SIEMENS

SITOP power supply

SITOP PSU300S

Manual

SITOP PSU300S 24 V/5 A
6EP1433-2BA20
SITOP PSU300S 24 V/10 A
6EP1434-2BA20
SITOP PSU300S 24 V/20 A
6EP1436-2BA10
SITOP PSU300S 24 V/40 A
6EP1437-2BA20

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C98130-A7587-A1-7-7629

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Overview

Figure 1 View of units

The 3-phase SITOP PSU300S from the SITOP smart product line is a powerful, regulated standard power supply for automated machines and systems. In addition to a high efficiency, these low-profile power supply units have an outstanding overload behavior.

The key benefits of the product include:

- Wide-range input, which allows it to be connected to almost any 3-phase line supply around the world
- Output voltage can be adjusted in the range 24 - 28 V
- Brief overload capability of 150% for 5 s/min (extra power)
- Continuous overload capability of 120% up to an ambient temperature of 45 °C
- Integrated signaling contact for "24 V O.K."
- No lateral mounting clearances are required
- ambient temperature -25 ... 70 °C
- To increase the system availability, these reliable power supplies can be expanded using SITOP supplementary modules (redundancy module, selectivity module, buffer module), as well as SITOP DC-UPS modules.

Ordering data

The following device options are available:

Regulated SITOP PSU300S power supply	
Type	**Order number**
Input 3AC 400 - 500 V, 24 V/5 A output	6EP1433-2BA20
Input 3AC 400 - 500 V, 24 V /10 A output	6EP1434-2BA20
Input 3AC 400 - 500 V, 24 V /20 A output	6EP1436-2BA10
Input 3AC 400 - 500 V, 24 V /40 A output	6EP1437-2BA20

Accessories	
Type	**Order number**
Device identification labels 20 mm × 7 mm, pastel turquoise	3RT1900-1SB20

Table of contents

Safety instructions

1

WARNING

Correct handling of the devices

When operating electrical devices, it is inevitable that certain components will carry dangerous voltages.

Therefore, failure to handle the units properly can result in death or serious physical injury as well as extensive property damage.

Only appropriately qualified personnel may work on or in the vicinity of this equipment.

Perfect, safe, and reliable operation of this equipment is dependent on proper transportation, storage, installation and mounting.

Before installation or maintenance work can begin, the system's main switch must be switched off and measures taken to prevent it being switched on again.

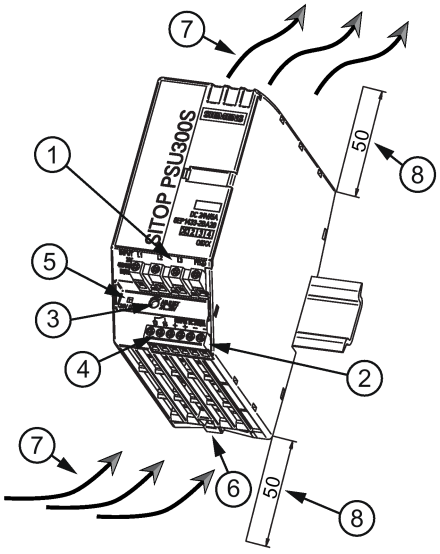
If this instruction is not observed, touching live parts can result in death or serious injury.

Description, device design, dimension drawing

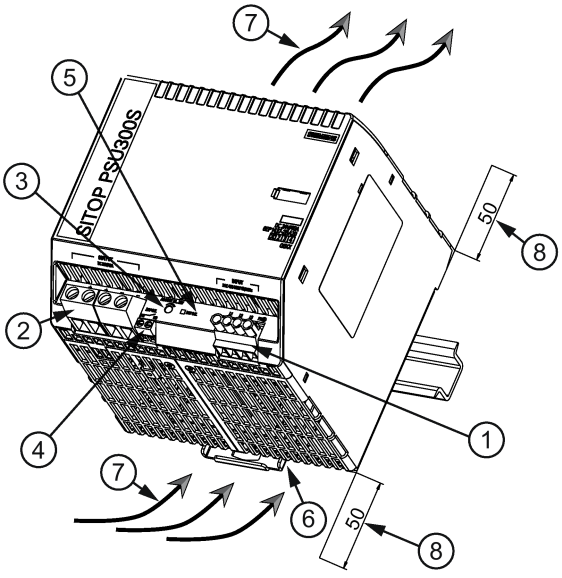
2

2.1 Device description

SITOP PSU300S is a primary-clocked power supply for connection to a 3-phase AC line supply. An electronically regulated DC voltage that can be set via a potentiometer is available at the output of the device. The output of the device is isolated, no-load proof and short-circuit proof. The LED display indicates the operating status. The operating state of the device can be processed via the signaling contact.



6EP1433-2BA20



6EP1437-2BA20

① AC input
② DC output
③ 24 - 28 V potentiometer
④ Signaling contacts (24 V OK)
⑤ Indicator light (24 V OK)
⑥ DIN rail slider
⑦ Natural convection
⑧ Clearance above/below

Figure 2-1 Design

2.2 Connections and terminal designation

The line input terminals ① can be used to establish the connection to supply voltage. The output terminals ② are used to connect to the loads to be supplied (see also Section Installation (Page 31)).

The operating state of the device can be processed via the signaling contact ④ (function and contact rating, see Chapter Status displays and signaling (Page 13)).

Connections and terminal designations	
① line input L1, L2, L3, PE	One screw terminal each
② Output +	2 screw terminals
② Output –	2 screw terminals
④ signal 13, 14 (24 V O.K.)	One screw terminal each

	①	② + ④	③
	0,6 x 3,5 / PZ1 / PH1	0,6 x 3,5	0,6 x 3 / PZ1 / PH1 max. ∅ 3,5 mm
	1 x 0,05 - 2,5 mm^2	1 x 0,2 - 2,5 mm^2	-
	1 x 0,05 - 2,5 mm^2	1 x 0,2 - 2,5 mm^2	-
AWG	30 - 12	24 - 12	-
Nm	0,5 - 0,6 Nm	0,5 - 0,6 Nm	0,04 Nm *1)
	6,5 - 7 mm	5,5 - 6,5 mm	-

*1) Do not subject the end stop to higher loads

Figure 2-2 Terminal data for 6EP1433-2BA20 and 6EP1434-2BA20

	①	②	④	③
	0,6 x 3,5 / PZ1 / PH1	1,0 x 5,5	0,6 x 3,5	0,4 x 2,5 / max. ∅ 3,5 mm
	1 x 0,5 - 4 mm^2	1 x 0,2 - 6 mm^2	1 x 0,05 - 2,5 mm^2	-
	1 x 0,5 - 4 mm^2	1 x 0,2 - 4 mm^2	1 x 0,05 - 2,5 mm^2	-
AWG	26 - 10	24 - 10	30 - 12	-
Nm	0,79 Nm	0,5 Nm	0,5 - 0,6 Nm	0,04 Nm *1)
	10 - 11 mm	8 mm	5,5 - 6,5 mm	-

*1) Do not subject the end stop to higher loads

Figure 2-3 Terminal data for 6EP1436-2BA10

	①	②	④	③
	0,6 x 3,5 / PZ1 / PH1	1,0 x 5,5	0,6 x 3,5	0,4 x 2,5 / max. ∅ 3,5 mm
	1 x 0,5 - 4 mm^2	1 x 0,5 - 16 mm^2	1 x 0,05 - 2,5 mm^2	-
	1 x 0,5 - 4 mm^2	1 x 0,5 - 16 mm^2	1 x 0,05 - 2,5 mm^2	-
AWG	26 - 10	26 - 6	30 - 12	-
Nm	0,79 Nm	1,2 - 1,5 Nm	0,5 - 0,6 Nm	0,04 Nm *1)
	10 - 11 mm	12 mm	5,5 - 6,5 mm	-

*1) Do not subject the end stop to higher loads

Figure 2-4 Terminal data for 6EP1437-2BA20

2.3 Potentiometer

The potentiometer ③ at the front of the device is used to adjust the output voltage. The output voltage is set to 24 V in the factory, and can be adjusted in the range 24 - 28 V; for example, to compensate voltage drops across long supply lines to the connected load.

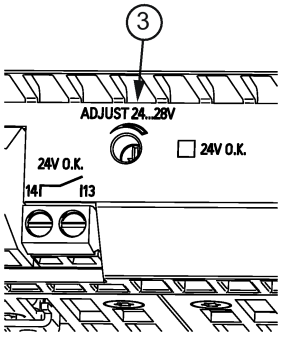


Figure 2-5 Potentiometer (example 6EP1437-2BA20)

NOTICE
Thermal overload possible
When adjusting the output voltage to >24 V, the output current must be derated by 4 %/V, or the permissible ambient temperature must be taken into account with 3 °C/V.

Note

It is only permissible to use an insulated screwdriver when actuating the potentiometer.

For notes on actuating the potentiometer (screwdriver, torque), see Figure 2-2 Terminal data for 6EP1433-2BA20 and 6EP1434-2BA20 (Page 10), Figure 2-3 Terminal data for 6EP1436-2BA10 (Page 10) and Figure 2-4 Terminal data for 6EP1437-2BA20 (Page 11)

2.4 Status displays and signaling

	6EP1433-2BA20 (24 V/5 A) **6EP1434-2BA20 (24 V/10 A)** **6EP1436-2BA10 (24 V/20 A)** **6EP1437-2BA20 (24 V/40 A)**
Status display	LED green for "24V O.K."
Signaling contact	Relay contact (NO contact, contact rating 30 V AC/0.5 A, 60 V DC/0.3 A, 30 V DC/1 A) for "24V O.K."

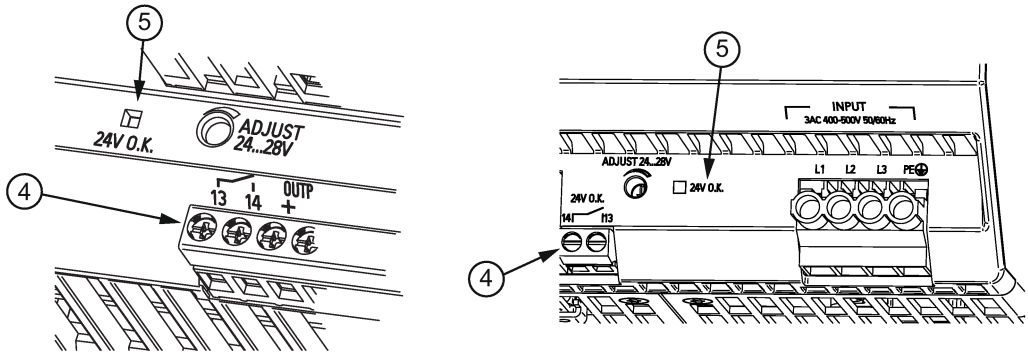


Figure 2-6 Operating display and signaling

Signaling	**6EP1433-2BA20 (24 V/5 A)** **6EP1434-2BA20 (24 V/10 A)** **6EP1436-2BA10 (24 V/20 A)** **6EP1437-2BA20 (24 V/40 A)**
LED ⑤ lights up green Signaling contact ④, contact 13 - 14 closed	Normal operation, output voltage >20 V ±0.5 V
LED ⑤ dark Signaling contact ④, contact 13 - 14 opened (quiescent position)	Overload / hiccup operation or power supply missing - or the device has tripped due to an overtemperature or overvoltage condition (caused by an external voltage at the output) (reset after approximately 120 s by switching off and on again). When 6EP1433-2BA20 and 6EP1433-2BA20 devices trip as a result of an overtemperature condition, these devices automatically start again after they have cooled down.

