

## BVS

# Battery Voltage Supervisor

- Automated string and cell voltage, string current and ambient temperature and cell temperature measurements during capacity tests
- Detection and notification of failing cells
- Reliable and easy to operate
- Detailed test analysis and reporting provided using DV-B Win software
- Two models: BVS and BVS-4 (1 module per 4 cells)
- Cell temperature measurement



## Description

The Battery Voltage Supervisor is a battery monitoring system for real-time data gathering and viewing.

This system's main role is monitoring battery voltage values during a battery discharge testing in order to meet IEC, IEEE and NERC requirements.

The Battery Voltage Supervisor is an integrated system consisting of:

- Control Unit for BVS or BVS-4 (BVS-CU)
- Cell Voltage Modules (CVM or CVM-4)
- String voltage module (SVM) (optional)
- String current module (SCM) (optional)

The BVS-CU performs monitoring and measurements data acquisition from the Cell Voltage Modules and transfers this data to a PC. In addition, the BVS-CU provides power supply to all connected modules. Cell Voltage modules are used to measure cell parameters.

Depending on the type of cell voltage modules used, DV Power provides two models of Battery Voltage Supervisors:

- **BVS** – One cell voltage module (CVM) measures one cell

- **BVS-4** – One cell voltage module (CVM-4) is connected to 4 cells and measures the voltage of each cell

BVS and BVS-4 systems act as an add-on to the Battery Load Unit (BLU) series of devices while performing a battery discharge test, providing detailed analysis of an individual cell's condition. The system identifies a potential battery malfunction by monitoring the cell voltage parameters from an array of the cell voltage module.

In addition, the BVS-CU provides ambient temperature measurements on multiple locations (4 temperature channels). Overall string voltage and string current measurements can be achieved by using optional string voltage module (SVM) and string current module (SCM).

The Cell Voltage Modules detect cells that fail a discharge test based on measured voltage values, so these cells can be safely removed from the battery string.

Data acquisition and extensive analysis capabilities of data collected from the modules is available in the DV-B Win application software suite, providing a user data viewing, tracking and generation of comprehensive reports.

## Applications

The list of the instrument applications includes:

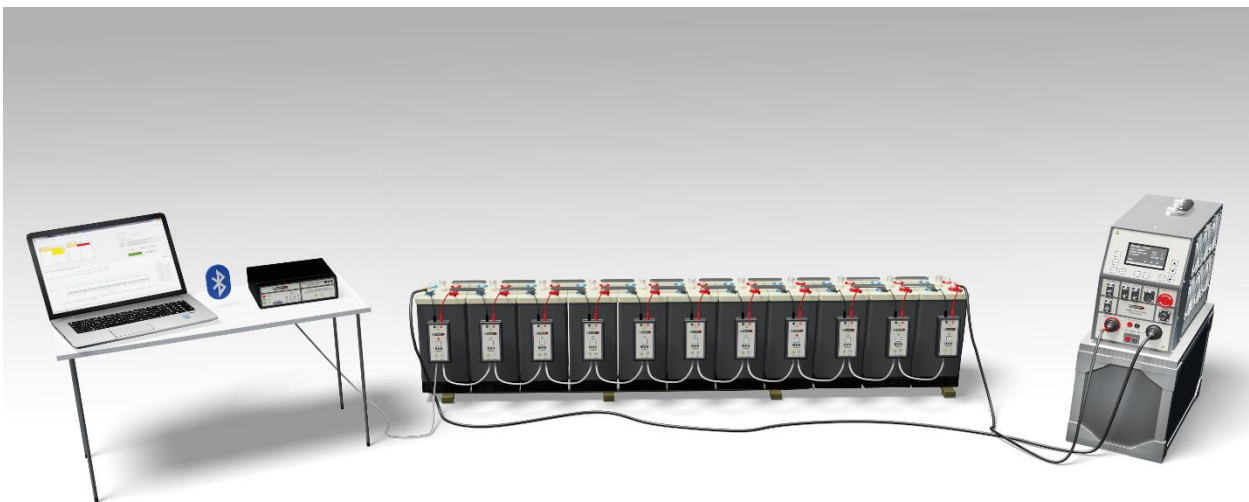
- Real time cell condition assessment by monitoring and recording cell voltages from the set modules during a battery capacity (discharge) testing as well as charging procedure.
- Real time ambient temperature monitoring with the BVS-CU unit
- Cell temperature measurement
- String voltage and current monitoring using additional string voltage module (SVM) and string current module (SCM)
- Detailed data trending and analysis provided using DV-B Win software

## Battery Voltage Supervisor BVS

In the BVS system implementation, every CVM module is installed directly on an individual cell. Each cell voltage module measures parameters of one cell. Measured parameters are:

- Cell Voltage
- Intercell connection voltage
- Cell temperature (optional)

Failure of one of the CVM modules will not affect communication between the rests of operating CVM modules and the BVS-CU. The connection diagram of the BVS to a battery string is presented in the figure below.



