

0PB0200.1

1 General information

Short-term mains interruptions are bridged by this maintenance-free buffer module on a capacitor basis. This enables a system to run on an unstable mains network or, when a longer power failure occurs, to be shutdown in a controlled manner after all relevant process data has been saved. The bridging time is 200 ms at 20 A and 4 s at 1 A. The buffer module also acts as a power storage device for peak loads and for triggering fuses. An active switch output and a warning light provide function monitoring capability. The integrated diode allows consumers to be divided into buffered and unbuffered loads. This extends the buffer period and buffered consumers are protected against errors in the internal network

- Buffering for 24 VDC consumers
- Output current to 20 A
- Can be switched in parallel for larger buffer currents and times
- Easy to switch in parallel to the power supply or to the load in the 24 VDC circuit
- Simple and problem-free retrofitting of existing systems
- Suitable for industry because of capacitor-based energy storage (no rechargeable battery)
- High MTBF (>500,000 h)
- International certification package
- Wide temperature range from -25 to 70°C

2 Organization of safety notices

The safety notices in this data sheet are organized as follows:

Safety notice	Description
Danger!	Disregarding safety guidelines and notices can be life-threatening.
Warning!	Disregarding safety guidelines and notices can result in severe injury or substantial damage to equipment.
Caution!	Disregarding safety guidelines and notices can result in injury or damage to equipment.
Information:	Important information for preventing errors.

Table 1: Description of the safety notices used in this documentation

3 Order data


Model number	Short description	Figure
0PB0200.1	24 VDC buffer module, 0 to 20 A, buffer time 0.2 s at 20 A to 4 s at 1 A, top-hat rail installation	

Table 2: 0PB0200.1 - Order data

4 Technical data

Model number	0PB0200.1
General information	
Status display	Green status LED (buffer charged/discharged, charging/discharging)
Insulation voltages	
Input - Output	1 kV (routine test) 1 kV (type test)
Active DC OK switch output	24 V, 20 mA
Connection type	Screw terminal
Connection cross section	
Input/Output	
Wire end sleeves	Flexible cables require wire end sleeves in order to fulfill EN 62368 / UL 60950
Flexible	0.5 to 10 mm ² / 20 to 6 AWG
Inflexible	0.5 to 16 mm ² / 20 to 6 AWG
Switch output	
Wire end sleeves	Flexible cables require wire end sleeves in order to fulfill EN 62368 / UL 60950
Flexible	0.2 to 2.5 mm ² / 24 to 12 AWG
Inflexible	0.2 to 2.5 mm ² / 24 to 12 AWG
Wire stripping length	10 mm (input/output)
Certifications	
CE	Yes
UL	cULus E123528 Industrial control equipment
Charging mode (input)	
Internal fuse	Yes
Loading time	<27 s
Nominal voltage	24 VDC
Input voltage range	22.5 to 30 VDC
Current consumption	
Maximum	20.6 A (max.)
No-load operation	0.1 A
Loading procedure	0.6 A
Load delay	No
Switching threshold	<22 VDC (fixed) (U _{IN} - 1 V) / 0.1 s (variable)
Protective circuit	Transient overvoltage protection - Suppressor diode, 35 VDC
Reverse polarity protection	Yes
Buffer operation (output)	
Buffer current	Up to 20 A
Current limiting	27 A (buffer mode)
Buffer voltage	U _{IN} - 0.8 V and >22.0 V
Buffer time	0.2 s at 20 A and 4 s at 1 A
Setting range for buffer voltage	22 - 28.5 VDC
Max. conduction current	27 A (at 40°C) 20 A (at 70°C)
Shutdown	>4.5 s (buffer operation)
Output	
Nominal voltage	24 VDC (depending on input voltage)
Residual ripple	<100 mV _{SS} (buffer operation)
Switching peaks	<100 mV _{SS} (20 MHz)
Can be connected in parallel	Yes, to increase buffer time and for redundancy
Can be connected in series	No
Protection against internal overvoltages	Yes, limited to approximately 35 VDC
Power back immunity	<35 VDC (buffer operation)
Output noise suppression	Device complies with EN 55011 (class B)
Efficiency, reliability	
Efficiency	>95% (at 27 A)
MTBF	>500,000 h, per IEC 61709 (SN 29500)
Power dissipation	
Readiness at 27 A	Max. 2.5 W
Buffer operation at 27 A	Max. 9.8 W
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	No
Ventilation/Cooling	Normal convection, no fan required
Degree of protection per EN 60529	IP20
Ambient conditions	
Temperature	
Operation	-25 to 70°C
Storage	-40 to 85°C
Transport	-40 to 85°C

