SIEMENS

SITOP power supply

SITOP modular 3 phase

Operating Instructions

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Overview

SITOP modular 24 V / 20 A 6EP1436-3BA00 SITOP modular 24 V / 40 A 6EP1437-3BA00 SITOP modular 48 V / 20 A 6EP1457-3BA00

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.

A WARNING

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

A 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

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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.

Overview



The 3-phase power supply from the SITOP modular product line is a powerful, stabilized technology power supply for automated machines and systems.

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...28.8 V or 42...56 V
- Power boost in operation 300% for 25 ms
- No lateral mounting clearances are required
- Ambient temperature 0°...+60° C (70° C)
- 48 V / 20 A permits small cable cross-sections
- Selectable short-circuit behavior
- Soft characteristic curve for parallel switching can be selected

- Display of the operating state via 3 LEDs
- To increase the system availability, these reliable power supplies can be expanded using SITOP supplementary modules (redundancy module, selectivity module, buffer module, signaling module), as well as SITOP DC-UPS modules.

Ordering data

The following device options are available:

| Stabilized power supply unit SITOP modular 3ph | |
|--|---------------|
| Туре | Order number |
| 3-phase 400-500 VAC input, | 6EP1436-3BA00 |
| 24 V /20 A output | |
| 3-phase 400-500 VAC input, | 6EP1437-3BA00 |
| 24 V /40 A output | |
| 3-phase 400-500 VAC input, | 6EP1457-3BA00 |
| 48 V / 20 A output | |

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Safety instructions

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.

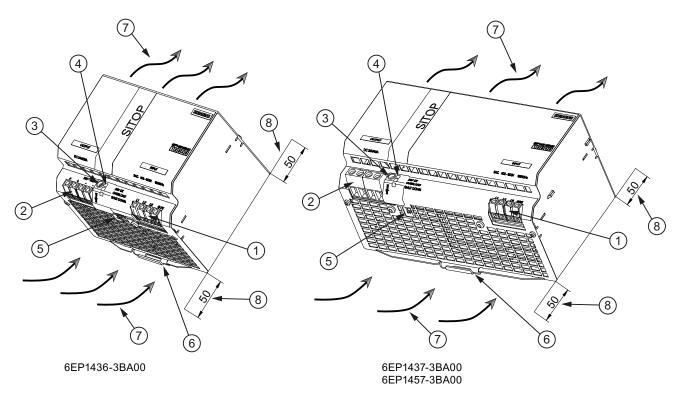
Perfect, safe, and reliable operation of this equipment is dependent on proper transportation, storage, installation and mounting.

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.

2.1 Device description

SITOP modular 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 displays indicate the operating status. The signaling contact (only for use of the 6EP1961-3BA10 supplementary signaling module) can be used to further process the operating state of the device.



- 1 Line input
- 2 DC output
- 3 Potentiometer 24...28.8 V
- 4 Pilot lamps (24 V OK, OVERLOAD, SHUTDOWN)
- 5 A/B selector switch
- 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 the supply voltage. The output terminals ② are used to connect to the loads to be supplied (see also Section Installation (Page 29)).

| Connections and terminal designations | |
|---------------------------------------|-------------------------|
| ① line input L1, L2, L3, PE | One screw terminal each |
| ② Output + Two screw terminals | |
| ② Output – | Two screw terminals |

| | 1) + 2) | 3 |
|-----|------------------------------|--------------------------------|
| | SZS 0,6 x 3,5 / PZ1 / PH1 | SZS 0,6 x 3,5 max. Ø 3,5 mm |
| | 1 x 0,2 - 6 mm ² | - |
| | 1 x 0,25 - 4 mm ² | - |
| AWG | 24 - 10 | - |
| Nm | 0,5 - 0,6 Nm | 0,04 Nm |
| | 8 mm | - |

Figure 2-2 Terminal data for 6EP1436-3BA00

| | 1 | 2 | 3 |
|-----|------------------------------|------------------------------|----------------------------------|
| | SZS 0,6 x 3,5 / PZ1 / PH1 | SZS 1,0 x 5,5 | SZS 0,6 x 3,5 / max. Ø 3,5 mm |
| | 1 x 0,2 - 6 mm ² | 1 x 0,5 - 16 mm ² | - |
| | 1 x 0,25 - 4 mm ² | 1 x 2,5 - 10 mm ² | - |
| AWG | 28 - 12 | 26 - 6 | - |
| Nm | 0,5 - 0,6 Nm | 1,2 - 1,5 Nm | 0,04 Nm |
| | 8 mm | 12 mm | - |

