

PRODUCT INFORMATION

# R-BSV Ultimate 24 0P

BATTERY BACKUP CENTRAL POWER SUPPLY SYSTEM



**According to DIN VDE 0100-710 / DIN VDE 0558-507 / EN 50171 for surgical lights - rated voltage 24 V DC**

#### Optional Features

- insulation fault - locating system
- automatic insulation fault location
- selective fault display per circuit
- no manual measurement required in the operating room
- substantial cost savings over traditional systems
- integrated remote maintenance and Modbus-protocol

**Specifically  
designed for  
hospitals, clinics,  
and medical  
care centers**



# Expert Advice You Can Trust

**RSV RUHSTRAT STROMVERSORGUNGEN GMBH:**  
**A MODERN, MEDIUM-SIZED COMPANY WITH A LONG-STANDING TRADITION.**

Since the founding in 1888, our high-quality solutions in electrical engineering and plant construction gained international recognition.

We can look back on over 90 years of experience in the field of emergency power supply systems. As early as 1916, Ruhstrat developed its first emergency lighting system. As a competent provider of battery backup power supply systems (BSV - formerly ZSV) and uninterruptible power supplies (UPS), Ruhstrat's BSV/ZSV systems provide reliable power for surgical lighting and life-supporting medical equipment in hospitals. Our UPS systems ensure a reliable power supply for industrial facilities and IT networks.

As a provider of end-to-end solutions, we support our customers from initial planning to installation. We offer complete solutions from a single source, ensure rapid availability of spare parts, and, upon request, take over system maintenance. We are also happy to meet individual customer requirements as well as the most demanding technical challenges.

The design, maintenance, and characteristics of emergency lighting systems are governed by a wide range of standards and regulations, which are interconnected through cross-references. These cover both lighting engineering and electrical engineering aspects. Many German standards and regulations that have proven effective in practice have recently been replaced by European standards or are currently being revised.

The most important installation standards for emergency lighting systems with regard to electrical requirements include DIN EN 50172 (VDE 0108-100), draft DIN VDE 0108-100, and DIN VDE 0100-718. These electrical regulations are complemented by a set of lighting related parameters defined in DIN EN 1838 and DIN 4844 (or ISO 3864).

The regulations according to EN 60598 Part 1 and EN 60598 Part 2-22 specify the general requirements for luminaires as well as the specific requirements for emergency lighting luminaires. For manufacturers, these standards are crucial for ensuring the electrical, thermal, and mechanical safety of luminaires.

## Product Overview



**Emergency lighting systems and central power supply systems**



**Battery backup central power supply systems (BSV)**  
according to DIN VDE 0100-710 and VDE 0558-507



**Decentralized power supply systems**  
with limited power capacity



**DC power supply**  
for stationary battery systems



**Emergency exit signs and safety luminaires**

- Central battery systems
- Single-battery systems



**Uninterruptible Power Supply (UPS) Systems**



## Battery Backup Central Power Supply System

# R-BSV Ultimate 24 0P



### RBSV Ultimate 24 0P for surgical lights

The BSV systems include the signaling and monitoring devices required by VDE 0558-507. They essentially consist of:

- charging unit with CCCV characteristic
- control and monitoring unit
- outgoing circuit with switched DC/DC converters
- device and battery housing

The rectifier unit, battery, and DC/DC-converter-fed loads are connected in parallel. With mains voltage present, the rectifier supplies the loads and maintains the battery in a fully charged state via constant voltage charging. The battery supports the power supply when the connected load exceeds the rated current of the system. In case of mains failure, the battery maintains uninterrupted operation of the surgical lights. When mains power is restored, the system resumes supplying the load while simultaneously recharging the battery. The rated current of the device is limited to 100% IN  $\pm$ 2%. The battery is charged with the difference between rated current and load current. A switched-mode DC/DC converter provides the loads with a constant DC voltage.

### Scope of delivery (basic device)

- charging unit according to DIN 41773
- voltage- and time-controlled automatic charging system
- deep discharge protection with fully integrated test system
- DC-ground fault monitoring
- fan run down control
- degree of radio interference: N
- automated monthly test
- automated annual test
- 3-phase mains monitoring
- float voltage monitoring for overvoltage or undervoltage
- monitoring of charging voltage for overvoltage
- charging current monitoring (too high/too low, no charging current, although mains power is available)
- battery circuit monitoring
- buffer memory for 1000 messages/automated functionality tests for 2 years