2.5 Block diagram

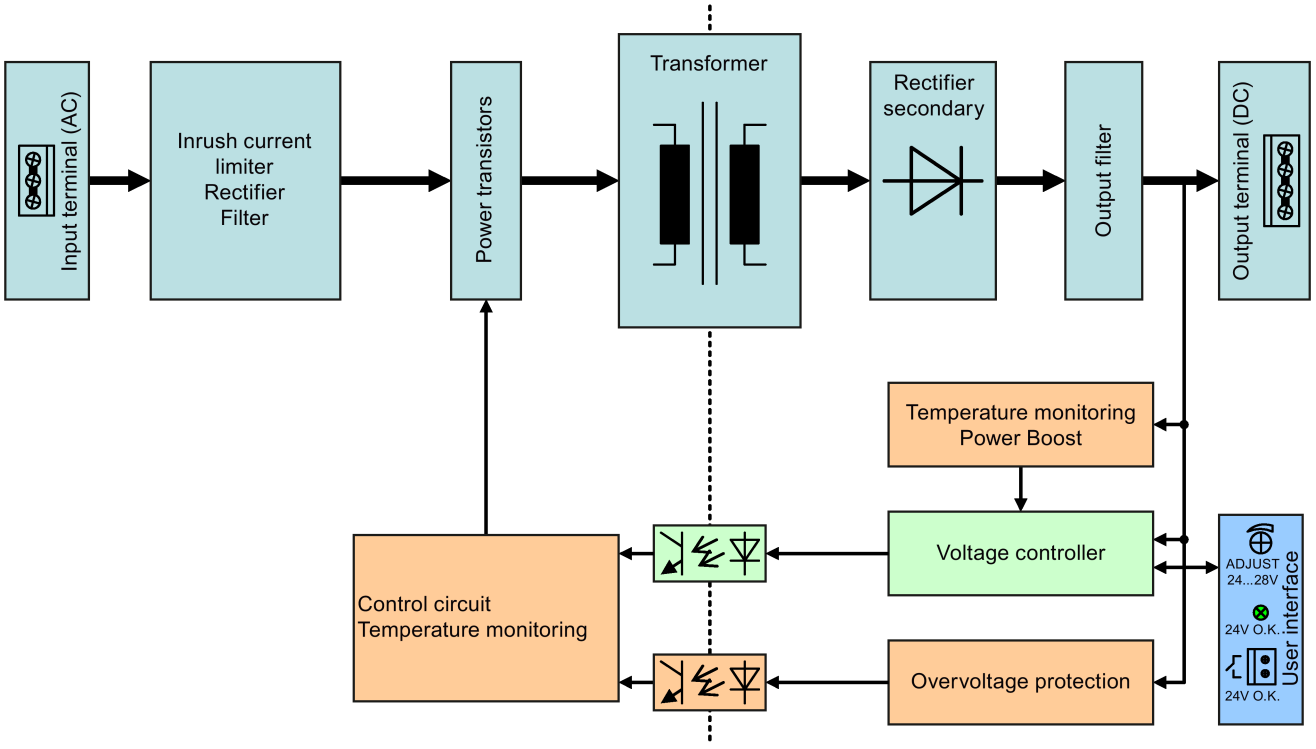


Figure 2-7 Block diagram for 6EP1433-2BA20 and 6EP1434-2BA20

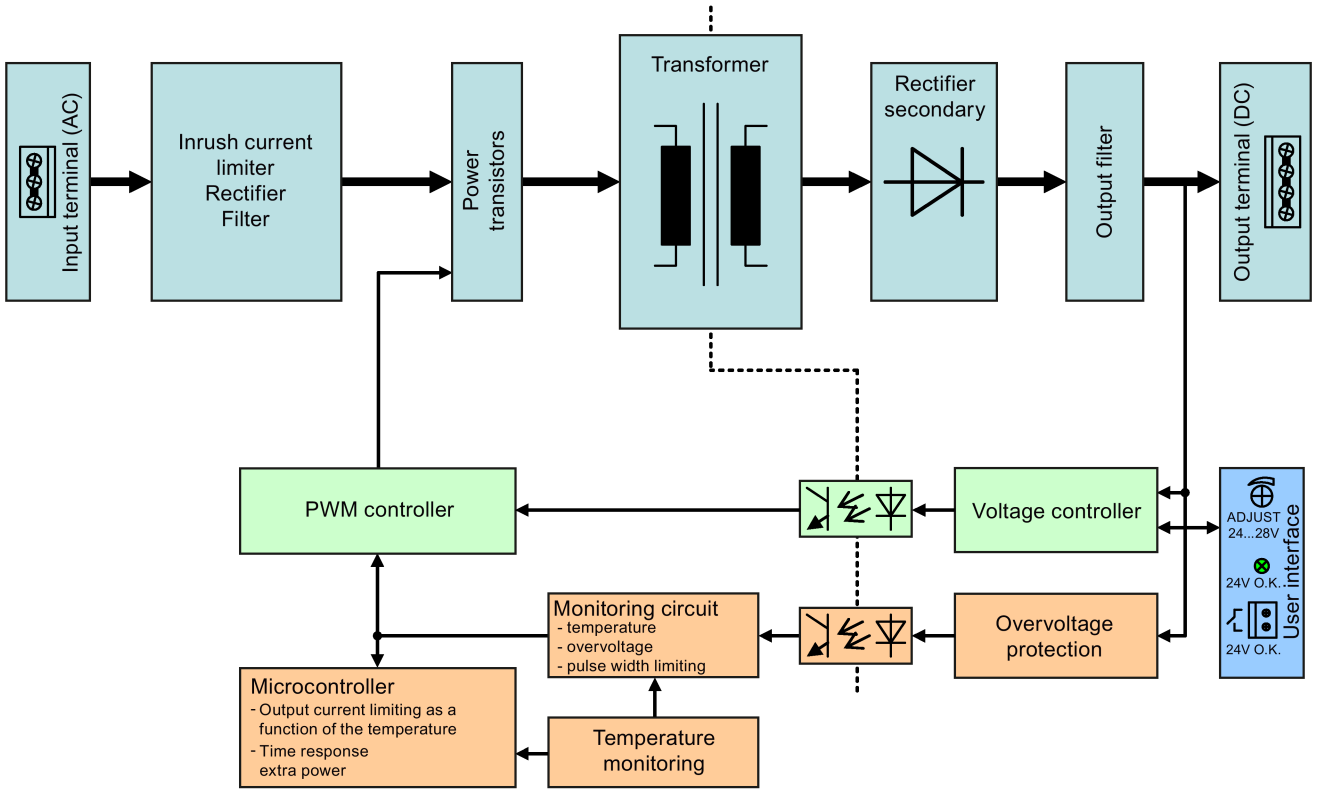


Figure 2-8 Block diagram for 6EP1436-2BA10 and 6EP1437-2BA10

2.6 Dimensions and weight

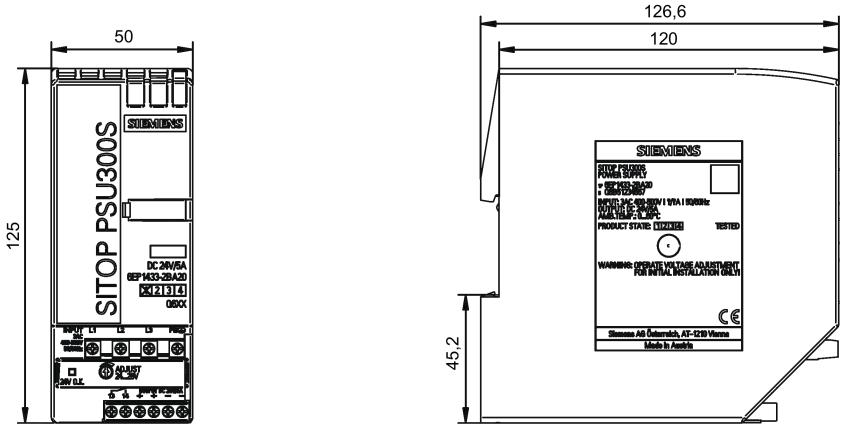


Figure 2-9 Dimension drawing 6EP1433-2BA20

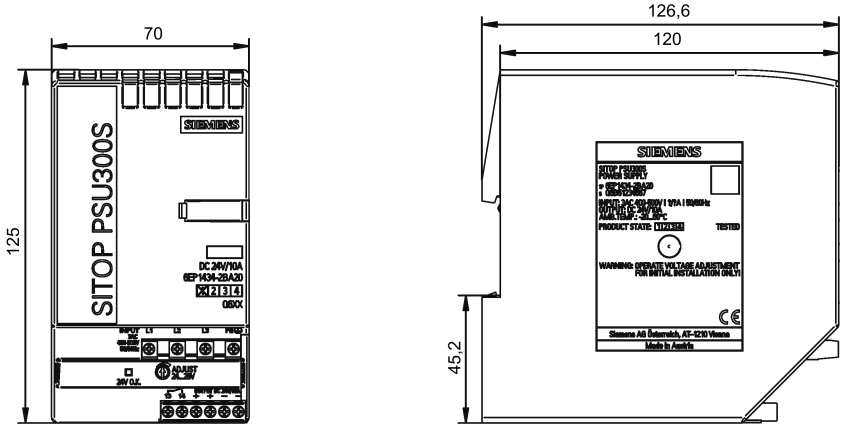


Figure 2-10 Dimension drawing 6EP1434-2BA20

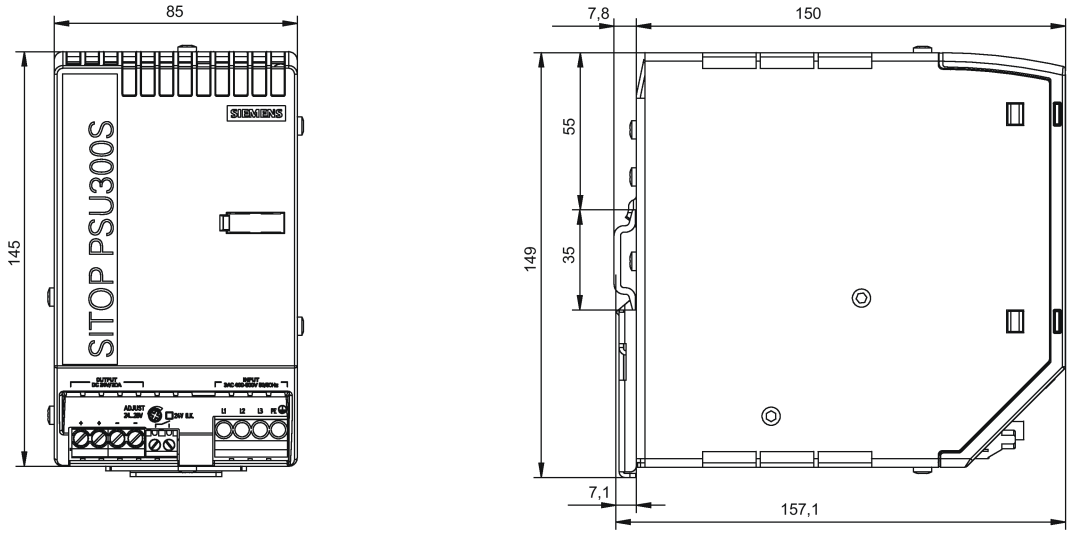


Figure 2-11 Dimension drawing 6EP1436-2BA10

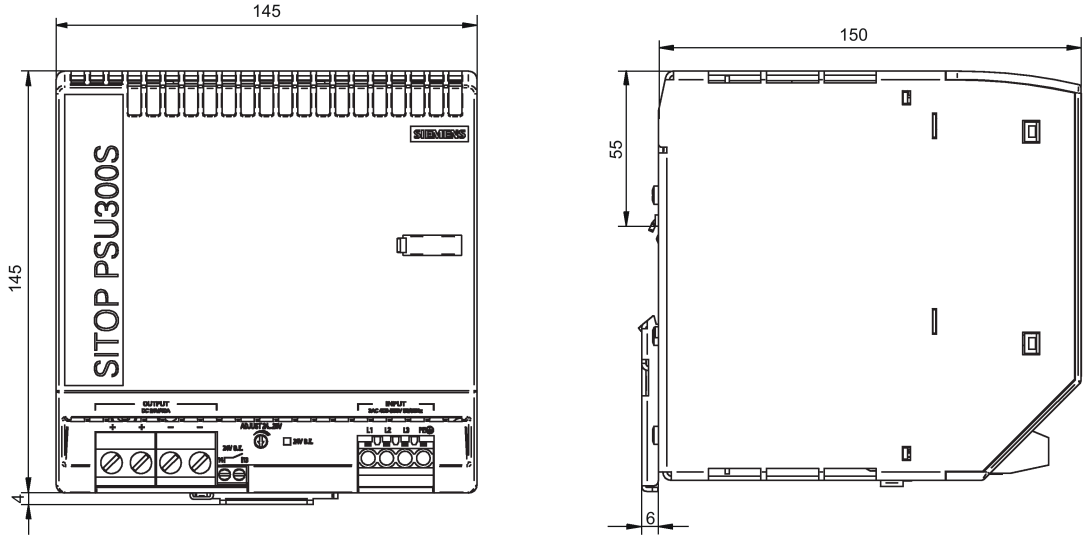


Figure 2-12 Dimension drawing 6EP1437-2BA20

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA10 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Dimensions (W × H × D) in mm	50 × 125 × 120	70 × 125 × 120	90 × 145 × 150	145 × 145 × 150
Weight	Approx. 0.5 kg	Approx. 0.7 kg	Approx. 1.6 kg	approx. 3.1 kg

Mounting/removal

3

WARNING

Installing the device in a housing or a control cabinet

The SITOP PSU300S power supply is a built-in device. It must be installed in a housing or control cabinet, to which only qualified personnel have access.

The device can be mounted in a control cabinet on standard mounting rails (see Chapter Mechanical system (Page 44))

Mounting

To mount the device, position it with the mounting rail guide at the upper edge of the standard mounting rail and press down to lock it into place. If it is too difficult to snap the device into place, press the slider at the same time, as described under "Removal".

Removing

To remove, pull up the slider using a screwdriver and disengage the device at the bottom edge of the standard mounting rail. Then you can remove the device from the upper edge of the standard mounting rail.

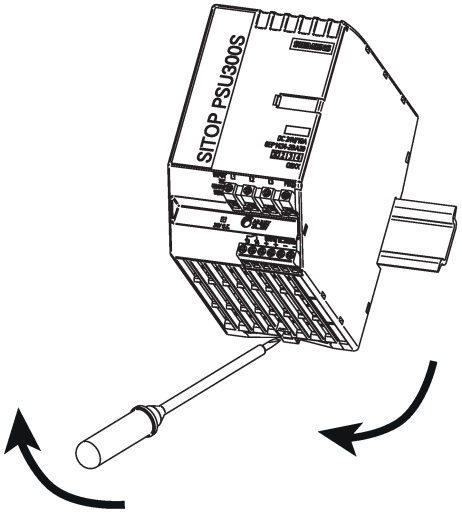


Figure 3-1 Removing

WARNING

Use in hazardous zones

If the device is to be used in a hazardous zone (Ex II 3G Ex nA nC IIC T3; Ex II 3G Ex nA nC IIC T4) it must be installed in a distribution box with degree of protection IP54 or higher.

Mounting position, mounting clearances

4

4.1 Standard mounting position

The device is mounted on standard mounting rails. The device must be mounted vertically in such a way that the input terminals and the output terminals are at the bottom to ensure correct cooling.

A clearance of at least 50 mm (6EP1433-2BA20 and 6EP1434-2BA20) – or 40 mm (6EP1436-2BA10 and 6EP1437-2BA20), must be maintained above and below the device (maximum depth of the cable duct, 50 mm).

No space is required at the side.

