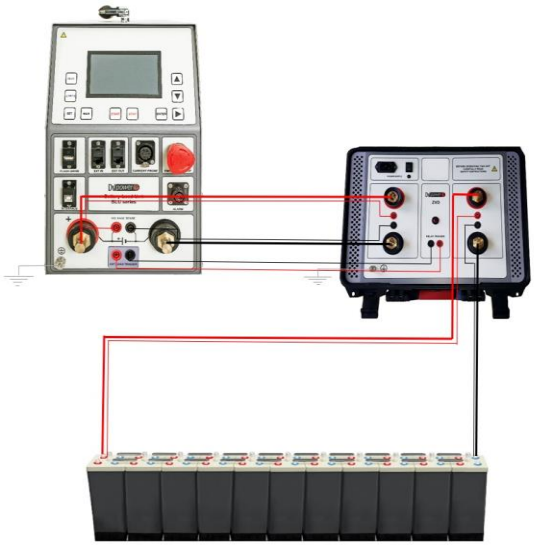
BLU + ZVD for Total Discharge (to 0 V)

Zero Voltage Discharge Module ZVD Series is specially designed external module enabling full battery discharge (down to 0 V). It is designed to operate in a system with BLU (or BLU-C) providing total discharge of batteries with voltage up to 500 V DC.

The total battery discharge is required in the battery recycling process. It is important to discharge a battery completely before entering the recycling process, because the battery can contain some remanent energy. That remanent energy can be dangerous and create problems during the disassembling of a battery or even during its transportation. In order to prevent that, we created the ZVD Series enabling a full battery discharge. A single discharge down to 0 V will not extract all the energy from the battery. Once the discharge is finished, battery voltage will rise to some non-zero value, confirming there is still energy in the batery. The phenomenon is called the battery voltage rebound. BLU & ZVD system improves the discharge process by discharging the battery in 2 steps:

Step 1: Efficient (up to 60 A) and controlled (current is constant down till 0 V is reached) discharge until battery voltage drops to 0 V.

Step 2: ZVD short-circuits the battery to remove the remaining energy.



Benefits and Features

The list of the instruments application, benefits and features includes:

- 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
- Parallel operation feature (*not provided for BLU110T model*)
- Current probe mode enables conducting discharging test while a load remains connected or when BXL-T units or any other load units in the market are used
- Test settings can be modified during the test
- Discharge test of single Lead-acid, Li-ion cell and Ni-based cells
- Adjustable alarm and shutdown parameters for preventing excessive discharge
- Complete battery discharge (down to 0 V) when in system with Zero Voltage Discharge Module (ZVD)
- If supported by a Battery Voltage Recorder BVR Series, additional features of cell voltage and cell temperature measurement are available
- The total voltage and capacity curve, as well as numerical values are recorded in the unit's internal memory after a test. The results can easily be transferred to personal computer or laptop for storage, printout or export purposes.
- Using the DV-B Win software (on a personal computer or laptop), graphical (curves) and numerical values of current / power / resistance, capacity, voltage and elapsed time are displayed and can be observed in real-time.

1 - Display - 4.3'' color touch screen display

2 - Keyboard - used for controlling and operating the instrument

4 - External input (EXT IN) and external output (EXT OUT) used for BLU-BLU parallel operation (not available for BLU110T model)

5 - Current probe - measuring load current using the external current probe.

3 - Flash drive - used for transferring BLU-T memory data into an external memory stick + SBC / firmware upgrade

6 - Emergency STOP button - used when unexpected or unwanted action occurs.

7 - Interface - enables controlling the BLU-T from a PC and downloading previously recorded results.

8 - Alarm output - used for triggering external alarm buzzer.

9 - Current and Voltage terminals - current and voltage test cable terminals

10 - External Load trigger - used for triggering BXL external load units

11 - Protective Earth Connector - protective earth connector used to connect to protective ground (PE)

Combining BLU-T 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 combination with the BLU-T 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.

Parameters Measured

- String and cell voltage, cell (electrolyte)/ambient temperature, DC current measurement using current clamps.
- Simultaneous string voltage and DC current measurement
- Bluetooth communication with external Density Meter

