BUBELA
Power Electronics

Capacitor Forming Power Supply

PSVD-1K-1000V-CF2

User Manual

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Contents

1. Safety Instructions

DANGER

- This equipment operates at hazardous DC voltages. Contact with live parts may result in serious injury or death.
- This device is intended for use only by qualified electrical personnel familiar with the installation and operation of electrical equipment and trained in electrical safety procedures. Operation by untrained or unauthorized persons is prohibited.

WARNING

- Do not operate the power supply in dusty, explosive, or humid environments.
- Ensure all connection cables are in good condition and rated for at least 1000 V insulation voltage.
- Do not operate the unit if it is damaged or if any enclosure parts are missing.
- Always properly ground the connected equipment.
- Do not touch output terminals or connected conductors when the main switch is ON, even if the output is disabled.
- Ensure the capacitor or load is fully discharged before handling connections.
- Keep ventilation openings unobstructed.

2. Introduction

The power supply is primarily intended for reforming electrolytic capacitors in DC link circuits of frequency inverters.

The instrument includes a built-in function for measuring the capacitance of DC-link capacitors and the discharge resistance of the capacitor bank in frequency inverters, enabling diagnostics of capacitor condition and verification of discharge circuits.

Two identical power supplies can be connected in parallel to increase the available output current and total output power.

It can also be used as a regulated laboratory power supply for general loads.

3. Description

The power supply is built as a portable instrument enclosure with all controls on the front panel. The rear panel contains the power connector and communication interface connectors. Cooling is forced air with a fan.

The enclosure includes an adjustable handle for carrying and tilting.

Front panel elements are illustrated in Fig. 1.

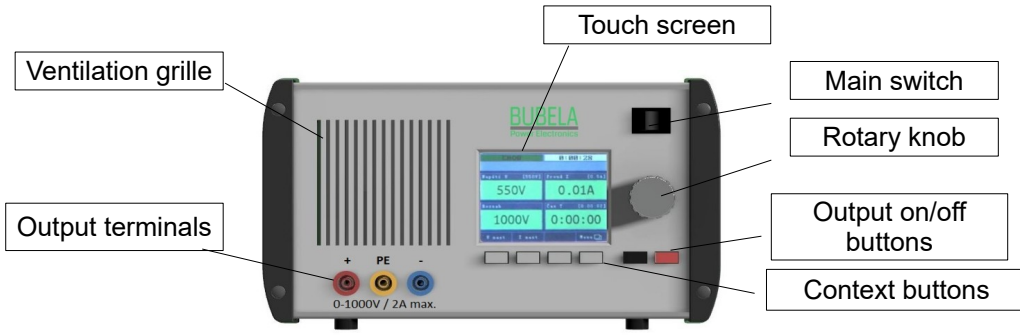

Fig. 1 Description of the front part of the device

Functions

After switching on the power supply output with the ON button, the output voltage is gradually increased to the set voltage value. If the set current is exceeded, current limiting occurs and the power supply switches to current mode. The voltage is then determined by the resistance of the connected load. The power supply output is short-circuit protected; it will not be damaged in the event of a short circuit, but the overcurrent protection may be triggered.

Voltage Ranges

Two voltage ranges are available:

- up to 550 V
- up to 1100 V

Maximum current in the lower range is double that of the higher range. Switching is done by connecting two internal supplies in series or parallel via relays (see Fig. 2).
At higher output voltages, the available output current is reduced due to the maximum power limit of the power supply.

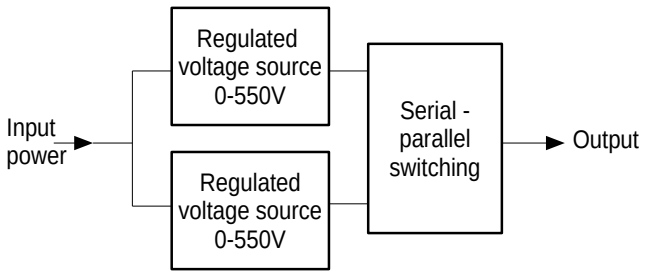

Fig. 2 Principle of voltage range switching

Voltage Ramp

Output voltage always increases according to an adjustable ramp time in range from a seconds up to 24 hours. If current limiting is activated during voltage ramp-up, the ramp-up time is always longer than the set value, or the voltage may not reach the required value.