Output current as a function of the ambient temperature and mounting height

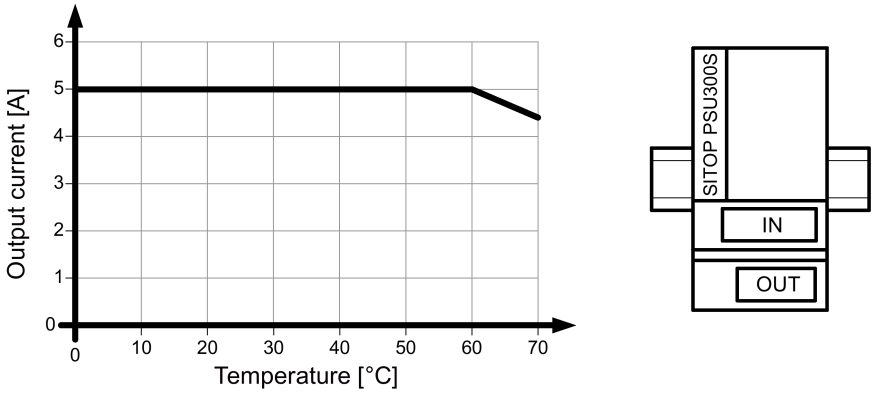


Figure 4-1 6EP1433-2BA20: Output current in the standard mounting position

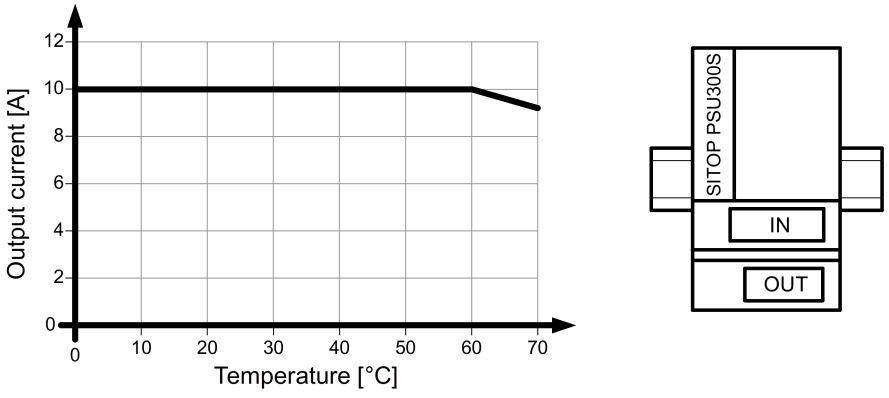


Figure 4-2 6EP1434-2BA20: Output current in the standard mounting position

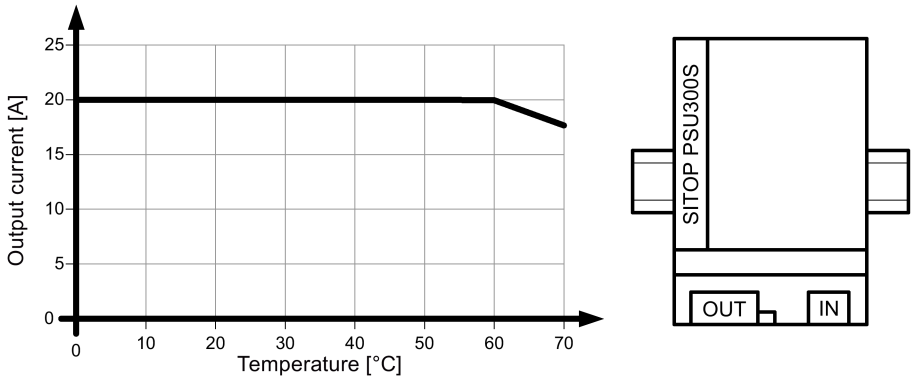


Figure 4-3 6EP1436-2BA10: Output current in the standard mounting position

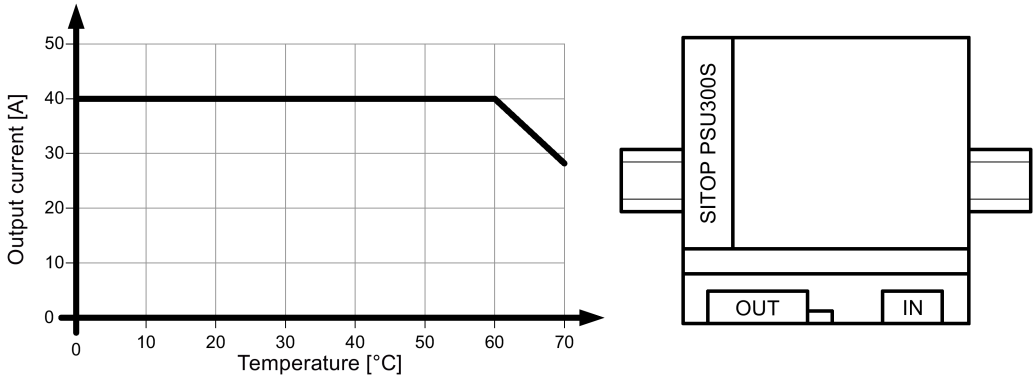


Figure 4-4 6EP1437-2BA20: Output current in the standard mounting position

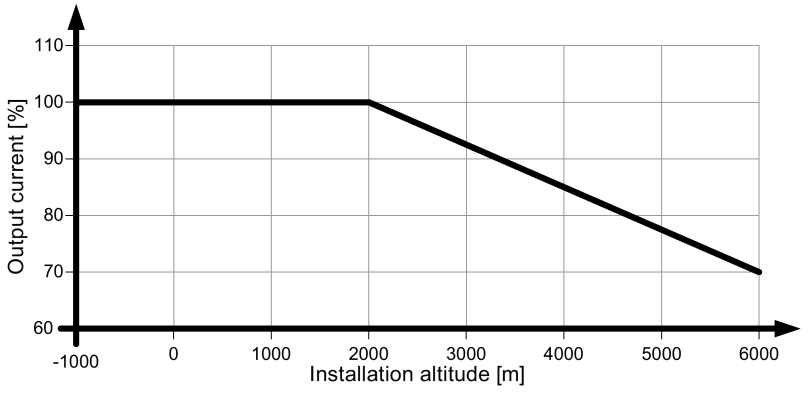


Figure 4-5 Altitude derating

Details see chapter Ambient conditions (Page 51)

4.2 Other mounting positions

For mounting positions that deviate from the standard mounting position, derating factors (reduction of the output power or the permissible ambient temperature) must be observed in accordance with the following diagrams.

Note

In the case of mounting positions that deviate from the standard mounting position, reduced mechanical resistance of the devices against vibration and shock must be expected.

Particularly when installing on a vertically fastened standard mounting rail, additional measures may be required, e.g. to prevent the device from slipping on the standard mounting rail.

4.2.1 6EP1433-2BA20

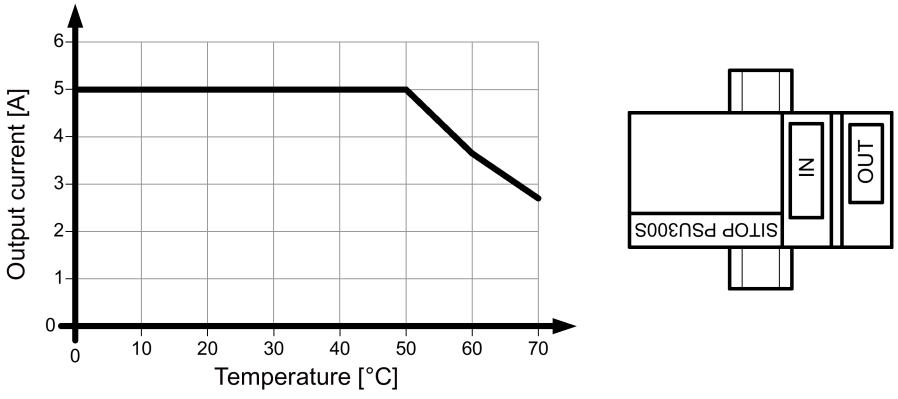


Figure 4-6 Mounting position (1)

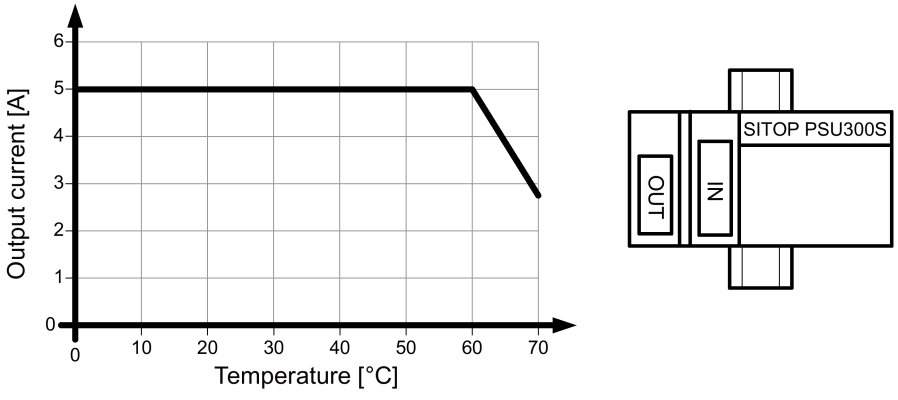


Figure 4-7 Mounting position (2)

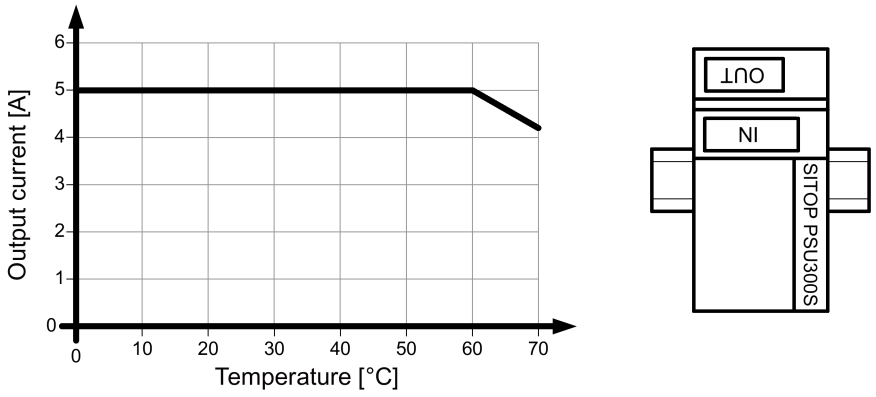


Figure 4-8 Mounting position (3)

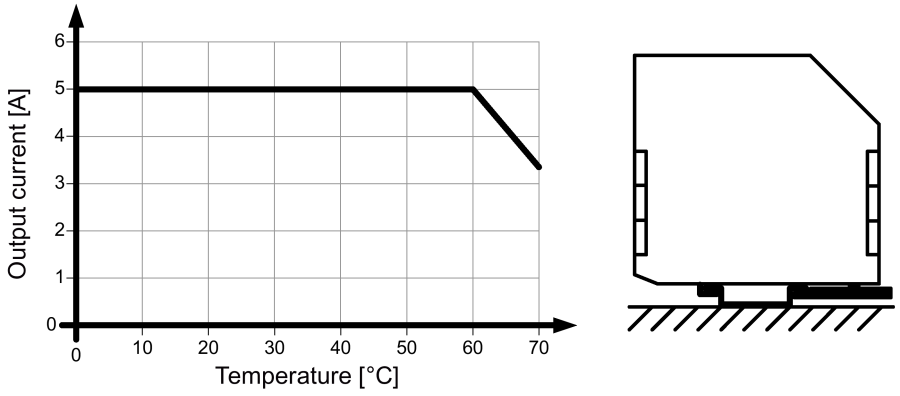


Figure 4-9 Mounting position (4)

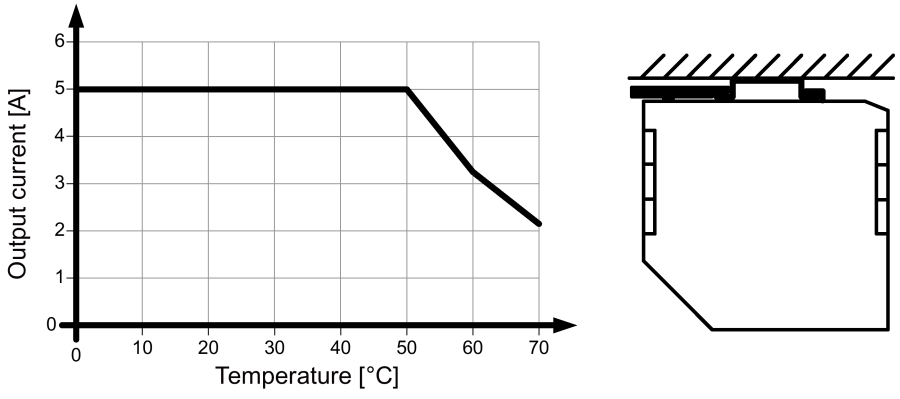


Figure 4-10 Mounting position (5)

4.2.2 6EP1434-2BA20

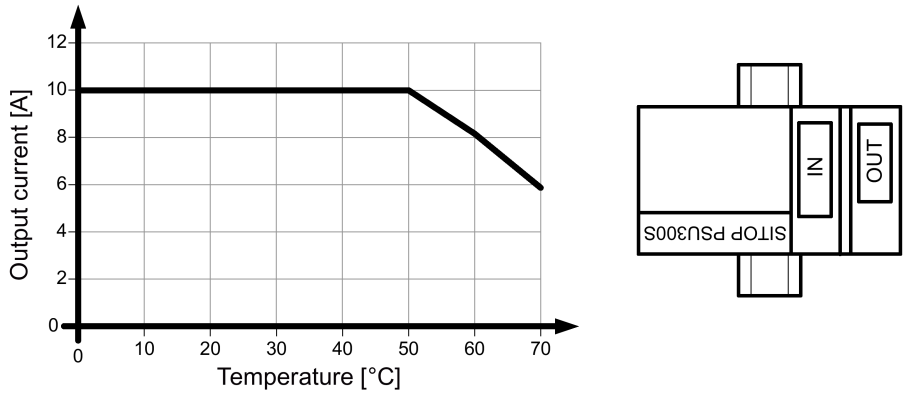


Figure 4-11 Mounting position (1)

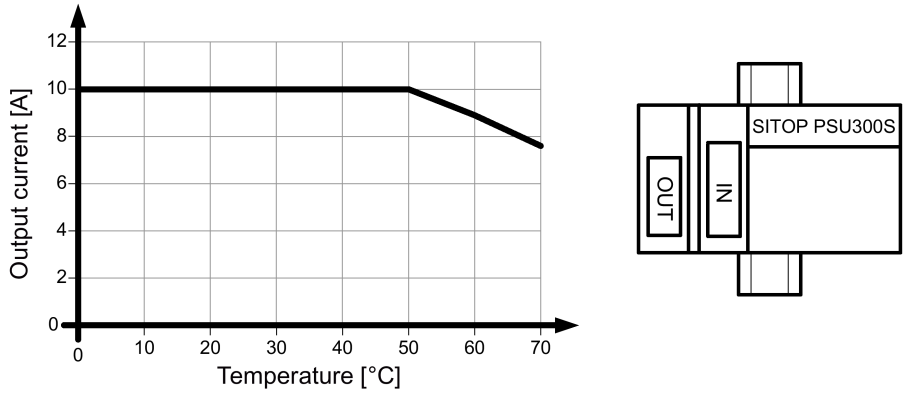


Figure 4-12 Mounting position (2)