Table 3: 0PB0200.1 - Technical data

Model number	OPB0200.1
Relative humidity	
Operation	Max. 95%, non-condensing
Vibration	
Operation	<15 Hz, amplitude ± 2.5 mm, per IEC 60068-2-6 15 to 150 Hz, 2.3 g, 90 min
Shock	
Operation	30 g in each direction, per IEC 60068-2-27
Pollution degree	2, per EN 50178
Climate category	3K3, per EN 60721
Mechanical properties	
Housing	
Material	AluNox (AlMg1)
Installation	Easy top-hat rail installation (DIN rail NS 35, EN 60715)
Dimensions	
Width	64 mm 122 mm (mounted sideways)
Height	130 mm
Depth	125 mm 67 mm (mounted sideways)
Weight	1000 g

Table 3: OPB0200.1 - Technical data

5 Standards and conformity

Standards

Electrical equipment of machines	EN 60204
Safety isolating transformers for switching power supplies	IEC 61558-2-17
Electrical security (for IT equipment)	IEC 60950 / VDE 0805 (SELV) EN 61558-2-17 UL/C-UL Recognized UL 60950
Industrial control equipment	UL/C-UL Listed UL 508
Shipbuilding	Germanischer Lloyd, ABS
Electronic equipment for high voltage systems	EN 50178 / VDE 0160
Safety extra low voltage	EN 62368 (SELV) and EN 60204 (PELV)
Safe isolation	DIN VDE 0106-1010

Conformity to EMC directive 89/336/EWG

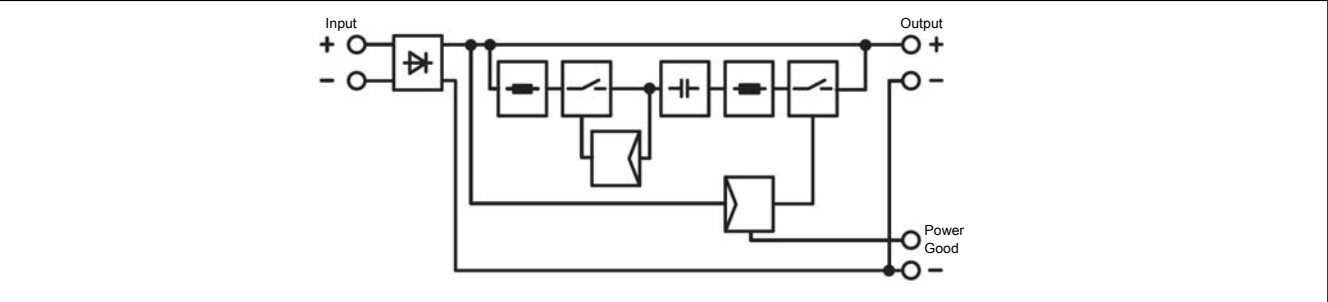
Immunity to disturbances EN 61000-6-2		
Electrostatic discharge	EN 61000-4-2	
	Housing	Level 4
	Contact discharge	8 kV
	Air discharge	15 kV
	Comment	Criteria B ¹⁾
Electromagnetic HF field	EN 61000-4-3	
	Housing	Level 3
	Frequency range	80 MHz to 1 GHz
	Field strength	10 V/m
	Comment	Criteria A ²⁾
Burst	EN 61000-4-4	
	Input / output	2 kV (Level 3 - asymmetrical: line to GND)
	Signal	1 kV (Level 2 - asymmetrical: line to GND)
	Comment	Criteria B ¹⁾
Surge	EN 61000-4-5	
	Input / output / signal	0.5 kV (Level 1 - asymmetrical: line to GND) 0.5 kV (Level 1 - symmetrical: line to line)
	Comment	Criteria B ¹⁾
Conducted interference	EN 61000-4-6	
	Input / output	Level 3
	Frequency range	150 kHz to 80 MHz
	Voltage	10 V
	Comment	Criteria A ²⁾

1 **Criteria B:** Temporary adverse effects on the operating characteristics that the device corrects automatically

2 **Criteria A:** Normal operating behavior within defined limits

Emissions in accordance with EN 61000-6-3	
RFI voltage EN 55011	EN 55011 (EN 55022) Class B for industry and office/home
Radiated emissions in accordance with EN 55011	EN 55011 (EN 55022) Class B for industry and office/home