Figure 2-3 Terminal data for 6EP1437-3BA00 and 6EP1457-3BA00

2.3 Potentiometer

The potentiometer ③ on the front of the device is used to set the output voltage. The output voltage is set to 24 V in the factory, and can be adjusted in the range 24...28.8 V (42...56 V); for example, to compensate voltage drops across long supply lines to the connected load.

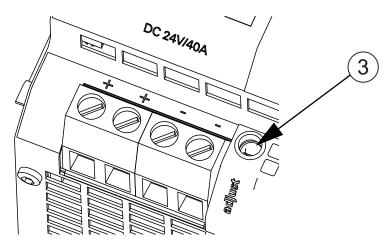


Figure 2-4 Potentiometer (example 6EP1437-3BA00)

NOTICE

Thermal overload possible

When adjusting the output voltage to >24 V (>48 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), refer to Figure 2-2 Terminal data for 6EP1436-3BA00 (Page 10) and Figure 2-3 Terminal data for 6EP1437-3BA00 and 6EP1457-3BA00 (Page 10).

2.4 Status displays and signaling

| | 6EP1436-3BA00 (24 V / 20 A) |
|----------------|--|
| | 6EP1437-3BA00 (24 V / 40 A) |
| | 6EP1457-3BA00 (48 V / 20 A) |
| Status display | Green LED for 24 V (48 V) O.K. |
| | Yellow LED for overload in "constant current" mode |
| | Red LED for latching shutdown in "shut down" mode |

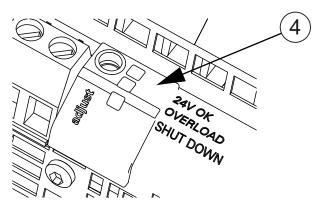


Figure 2-5 Operational displays and signals (example 6EP1437-3BA00)

| Signaling | 6EP1436-3BA00 (24 V / 20 A) |
|---------------------|---|
| | 6EP1437-3BA00 (24 V / 40 A) |
| | 6EP1457-3BA00 (48 V / 20 A) |
| LED green 4 lights | Normal operation, output voltage >20 V (>38 V) ±0.5 V |
| Yellow LED ④ lights | Overload (Ua <20 V (<38 V) ±0.5 V) |
| Red LED ④ lights | Latching shutdown and remote switchoff (only when the supplementary signaling module 6EP1961-3BA10 is used) |
| LED green ④ off | No supply voltage |

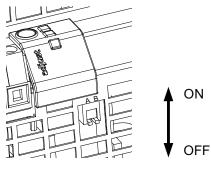


Figure 2-6 A, B switches

The two switches A and B are used to influence the output characteristic curve:

| Switch | ON | OFF |
|--|---|---|
| A influences the output characteristic curve in | Parallel operation: 'Soft' characteristic curve (see, e.g. Figure 6-6 6EP1436-3BA00 parallel operation output | Single operation: Delivered state |
| the load range 0 - 20 A (0 - 40 A) | · · · · · · · · · · · · · · · · · · · | 'Hard' characteristic curve (see, e.g. Figure 6-3 6EP1436-3BA00 single operation output characteristic curve (Page 36)) for normal operation (single operation): The output voltage is independent of the output current. |
| B influences the output characteristic curve in the overload range > 20 A (40 A) | Latching shutdown: If the output current rises above 20 A (40 A) and above the current limit, the device reduces the output voltage (see, e.g. Figure 6-9 6EP1436-3BA00 latching shutdown output characteristic curve (Page 38)). If the output voltage falls below 20 V (38 V), the device shuts down latching, the red LED lights. This limit voltage of 20 V (38 V) is independent of | Constant current: Delivered state If the output current rises above 20 A (40 A) and above the current limit, the device reduces the output voltage. The yellow LED lights if the output voltage falls below 20 V (38 V). |
| | the set output voltage. The 'Short-time overload current' feature is not available in this operating mode. To also permit the uploading of large capacitances in this operating mode at the output, a shutdown is performed during the first ten seconds after power on or remote on in conjunction with the non-latching signaling module. During these first ten seconds, the device responds for overload as if the switch is OFF. | |