*Connectivity diagram of BVS system components in combination with Battery Load Unit device*

## Battery Voltage Supervisor BVS-4

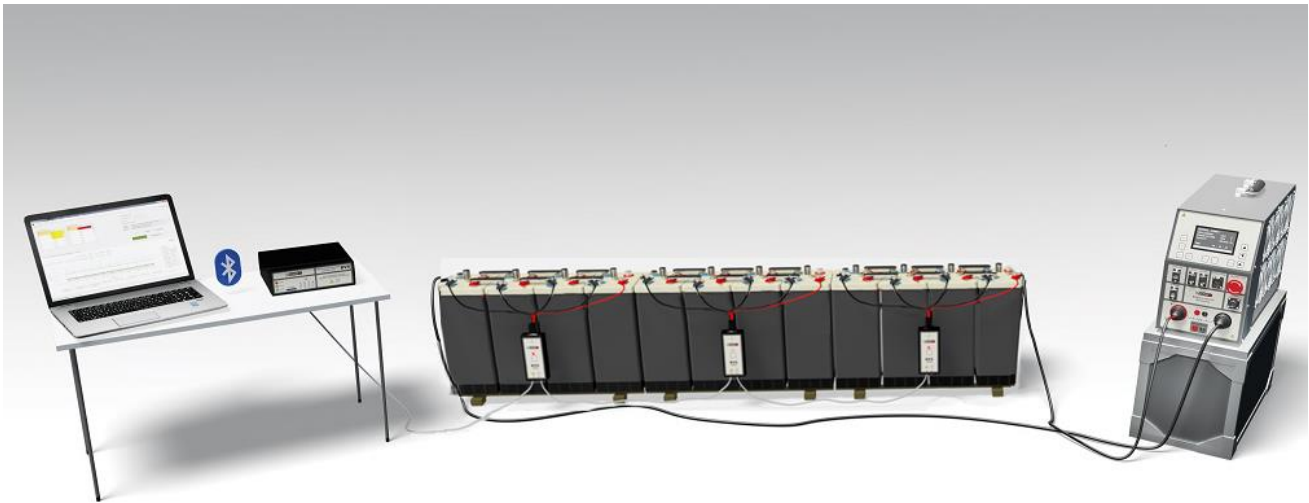
In the BVS-4 system implementation, every CVM-4 module is installed to monitor up to 4 cells. Measured parameters are:

- Cell Voltage
- Cell temperature (optional) – on one of the 4 cells

This simplifies the connection to the battery string, since a fewer number of connections is required.

Failure of one of the CVM-4 modules will not affect communication between the rests of operating CVM-4 modules and the BVS-CU.

The connection diagram of the BVS-4 to a battery string is presented in the figure below.



*Connection diagram of BVS-4 system components in combination with Battery Load Unit device*

## Features and Benefits

### Extensive cell analysis during discharge test

Using the BVS/BVS-4 as a supplement to the Battery Load Unit (BLU) devices provides multiple advantages during a battery discharge testing.

The Cell Voltage Modules measure voltage values in real-time mode and forward recorded data to the Control Unit in user defined intervals selected through DV-B Win application software. All out-of-tolerance measurement values are announced by a LED signalization on individual modules, so the failing cells can be detected before endangering the entire battery system. This enables detecting and safely bypassing the failing cell during a discharge process.

Up to 4 ambient temperature measurement channels are provided on the BVS-CU for measuring ambient temperature on multiple locations. Additional two modules can be used in case string voltage and current measurements are required. Using these two optional modules enables the system to work in conjunction with any load bank on the market and perform completely automated capacity test.

### DV-B Win Software

All results transferred from the BVS/BVS-4 system can be viewed, analyzed and presented in selectable report forms by using the DV-B Win software application.