6 Block diagram



7 Signaling

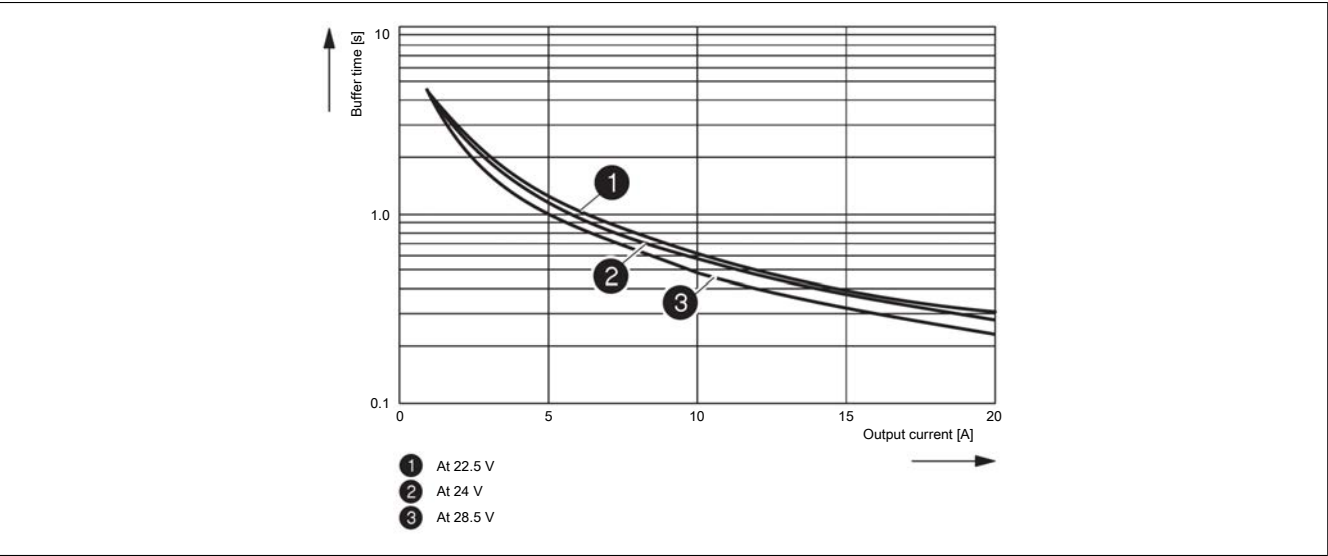
The "DC OK" LED makes it possible to evaluate the functionality of the power supply directly on-site.

	State 1	State 2
"Power Good" LED	Lit	Blinking
Active "Power Good" signal output	U = 24 V (with respect to "-")	U = 0 V (with respect to "-")
Meaning	<ul style="list-style-type: none">• Supply voltage applied• Buffer charged• Buffer module ready	<ul style="list-style-type: none">• Supply voltage applied, buffer charging• Supply voltage not applied, buffered power (if available) provided at output

8 Characteristic curve

The unit outputs a controlled and uninterruptable 24 VDC for a load current of 20 A for all connected consumers. When the 24 V supply voltage is applied, the integrated capacitor-based power buffer is charged. When a power fail occurs, buffered energy ensures up to 4 seconds of uninterrupted operation for all connected consumers.

Buffer time extension



The connected devices can be divided into buffered and unbuffered loads using the isolated input. This extends the buffer time, which depends on the output current. If only critical devices are protected using fuses, smaller battery modules can be used that save money and space in the control cabinet. In addition, the isolated input protects the connected devices against errors in the internal network.

9 Safety notices

Information:

Please note before commissioning:

The mains connection must be implemented properly and provide protection against electrical shock.

All lines must be sufficiently dimensioned and protected.

All output lines must be dimensioned to handle the maximum output current for the unit or special protective measures must be implemented.

Sufficient convection must be ensured!

Caution!

The power supply units are built-in devices. They must be installed and commissioned by appropriately qualified personnel in adherence with local regulations.

Danger!

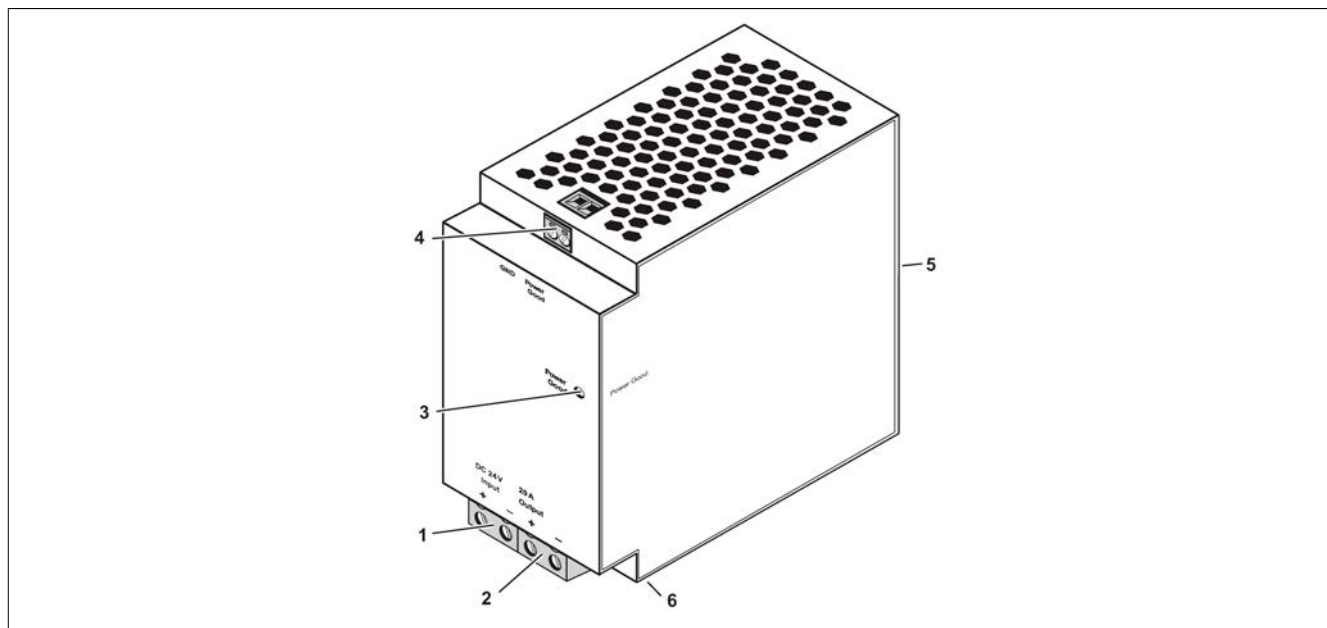
The units contain components with life-threatening levels of voltage and large amounts of stored power!