Delivery condition: A - OFF; B - OFF

2.5 Block diagram

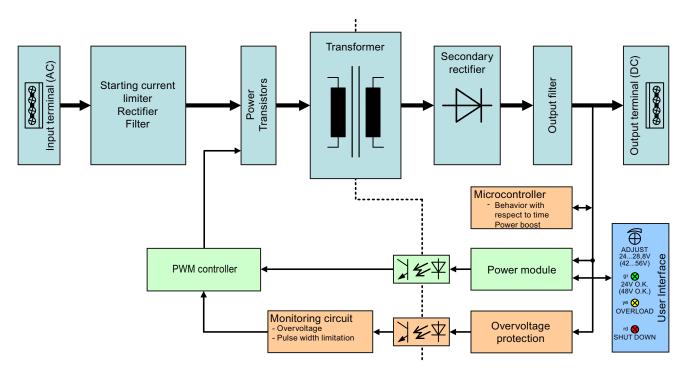
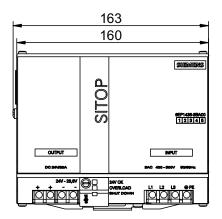


Figure 2-7 Block diagram

2.6 Dimensions and weight



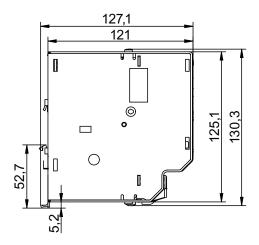
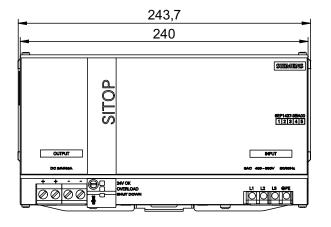


Figure 2-8 6EP1436-3BA00 dimensioned drawing



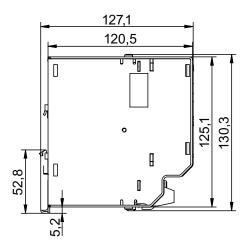


Figure 2-9 6EP1437-3BA00, 6EP1457-3BA00 dimensioned drawing

| | 6EP1436-3BA00 (24 V / 20 A) 6EP1437-3BA00 (24 V / 40 A) | |
|------------------------------|---|-----------------------------|
| | | 6EP1457-3BA00 (48 V / 20 A) |
| Dimensions (W × H × D) in mm | 160 × 125 × 121 | 240 × 125 × 120.5 |
| Weight | Approx. 2 kg | Approx. 3.2 kg |

2.6 Dimensions and weight

Mounting/removal 3

WARNING

Installing the device in a housing or a control cabinet

The SITOP modular 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 according to EN 60715.

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 this is too difficult, press slider ① at the same time, as described under "Removal".

Removing

To remove, pull up the slider ① using a screwdriver ② 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.

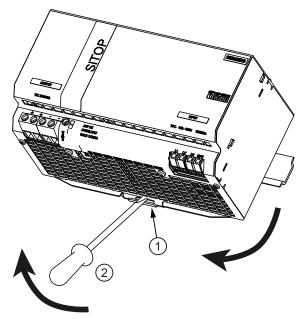


Figure 3-1 Removal (example: 6EP1437-3BA00)

MARNING

Use in hazardous zones

If the 6EP1436-3BA00 and 6EP1437-3BA00 devices are installed in a hazardous zone (Ex II 3G Ex nA nC IIC T3), they must be installed in a distributor 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 according to EN 60715. 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 should 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