Measurement range

- String / Cell Voltage: ± 600 V DC
- Current / Intercell voltage: ± 1 V DC

Data Transfer: Bluetooth and USB to PC

Combining BLU-T and BVS

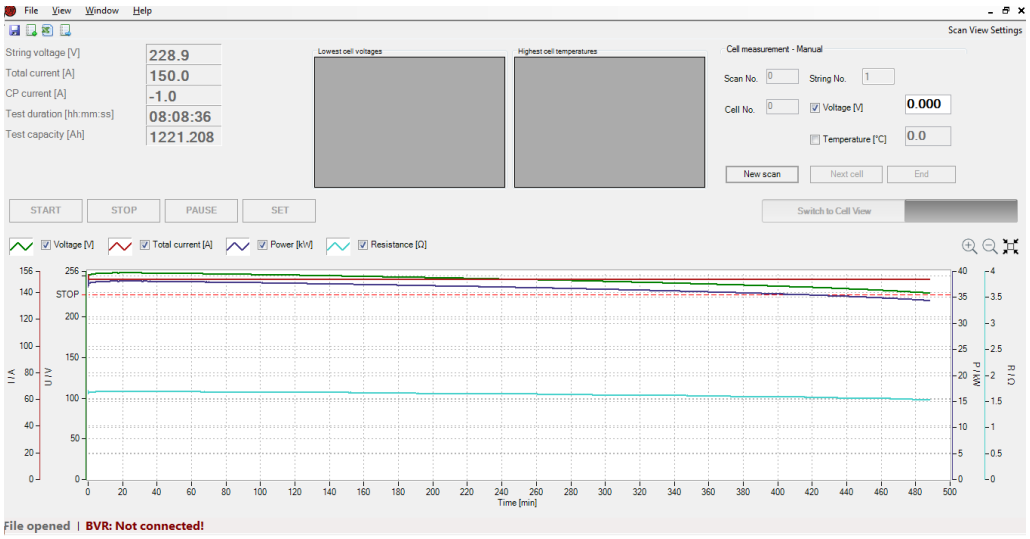
DV Power battery voltage supervisor – BVS, is an accurate battery voltage monitoring system that monitors the state of health of battery systems. It records important battery parameters such as battery voltage, inter-cell connection voltage, and ambient temperature. Because of that, it can be a support tool for BLU-T 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
  90 V – 264 V AC, 50 / 60 Hz, single-phase
- Supply from battery under test* (for BLU200A):
  110V – 240 V DC
  * Optionally / provided on request

Dimensions and Weights

Model		Dimensions	Weight
BLU110T (without acc.)	Instrument	440 x 221 x 355 mm 17.3 x 8.7 x 14 in	12,8 kg 28.2 lbs.
	Transport case *	545 x 300 x 418 mm 21.1 x 11.8 x 16.5 in	6,9 kg 15.2 lbs
	Canvas Transport case **	570 x 310 x 415 mm 22.4 x 12.2 x 16.3 in	3,6 kg 7.9 lbs.
BLU220T (without acc.)	Instrument	560 x 221 x 355 mm 22 x 8.7 x 14 in	15,1 kg 33.2 lbs.
	Transport case *	665 x 300 x 418 mm 26.2 x 11.8 x 16.5 in	8,5 kg 18.7 lbs.
	Canvas Transport case **	690 x 310 x 415 mm 27.2 x 12.2 x 16.3 in	3,7 kg 8.2 lbs.

* Included instrument transport case
** Optional instrument transport case

Measurement

Internal voltage measurement

Model	Range **	Resolution
BLU110T	0 – 75 V DC	0,1 V (or better*)
BLU220T	0 – 75 V DC	0,1 V (or better*)

* Optionally / provided on request
** Range is set automatically at start of test

- Typical accuracy: ± 0,5% of reading ± 0,1 V

Internal current measurement

Model	Range	Resolution
BLU110T	0 – 300 A DC	0,1 A
BLU220T	0 – 400 A DC	0,1 A

- 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

Load section

Model	Battery Voltage
BLU110T	0,9* – 70,5 V DC
BLU220T	5,25* – 70,5 V DC

*Total discharge down to 0 V available with ZVD module

- Power: 19.2 kW (max)
- Discharge modes:
  Constant current / power / resistance; current, power or resistance profile mode

Constant current (Const I)

Model	Range
BLU110T	0 – 150 A DC*
BLU220T	0 – 340 A DC*
ZVD module	0 – 60 A DC

* Range of currents settable on a single unit

- Typical accuracy: ± (0,5 % of reading + 0,2 A)
- Ripple: max 0,4 A peak
- Resolution: 0,1 A

Constant resistance (Const R)

Model	Resistance
BLU110T	0,01 – 70,5 Ω
BLU220T	0,2 – 70,5 Ω

* Optionally / provided on request

- Typical accuracy: ± 1%
- Resolution: up to 0,01 Ω

Constant power (Const P)

Model	Range	Resolution
BLU110T	0 – 8,5 kW*	0,01 kW
BLU220T	0 – 19,2 kW*	0,01 kW

- Typical accuracy: ± 1%
- Ripple: max 0,2 kW

* Discharge power range settable on a single unit

Display

Size

- 4,3 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

STOP parameters

- End voltage (total battery or per-cell voltage)
- Capacity
- Test time

Environment conditions

- Operating temperature:
  -20 °C to +55 °C / -4 °F to +131 °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

Communication with PC

- USB
- RS232 (optional)
- Ethernet (optional)

Protection

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

Available languages

- English, German, French, Spanish

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	

*** current clamps 100/600 A and/or 200/1000 A can be provided on request.**

Encapsulation class / Ingress protections

- IP20

Warranty

- 3 years + additional 1 (one) year upon registration on DV Power official website (www.dv-power.com)

Applicable Standards

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

Transport case

Canvas trans. case

Current clamp 30/300 A

Cable bag

Cable set for BLU-BXL simultaneous triggering

Order Info

Instrument	Article No
Battery Load Unit BLU110T	BLU110T-N-00
Battery Load Unit BLU220T	BLU220T-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 for BLU - small size (*for BLU110T model*)	HARD-CASE-B0
Transport case for BLU – medium size (*for BLU220T model*)	HARD-CASE-BL

Recommended	Article No
Current cables 2 x 3 m 50 mm^2 (9.84 ft, 0 AWG) with alligator clamps (A4) isolated (*for BLU110T*)	C2-03-50FA4I
Current cables 2 x 3 m 70 mm^2 (9.84 ft, 00 AWG) with alligator clamps (A4) isolated (*for BLU220T*)	C2-03-70FA4I
Sense cables 2 x 3 m (9.84 ft) with banana plugs + dolphin clip	S2-03-00BPDC
Cable bag	CABLE-BAG-00