Automatic Shutdown

The output can automatically switch off after a set time once the target voltage is reached. For more details, see Chapter 4 Operation.

Capacitive load discharge function
After switching off the output or reducing the required source voltage, the energy from the capacitive load is dissipated in a controlled manner in the built-in resistors, thereby achieving a faster voltage drop.

Communication Interfaces
Rear connectors allow PC or external control connection. Contact manufacturer for details.

Protection Functions

- Thermal overload
- Supply over/undervoltage
- Output overvoltage
- Internal supply asymmetry
- Overcurrent protection
- Output voltage indication even when OFF

3.1. Capacitor Measurement Function

The power supply can also be used to measure the capacitance of DC-link capacitors in frequency inverters. At the same time, the device automatically measures the discharge resistance of the capacitor bank.

The measurement is performed by controlled charging of the capacitor to a defined voltage and evaluation of the charging and discharging time constants.

From the measured voltage and current profiles, the instrument calculates:

- **Capacitance of the DC-link capacitor bank**
- **Discharge resistance of the capacitor bank**

This function is useful for diagnostics of aging capacitors in frequency inverters and for verifying compliance with safety discharge requirements.

Typical Applications

- Condition testing of DC-link capacitors in inverter drives
- Maintenance diagnostics of industrial drives
- Verification of discharge circuits in power electronics equipment
- Incoming inspection of spare capacitor modules

Measurement Notes

- The capacitor must be fully discharged before starting the measurement
- The measured value depends on temperature and leakage current of the capacitor
- For large capacitor banks, measurement time may be longer due to controlled voltage ramp
- The discharge resistance is measured after output shutdown using the built-in discharge circuit
- The measured capacitance and discharge resistance values are approximate. Typical measurement accuracy is about ±5%

4. Operation

Basic control is via four context buttons and a rotary knob. Some functions are also available via the touch display.
Output is switched ON/OFF using the **ON** and **OFF** buttons.

Startup Procedure

1. Connect power cable
2. Connect load
3. Turn ON main switch
4. Check or set parameters
5. Turn ON output with ON button

Display elements shown in Fig. 3

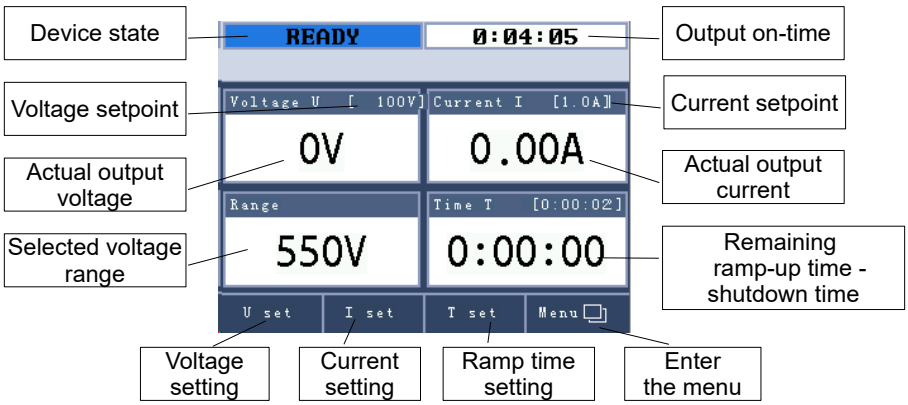

Fig. 3 Description of the basic display

Adjustable Parameters

The set parameters can be changed by opening the "Menu" by pressing the appropriate context button or touching the display, selecting "Settings" and then the appropriate parameter.
Three context buttons are used for quick access to editing certain parameters - see Fig. 3.
The set parameters are stored even after the power is turned off.