Always ensure that the power is turned off before handling them.

Disconnect equipment from the power source and ensure that it is not located in a potentially explosive atmosphere before removing it.

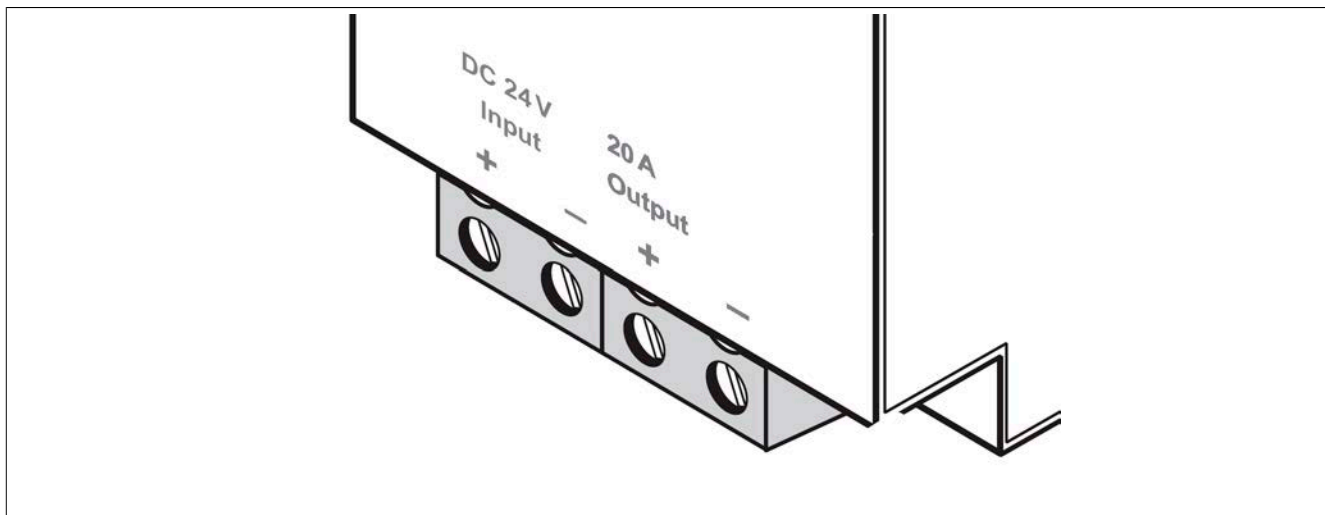
Depending on the ambient temperature and the operating load, the housing may become very hot!

10 Layout



- 1) DC input
- 2) DC output
- 3) "Power Good" LED
- 4) Switch output active
- 5) Mounting rail adapter
- 6) DYNAMIC switch ON/OFF

11 Input



Protection on the primary side

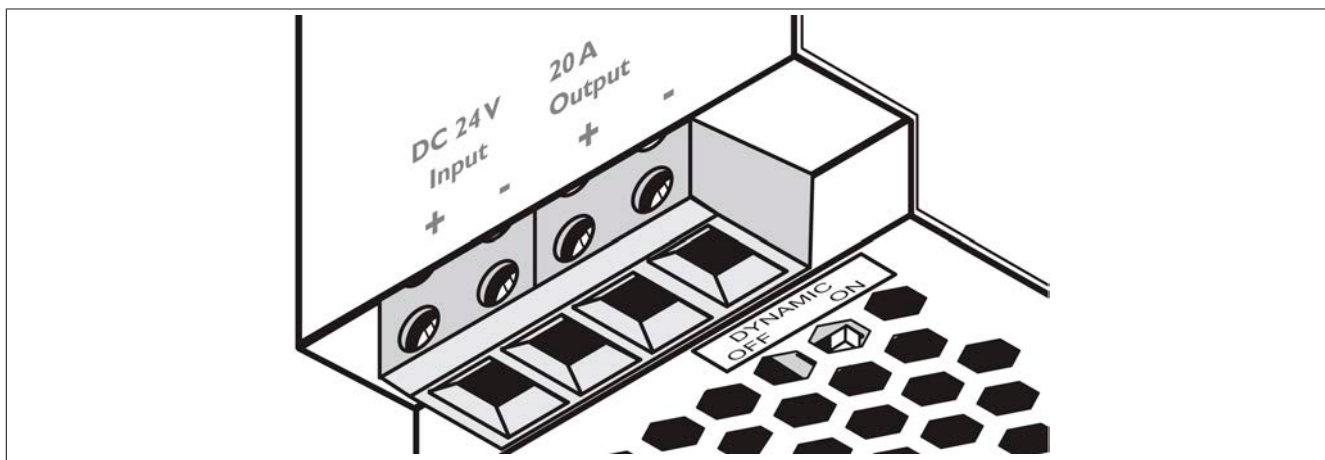
The device must be installed in accordance with the regulations in EN 62368.