Optional	
Zero Voltage Discharge Module ZVD	BLU-ZVDMxx-0
Battery External Load Unit BXL-T	BXL400X-T-00
Battery Voltage recorder BVR22 with accessories	BVR22X-NN-00
Cable set 2 x 2 m 1 mm^2 (6.56 ft, 17 AWG) for BLU-BXL simultaneous triggering (*for BXL-T model*)	PO-02-01BPBP
Cable set 2 x 5 m 1 mm^2 (16.4 ft, 17 AWG) for BLU-BXL simultaneous triggering (*for BXL-T model*)	PO-05-01BPBP
Current cables 2 x 5 m 70 mm^2 (16.4 ft, 00 AWG) with alligator clamps (A4) isolated (*for BLU220T and BXL-T models*)	C2-05-70FA4I
Current cables 2 x 5 m 25 mm^2 (16.4 ft, 3 AWG) with alligator clamps (A4) isolated (*for BLU110T model*)	C2-05-25FA4I
Extension cables 2 x 5 m 70 mm^2 (16.4 ft, 00 AWG) (*for BLU220T and BXL-T models*)	E2-05-70VFMI
Extension cables 2 x 3 m 16 mm^2 (9.84 ft, 5 AWG) with alligator clamps (A4) isolated (*for BLU110T model*)	E2-03-16VFMI
Sense cables 2 x 5 m (16.4 ft) with banana plugs + dolphin clip (*for BLU-T models*)	S2-05-00BPDC
Current clamp 30/300 A power supplied from the instrument with extension 5 m (16.4 ft) (*for BLU-T models*)	CACL-0300-06
Cable for external alarm (*for BLU-T models*)	CABLE-EXA-05
Extension cable for external alarm 5 m (16.4 ft) (*for BLU-T models*)	E1-EXABLU-05
Cable for BLU-BLU parallel operation 3 m (9.84 ft) (*for BLU220T model*)	CP-03RJ45-00
Canvas transport case – small size (*for BLU110T model*)	HARD-CASE-B2
Canvas transport case – medium size (*for BLU220T models*)	HARD-CASE-B3

Order Examples

BLU110T with recommended accessories

Instrument with Included Accessories	Quantity	Article No
Battery Load Unit BLU110T	1 set	BLU200A-N-00
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
- Ground (PE) cable		
- Transport case		
Recommended Accessories		
Current cables 2 x 3 m 50 mm^2 (9.84 ft, 0 AWG) with alligator clamps (A4) isolated	1 set	C2-03-50FA4I
Sense cables 2 x 3 m (9.84 ft) with banana plugs + dolphin clip	1 set	S2-03-00BPDC
Cable bag	1 pc	CABLE-BAG-00

BLU220T with recommended accessories

Instrument with Included Accessories	Quantity	Article No
Battery Load Unit BLU220T	1 set	BLU220T-N-00
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
- Ground (PE) cable		
- Transport case		
Recommended Accessories		
Current cables 2 x 3 m 70 mm^2 (9.84 ft, 00 AWG) with alligator clamps (A4) isolated	1 set	C2-03-70FA4I
Sense cables 2 x 3 m (9.84 ft) with banana plugs + dolphin clip	1 set	S2-03-00BPDC
Cable bag	1 pc	CABLE-BAG-00

IBEKO Power AB
Stockholmsvägen 18
181 50 Lidingö, Sweden

Contact
Phone: +46 70 0925 000
E-mail: sales@dv-power.com

BLU-A SERIES

Battery Load Units

- Operating voltage range: 3,0 (0,0)* - 500 V DC
  *Total discharge down to 0 V available with ZVD module
- Powerful – discharge power of up to 28,4 kW
- Discharge current – up to 240 A DC
- Lightweight – starting from 12,8 kg (28.2 lbs)
- Easily expandable for larger banks using BXL extra load units
- Discharge test of single Lead-acid, Ni-based and Li-ion cell
- Adjustable alarm and shutdown parameters for preventing excessive discharge
- Enables testing batteries while in service
- Detailed test analysis using DV-B Win software
- 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 life-time. 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.

The Battery Load Units – BLU-A series are stand-alone or PC-controlled battery capacity test set, based on a state-of-the-art technology, using the most advanced power electronics solutions with coolers and fans integrated into device.

The BLU series devices are lightweight solution for the test engineers from all around the world, developed to meet customer's wide ranging test procedures (standardized as well as customized). Using a BLU 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).

Additionally, when combined with Zero Voltage Discharge Module ZVD, BLU series enables **full battery discharge down to 0 V**, required before battery recycling.

Discharging can be performed at constant current, constant power, constant resistance or

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in accordance with a pre-selected load profile. The discharge test can be conducted even in case a battery remains connected to the load – by measuring and taking into account the load current during the process.

The BLU-A series devices provide the discharge current of up to 240 A and are applicable to up to 500 V battery voltages.

Values of voltage, current / power / resistance, capacity and elapsed time are displayed on touch screen display during the test. The instrument will keep the preset current / power / resistance constant during the test (no manual corrections during the test are required).

When a required discharge current or power exceeds the capacity of a single BLU device, several BLU devices can be connected in parallel. Alternatively, External Load Units BXL series can also be used to increase discharging capacity. Combined with Battery Voltage Supervisor BVS and Battery Voltage Recorders BVR, BLU-A series devices are powerful tool which enables performing detailed evaluation of batteries. Overview of the maximum currents for various battery voltage ranges with the minimum achievable cell voltage of 1,75 V is presented in the table below. Maximum currents available by using BXL series devices are also presented in the table.