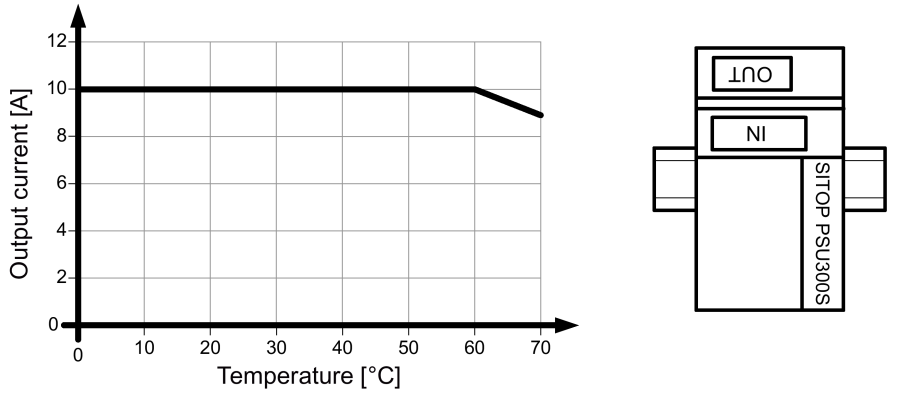


Figure 4-13 Mounting position (3)

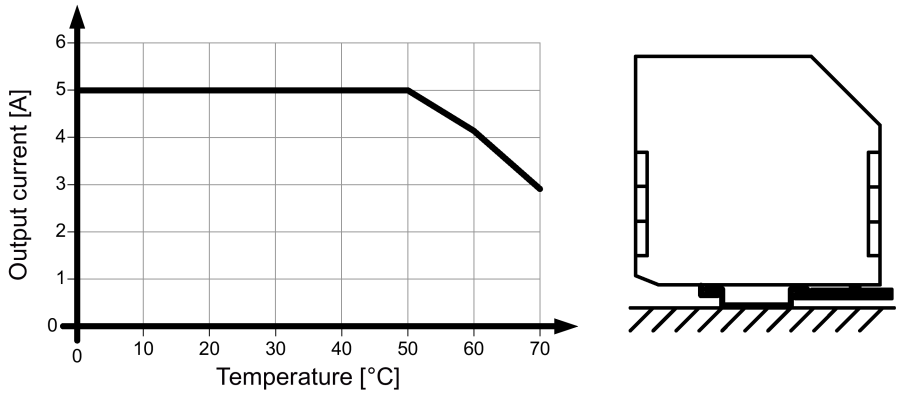


Figure 4-14 Mounting position (4)

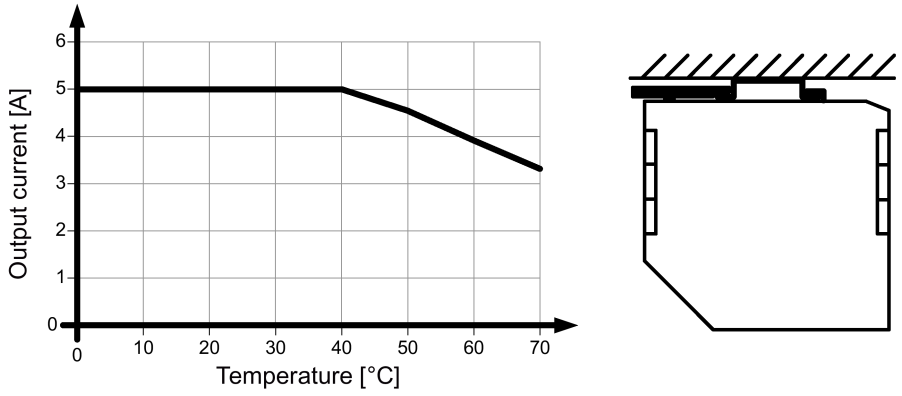


Figure 4-15 Mounting position (5)

4.2.3 6EP1436-2BA10

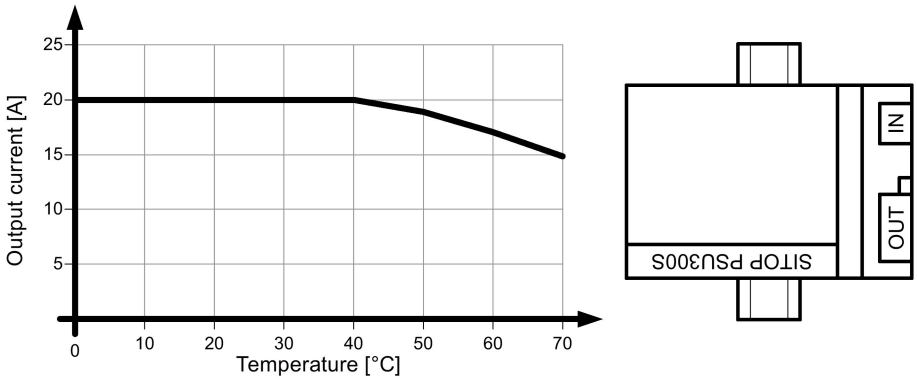


Figure 4-16 Mounting position (1)

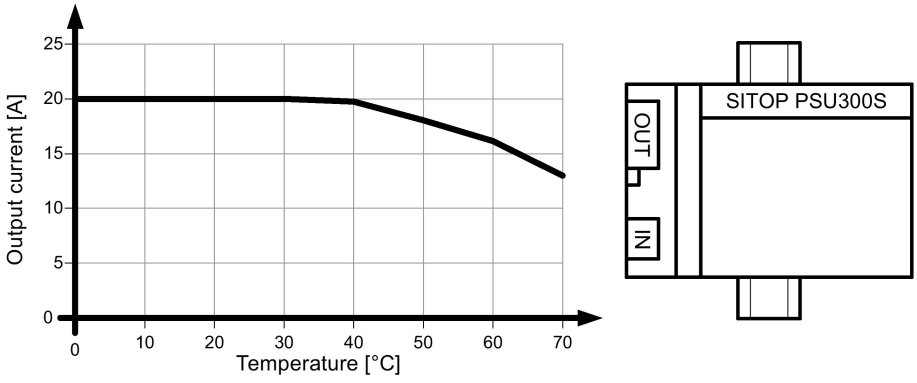


Figure 4-17 Mounting position (2)

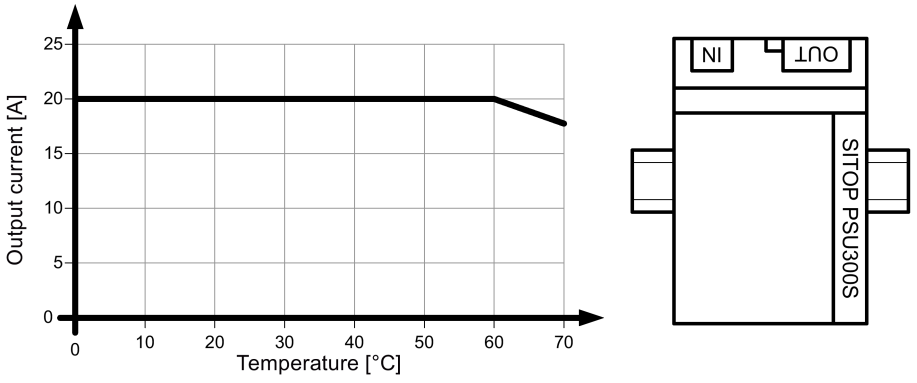


Figure 4-18 Mounting position (3)

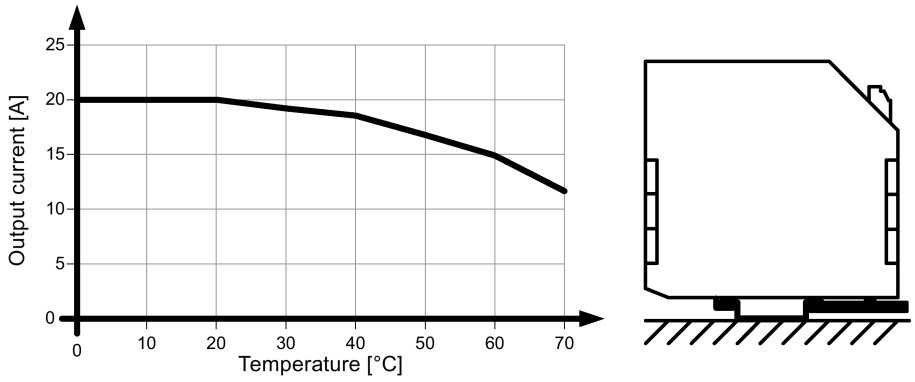


Figure 4-19 Mounting position (4)

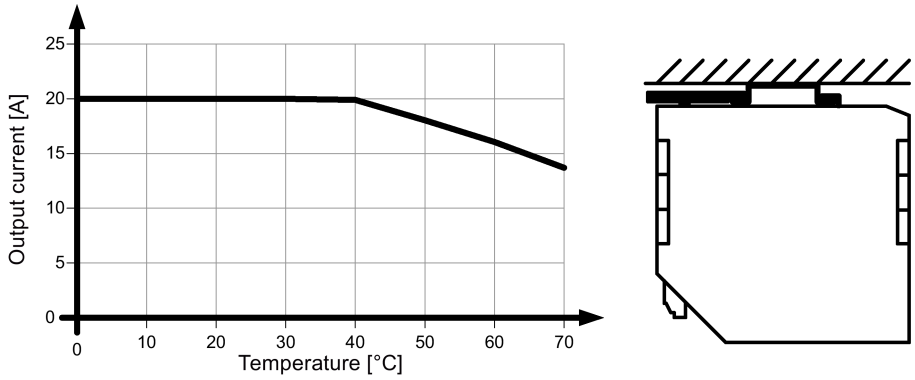


Figure 4-20 Mounting position (5)

4.2.4 6EP1437-2BA20

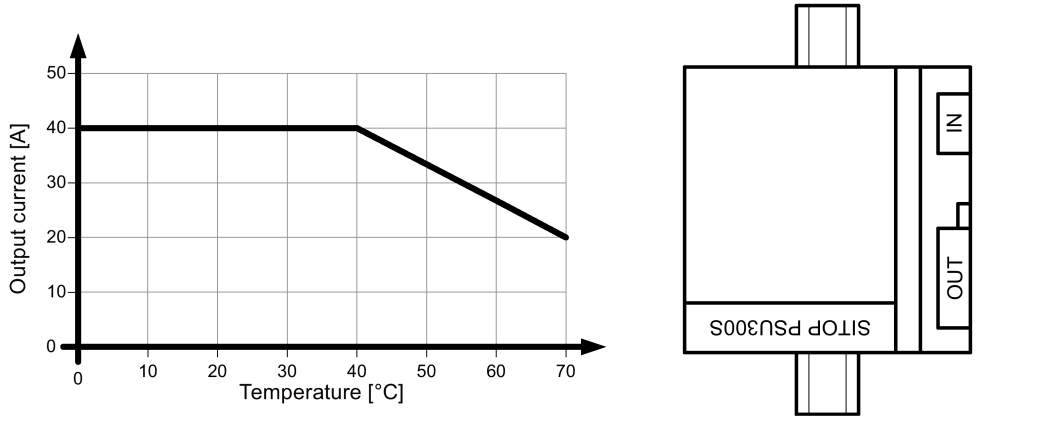


Figure 4-21 Mounting position (1)

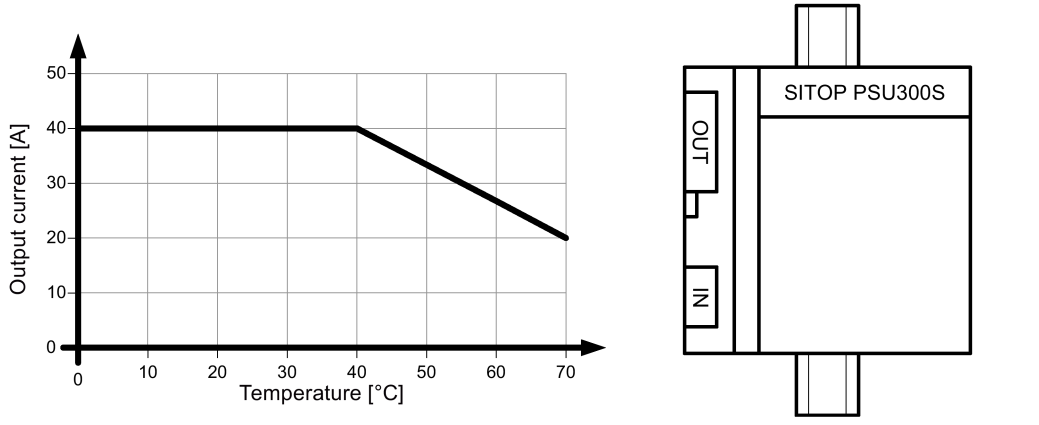


Figure 4-22 Mounting position (2)

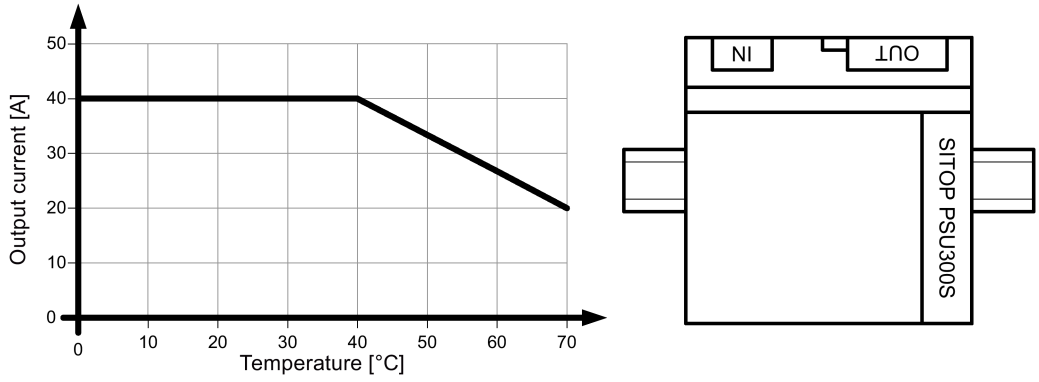


Figure 4-23 Mounting position (3)