1. **Voltage range:** 550 V / 1000 V
   (Cannot be changed while output is ON or output voltage > 5 V)
2. **Voltage:** from 1 V to 1100 V, step 1 V
   Setting the desired output voltage.
   (When the range of 550V is selected, the set voltage is limited to the range voltage)
3. **Current limit:** from 0.1 A to 2.0 A, step 0.1 A
   - 2 A max at 550 V range
   - 1 A max at 1000 V range
4. **Ramp time:** from 2 s to 23 h 59 min 59 s
5. **Shutdown delay: from** 0 s to 23 h 59 min 59 s
   (0 s = continuous operation)

Menu Structure

Settings	
Voltage range	… voltage range selection
Voltage	… voltage setting
Current	… current limit value setting
Ramp time	… voltage start-up ramp time setting
Shutdown time	… shutdown time setting after voltage start-up
Cap. identification	… activation of capacitance measurement
Parallel/Remote	… selection Master / Slave for parallel mode
TCP/IP	… network settings
Diagnostics	
Faults	… display of current faults and warnings
Faults archive	… browsing the archive of recorded faults
Faults counts	… display of counters for individual faults
Operation times	… display of operating time counters
Info	
Measurements	… display of measured variables

FW version … firmware version information

Example display screenshots

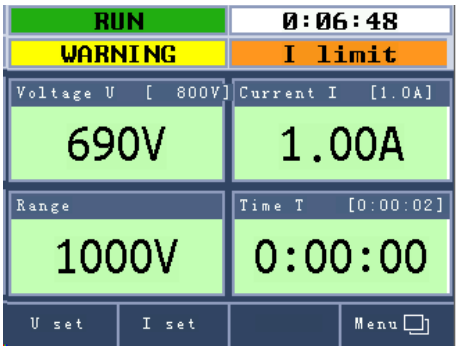

Fig. 4 Switched-on output in current limitation

Fig. 5 Voltage setting

Fig. 6 Voltage range setting

Fig. 7 Menu display

4.1. Capacitor Measurement

Measurement Conditions

Capacitance measurement is performed using a controlled test signal with:

- Test voltage: 100 V DC
- Test current: 1 A (current-limited charging)

These values are selected automatically by the instrument and cannot be changed by the user.

Preparation

- Make sure that the measured capacitor is rated for at least 100V
- Disconnect the capacitor from the inverter or other equipment
- Ensure the capacitor is fully discharged
- Connect the capacitor to the output terminals of the power supply
- Verify correct polarity

Measurement

- Open Menu → Settings → Cap. identification and set ON
- Press ON to start the measurement
- The power supply automatically performs the charging and discharging sequence
- For greater accuracy, we recommend repeating the measurement several times and using the average value

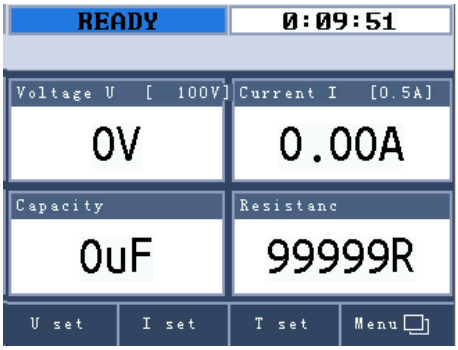

Fig. 8 Main screen for capacity measurement

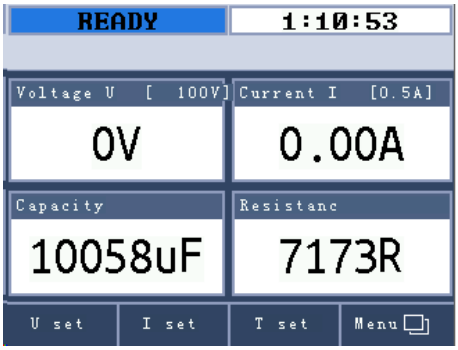

Fig. 9 Display of measured values

4.2. Parallel Operation

Two identical power supplies can be connected in parallel to increase the available output current and total output power. Parallel operation is implemented in Master/Slave mode.

Operating Principle

- One unit is configured as Master, the other as Slave
- The Master controls output voltage, current limit, ramp time, and operating state
- The Slave follows the commands received from the Master
- Both units share the load current automatically
- Only two power supplies may be connected in parallel.

Communication Connection

The units are interconnected via an RS485 communication link using a standard UTP cable.