The device is protected by an internal fuse. Additional device protection is not necessary.

Notice!

If an internal fuse is tripped, it is very likely that the unit is defective. In this case it needs to be sent back to the factory to be checked.

12 Output



All loads that, in the event of a failure of the supply voltage, are to be supplied with power stored in the buffer module ("Buffered Load") are connected to the "+" and "-" of the DC output. We recommend that all other loads not requiring buffering in the event of a failure of the supply voltage ("Unbuffered Load") should be connected parallel to the power supply unit. This extends the buffer time, as it depends on the output current.

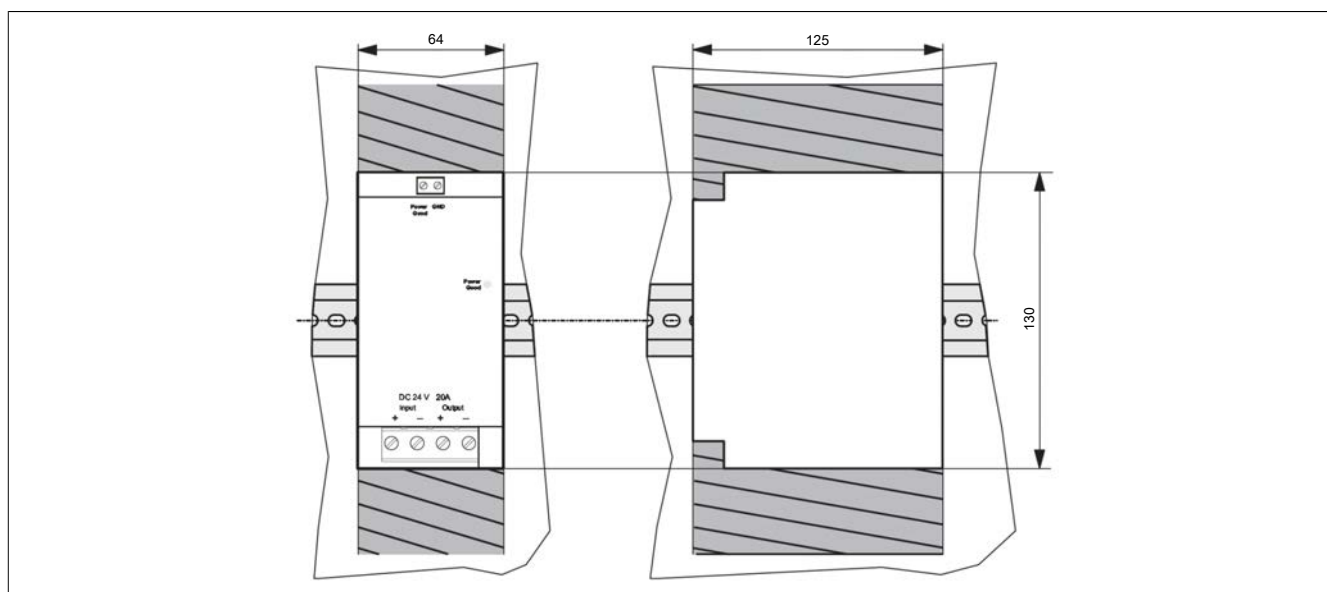
The internal diode guarantees that the buffered loads are decoupled from the unbuffered loads.

Output voltage

The output voltage of the buffer module is equal to the supply voltage connected. If the input voltage falls by more than 1 V within 0.1 s, then the buffer is connected and the output voltage is regulated to this value. This dynamic detection can be disabled with the "DYNAMIC ON/OFF" switch. The minimum connect threshold is 22 V.

The device is electronically protected against short circuit and idling. When a fault occurs, the output voltage is limited to 35 VDC.