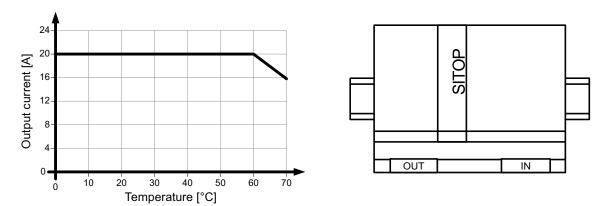


Figure 4-1 6EP1436-3BA00: Output current in the standard mounting position

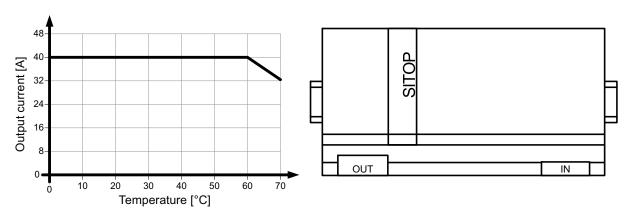


Figure 4-2 6EP1437-3BA00: Output current in the standard mounting position

4.1 Standard mounting position

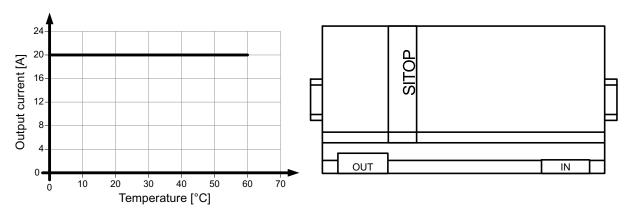


Figure 4-3 6EP1457-3BA00: Output current in the standard mounting position

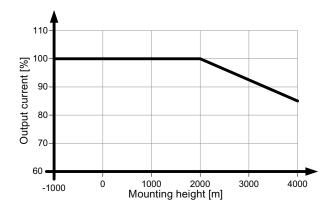


Figure 4-4 Mounting height derating

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 6EP1436-3BA00

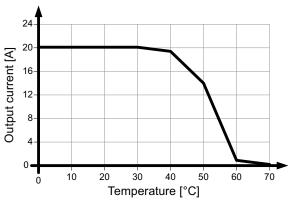
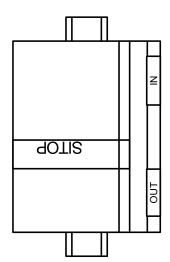
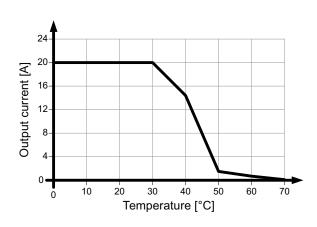


Figure 4-5 6EP1436-3BA00 installation position (1)



4.2 Other mounting positions



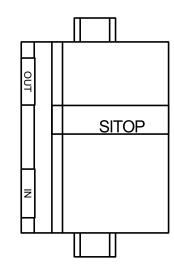
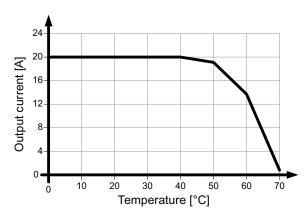


Figure 4-6 6EP1436-3BA00 installation position (2)



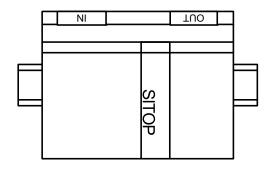
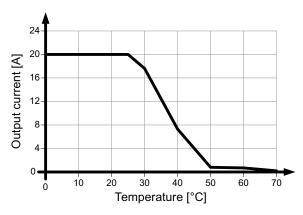


Figure 4-7 6EP1436-3BA00 installation position (3)



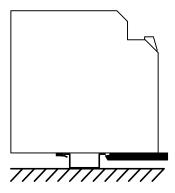
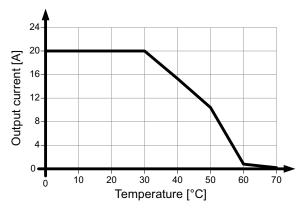


Figure 4-8 6EP1436-3BA00 installation position (4)



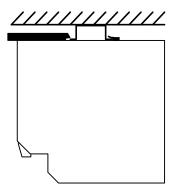


Figure 4-9 6EP1436-3BA00 installation position (5)

4.2.2 6EP1437-3BA00

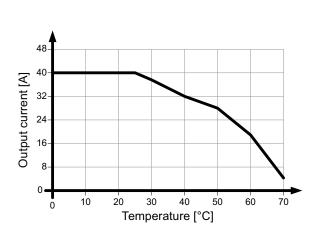


Figure 4-10 6EP1437-3BA00 installation position (1)