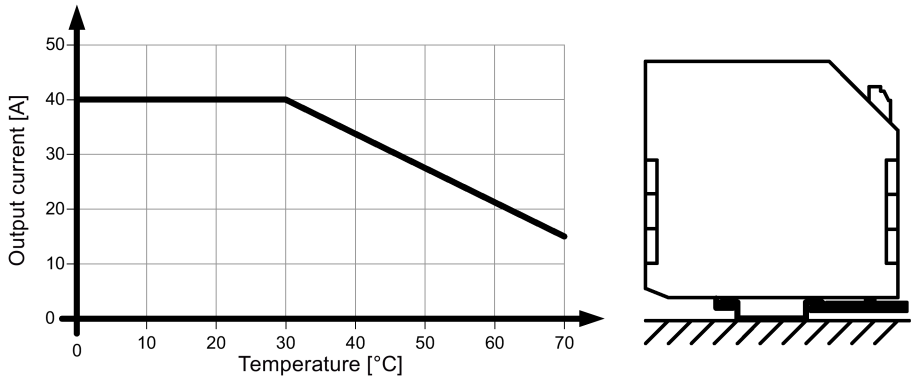


Figure 4-24 Mounting position (4)

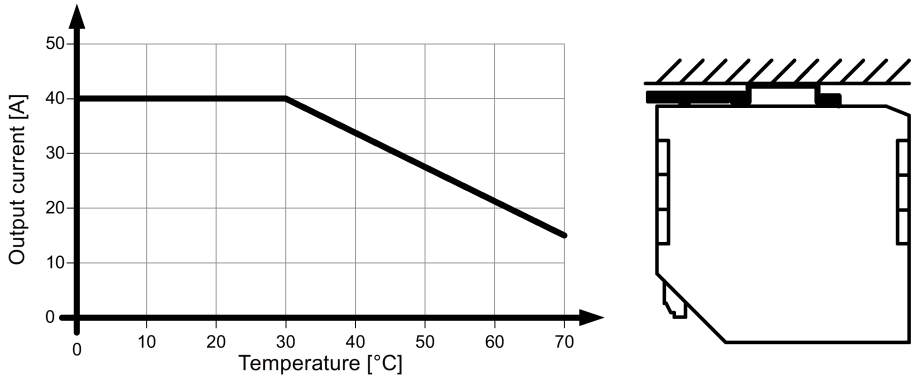


Figure 4-25 Mounting position (5)

Installation

5

WARNING

Hazard due to electric shock

Before installation or maintenance work can begin, the system's main switch must be switched off and measures taken to prevent it being switched on again. If this instruction is not observed, touching live parts can result in death or serious injury.

5.1 Line-side connection

The SITOP PSU300S power supply is designed for connection to a 3-phase AC line supply (TN or TT system according to VDE 0100 T 300 / IEC 364-3) with a rated voltage of 3-phase 400 - 500 VAC, 50 - 60 Hz.

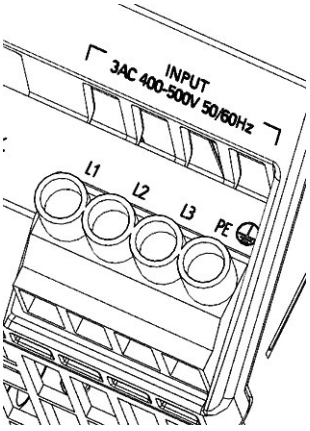


Figure 5-1 Line connection (example: 6EP1436-2BA10)

The line supply is connected using terminal L1, L2, L3 and PE (see Figure Line connection (example: 6EP1436-2BA10) (Page 31)), and must be implemented according to IEC 60364 and EN 50178 . A protective device (miniature circuit-breaker or circuit-breaker) and a disconnection unit for the power supply must be provided. A ground-fault circuit interrupter is not permissible against indirect contact as the only protective measure. This is true for the complete line supply protected by the ground-fault circuit interrupter.

Protection

SITOP PSU300S	Required line-side protection
6EP1433-2BA20	3-pole coupled miniature circuit breaker (IEC 898) characteristic C, 3 - 16 A or 3RV2011-1DA10 circuit breaker, thermal overload release setting: 3 A or 3RV2711-1DD10 circuit breaker (branch circuit protection according to UL 489)
6EP1434-2BA20	3-pole coupled miniature circuit breaker (IEC 898) characteristic C, 3 - 16 A or 3RV2011-1DA10 circuit-breaker, setting of the thermal overcurrent release: 3 A or 3RV2711-1DD10 circuit-breaker (branch circuit protection according to UL 489)
6EP1436-2BA10	3-pole coupled miniature circuit breaker (IEC 898) characteristic C, 6 - 16 A or 3RV2011-1DA10 circuit-breaker, setting of the thermal overcurrent release: 3 A or 3RV2711-1DD10 circuit-breaker (branch circuit protection according to UL 489)
6EP1437-2BA20	3-pole coupled miniature circuit breaker (IEC 898) characteristic C, 10 - 16 A or 3RV2011-1DA10 circuit-breaker, setting of the thermal overcurrent release: 3 A or 3RV2711-1DD10 circuit-breaker (branch circuit protection according to UL 489)

The protective conductor of the line supply must be connected at the PE terminal.

Other country-specific regulations may have to be observed when installing the device.

5.2 Output-side connection

At its output, the SITOP PSU300S power supply provides an isolated (= non-grounded) SELV output voltage (Safety Extra Low Voltage). The output of the power supply is no-load, overload, and short-circuit proof. If an overload occurs, the electronic current limiting function limits the output current to a maximum value (refer to Chapter Technical data (Page 35)).

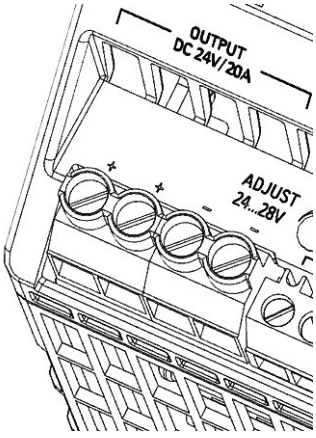


Figure 5-2 Connection of the output voltage (example: 6EP1436-2BA10)

The output voltage is connected via the + and - terminals at the output of the power supply (see Figure Connection of the output voltage (example: 6EP1436-2BA10) (Page 33)). Ensure that the output cables are dimensioned correctly for the maximum output current rms value and fused accordingly.

Note

If the safety concept of the plant or system specifies that the DC output circuit should be grounded (PELV), then it is permissible that the output voltage of the SITOP power supply is grounded. In this case, ideally, the grounding at the output should be directly connected from terminal "-" of the power supply to a suitable connection point of the protective conductor system (PE) of the plant or system.

Technical data

6

Note

Technical data apply for a rated input voltage, rated load and 25 °C ambient temperature if nothing else is specified.

6.1 Input

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Input	3-phase, AC			
Rated voltage $U_{in\ rated}$	400 - 500 V			
Voltage range	340 - 550 V			
Wide-range input	Yes			
Line failure buffering at $I_{out\ rated}$, min	18 ms	7 ms	6 ms	6 ms
Power-failure buffering	At U_{in} = 400 V			
Rated line frequency	50 - 60 Hz			
Line frequency range	47 - 63 Hz			
Input current / at rated value of input voltage 400 V	0.45 A	0.7 A	1.2 A	2 A
Input current / at rated value of input voltage 500 V	0.4 A	0.6 A	1 A	1.7 A
Inrush current limiting (25 °C), max.	20 A	20 A	36 A	60 A
I^2t, max	0.5 A^2s	0.5 A^2s	0.9 A^2s	3.4 A^2s
Integrated input fuse	None			
Protection in the line feeder cable (IEC 898)	required: 3-pole, coupled miniature circuit breaker 3 - 16 A characteristic C or circuit breaker 3RV2011-1DA10 (setting 3 A) or 3RV2711-1DD10 (UL 489-listed, DIVQ)		required: 3-pole, coupled miniature circuit breaker 6 - 16 A characteristic C or circuit breaker 3RV2011-1DA10 (setting 6 A) or 3RV2711-1DD10 (UL 489-listed, DIVQ)	required: 3-pole, coupled miniature circuit breaker 10 - 16 A characteristic C or circuit breaker 3RV2011-1DA10 (setting 3 A) or 3RV2711-1DD10 (UL 489-listed, DIVQ)
Overvoltage strength	-	-	2.3 × $U_{in\ rated}$ 1.3 ms	-

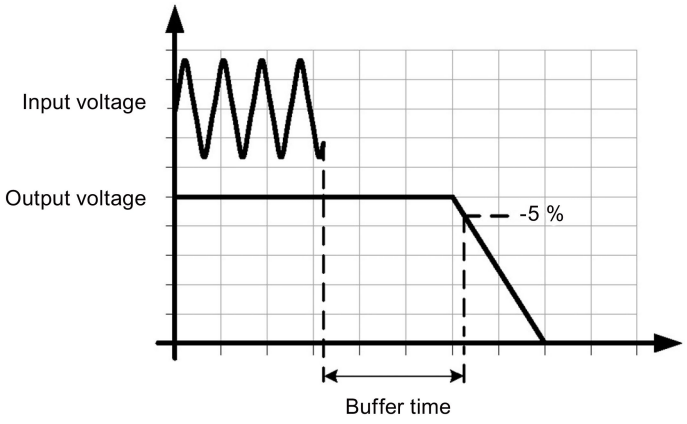


Figure 6-1 Power-failure buffering

6.2 Output

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Output	Regulated, isolated DC voltage			
Rated voltage $U_{out\ rated}$ DC	24 V			
Total tolerance, static ±	3 %	3 %	3 %	3 %
Static line regulation, approx.	0.1 %	0.1 %	0.5 %	1 %
Static load regulation, approx.	0.1 %	0.15 %	1 %	2 %
Residual ripple in the load range peak-peak, max.	200mV: 0 - 1.1 A 150mV: >1.1 A	200mV: 0 - 1.1 A 150mV: >1.1 A	150 mV	150 mV
Spikes peak-peak, max. (bandwidth, 20 MHz)	240 mV	240 mV	240 mV	240 mV
Adjustment range	24 - 28 V			
Product function / output voltage can be adjusted	Yes			
Output voltage setting	Using a potentiometer			
• Remark	Max. 120 W	Max. 240 W	Max. 480 W	Max. 960 W
Status display	LED green for "24V O.K."			
Signaling	Relay contact (NO contact, rating 60 VDC/0.3 A) for "24V O.K."			

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Response when switching on/off	Overshoot, 1.05 × $U_{out\ rated}$	Overshoot, 1.05 × $U_{out\ rated}$	No overshoot of U_{out} (soft start)	
Starting delay, max.	1.5 s	1.5 s	1.5 s	1.5 s
Voltage rise, typ.	60 ms	50 ms	30 ms	15 ms
Voltage rise time / of the output voltage / maximum	500 ms	500 ms	500 ms	500 ms
Rated current $I_{out\ rated}$	5 A	10 A	20 A	40 A
Current range	0 - 5 A	0 - 10 A	0 - 20 A	0 - 40 A
• Remark	6 A to 45 °C 60 ... 70 °C derating: 5 % $I_{out\ rated}$/K	12 A to 45 °C 60 ... 70 °C derating: 5 % $I_{out\ rated}$/K	24 A to 45 °C 60 ... 70 °C derating: 2 % $I_{out\ rated}$/K	48 A to 45 °C 60 ... 70 °C derating: 3 % $I_{out\ rated}$/K
Output active power / typical	120 W	240 W	480 W	960 W
Short-time overload current / for a short circuit when powering up / typical	-	-	35 A	65 A
Duration of the overload capability, overcurrent / for a short circuit while powering up	-	-	100 ms	100 ms
Short-time overload current / for a short circuit in operation / typical	-	-	35 A	65 A
Duration of the overload capability, overcurrent / for a short circuit in operation	-	-	100 ms	100 ms
• Remark			every 2.5 s	every 2.5 s
Can be connected in parallel to increase the power rating	Yes			
Number of devices that can be connected in parallel to increase the power rating, units	2			
Overload capability (Extra Power)	7.5 A for 5 s/min	15 A for 5 s/min	30 A for 5 s/min	60 A for 5 s/min
Output characteristic	See Figure 6-3 Output characteristic 6EP1433-2BA20 (Page 38)	See Figure 6-4 Output characteristic 6EP1434-2BA20 (Page 38)	See Figure 6-5 Output characteristic 6EP1436-2BA10 (Page 39)	See Figure 6-6 Output characteristic 6EP1437-2BA20 (Page 39)