13 Dimensions



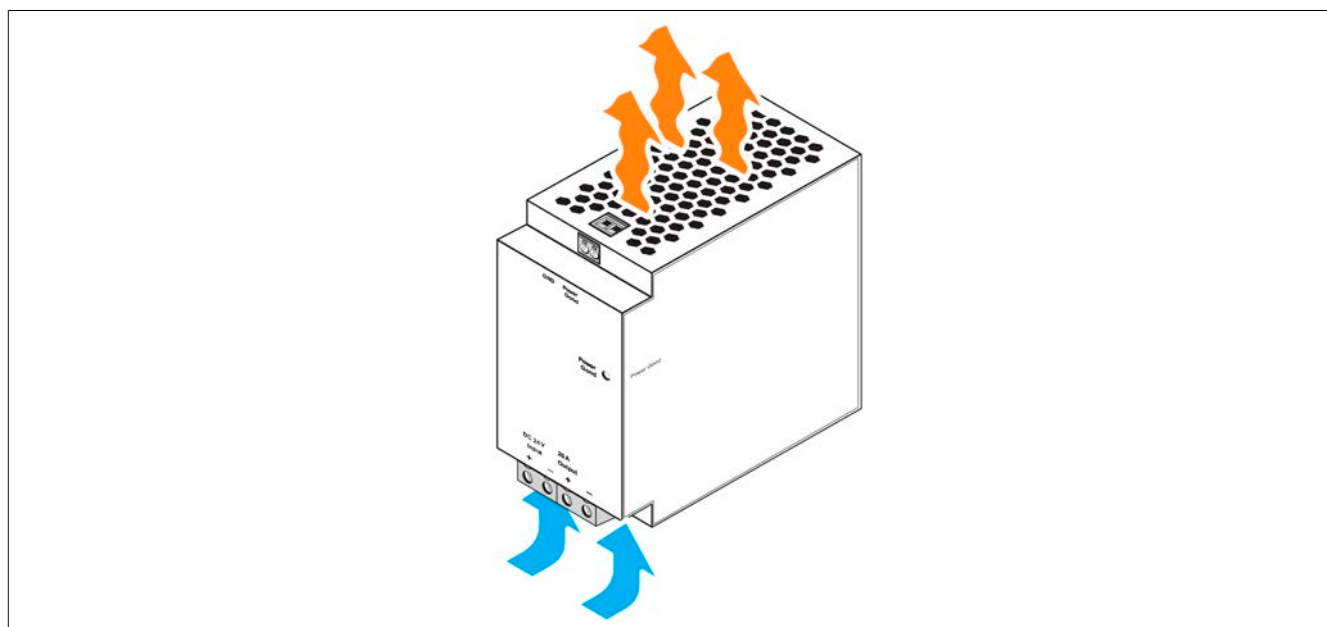
Narrow installation:

Installation depth 125 mm + DIN rail (state at delivery)

Wide installation:

Installation depth 67 mm + DIN rail

14 Installation



Information:

Functionality of the device is not affected by spacing to other devices.

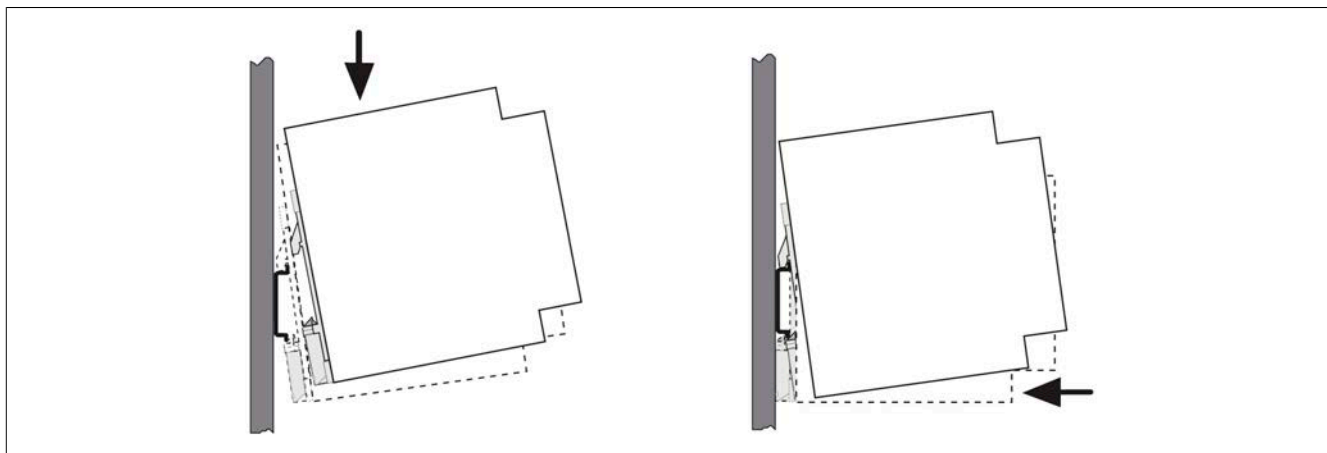
The DIN rail must be mounted horizontally with the ventilation slots facing up and down.

15 Mounting rail installation

The power supply unit can be snapped onto all 35 mm DIN rails in acc. with EN 60715.