Battery voltage (V)		**Maximum discharge current (A)**							
		BLU-A Series + BXL Models							
Nom.	**Min/max**	**BLU100L**	**BLU100A**	**BLU200A**	**BLU340A**	**BXL-A**	**BXL-T**	**BLU360V**	**BXL-V**
3,7	3,0	50	-	-	-	-	-	-	-
	4,2								
6	5,25	40	40	60	50	59	62	50	11
	7,05					80	80		15
12	10,5	80	80	120	100	119	125	100	22
	14,1					160	165		30
24	21,0	160	160	**240**	160	186	250	160	48
	28,2					250	330		65
48	42,0	160	160	**240**	160	186	241	160	96
	56,4					250	320		130
60	52,5	120	120	210	160	81	189	160	122
	70,5					110	250		165
110	96,3	110	110	140	160	119	-	160	89
	129,3					160			120
120	105,0	100	100	140	150	134	-	150	96
	141,0					180			130
220	192,5	55	55	75	**110**	67	**-**	**110**	78
	258,5					90			105
240	210,0	50	50	70	**100**	67	**-**	**100**	85
	300,0					90			115
420	300,0	-	-	-	-	-	**-**	**65**	30
	410,0								41
	410,0							**55**	41
	500,0								50
Weight (kg / lbs)		12,8 / 28.2	12,8 / 28.2	14,5 / 32	20,6 / 45.4	12,5 / 28	12,5 / 28	20,6 / 45.4	16/35
Max Power (kW)		14,2	14,2	19,7	28,4	25,4	18	28,4	32,4

Application

Typical application is measuring the capacity of batteries up to 500 V DC. Additionally, BLU & ZVD system enables full discharge of the battery (down to 0 V DC).

BLU Series can be applied to batteries that can be found in (but not limited to):

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

Connecting BLU to Battery

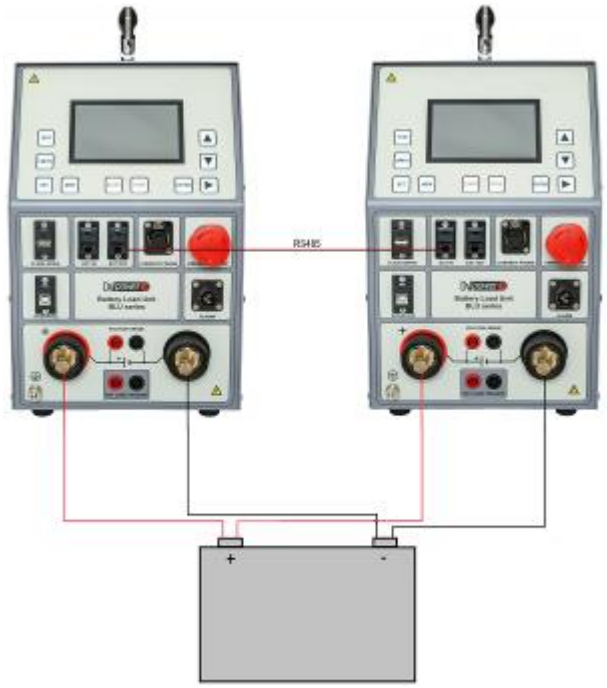
Single mode

The BLU 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 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 device, several (up to ten) devices can be connected in parallel.*

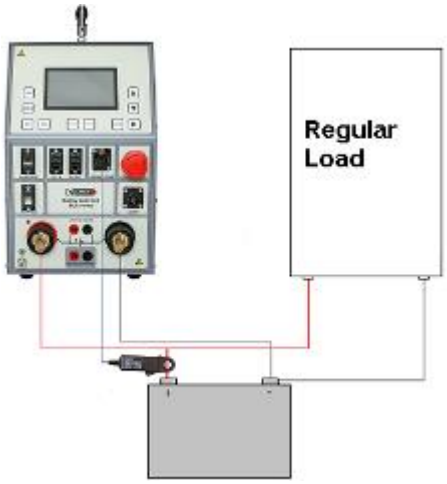
Connection between BLU devices is established by using Ethernet ports and RS485 communication. The communication is based on a MASTER-SLAVE principle – arbitrary selected device is set as MASTER while all the other BLU devices should be set as SLAVE units. In the parallel connection the MASTER will discharge as much energy as possible; the remaining energy (discharge current / discharge power) will be discharged on the first SLAVE unit in a chaine. 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.



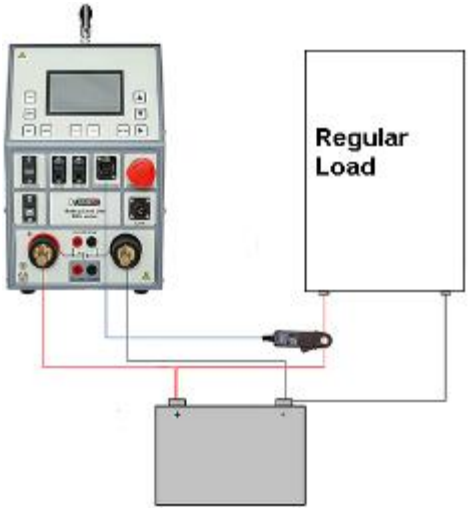
* BLU100A & BLU100L models do not support testing in parallel discharge mode.