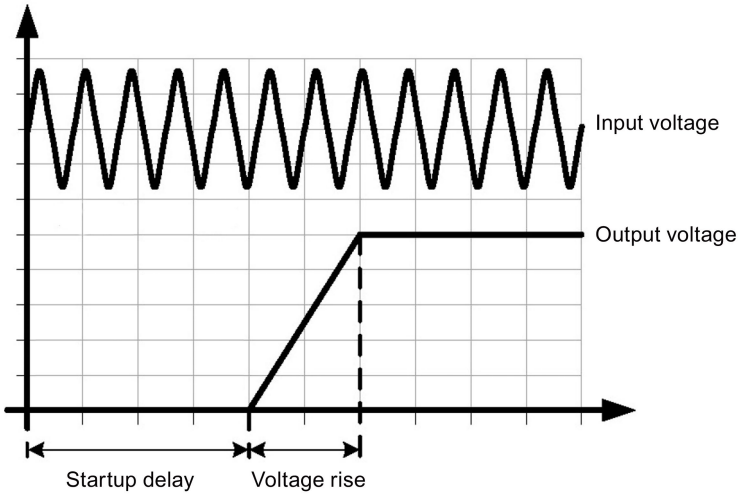


Figure 6-2 Startup delay/voltage rise

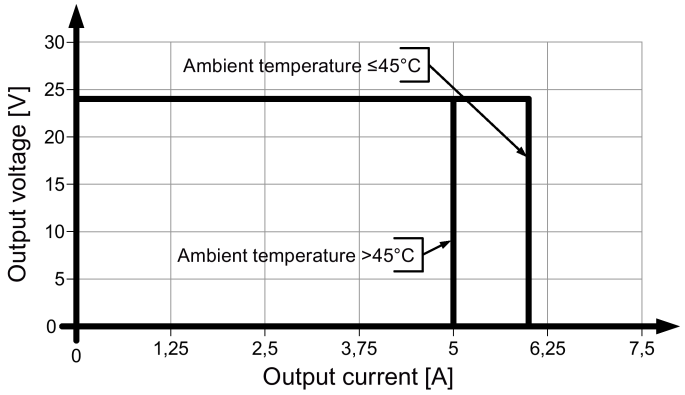


Figure 6-3 Output characteristic 6EP1433-2BA20

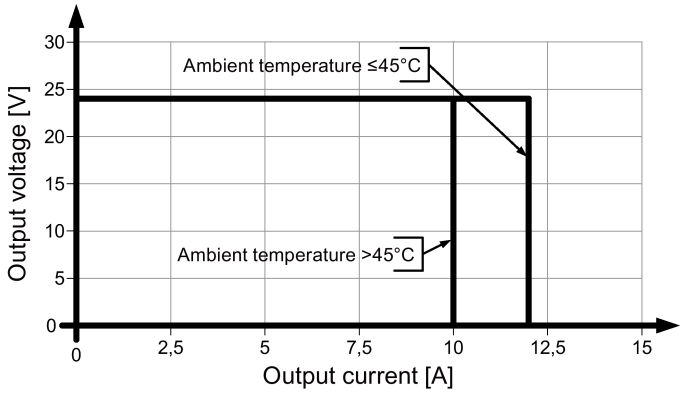


Figure 6-4 Output characteristic 6EP1434-2BA20

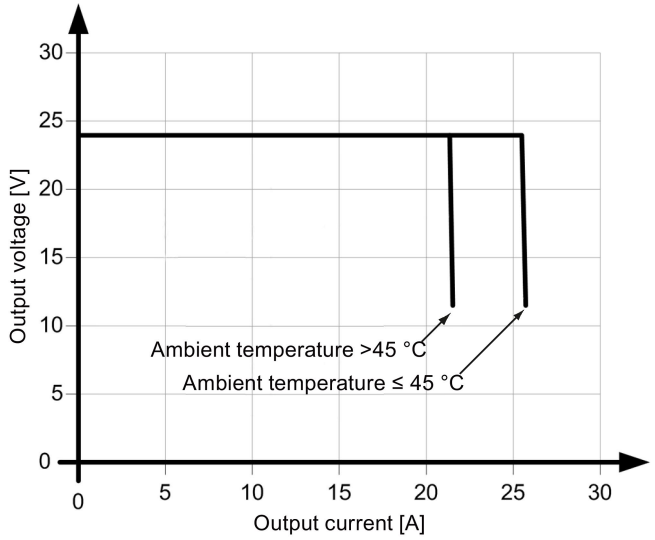


Figure 6-5 Output characteristic 6EP1436-2BA10

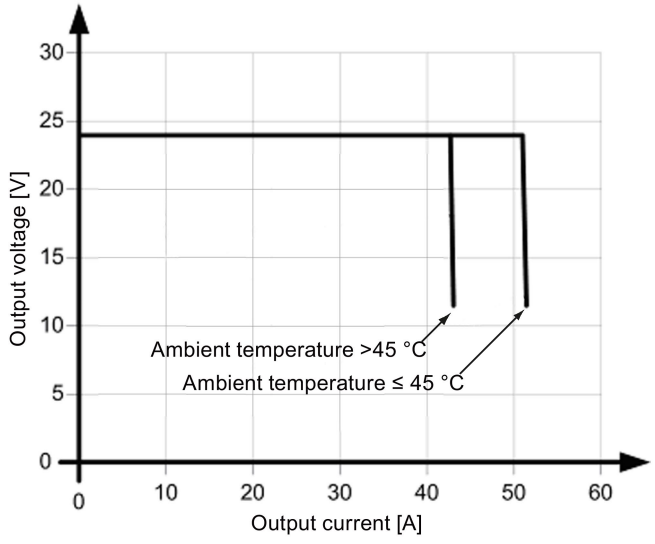


Figure 6-6 Output characteristic 6EP1437-2BA20

The device supplies a constant output voltage until the current limit is reached. In the event of an overload, the output current and the output voltage are reduced.

For 6EP1436-2BA10 and 6EP1437-2BA20, the following applies: When the output voltage falls below approx. 10 V, the device switches off, and initiates an automatic restart. This response is repeated as long as the overload condition is present.

6.3 Efficiency

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Efficiency at $U_{out\ rated}$, $I_{out\ rated}$, approx.	89.5 %	91 %	91 %	91.5 %
Power loss at $U_{out\ rated}$, $I_{out\ rated}$, approx.	12.6 W	24 W	47 W	89 W
No-load operation power loss, approx.	2 W	2 W	2.5 W	5 W

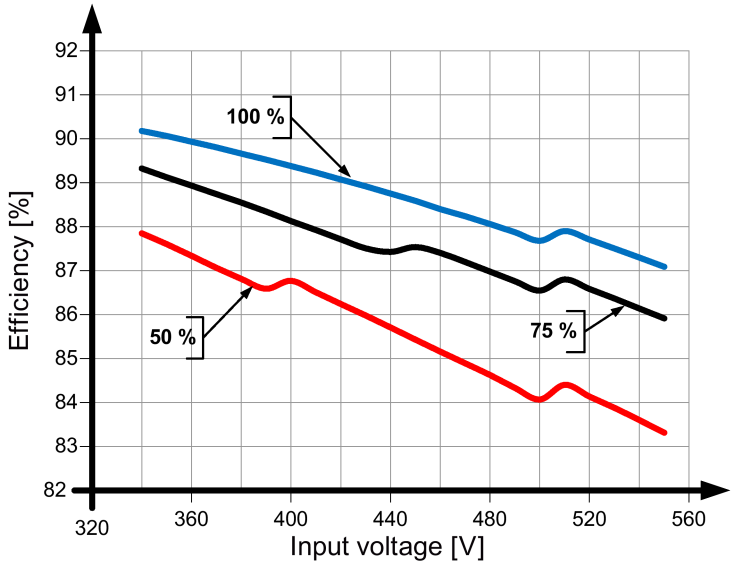


Figure 6-7 Efficiency 6EP1433-2BA20

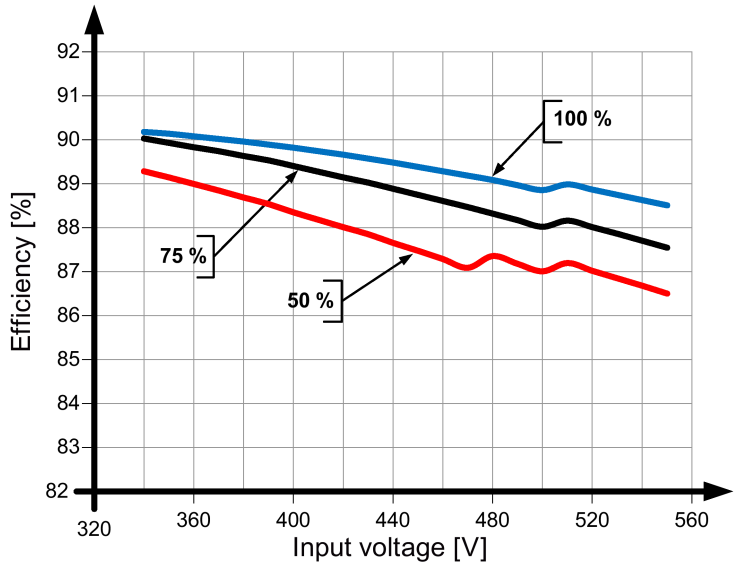


Figure 6-8 Efficiency 6EP1434-2BA20

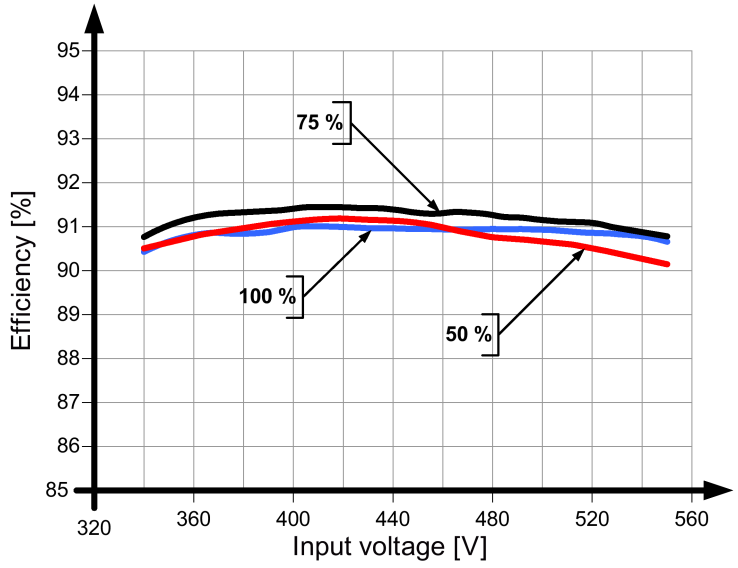


Figure 6-9 Efficiency 6EP1436-2BA10

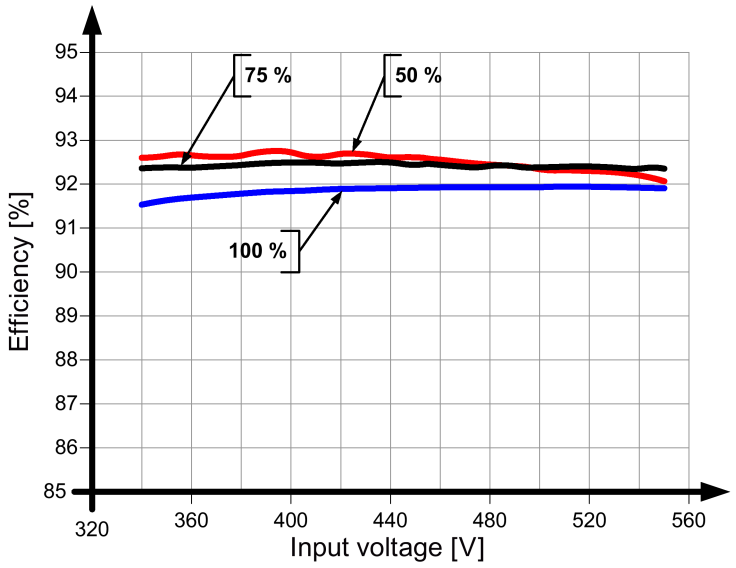


Figure 6-10 Efficiency 6EP1437-2BA20

6.4 Closed-loop control

	6EP1433-2BA20 (24 V/5 A) 6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Dyn. line regulation ($U_{in\ rated}$ ±15 %), max.	1 %	3 %	3 %
Dyn. load regulation (I_{out}: 10/90/10 %), U_{out} ± typ.	3 %	3 %	3 %
Load step regulation time 10 to 90%, typ.	4 ms	2 ms	1 ms
Load step regulation time 90 to 10%, typ.	4 ms	2 ms	1 ms
Dyn. load regulation (I_{out}: 50/100/50 %), U_{out} ± typ.	1 %	3 %	1.5 %
Load step regulation time 50 to 100%, typ.	3 ms	2 ms	1 ms
Load step regulation time 100 to 50%, typ.	3 ms	2 ms	1 ms
Regulation time / maximum	10 ms	10 ms	10 ms

6.5 Protection and monitoring

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Output overvoltage protection	in the case of an internal fault U_{out} < 35 V			
Current limitation, typ.	6.6 A	13 A	25.5 A	50 A
Property of the output/short-circuit proof	Yes			
Short-circuit protection	Constant current characteristic		Electronic trip, automatic restart	
Continuous short-circuit current / rms value / maximum	8 A	16 A	7 A	14 A
Continuous short-circuit current / rms value / typical	6.6 A	13 A	-	-
• Remark	Overload capability 150 % $I_{out\ rated}$ up to 5 s/min	Overload capability 150 % $I_{out\ rated}$ up to 5 s/min	Overload capability 150 % $I_{out\ rated}$ up to 5 s/min	Overload capability 150 % $I_{out\ rated}$ up to 5 s/min

6.6 MTBF

	6EP1433-2BA20 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Mean Time Between Failures	SN29500: > 500000 h (typ. 1500000 h) at 40 °C, rated load, 24 hour operation	SN29500: > 500000 h (typ. 1450000 h) at 40 °C, rated load, 24 hour operation	SN29500: > 800000 h at 40 °C, rated load, 24 hour operation	SN29500: > 500000 h (typ. 700000 h) at 40 °C, rated load, 24 hour operation

6.7 Mechanical system

	6EP1433-2BA2 (24 V/5 A)	6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Connection system	screw-type terminal			
Connections / line supply	L1, L2, L3, PE: 1 screw terminal each for 0.2 - 4 mm² solid/finely stranded			
Connections / output	+, -: 2 screw terminals each for 0.2 - 4 mm²			+, -: 2 screw terminals each for 0.5 - 10 mm²
Connections / auxiliary contacts	(13, 14) (signal): 1 screw terminal each for 0.14 - 1.5 mm²			
Width of the housing	50 mm	70 mm	90 mm	145 mm
Height of the housing	125 mm	125 mm	145 mm	145 mm
Depth of the housing	120 mm	120 mm	150 mm	150 mm
Installation width	50 mm	70 mm	90 mm	145 mm
Mounting height	225 mm	225 mm	225 mm	225 mm
Weight, approx.	0.5 Kg	0.7 Kg	1.6 kg	3.1 kg
Product feature of the housing / housing that can be lined up next to one another	Yes			
Type of mounting / panel mounting	No			
Type of mounting / rail mounting	Yes			
Type of mounting / S7-300 rail mounting	No			
Mounting	Can be snapped onto standard TH35-15/7,5 (EN 60715) mounting rails			Can be snapped onto standard TH35-15 (EN 60715) mounting rails