Data can be transferred to a PC through USB or Bluetooth communication.

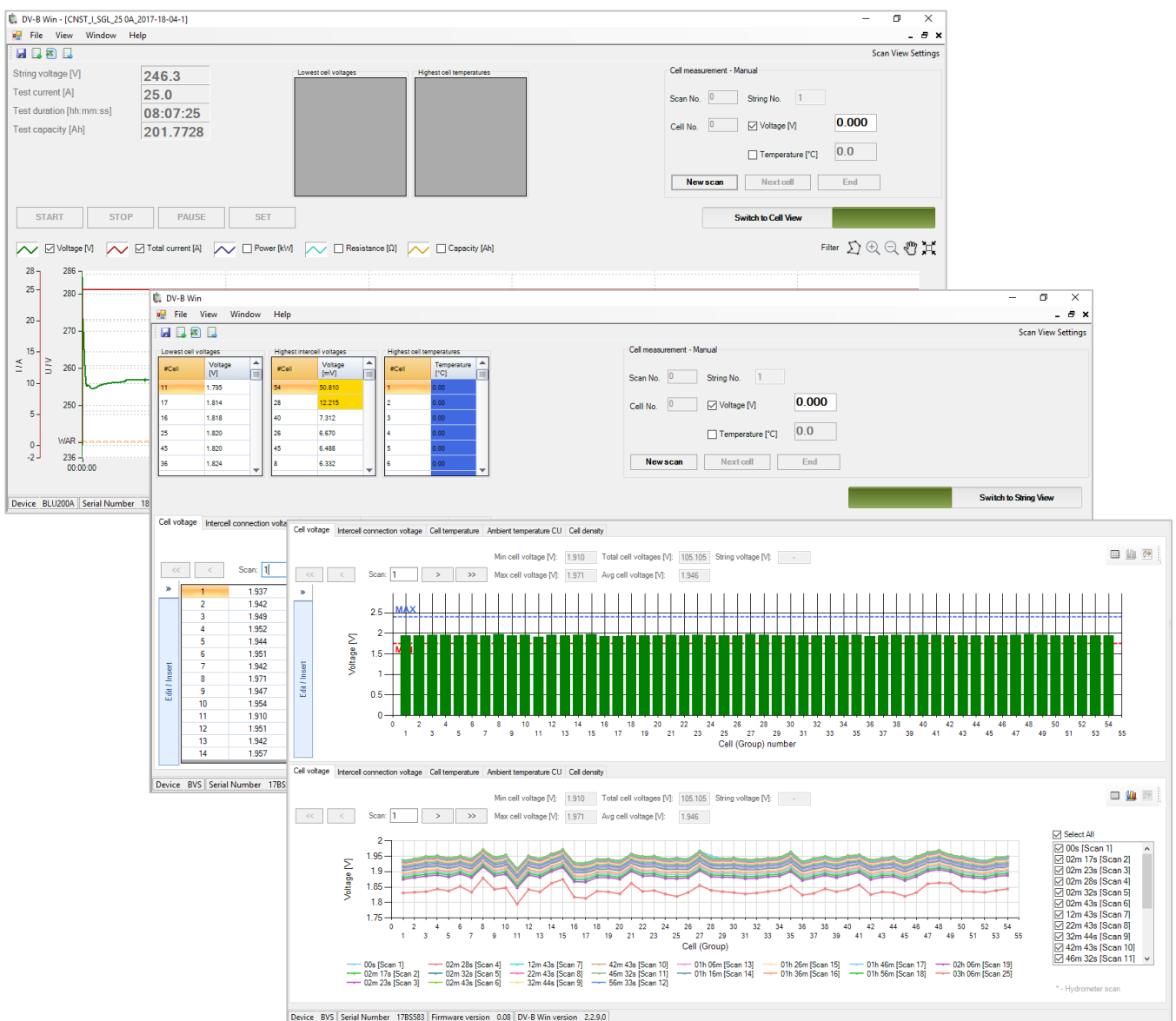
Both, the BVS/BVS-4 and the BLU device provided results can be viewed on the same report form.

A quick pass/fail test for a cell internal resistance values may be performed based on a user defined thresholds, adding additional insight in an individual cell's status.