Current Probe mode

In case the battery has to remain connected to the load, or an Extra Load BXL needs to be connected due to increase in discharge power, the discharge test needs to be carried out using the Current Probe CP MODE.



In this mode the measurement will be based either on the total battery current or a load current being measured by the DC current probe. The current probe connection point, for both modes, are illustrated in the figures below.



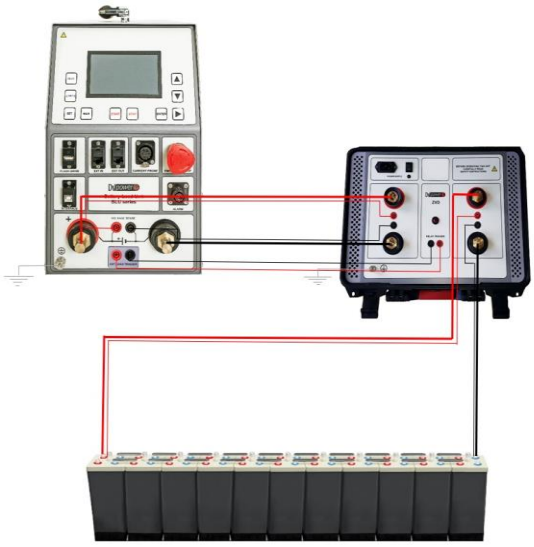
BLU + ZVD for Total Discharge (to 0 V)

Zero Voltage Discharge Module ZVD Series is specially designed external module enabling full battery discharge (down to 0 V). It is designed to operate in a system with BLU (or BLU-C) providing total discharge of batteries with voltage up to 500 V DC.

The total battery discharge is required in the battery recycling process. It is important to discharge a battery completely before entering the recycling process, because the battery can contain some remanent energy. That remanent energy can be dangerous and create problems during the disassembling of a battery or even during its transportation. In order to prevent that, we created the ZVD Series enabling a full battery discharge. A single discharge down to 0 V will not extract all the energy from the battery. Once the discharge is finished, battery voltage will rise to some non-zero value, confirming there is still energy in the batery. The phenomenon is called the battery voltage rebound. BLU & ZVD system improves the discharge process by discharging the battery in 2 steps:

Step 1: Efficient (up to 60 A) and controlled (current is constant down till 0 V is reached) discharge until battery voltage drops to 0 V.

Step 2: ZVD short-circuits the battery to remove the remaining energy.



Benefits and Features

The list of the instruments application, benefits and features includes:

- 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
- Parallel operation feature (*not provided for BLU100L & BLU100A models*)
- Current probe mode enables conducting discharging test while a load remains connected or when BXL units or any other load units in the market are used
- Test settings can be modified during the test
- Discharge test of single Lead-acid, Li-ion cell and Ni-based cells
- Adjustable alarm and shutdown parameters for preventing excessive discharge
- Complete battery discharge (down to 0 V) when in system with Zero Voltage Discharge Module (ZVD)
- If supported by a Battery Voltage Recorder BVR Series, additional features of cell voltage and cell temperature measurement are available
- The total voltage and capacity curve, as well as numerical values are recorded in the unit's internal memory after a test. The results can easily be transferred to personal computer or laptop for storage, printout or export purposes.
- Using the DV-B Win software (on a personal computer or laptop), graphical (curves) and numerical values of current / power / resistance, capacity, voltage and elapsed time are displayed and can be observed in real-time.

1 - Display - 4.3'' color touch screen display

4 - External input (EXT IN) and external output (EXT OUT) used for BLU-BLU parallel operation (not available for BLU100A & BLU100L models)

3 - Flash drive - used for transferring BLU memory data into an external memory stick + SBC / firmware upgrade

7 - ***Interface*** - enables controlling the BLU from a PC and downloading previously recorded results.

9 - ***Current and Voltage terminals*** - current and voltage test cable terminals

11 - ***Protective Earth Connector*** - protective earth connector used to connect to protective ground (PE)

2 - Keyboard - used for controlling and operating the instrument

5 - ***Current probe*** - measuring load current using the external current probe.

6 - ***Emergency STOP button*** - used when unexpected or unwanted action occurs.

8 - ***Alarm output*** - used for triggering external alarm buzzer.

10 - ***External Load trigger*** - used for triggering BXL external load units

Combining BLU-A 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 combination with the BLU 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.

Parameters Measured

- String and cell voltage, cell (electrolyte)/ambient temperature, DC current measurement using current clamps.
- Simultaneous string voltage and DC current measurement
- Bluetooth communication with external Density Meter