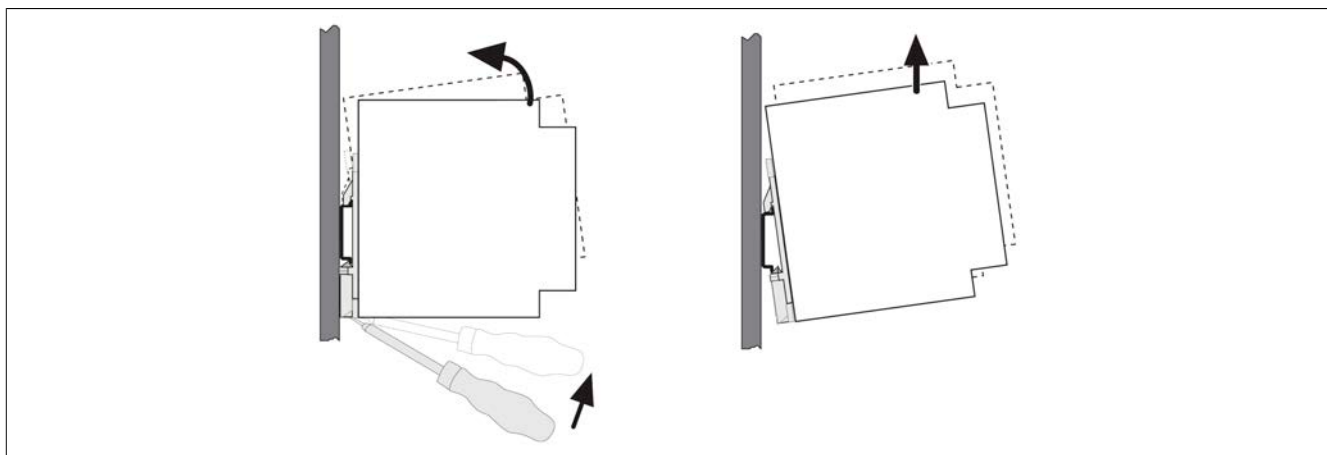
15.1 Narrow installation:

Mounting



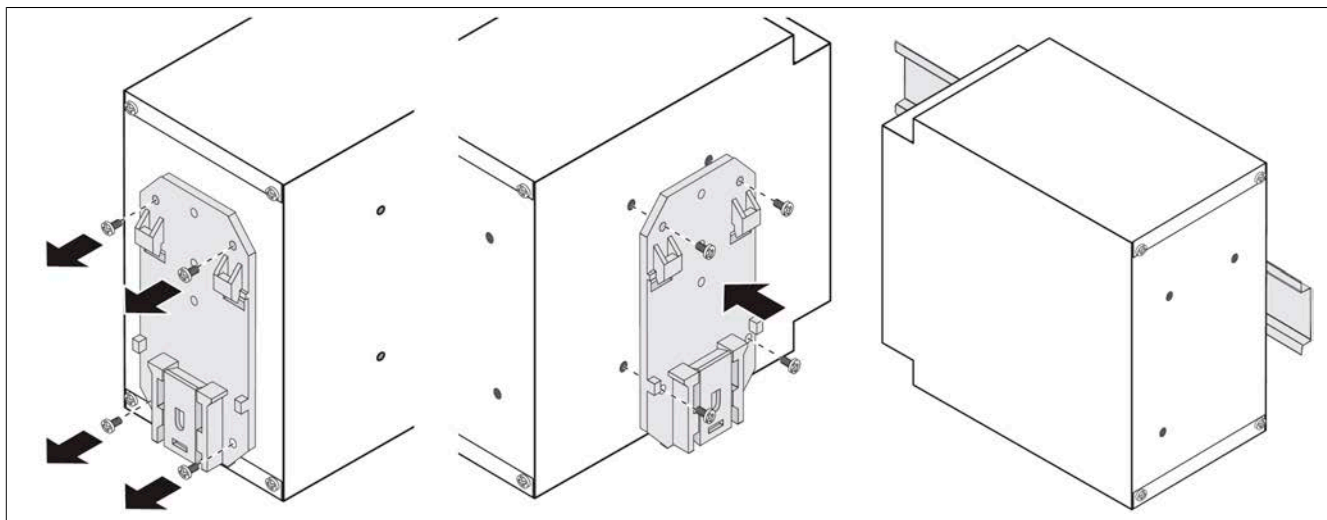
Position the module with the DIN rail guide on the **upper edge** of the DIN rail, and snap it in with a **downward** motion.

Removal



Pull the snap lever open with the aid of a screwdriver and slide the module out at the **lower edge** of the DIN rail.

15.2 Wide installation:



Wide installation can be achieved by mounting the device at a right-angle to the DIN rail. Mount the DIN rail adapter (UTA 107) as illustrated in the figure. No additional mounting material is required.

Mounting screws: Torx T10 (torque 0.8 Nm to 0.9 Nm).