6.8 Accessories

	6EP1433-2BA20 (24 V/5 A) 6EP1434-2BA20 (24 V/10 A) 6EP1436-2BA10 (24 V/20 A) 6EP1437-2BA20 (24 V/40 A)
Electrical accessories	Redundancy module, buffer module, diagnostics module SITOP select (for 6EP1433-2BA20 only PSE200U) or DC USV
Mechanical accessories	Device identification labels 20 mm × 7 mm, pastel turquoise 3RT1900-1SB20

6.9 Dimension drawing

See Section Dimensions and weight (Page 16)

CAD data that can be downloaded from the Internet:

6EP1433-2BA20
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_01098)

6EP1434-2B20
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_01101)

6EP1436-2BA10
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00408)

6EP1437-2BA20
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00571)

Safety, approvals, EMC

7

7.1 Safety

	6EP1433-2BA20 (24 V/5 A) 6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A) 6EP1437-2BA20 (24 V/40 A)
Primary/secondary electrical isolation	Yes	
Galvanic isolation	SELV output voltage U_{out} acc. to EN 60950-1 and EN 50178 Transformer according to EN 61558-2-16	
Protection class	Class I	
Degree of protection (EN 60529)	IP20	
Leakage current, typ.	0.4 mA	1 mA
Leakage current, max.	3.5 mA	
Test voltage	See Table 7-1 Test voltage (Page 48)	

7.2 Test voltage

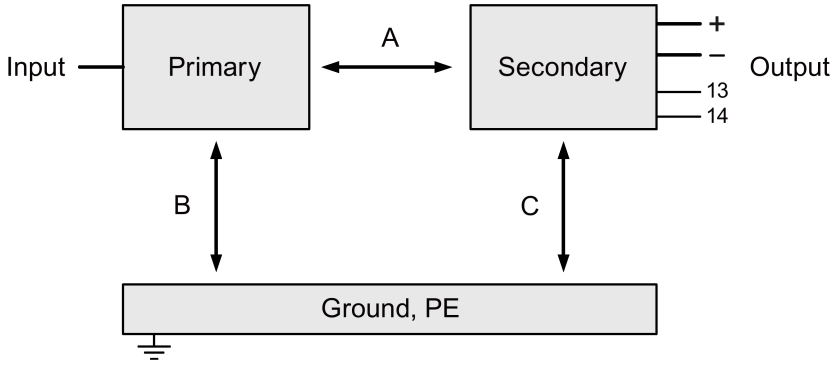


Figure 7-1 Test voltage diagram

Only the manufacturer can perform the type test and production test; users can also perform the field test.

Preconditions for performing the field test:

Tests (A) & (B)

- Connect the input terminals with one another
- Connect the output terminals, signaling contact and PE with one another

Test (C)

- Connect the output terminals and signaling contact with one another and measure with respect to PE

Table 7- 1 Test voltage

	Test time	**Prim ↔ sec (A)**	**Prim ↔ PE (B)**	**Sec ↔ PE (C)**
Type test	60 s	4200 V DC	2200 V DC	700 V DC
	60 s	3000 V AC	1500 V AC	500 V AC
Production test	1 s	2200 V DC	2200 V DC	500 V DC
	1 s	1500 V AC	1500 V AC	350 V AC
Field test	1 s	2200 V DC	2200 V DC	500 V DC
	1 s	1500 V AC	1500 V AC	350 V AC

Remark:

Tripping current for DC measurement: 0 mA

Tripping current for AC measurement: < 100 mA

7.3 Approvals

	6EP1433-2BA20 (24 V/5 A) 6EP1434-2BA20 (24 V/10 A)	**6EP1436-2BA10 (24 V/20 A)**	**6EP1437-2BA20 (24 V/40 A)**
CE marking	Yes, (2014/35/EU, 2014/30/EU,2014/34/EU)		
UL/cUL (CSA) approval	cULus-Listed (UL 508, CSA C22.2 No. 107.1), File E197259; cCSAus (CSA C22.2 No. 60950-1, UL 60950-1)		
Explosion protection	ATEX (EX) II 3G Ex nA nC IIC T3; cCSAus (CSA C22.2 No. 213, ANSI/ISA-12.12.01-2015) IECex QPS 16.0002X PTZ 16 ATEX 0001 X	ATEX (EX) II 3G Ex nA nC IIC T4; cCSAus (CSA C22.2 No. 213, ANSI/ISA-12.12.01-2007) IECex EPS 14.0072X EPS 10 ATEX 1 255 X	ATEX (EX) II 3G Ex nA nC IIC T3; cCSAus (CSA C22.2 No. 213, ANSI/ISA-12.12.01-2007) IECex EPS 14.0071X EPS 11 ATEX 1 309 X
CB approval	Yes, (IEC 60950-1)		
SEMI F47 compliance	fulfilled		
Marine approvals	GL, ABS		

7.4 EMC

		6EP1433-2BA20 (24 V/5 A) 6EP1434-2BA20 (24 V/10 A)	6EP1436-2BA10 (24 V/20 A)	6EP1437-2BA20 (24 V/40 A)
Electrostatic discharge	EN 61000-4-2	8 kV contact, 8 kV air	8 kV contact, 8 kV air	8 kV contact, 8 kV air
Electromagnetic fields	EN 61000-4-3	80 - 1000 MHz 10 V/m 1000 - 2700 MHz 10 V/m	80 - 1000 MHz 25 V/m 1000 - 2700 MHz 10 V/m	80 - 1000 MHz 25 V/m 1000 - 2700 MHz 10 V/m
High-speed transient disturbance variables (burst)	EN 61000-4-4	4 kV at line supply connections 2 kV at the DC output	4 kV at line supply connections 2 kV at the DC output	4 kV at line supply connections 2 kV at the DC output
Surge voltages	EN 61000-4-5	3 kV symmetrical at the line supply connections	3 kV symmetrical at the line supply connections	3 kV symmetrical at the line supply connections
		6 kV asymmetrical at the line supply connections	5 kV symmetrical at the line supply connections	6 kV symmetrical at the line supply connections
		500 V symmetrical/asymmetrical on DC output cables	500 V symmetrical/asymmetrical on DC output cables	500 V symmetrical/asymmetrical on DC output cables
High-frequency fields	EN 61000-4-6	10 V; 0.15 - 80 MHz	10 V; 0.15 - 80 MHz	10 V; 0.15 - 80 MHz
Magnetic fields	EN 61000-4-8	100 A/m, 50 - 60 Hz	30 A/m; 50 Hz	30 A/m; 50 Hz
Voltage dips	EN 61000-4-11	100 % for 20 ms, 60 % for 100 ms, 30 % for 10 ms	100% for 20 ms, 60% for 200 ms, 30% for 500 ms	100% for 20 ms, 60% for 200 ms, 30% for 500 ms
Voltage interruptions	EN 61000-4-11	100 % for 5000 ms	100% for 5000 ms	100% for 5000 ms
Emitted interference	EN 55022	Class B		
Line harmonics limitation	EN 61000-3-2	Class A		
Generic standards	EN 61000-6-2	Immunity for industrial environments		
	EN 61000-6-3	Emission for residential areas		

Ambient conditions

8

	6EP1433-2BA20 (24 V/5 A) 6EP1434-2BA20 (24 V/10 A) 6EP1436-2BA10 (24 V/20 A) 6EP1437-2BA20 (24 V/40 A)
Ambient temperature	-25 ... 70 °C for natural convection (self convection) Remark: for 6EP1437-2BA20 with EZ 1: -10 … 70 °C
	Tested according to: • EN 60068-2-1 Cold • EN 60068-2-2 Dry heat • EN 60068-2-78 Humid heat, constant • EN 60068-2-14 Temperature change
Transport and storage temperature	-40 ... 85 °C Tests (packed for shipping) according to: • EN 60068-2-1 Cold • EN 60068-2-2 Dry heat • EN 60068-2-30 Humidity heat, cyclic
Humidity class	Climatic class 3K3 according to EN 60721, 5 - 95 % no condensation
Degree of pollution	2
Mechanical stressing in operation	• Tested according to EN 60068-2-6 vibration, test Fc:
	3.5 mm deflection in the range 5 - 8.4 Hz 2 g acceleration in the range 8.4 - 150 Hz Comment: for 6EP1437-2BA20 with EZ 1: 1.3 g acceleration in the range 8.4 - 150 Hz
	• Tested according to EN 60068-2-27 shock, test Ea: acceleration 150 m/s^2, test duration 11 ms

	6EP1433-2BA20 (24 V/5 A) **6EP1434-2BA20 (24 V/10 A)** **6EP1436-2BA10 (24 V/20 A)** **6EP1437-2BA20 (24 V/40 A)**
Damaging gases	Tested according to: • EN 60068-2-42 sulfur dioxide • EN 60068-2-43 hydrogen sulfide
Atmospheric pressure	Operation: • 1080 - 795 hPa (-1000 - 2000 m) • For operation at altitudes of 2000 m up to 6000 m above sea level: output must be derated by -7.5% / 1000 m or the ambient temperature must be reduced by 5 K / 1000 m see Figure 4-5 Altitude derating (Page 22) • Overvoltage category: II up to 2000 m (EN 60950-1) I from 2000 m up to 6000 m (EN 60950-1) Storage: • 1080 - 660 hPa (-1000 - 3500 m)

Applications

9

9.1 Parallel connection to increase the power rating

To increase the power rating, power supplies of the same type can be directly connected in parallel.

The following must be observed:

- The cables connected to each power supply at terminals "+" and "-" must have identical lengths and the same cable cross-sections (or the same impedance) up to a common external connection point (terminal strip) if possible.
- The power supplies connected in parallel must be switched on simultaneously with a common switch in the line feeder cable (e.g. with the main switch available in control cabinets).
- The output voltages measured in no-load operation for the power supplies that are not yet connected in parallel should not deviate more than a maximum of 50 mV. This usually corresponds to the factory setting. If the output voltage is changed, you should connect the "-" terminals and then, in no-load operation, measure the voltage difference between the "+" terminals that have not yet been connected. The voltage difference should not exceed 50 mV.

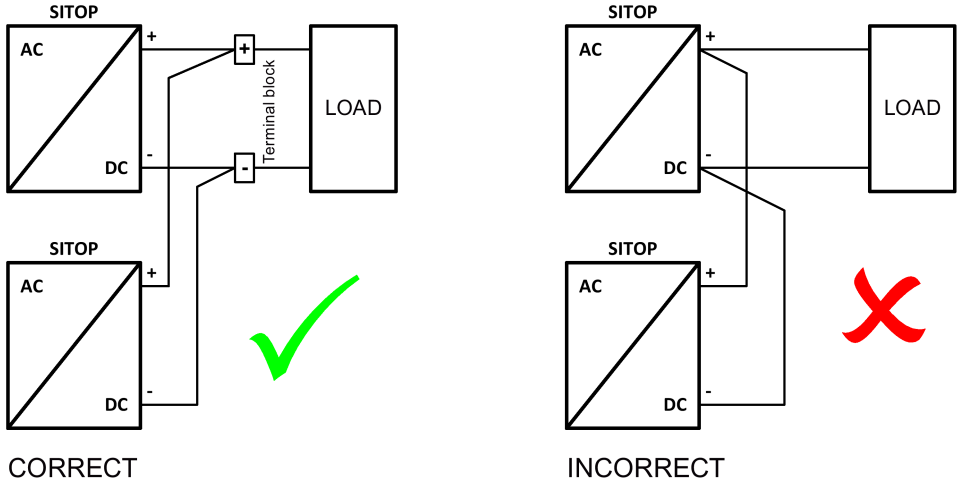


Figure 9-1 Parallel connection

Note

It is not permissible to take into account simultaneous overload capability (Extra-Power 150% for 5 s/min) of several power supplies connected in parallel when configuring the power supply system.

NOTICE
Protective circuit for the parallel connection of more than two power supplies When connecting more than two power supplies in parallel, additional measures must be taken to prevent high backward feeding currents in the event of a secondary device fault. For this purpose, a suitable protective circuit (e.g. decoupling diode or DC-conform circuit breaker) must be installed between each "+" terminal of the power supply and the common connection point.

9.2 Parallel connection for redundancy

Connecting several 24 V power supplies in parallel for redundancy purposes is required if especially high demands are placed regarding the availability of a reliable 24 V power supply.
Using the SITOP PSE202U redundancy module, two power supplies of the same type up to 20 A can be decoupled (Figure 9-2 Redundant configuration with two power supplies and SITOP PSE202U redundancy module (Page 55)). When one of the devices fails, then the other automatically takes over the power supply. If one of the power supplies fails, then this is signaled using an LED on the redundancy module as well as an isolated relay contact.
For higher output current, each power supply must be connected to a redundancy module (Figure 9-3 Redundant configuration with two power supplies and two SITOP PSE202U redundancy modules (Page 55)). When dimensioning the system, it must be ensured that n+1 redundant connected power supplies can handle the total power requirement of the remaining n power supplies.

Note

For a high reliability of the supply, it is recommended that the redundant switched power supplies are fused separately on the line-side and, if possible, be connected to different power supply networks.

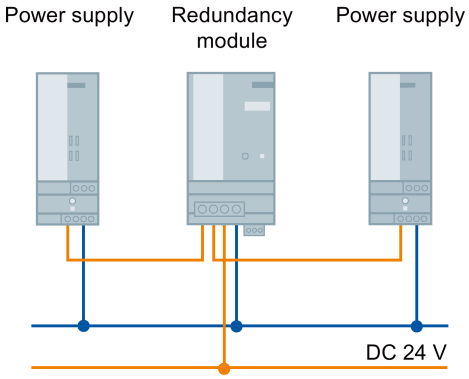


Figure 9-2 Redundant configuration with two power supplies and SITOP PSE202U redundancy module

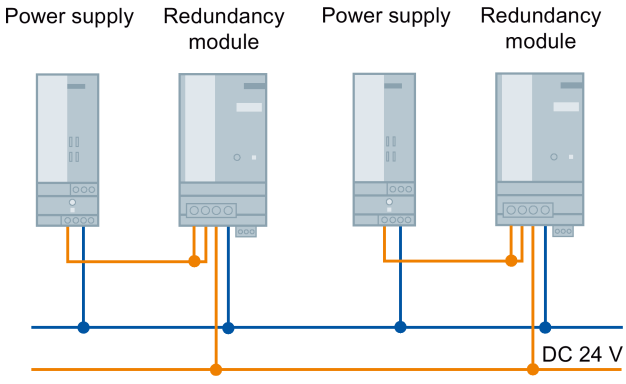


Figure 9-3 Redundant configuration with two power supplies and two SITOP PSE202U redundancy modules

You can find additional information at:

SITOP PSE202U manual (https://support.industry.siemens.com/cs/ww/en/view/42248598)

9.3 Series connection for increased voltage

To achieve an output voltage of 48 V DC, two 24 V SITOP power supplies of the same type can be connected in series.