Model	BVS (CVM)	BVS-4 (CVM-4)
<b>Measured parameters</b>	<i>Cell voltage</i> <i>Intercell voltage</i> String current (with SCM) String voltage (with SVM) Ambient temperature Cell temperature (optional)	<i>Cell voltage + Intercell voltage</i> String current (with SCM) String voltage (with SVM) Ambient temperature Cell temperature (optional) – 1 temperature measurement channel per module
<b>Number of cells per module</b>	1	4
<b>Measurement range</b>	Cell voltage: 30 V Intercell voltage: 50 mV	Voltage: 30 V per channel (1 CVM-4 has 4 voltage measurement channels)
<b>Sample rate</b>	1 sec max (depends on number of CVM)	1 sec max (depends on number of CVM-4)

## DV-B Win Main Features

- Full control of the BVS/BVS-4 from a PC or a BLU-C unit
- Both discharge results from BLU device and cell voltage values from the Cell Voltage Modules can be previewed in one DV-B Win file
- Acquisition and detailed analysis of measured data
- String voltage, Cell voltage and internal resistance trending
- Test report for BLU and BVS/BVS-4 are available in several formats (Excel spreadsheet, pdf, word or RTF)
- User selected sampling time of CVM/CVM-4



DV-B Win features: String View (BLU) & Cell View (BVS/BVS-4) functions

## Technical Data

### Mains Power Supply

- Input voltage: 90 – 264 V AC, 50/60 Hz
- Input power: 110 VA
- CVM/CVM-4 supply voltage: 66 V DC

### Measurement

Parameters	Measuring range	Resolution
Cell Voltage	± 30 V DC	1 mV
String Voltage	± 600 V	1 mV
String Current	± 1 V	0,1 µV
Intercell connection Voltage ( <b>CVM</b> )*	± 50 mV DC	1 µV

- Typical accuracy:
  - ±50 mV DC (only for **CVM**): ± (1% rdg + 1% F.S)\*
  - ±1 V DC (for **SCM**): ± (0,1% rdg + 0,1% F.S)
  - ±30 V DC (for **CVM** and **CVM-4**): ± (0, 1% rdg + 0,1% F.S)
  - ± 600 V DC (for **SVM**): ± (0, 1% rdg + 0,1% F.S)
- Temperature:
  - 20 °C - +80 °C / -4 °F - +176 °F

### BVS-CU and CVM/CVM-4 communication

- RS485 serial communication

### Communication with PC

- USB
- Bluetooth

### Memory

- Internal SD Card: 2 GB SD

### Environment conditions

- Temperature:
  - 40 °C to +85 °C / -40 °F to +185 °F

- Maximum relative humidity:
  - 95 % for temperatures up to 31 °C/88 F, decreasing linearly to 40 % relative humidity at 55 °C/131 F

### Dimensions and Weight

- Dimensions (L x W x D):
  - BVS-CU: 206 mm x 180 mm x 64 mm  
8.11 in x 7.08 in x 2.51 in
  - CVM: 66 mm x 28 mm x 139 mm  
2.6 in x 1.1 in x 5.5 in
  - CVM-4: 66 mm x 28 mm x 139 mm  
2.6 in x 1.1 in x 5.5 in
  - SVM: 66 mm x 28 mm x 139 mm  
2.6 in x 1.1 in x 5.5 in
  - SCM: 66 mm x 28 mm x 139 mm  
2.6 in x 1.1 in x 5.5 in
- Weight:
  - BVS-CU: 0, 78 kg / 1.7 lbs.
  - CVM: 0, 14 kg / 0.3 lbs.
  - CVM-4: 0, 14 kg / 0.3 lbs.
  - SVM: 0, 18 kg / 0.4 lbs.
  - SCM: 0, 18 kg / 0.4 lbs.

### Warranty

- 3 years

### Applicable Standards

- Pollution degree: 2
- Insulation category: I
- Safety: EN 61010-1, LVD 2014/35/EU  
IEC 61010-1 (International standard)  
UL 61010-1

CAN/CSA-C22.2 No. 61010-1, 2<sup>nd</sup> edition, including Amendment 1

### Electromagnetic Compatibility (EMC)

- CE conformity: EMC standard EN 61326-1:2013  
EMC directive 2014/30/EU

All specifications herein are valid at cell temperature of + 25 °C and recommended accessories. Specifications are subject to change without notice.