- Use a straight-through UTP cable
- Connect the RS485 communication ports of both power supplies
- Configure one unit as Master and the second as Slave in the communication settings

Output Connection

- Connect the output terminals of both power supplies in parallel
- Use cables of equal length and cross-section to ensure proper current sharing
- Connect the load only after both units are configured.

Startup Procedure

- Connect RS485 link between units
- Connect output terminals in parallel
- Connect the load
- Turn on both units
- Configure Master and Slave roles, set using the Parallel/Remote parameter
- Set voltage, current, range, etc. only in the Master device
- Turn on the output using the ON button on the Master device only, the Slave output is controlled automatically

Notes

- Connect RS485 link between units
- Only identical models PSVD-1K-1000V-CF2 may be connected in parallel
- Total output power is approximately doubled
- For higher-power systems or more than two units, contact the manufacturer

4.3. Remote Control

The power supply can be remotely controlled via a VNC connection to the built-in graphical user interface. The device can also be controlled via MODBUS TCP. A detailed communication protocol description is available from the manufacturer upon request.

VNC Client Control

Recommended VNC Client
We recommend using RealVNC Viewer for reliable operation and best compatibility.

Connection Settings
For stable display performance and reduced network load, configure the VNC client with the following options:

ColorLevel:	bgr233
PreferredEncoding:	Hextile
Encryption:	Let VNC Server choose (default)

Only connect to trusted networks. When remote access over public networks is required, use a VPN connection.

Operation
After connecting via VNC, the device can be operated in the same way as via the local touch display.

5. Maintenance

WARNING
Do not attempt to repair the device yourself.
Repairs must be performed by qualified service or manufacturer.

General Maintenance

- Do not use abrasive cleaners or solvents.
- Turn off when not in use.
- Do not store/use in humid or high-temperature environments.
- Do not use if wet.

Fuse Replacement

Disconnect power first. There is a fuse holder with two fuses on the power connector of the power supply. Slide the cover of the holder outwards with a screwdriver, remove the fuse and insert a new one.
Replace only with specified type.
If fuse blows repeatedly, send device for repair.

Measurement Calibration

If the measured output voltage or current is inaccurate, the instrument requires calibration. Calibration may be performed by qualified personnel; request the service manual from the manufacturer.
Recommended calibration interval: once every 24 months.

6. Disposal

At end of life, return device to manufacturer or recycling company.

7. Specifications

Electrical Parameters

Output voltage:	0 - 1100V DC
Output current:	2 A for 550 V range
	1 A for 1100 V range
Stability:	voltage ±2 V, current ±10 mA NOTE
Accuracy:	voltage ±2 V, current ±20 mA
Max power:	1000 W
Supply:	230 V / 50 Hz
Max. input current:	10 A
Protection:	2× fuse 5×20 mm F10A

NOTE: Stability depends on the type of connected load; in some cases, the fluctuation may be greater than that specified here.

Adjustable Parameters

Voltage:	1 V step
Current limit:	0,1 A step
Start-up ramp:	2 s - 24 h, step 1 s
Shutdown delay:	0 s - 24 h, step 1 s

Environment

Operating temperature:	0 – 35 °C
Storage temperature:	-20 – 60 °C
Humidity:	< 85 % / < 90 %
Pollution degree:	2
Operating altitude:	up to 2000 m above sea level

Indoor use only

Construction

Size *(width x height x depth)*:	250 x 144 x 200 mm (without handle)
Weight:	~ 5 kg
Portable aluminium enclosure	
Mechanical resistance:	5 J

Other

Protection class:	IP20
Isolation:	2500 V AC / 1 min.
Leakage resistance:	1 MΩ
Power connector:	IEC 320 C13
Output terminals:	4 mm binding posts
Interfaces:	RS485, LAN, USB
Display:	TFT, resolution 320x240, resistive touch screen

Safety and Compliance

CE marking	
Protection class:	IP20
Standards:	EN 61010-1 ed. 2, EN 61326-1 ed. 2, Class A
Overvoltage category	CAT II 300 V

8. Contact Information

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Document revision

February 2026, rev 0

Document number

D260009-12