### INNOVATION

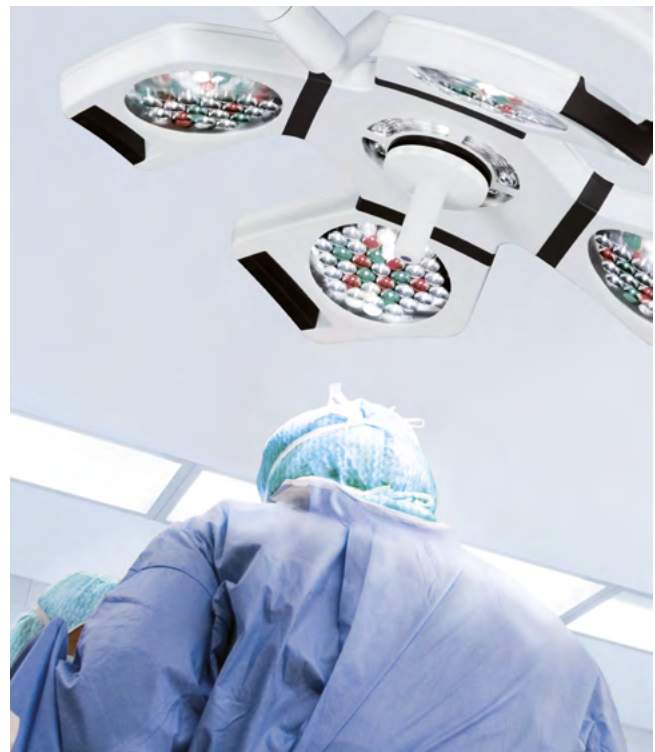
**Circuit regulator with a completely new concept – no insulation fault detection or evaluation system required**

The RBSV Ultimate-24 OP includes standard system-wide insulation monitoring, with fault indication on the touchscreen display. Optionally, the RBSV Ultimate-24 OP can be equipped with circuit-selective insulation monitoring with fault location. The robust, integrated galvanically isolated DC/DC converter in the power section converts the supplied power into a 18–28 V DC output voltage. The output voltage is continuously adjustable and can also be dimmed from the control room. Integrated bypass per circuit controller, activated immediately upon module failure. Due to galvanic isolation, the integrated insulation monitoring device in each module enables precise insulation fault location, eliminating the need for an external insulation fault detection and evaluation system. The Ruhstrat circuit controller provides detailed fault messages to the touchscreen display.

### Load circuits

The load circuits are supplied with a constant DC voltage from a processor-controlled DC/DC converter. The output voltage can be adjusted using the system touchscreen or externally connected push-buttons, allowing voltage drops caused by different cable lengths and conductor cross-sections to be compensated. The DC/DC converters provide a regulated constant output voltage and maintain a terminal voltage of 24 V  $\pm 1\%$  at the surgical luminaires, even during battery charging and discharging. To prevent overvoltage at the luminaire, the maximum output voltage can be limited directly on the converter using a potentiometer.

The converter can be switched on and off via the touchscreen display. For testing the bypass function, each converter includes a manual bypass switching option. The surgical controller regulates the output voltage in both directions, ensuring that a battery voltage of 24 V is always sufficient.



### Adjustable DC/DC converter output voltage for dimming (brighter/darker)

The DC/DC converter provides a dimmable output voltage. The output voltage can be adjusted in 0.1 V increments using the “brighter/darker” buttons. The hysteresis range is approximately 18–28 V. The output voltage can also be adjusted via external push-buttons. To prevent overvoltage at the luminaire during “ON” push-button operation, the maximum output voltage of the converter can be set in installation mode prior to operating room use.

To prevent overvoltage on the light source during ON-OFF switching, the upper limit for the converter’s output voltage can be set in activated installation mode prior to operational use.

# R-BSV Ultimate 24 OP

## Technical data - circuit control unit

Output voltage	18-28V ± 1% dimming range: 18 V to maximum preset converter voltage
dimming range: 18 V to maximum preset converter voltage	300 W or 600 W
Setting range	18 V-28V (external dimming via push-buttons)
Output power	300 W or 600 W
Overload	short-circuit proof
EMC interference level	8
Control mode	constant voltage regulation
LED-display for	operation mode, fault, bypass mode, remote ON, insulation fault
Electrical efficiency	90%

## Automatic mains bypass

If a fault occurs in any DC/DC converter during operation, the unit is automatically bypassed via an internal changeover circuit, ensuring continued supply of the surgical luminaires with regulated 24 V DC ±1% from the bypass rectifier. The bypass function can be tested for each DC/DC converter.

The bypass system uses a regulated constant voltage, which can be adjusted during installation to compensate for voltage drops in the wiring. In addition, it provides a redundant DC supply to the converters' control electronics. Bypass power is continuously available to all converters, allowing immediate access when required.

For testing the changeover function, the bypass system can be manually activated. In normal operation, bypass switching is controlled by the processor.

### Display

The system display shows the output voltage and output current of each circuit.