\*Applies only to BVS

## Ordering Info:

Instrument	Article No
Battery Voltage Supervisor Control Unit	BVS-CUNN-000
Battery Voltage Supervisor BVS-4 Control Unit	BVS4-CUNN-00

Included accessories	Article No
Mains power cable, DV-B Win software including USB cable,	

Recommended accessories	Article No
Cell Voltage modules CVM * (for BVS)	BVS-CVMCN-00
Cell Voltage module CVM-4* (for BVS-4)	BVS-CVM4N-00
Voltage sense cables 2 x 0,25 m 1mm <sup>2</sup> with banana plugs + alligator clips (for BVS)**	S-025-01BPAC
Voltage sense cable set 2 x 0,75 m and 3 x 0,5 m for CVM-4 with banana plugs + dolphin clips (for BVS-4) **	S230-00NN-DC
Communication cable for CVM-C connection 1 x 0,25 m (for BVS)	C1-0025-RJRJ
Communication cable for CVM connection 1 x 0,75 m (for BVS-4)	C1-0075-RJRJ
Communication cable for CVM connection 1 x 2 m	C1-2000-RJRJ
Temperature sensor for ambient temperature measurement 1,5 m	TP-2015-NTC1
Cable bag	CABLE-BAG-00
Plastic transport case for BVS Control Unit and CVM	PLST-CAS-BV1

Optional accessories	Article No
String Voltage module	BVS-SVM00-00
String Current module	BVS-SCM00-00
Voltage sense cables 2 x 0,25 m 1mm <sup>2</sup> with banana plugs + dolphin clips (for BVS)	S-025-01BPDC
Voltage sense cables 2 x 0,5 m 1mm <sup>2</sup> with banana plugs + alligator clips (for BVS)	S-005-01BPAC
Voltage sense cables 2 x 0,5 m 1mm <sup>2</sup> with banana plugs + dolphin clips (for BVS)	S-005-01BPDC
Voltage sense cables 2 x 0,5 m 1mm <sup>2</sup> with banana plugs + alligator clips (for BVS)	S-005-01BPAC
Voltage sense cables 2 x 0,25 m 1mm <sup>2</sup> with banana plugs (for BVS)	S-025-01BPBP
Voltage sense cables 2 x 0,5 m 1mm <sup>2</sup> with banana plugs (for BVS)	S-005-01BPBP
Voltage sense cable set 2 x 1 m, 2 x 0,75 m and 1 x 0,5 m for CVM-4 with banana plugs + alligator clips (for BVS-4)	S221-00NN-AC
Voltage sense cable set 2 x 1 m, 2 x 0,75 m and 1 x 0,5 m for CVM-4 with banana plugs + dolphin clips (for BVS-4)	S221-00NN-DC
Voltage sense cable set 2 x 1 m, 2 x 0,75 m and 1 x 0,5 m for CVM-4 with temperature sensor and banana plugs + dolphin clips (for BVS-4)	S221-00TS-DC
Voltage sense cable set 2 x 1 m, 2 x 0,75 m and 1 x 0,5 m for CVM-4 with temperature sensor and banana plugs + alligator clips (for BVS-4)	S221-00TS-AC
Voltage sense cable set 2 x 0,75 m and 3 x 0,5 m for CVM-4 with banana plugs + alligator clips (for BVS-4)	S230-00NN-AC
Voltage sense cable set 2 x 0,75 m and 3 x 0,5 m for CVM-4 with temperature sensor and banana plugs + alligator clips (for BVS-4)	S230-00TS-AC
Voltage sense cable set 2 x 0,75 m and 3 x 0,5 m for CVM-4 with temperature sensor and banana plugs + dolphin clips (for BVS-4)	S230-00TS-DC

Communication cable for CVM connection 1 x 1 m	C1-1000-RJRJ
Communication cable for CVM connection 1 x 0,25 m	C1-0025-RJRJ
Communication cable for CVM connection 1 x 0,5 m	C1-0005-RJRJ
Sense cables 2 x 5 m with banana plugs + dolphin clip	S2-05-00BPDC
Current clamp 30/300 A with internal battery supply and extension 5 m	CACL-0300-08
Plastic transport case for CVM	PLST-CAS-BV2
Cable plastic case - small size	CABLE-CAS-01
Cable plastic case - medium size	CABLE-CAS-02
Cable plastic case – large size	CABLE-CAS-03
Alligator clip (red)	ALIG-CLP-R00
Alligator clip (black)	ALIG-CLP-B00
Dolphin clip (red)	DOLP-CLP-R00
Dolphin clip (black)	DOLP-CLP-B00
Rechargeable NiMH battery 8,4 V 300 mAh for current clamps	RCGB-30084-0
Battery charger 2 x 9 V for NiMH/NiCd batteries	BATCH-2X9V-0