Measurement range

- String / Cell Voltage: ± 600 V DC
- Current / Intercell voltage: ± 1 V DC

Data Transfer: Bluetooth and USB to PC

Combining BLU-A and BVS

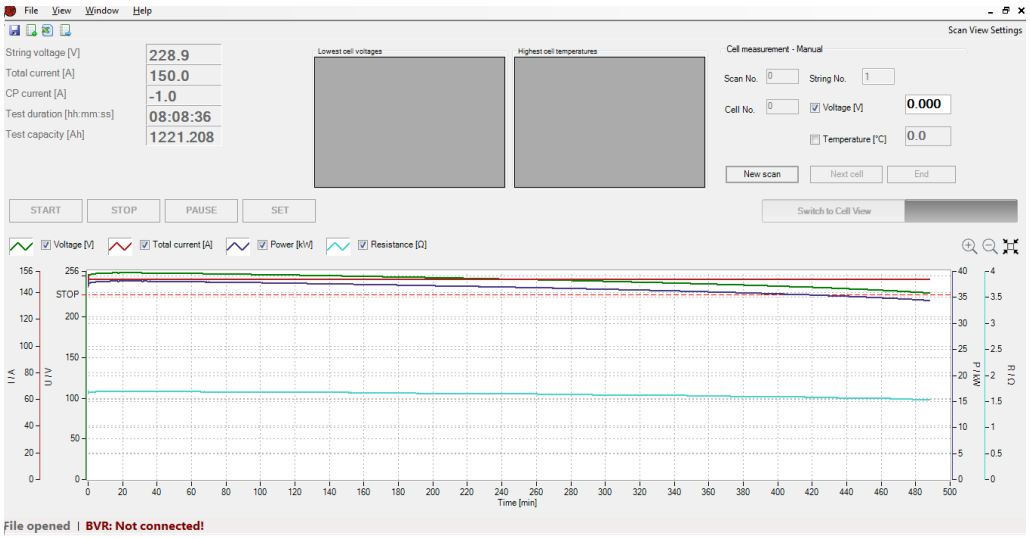
DV Power battery voltage supervisor – BVS, is an accurate battery voltage monitoring system that monitors the state of health of battery systems. It records important battery parameters such as battery voltage, inter-cell connection voltage, and ambient temperature. Because of that, it can be a support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



BLU-A Series - models

BLU100L

- applicable to 3 V – 300 V DC battery voltages
- weight – 12,8 kg (28.2 lbs)
- discharge power – up to 14,2 kW
- discharge current – up to 160 A

BLU100A

- applicable to 5,25 V – 300 V DC battery voltages
- weight – 12,8 kg (28.2 lbs)
- discharge power – up to 14,2 kW
- discharge current – up to 160 A

BLU200A

- applicable to 5,25 V – 300 V DC battery voltages
- weight – 14,5 kg (32 lbs)
- discharge power – up to 19,7 kW
- discharge current – up to 240 A

BLU340A

- applicable to 5,25 V – 300 V DC battery voltages
- weight – 20,6 kg (45.4 lbs)
- discharge power – up to 28,4 kW
- discharge current – up to 160 A

BLU360V

- applicable to 5,25 V – 500 V DC battery voltages
- weight – 20,6 kg (45.4 lbs)
- discharge power – up to 28,4 kW
- discharge current – up to 160 A

Technical Data

Mains Power Supply

- Connection according to IEC/EN60320-1; C320
  90 V – 264 V AC, 50 / 60 Hz, single-phase
- Supply from battery under test* (for BLU200A):
  110V – 240 V DC
  * Optionally / provided on request

Dimensions and Weights

Model		Dimensions	Weight
BLU100A & BLU100L (without acc.)	Instrument	440 x 221 x 355 mm 17.3 x 8.7 x 14 in	12,8 kg 28.2 lbs.
	Transport case *	545 x 300 x 418 mm 21.1 x 11.8 x 16.5 in	6,9 kg 15.2 lbs
	Canvas Transport case **	570 x 310 x 415 mm 22.4 x 12.2 x 16.3 in	3,6 kg 7.9 lbs.
BLU200A (without acc.)	Instrument	560 x 221 x 355 mm 22 x 8.7 x 14 in	14,5 kg 32 lbs.
	Transport case *	665 x 300 x 418 mm 26.2 x 11.8 x 16.5 in	8,5 kg 18.7 lbs
	Canvas Transport case **	690 x 310 x 415 mm 27.2 x 12.2 x 16.3 in	3,7 kg 8.2 lbs.
BLU340A (without acc.)	Instrument	730 x 221 x 355 mm 28.7 x 8.7 x 14 in	20,6 kg 45.4 lbs.
	Transport case *	795 x 290 x 415 mm 31.3 x 11.4 x 16.3 in	10,1 kg 22.3 lbs.
BLU360V (without acc.)	Instrument	730 x 221 x 355 mm 28.7 x 8.7 x 14 in	20,6 kg 45.4 lbs.
	Transport case *	795 x 290 x 415 mm 31.3 x 11.4 x 16.3 in	10,1 kg 22.3 lbs.

* Included instrument transport case
** Optional instrument transport case

Measurement

Internal voltage measurement

Model	Range **	Resolution
BLU100L	0 – 300 V DC	0,1 V or better*
BLU100A	0 – 300 V DC	0,1 V or better*
BLU200A	0 – 300 V DC	0,1 V (0,002 V up to 60 V, 0,02 V up to 300 V)*
BLU340A	0 – 300 V DC	0,1 V or better*
BLU360V	0 – 500 V DC	0,1 V or better*

* Optionally / provided on request
** Range is set automatically at start of test

- Typical accuracy: ± 0,5% of reading ± 0,1 V

Internal current measurement

Model	Range	Resolution
BLU100L	0 – 300 A DC	0,1 A
BLU100A	0 – 300 A DC	0,1 A
BLU200A	0 – 300 A DC	0,1 A
BLU340A	0 – 300 A DC	0,1 A
BLU360V	0 – 300 A DC	0,1 A

- 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:
  ± 0,01 % 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

Load section

Model	Battery Voltage
BLU100L	3,0* – 300 V DC
BLU100A	5,25* – 300 V DC
BLU200A	5,25* – 300 V DC
BLU340A	5,25* – 300 V DC
BLU360V	5,25* – 500 V DC