Depending on the grounding point of the secondary output voltages, voltages of +48 V, ±24 V or -48 V can be realized.

Note

For additional details, see Catalog KT 10.1 Chapter 15 Technical information and configuring (see (http://w3app.siemens.com/mcms/infocenter/content/en/Pages/order_form.aspx?nodeKey=key_518431&infotype=catalogs)).

WARNING

SELV is not guaranteed in the case of a fault

When connecting two power supplies in series, the continuous, permissible SELV voltage of a maximum of 60 VDC according to EN 60950-1 cannot be guaranteed in the case of a fault.

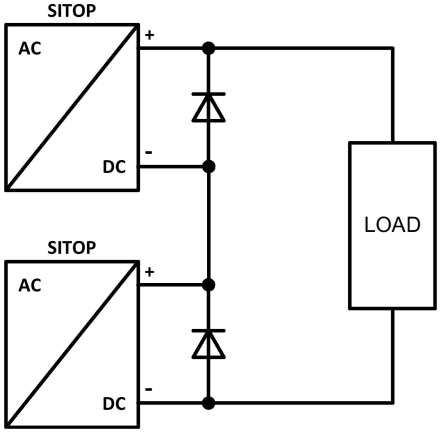


Figure 9-4 Series connection

9.4 Overload protection in the 24 V output circuit

If an overload occurs, the electronic current limiting function of the 24 V power supply limits the output current to a maximum value (see Section Technical data (Page 35)). The output cables are protected against a thermal overload if they are dimensioned corresponding to the maximum rms output current, or protected using additional components (for example, miniature circuit breaker, fuses).

However, a load circuit that fails as a result of overload, for instance, should frequently be reliably and quickly identified and specifically switched off before the power supply goes into current-limiting mode (in current-limiting mode, the supply voltage would also be reduced for all of the remaining 24 V loads).

The SITOP PSE200U selectivity module with 4 outputs (versions with adjustable output current range for each output from 0.5 - 3 A and 3 - 10 A) is available for this purpose; this monitors the 24 V branches for overload and short circuit (Figure 9-5 Electronic protection of 24 V loads using the SITOP PSE200U selectivity module (Page 58)). Brief current peaks, e.g. as a result of a high inrush current, are permitted, and branches with a longer overload are switched into a no-current condition. This is also ensured for cables in a high-ohmic condition and for short circuits that slowly develop over time.

When an output fails, the fault is signaled using a group signal contact or as a single channel signal, and the branch of the module involved is displayed using an LED.

For variants with single-channel signaling, function blocks for evaluation purposes are available for SIMATIC S7-1200/1500/300/400, for STEP 7 Classic and TIA Portal at no charge.

You can find additional information at:

Manual SITOP selectivity modules
(https://support.industry.siemens.com/cs/ww/en/view/108989004)

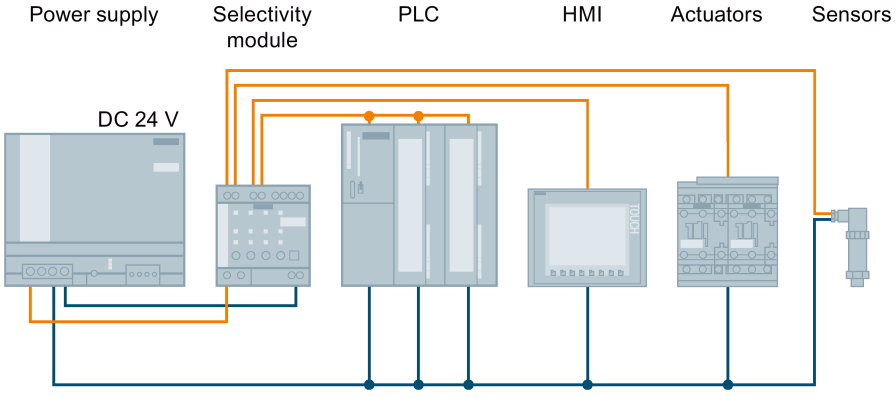


Figure 9-5 Electronic protection of 24 V loads using the SITOP PSE200U selectivity module

9.5 Protection against short-time voltage dips

For a drop in the line-side supply voltage, the 24 V power supply still maintains the output voltage for a short time in the millisecond range (see Chapter Technical data (Page 35)).

For line supplies that manifest frequent brief voltage dips, in order to increase the power supply reliability, it may make sense to increase the line buffering time in the device using an additional SITOP PSE201U buffer module.

The SITOP PSE201U buffer module, based on electrolytic capacitors, is connected in parallel to the power supply output (Figure 9-6 Buffering brief power failures using the SITOP PSE201U buffer module (Page 59)). The buffer time is 200 ms at 40 A up to 1.6 s for a load current of 5 A. This time can be increased a multiple number of times by connecting buffer modules in parallel; the maximum buffer time is 10 s.

You can find additional information at:

SITOP PSE201U manual (https://support.industry.siemens.com/cs/ww/en/view/41129219)

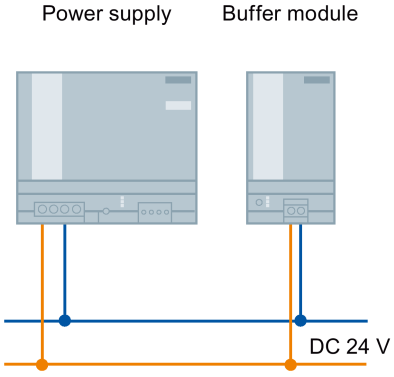


Figure 9-6 Buffering brief power failures using the SITOP PSE201U buffer module

9.6 Protecting against longer power failures

Sudden and longer failures of the line supply voltage can result in undefined states and significant danger as a result of the associated failure of the plant or system control. The SITOP power supply product portfolio includes various DC-UPS solutions to prevent the failure of the 24 V power supply voltage.

Power supply failures up into the minutes range can be buffered using the maintenance-free SITOP UPS500 DC-UPS modules based on capacitors (Figure 9-7 24 V buffering to allow the saving of process data and controlled shutdown of PCs (Page 60)).

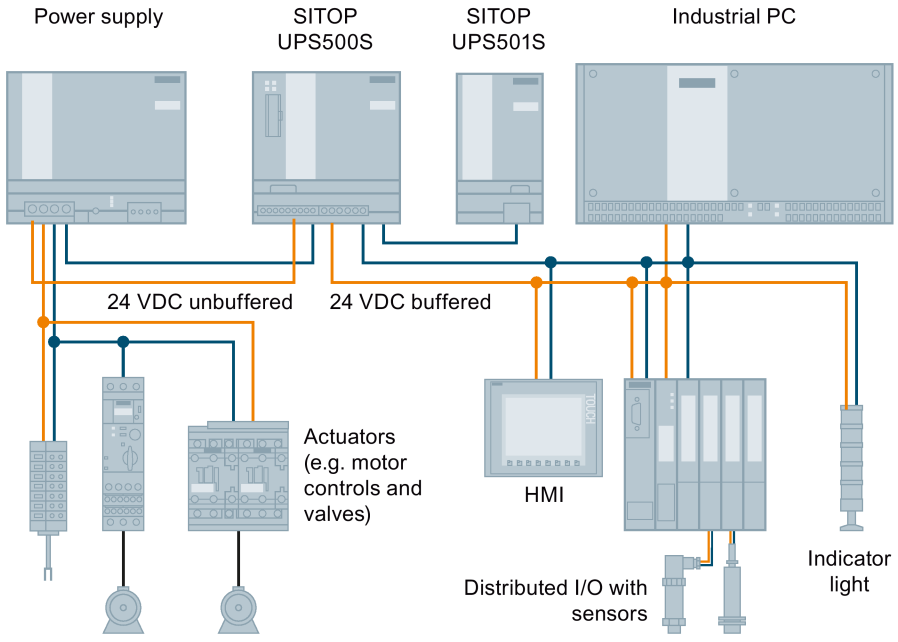


Figure 9-7 24 V buffering to allow the saving of process data and controlled shutdown of PCs

Using the free-of-charge SITOP DC-UPS software tool, DC-UPS systems can be simply integrated into PC-based automation solutions. This supports further processing of the status signals and safely running down the PC.

You can find additional information at:

Manual, DC UPS with capacitors
(https://support.industry.siemens.com/cs/ww/en/ps/18042/man)

Using DC UPS SITOP UPS1600 and SITOP UPS1100 battery modules, buffer times in the range of hours can be implemented. Intelligent battery management using Energy Storage Link automatically detects the UPS1100 energy storage device, and ensures optimum temperature-controlled charging and continuous monitoring. The UPS1600 can be flexibly integrated into the widest range of automation applications with its digital inputs/outputs as well as optional USB interface or Ethernet/PROFINET port.

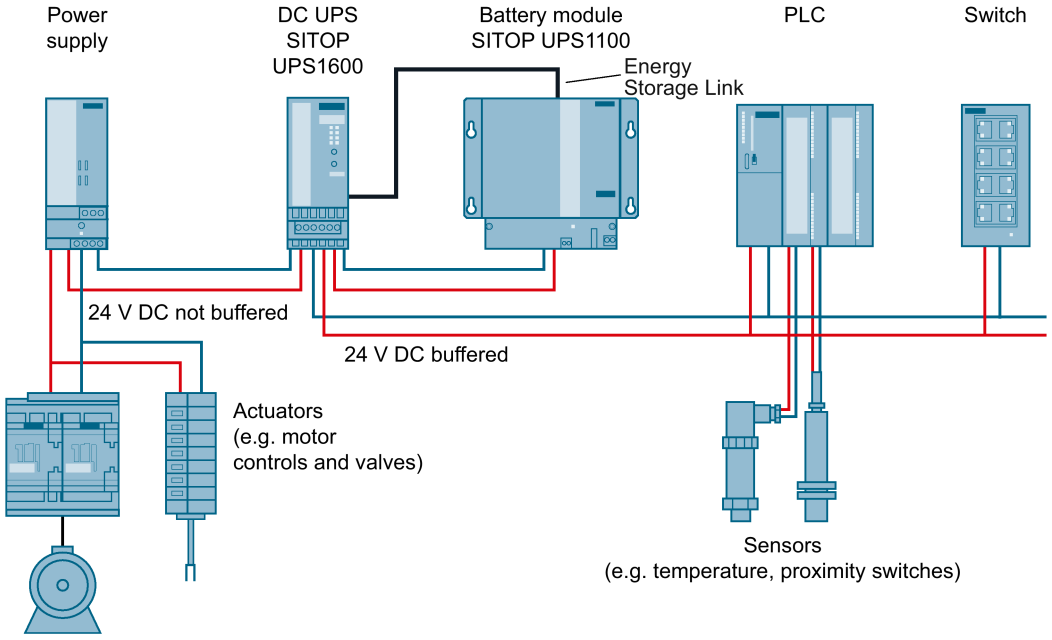


Figure 9-8 24 V buffering with SITOP UPS1600 to maintain communication, signaling functions, sensor measured values and position values

For open, PC-based automation systems, configuration and monitoring is realized using the SITOP UPS Manager PC software, which is available at no charge. This allows PC responses to the operating states of the DC UPS to be freely selected – and offers comprehensive diagnostic functions.

For TIA-based automation systems, the UPS1600 is engineered using the TIA Portal. Special function blocks for SIMATIC S7-300/400/1200 and S7-1500 – available at no charge – make it easy to integrate operating and diagnostics information into STEP 7 user programs. Preconfigured UPS faceplates for WinCC visualization can be downloaded at no charge.

You can find additional information at:

DC UPS SITOP UPS1600/UPS1100 Manual
(https://support.industry.siemens.com/cs/ww/en/view/84977415)

Environment

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The devices are in conformance with RoHS.

As a rule, only non-silicon precipitating materials are used.

Disposal guidelines

Packaging and packaging aids can and should always be recycled. The product itself may not be disposed of as domestic refuse.

Service & Support

11

Technical support

Technical support for all IA/DT products can be accessed through the following communication channels:

- Telephone: + 49 (0) 911 895 7222
- E-Mail (mailto:support.automation@siemens.com)
- Internet:
  Online support request form (http://www.siemens.de/automation/support-request)

Technical documentation on the Internet

Operating instructions and manuals for SITOP are available in the Internet:
Operating instructions/manuals (http://www.siemens.com/sitop/manuals)

SITOP power supply homepage

General news about our power supplies is available in the Internet at the SITOP home page:
SITOP (http://www.siemens.com/sitop)

Information material

SITOP information can be downloaded from the Internet:
Information and download center (http://www.siemens.com/sitop-infomaterial)

CAx data

2D/3D data and circuit diagram macros can be downloaded from the Internet:
Siemens image database (http://www.siemens.com/sitop-cax)

Request all CAx data via the CAx download manager:
CAx shopping cart (http://www.siemens.com/cax)

SITOP Selection Tool

Simply and quickly select the optimum the power supply or DC-UPS:
SITOP Selection Tool (http://www.siemens.com/sitop-selection-tool)

Online catalog and ordering system

The online catalog and the online ordering system are available through the Industry Mall homepage:
Industry Mall (http://www.siemens.com/industrymall/de)

Contact persons

If you have any questions regarding the use of our products, then contact the Siemens contact person in your regional Siemens sales office.

You can find these addresses as follows:

- On the Internet (http://www.automation.siemens.com/partner)
- In Catalog CA 01