\* Number of CVM/CVM-4 may vary depending on application

\*\* Different cable lengths available upon request

\*\*\*Different types of temperature sensors available upon request



## Order Examples (BVS):

### BVS for 24 cells supervision:

Instrument with Included Accessories	Quantity	Article No
Battery Voltage Supervisor Control Unit	1 set	BVS-CUNN-000
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
<b>Recommended Accessories</b>		
Cell Voltage module CVM	24 pcs	BVS-CVMCN-00
Voltage sense cables 2 x 0,25 m 1mm <sup>2</sup> with banana plugs + alligator clips	24 set	S230-00NN-DC
Communication cable for CVM-C connection 1 x 0,25 m	23 pcs	C1-0025-RJRJ
Communication cable for CVM connection 1 x 2 m	1 pc	C1-2000-RJRJ
Temperature sensor with cable 1,5 m for temperature measurement	1 pc	TP-2015-NTC1
Cable bag	1 pc	CABLE-BAG-00
Plastic transport case for BVS Control Unit and CVM	1 pc	PLST-CAS-BV1

### BVS for 120 cells supervision:

Instrument with Included Accessories	Quantity	Article No
Battery Voltage Supervisor Control Unit	1 set	BVS-CUNN-000
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
<b>Recommended Accessories</b>		
Cell Voltage module CVM	120 pcs	BVS-CVMCN-00
Voltage sense cables 2 x 0,25 m 1mm <sup>2</sup> with banana plugs + alligator clips	120 set	S230-00NN-DC
Communication cable for CVM-C connection 1 x 0,25 m	119 pcs	C1-0025-RJRJ
Communication cable for CVM connection 1 x 2 m	1 pc	C1-2000-RJRJ
Temperature sensor with cable 1,5 m for temperature measurement	1 pc	TP-2015-NTC1
Cable bag	1 pc	CABLE-BAG-00
Plastic transport case for BVS Control Unit and CVM	1 pc	PLST-CAS-BV1
Plastic transport case for CVM	2 pc	PLST-CAS-BV2

## Order Examples (BVS-4):

### BVS-4 for 24 cells supervision:

Instrument with Included Accessories	Quantity	Article No
Battery Voltage Supervisor BVS-4 Control Unit	1 set	BVS4-CUNN-00
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
<b>Recommended Accessories</b>		
Cell Voltage module CVM-4	6 pcs	BVS-CVM4N-00
Voltage sense cable set 2 x 0,75 m and 3 x 0,5 m for CVM-4 with banana plugs +dolphin clips	6 set	S230-00NN-DC
Communication cable for CVM connection 1 x 0,75 m	5 pcs	C1-0075-RJRJ
Communication cable for CVM connection 1 x 2 m	1 pc	C1-2000-RJRJ
Temperature sensor with cable 1,5 m for temperature measurement	1 pc	TP-2015-NTC0
Cable bag	1 pc	CABLE-BAG-00
Plastic transport case for BVS Control Unit and CVM	1 pc	PLST-CAS-BV1

### BVS-4 for 120 cells supervision:

Instrument with Included Accessories	Quantity	Article No
Battery Voltage Supervisor BVS-4 Control Unit	1 set	BVS4-CUNN-00
- Mains power cable		
- USB with DV-B Win PC software		
- USB cable		
<b>Recommended Accessories</b>		
Cell Voltage module CVM-4	30 pcs	BVS-CVM4N-00
Voltage sense cable set 2 x 0,75 m and 3 x 0,5 m for CVM-4 with banana plugs +dolphin clips	30 set	S230-00NN-DC
Communication cable for CVM connection 1 x 0,75 m	29 pcs	C1-0075-RJRJ
Communication cable for CVM connection 1 x 2 m	1 pc	C1-2000-RJRJ
Temperature sensor with cable 1,5 m for temperature measurement	1 pc	TP-2015-NTC0
Cable bag	2 pc	CABLE-BAG-00
Plastic transport case for BVS Control Unit and CVM	1 pc	PLST-CAS-BV1