*Total discharge down to 0 V available with ZVD module

- Power: 28.4 kW (max)
- Discharge modes:
  Constant current / power / resistance; current, power or resistance profile mode

Constant current (Const I)

Model	Range
BLU100L	0 – 160 A DC (14,2 kW)*
BLU100A	0 – 160 A DC (14,2 kW)*
BLU200A	0 – 240 A DC (19,7 kW)*
BLU340A	0 – 160 A DC (28,4 kW)*
BLU360V	0 – 160 A DC (28,4 kW)*
ZVD module	0 – 60 A

* Maximum discharge power

- Typical accuracy: ± (0,5 % of reading + 0,2 A)
- Ripple: max 0,4 A peak
- Resolution: 0,1 A

Constant resistance (Const R)

Model	Resistance
BLU100L	0,1 – 300 Ω
BLU100A	0,2 – 300 Ω
BLU200A	0,2 – 300 Ω (0,2 – 3000 Ω)*
BLU340A	0,2 – 300 Ω
BLU360V	≤ 200 mΩ – 500 Ω

* Optionally / provided on request

- Typical accuracy: ± 1%
- Resolution: up to 0,01 Ω

Warranty

- 3 years + additional 1 (one) year upon registration on DV Power official website (www.dv-power.com)

Constant power (Const P)

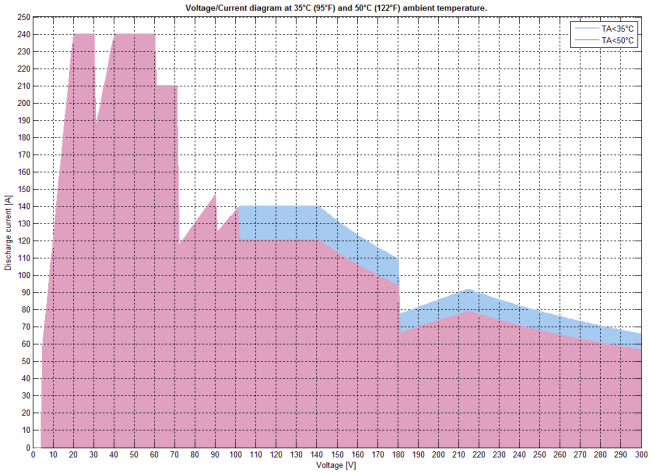
Model	Range	Resolution
BLU100L	0 – 14,2 kW*	0,01 kW
BLU100A	0 – 14,2 kW*	0,01 kW
BLU200A	0 – 19,7 kW**	0,01 kW
BLU340A	0 – 28,4 kW*	0,01 kW
BLU360V	0 – 28,4 kW**	0,01 kW

- Typical accuracy: ± 1%
- Ripple: max 0,2 kW

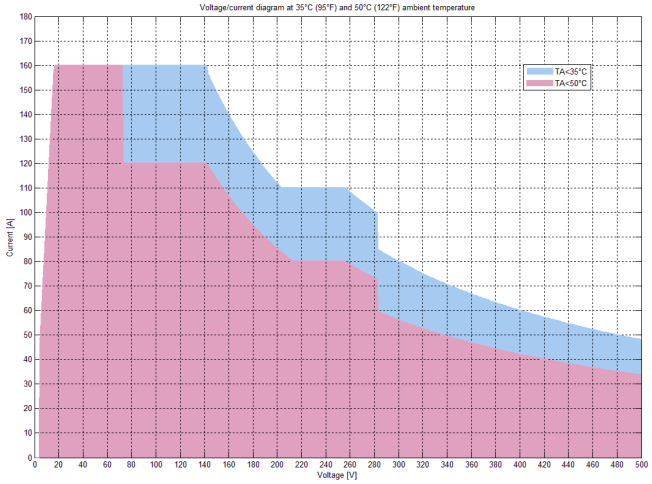
* Discharge power range settable on a single unit

** For BLU200A and BLU360V models, maximum power derates at temperatures over +35˚C (+95˚F).

Current / voltage diagram for the BLU200A model at +35˚C (+95˚F) and +50˚C (+122˚F) is presented below.



Current / voltage diagram for the BLU360V model at +35˚C (+95˚F) and +50˚C (+122˚F) is presented below.



Display

Size

- 4,3 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

STOP parameters

- End voltage (total battery or per-cell voltage)
- Capacity
- Test time

Environment conditions

- Operating temperature:
  -20 °C to +55 °C / -4 °F to +131 °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

Communication with PC

- USB
- RS232 (optional)

Protection

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

Available languages

- English, German, French, Spanish

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	

*** current clamps 1000 A 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
- 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

Transport case

Canvas trans. case

Current clamp 30/300 A

Cable bag

Cable set for BLU-BXL simultaneous triggering

Cable for BLU-BLU parallel operation

Cable for external alarm

Order Info

Instrument	Article No
Battery Load Unit BLU100L	BLU100A-N-00
Battery Load Unit BLU100A	BLU100L-N-00
Battery Load Unit BLU200A	BLU200A-N-00
Battery Load Unit BLU340A	BLU340A-N-00
Battery Load Unit BLU360V	BLU360V-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 for BLU - small size (*for BLU100L & BLU100A models*)	HARD-CASE-B0
Transport case for BLU – medium size (*for BLU200A models*)	HARD-CASE-BL
Transport case for BLU – large size (*for BLU340A and BLU360V models*)	HARD-CASE-B1