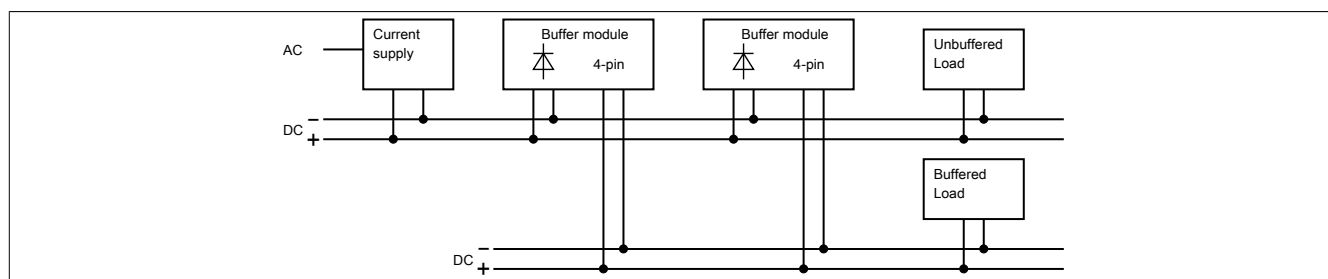
16 Cable data

Type of connection: Screw clamp
 Stripping length: Input/Output: 10 mm
 Switch output: 7 mm

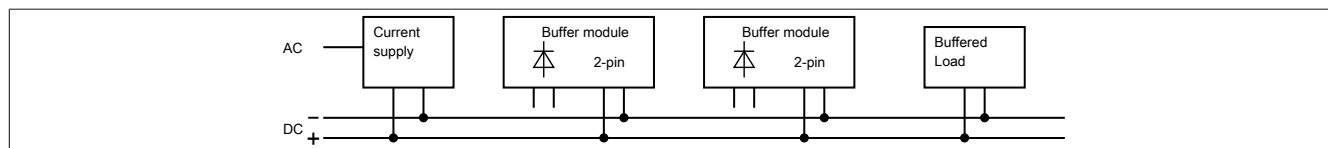


	[mm²]		AWG	[Nm]
	Fixed	Flexibility		Torque
Input	0.5 - 16	0.5 - 10	24 - 6	1.2 - 1.5
Output	0.5 - 16	0.5 - 10	24 - 6	1.2 - 1.5
Switch output	0.2 - 2.5	0.2 - 2.5	24 - 12	0.5 - 0.6

17 Connection to supply voltage



The buffer module is connected at the output of the power supply via the "+" and "-" screw connections of the 24 VDC input (4-pin connection). The output is decoupled from the input by means of the internal diode. The stored power is only delivered at the output.



If no decoupling is required, the buffer module can also be connected to the power supply as a 2-pin connection via the "+" and "-" connections of the DC output.

18 Forming DC bus capacitors

Electrolytic capacitors are installed in B&R servo drives, inverter modules, stepper motor modules and power supplies. In these cases, the oxide layer that acts as a dielectric can become weakened by electrochemical processes when stored for a lengthy period with the power is switched off. In the worst case, this can cause a short circuit and subsequent destruction of the capacitor and irreparable damage to B&R modules.

When stored for periods over 1 year, the electrolytic capacitors may be destroyed during commissioning if not preconditioned. If preconditioning takes place using a forming process defined for B&R modules, then proper operation can be guaranteed. Forming is performed by applying a defined voltage over a defined period of time. This reforms the oxide layer to ensure the functionality of the electrolytic capacitors.

Caution!

DC bus capacitors can become damaged or destroyed when switching on at the nominal voltage after being stored for periods over 1 year.

Forming B&R modules stored over a long period of time before commissioning avoids damage to the capacitors.

18.1 Forming specifications for DC bus capacitors

Procedure for modules stored for a long period of time

If modules are not supplied with nominal voltage for a longer period of time, the DC bus capacitors must be formed as follows.

The nominal voltage is the voltage permitted at the mains connections on the respective module.

Power is only supplied to the module; the output stage or controller is NOT permitted to be switched on during this!

Storage time up to 1 year:	→ No action required
Storage time 1 to 2 years:	→ Supply the module with nominal voltage 1 hour before commissioning.
Storage time 2 to 3 years:	<p>Supply the module with an adjustable power supply and increase the voltage in steps. Observe the following sequence:</p> <ol style="list-style-type: none"> 1. Supply with 25% of the nominal voltage for 30 minutes. 2. Supply with 50% of the nominal voltage for 30 minutes. 3. Supply with 75% of the nominal voltage for 30 minutes. 4. Supply with 100% of the nominal voltage for 30 minutes. <p>Total forming time: >2 hours The module is now ready for operation.</p>
Storage time 3 or more years:	<p>Supply the module with an adjustable power supply and increase the voltage in steps. Observe the following sequence:</p> <ol style="list-style-type: none"> 1. Supply with 25% of the nominal voltage for 2 hours. 2. Supply with 50% of the nominal voltage for 2 hours. 3. Supply with 75% of the nominal voltage for 2 hours. 4. Supply with 100% of the nominal voltage for 2 hours. <p>Total forming time: >8 hours The module is now ready for operation.</p>

Information:

B&R recommends forming at nominal voltage for 1 hour once a year.

B&R modules that have been stored for more than 5 years without forming should no longer be put into operation.

The storage period is valid from the time of delivery by B&R.