### LED status indicators

- fault
- ready for operation
- battery mode
- mains operation
- test mode
- bypass/active mode
- battery mode - overvoltage
- battery mode - undervoltage
- insulation fault
- DC/DC converter fault
- overtemperature
- the system is not operational following a monthly or annual test

## Microprocessor control unit

A microprocessor unit is integrated for controlling and monitoring the charging system and battery, as well as for displaying measured values and fault messages. A backlit plain-text display shows charging voltage, charging current, discharging current, date, time, and all status messages and test results. Messages and functional test results from the past two years are stored and are available at any time for retrieval.

### Plain text display

- battery voltage
- loading current
- rectifier current
- discharge current
- insulation resistance in kΩ (kilo-ohm)
- operating and status messages in plain text

### Potential-free remote signal

- system fault
- test mode
- system mains operation
- system battery mode
- operating circuit - ON

### Error signal (plain text)

- voltage too high
- voltage too low
- deep discharge
- battery circuit fault
- charging fault
- mains failure
- internal microprocessor unit fault
- battery imbalance fault
- insulation fault
- DC/DC converter fault
- overtemperature
- the system is not operational following a monthly or annual test

### Battery selection

The battery shall be designed to supply the load current for 3 hours, including a 20% reserve capacity. For the calculation of the discharge current, an average battery voltage between the end-of-discharge voltage and the nominal voltage (24 V) is used. DC/DC converter operates at 90% efficiency.

## R-BSV Ultimate 24 OP

### Charging unit

The charging unit operates according to a controlled IU characteristic in accordance with DIN 41773 for lead-acid batteries and DIN 41775 for NiCd batteries, maintaining the output voltage at the set value within a tolerance of  $\pm 1\%$  over a load range of 0-100% of the rated device current. Supply voltage variations of  $\pm 10\%$  and mains frequency deviations of  $\pm 4\%$  are compensated using a dedicated electronic control unit, which drives a thyristor power controller. The charging system, comprising both the charging and float-charging stages, is designed so that after a discharge of the specified rated battery capacity, 90% of that capacity is restored within 6 hours.

### Options

Printer for system status messages and test reports. All faults and system status changes are logged with their respective date and time. The resolution of any faults is recorded accordingly. Upon completion of a one-month or endurance (operational life) test, the results and measured values are printed together with the date and time. The printer menu allows you to choose whether messages are printed continuously or just upon request.

#### Optional signalling card

An optional signalling card offers additional potential-free contacts beyond the standard signals, with support for up to five configurable changeover contacts as needed.

- (system) ready for operation
- fault
- battery mode
- bypass mode
- test mode
- TE triggered
- ISO error
- charging fault
- current-dependent fan contact

### Control and indicator panel RMTB-BSV-OP

The control unit is compatible with an indicator panel available in surface-mounted and flush-mounted designs. The control panel is connected to the central system via an RS 485-Bus interface, enabling convenient operation and status reporting from each operating room. In addition to the mandatory notifications in accordance with VDE 0558-507, the panel is equipped with two dimming push-buttons labeled "brighter" and "darker." The panel has dimensions of 200 × 120 × 40 mm.

#### Indicator panel with the following features:

##### Display:

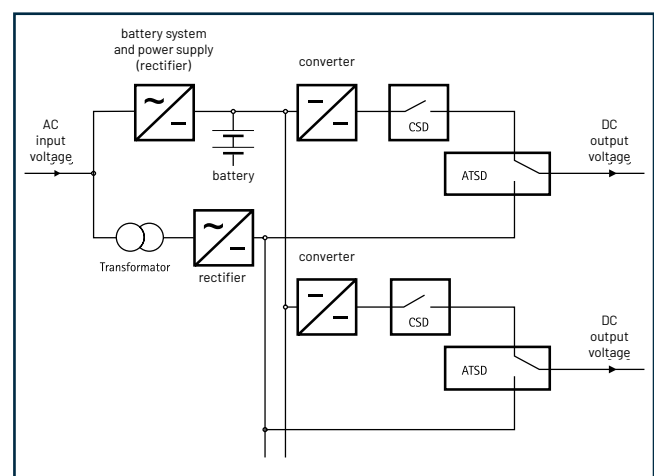
- mains operation, battery mode, bypass mode, fault, insulation fault (ISO fault), test mode

##### Membrane keyboard:

- DC/DC converter ON/OFF
- dimming "brighter/darker"

##### Customer connection terminal for converter connection:

- external push-button circuit „ON/OFF“
- push-button dimming "brighter"
- push-button dimming "darker"
- potentiometer contact DC/DC converter „ON/OFF“







## POINT OF CONTACT

RSV Ruhstrat  
Stromversorgungen GmbH

Heinestraße 12  
D-37120 Bovenden

T +49(0)5593 93722-0  
F +49(0)5593 93722-222

info@ruhstrat.eu  
www.ruhstrat.eu