Recommended	Article No
Current cables 2 x 3 m 35 mm^2 (9.84 ft, 2 AWG) with alligator clamps (A4) isolated (*for BLU100L, BLU100A, BLU340A and BLU360V models*)	C2-03-35VA4I
Current cables 2 x 3 m 50 mm^2 (9.84 ft, 0 AWG) with alligator clamps (A4) isolated (*for BLU200A model*)	C2-03-50VA4I
Cable bag	CABLE-BAG-00

Optional	Article No
Zero Voltage Discharge Module ZVD	BLU-ZVDMxx-0
Battery External Load Unit BXL-A	BXL400X-A-00
Battery External Load Unit BXL-T	BXL400X-T-00
Battery External Load Unit BXL-V	BXL400X-V-00
Cable set 2 x 2 m 1 mm^2 (6.56 ft, 17 AWG) for BLU-BXL simultaneous triggering (*for BXL models*)	PO-02-01BPBP
Battery Voltage recorder BVR11 with accessories	BVR11X-NN-00
Battery Voltage recorder BVR22 with accessories	BVR22X-NN-00
Current cables 2 x 3 m 50 mm^2 (9.84 ft, 0 AWG) with alligator clamps (A4) isolated (*for BLU100L, BLU100A, BLU200A, BLU340A, BLU360V, BXL-A and BXL-V models*)	C2-03-50VA4I
Current cables 2 x 5 m 35 mm^2 (16.4 ft, 2 AWG) with alligator clamps (A4) isolated (*for BLU100L, BLU100A, BLU340A, BLU360V, BXL-A and BXL-V models*)	C2-05-35VA4I
Current cables 2 x 5 m 50 mm^2 (16.4 ft, 0 AWG) with alligator clamps (A4) isolated (*for BLU100L, BLU100A, BLU200A, BLU340A, BLU360V, BXL-A and BXL-V models*)	C2-05-50VA4I
Current cables 2 x 5 m 70 mm^2 (16.4 ft, 00 AWG) with alligator clamps	C2-05-70FA4I

(A4) isolated (*for BXL-T model*)	
Extension cables 2 x 5 m 35 mm^2 (16.4 ft, 2 AWG) (*for BLU100L, BLU100A, BLU340A, BLU360V and BXL models*)	E2-05-35VA3I
Extension cables 2 x 5 m 70 mm^2 (16.4 ft, 00 AWG) (*for BXL-T model*)	E2-05-70VFMI
Sense cables 2 x 3 m (9.84 ft) with banana plugs + dolphin clip (*for BLU models*)	S2-03-00BPDC
Sense cables 2 x 5 m (16.4 ft) with banana plugs + dolphin clip (*for BLU models*)	S2-05-00BPDC
Current clamp 30/300 A power supplied from the instrument with extension 5 m (16.4 ft) (*for BLU models*)	CACL-0300-06
Cable for external alarm (*for BLU models*)	CABLE-EXA-05
Extension cable for external alarm 5 m (16.4 ft) (*for BLU models*)	E1-EXABLU-05
Cable for BLU-BLU parallel operation 3 m (9.84 ft) (*for BLU200A, BLU340A and BLU360V models*)	CP-03RJ45-00
Cable set 2 x 5 m 1 mm^2 (16.4 ft, 17 AWG) for BLU-BXL simultaneous triggering (*for BXL models*)	PO-05-01BPBP
Canvas transport case – small size (*for BLU100L and BLU100A models*)	HARD-CASE-B2
Canvas transport case – medium size (*for BLU200A model*)	HARD-CASE-B3

Order Examples

BLU200A with recommended accessories

Instrument with Included Accessories	Quantity	Article No
Battery Load Unit BLU200A	1 set	BLU200A-N-00
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
- Ground (PE) cable		
- Transport case		
Recommended Accessories		
Current cables 2 x 3 m 50 mm^2 (9.84 ft, 0 AWG) with alligator clamps (A4) isolated	1 set	C2-03-50VA4I
Cable bag	1 pc	CABLE-BAG-00

BLU340A + BXL-A with recommended accessories

Instruments with Included Accessories	Quantity	Article No
Battery Load Unit BLU340A	1 pc	BLU340A-N-00
Battery Extra Load Unit BXL-A	1 pc	BXL400X-A-00
- USB with DV-B Win PC software	1 pc	
- USB cable	1 pc	
- Mains power cable	2 pcs	
- Ground (PE) cable	2 pcs	
- Transport case	2 pcs	
Recommended Accessories		
Current cables 2 x 3 m 35 mm^2 (9.84 ft, 2 AWG) with alligator clamps (A4) isolated	2 sets	C2-03-35VA4I
Cable bag	2 pcs	CABLE-BAG-00
Current clamp 30/300 A power supplied from the instrument with extension 5 m (16.4 ft)	1 pc	CACL-0300-06

2 x BLU360V with recommended accessories

Instruments with Included Accessories	Quantity	Article No
Battery Load Unit BLU360V	2 sets	BLU360V-N-00
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
- Ground (PE) cable		
- Transport case		
Recommended Accessories		
Current cables 2 x 3 m 35 mm^2 (9.84 ft, 2 AWG) with alligator clamps (A4) isolated	2 sets	C2-03-35VA4I
Cable bag	2 pcs	CABLE-BAG-00
Cable for BLU-BLU parallel operation 3 m (9.84 ft)	1 pc	CP-03RJ45-00

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