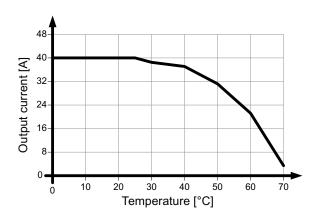
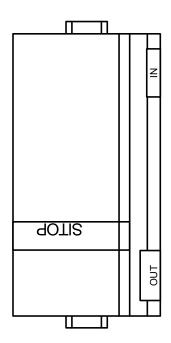
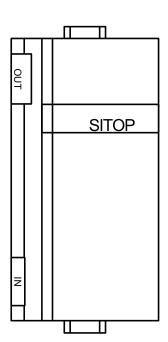


Figure 4-11 6EP1437-3BA00 installation position (2)





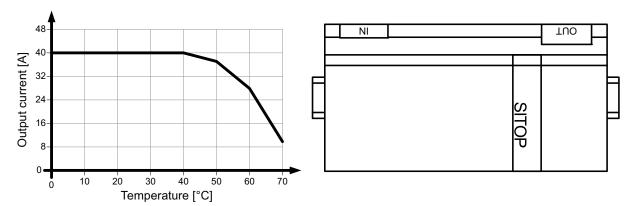


Figure 4-12 6EP1437-3BA00 installation position (3)

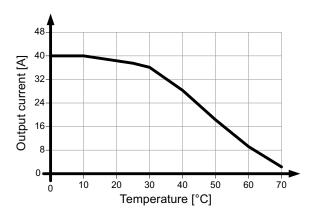
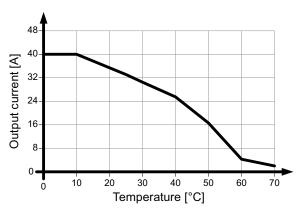


Figure 4-13 6EP1437-3BA00 installation position (4)



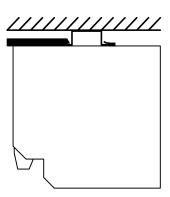


Figure 4-14 6EP1437-3BA00 installation position (5)

4.2.3 6EP1457-3BA00

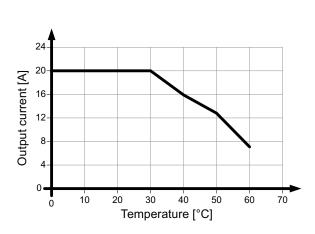


Figure 4-15 6EP1457-3BA00 installation position (1)

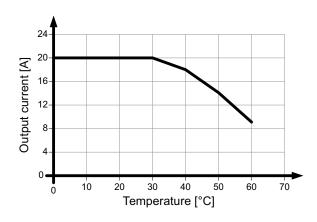
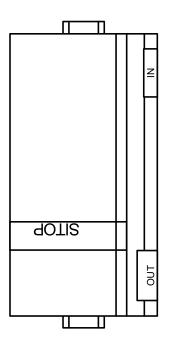
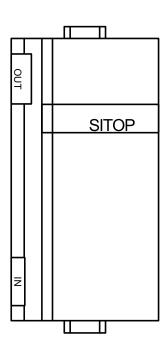


Figure 4-16 6EP1457-3BA00 installation position (2)





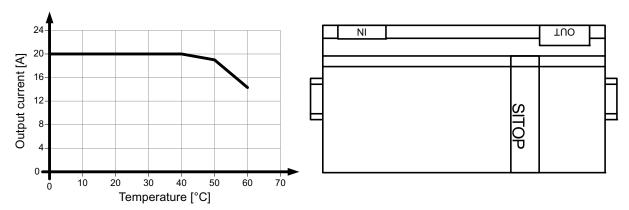


Figure 4-17 6EP1457-3BA00 installation position (3)

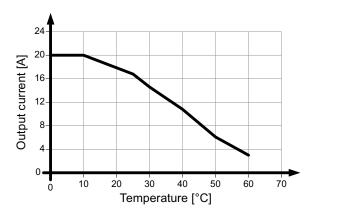
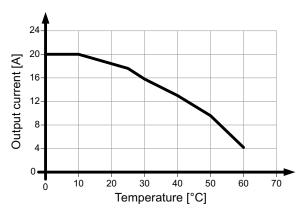


Figure 4-18 6EP1457-3BA00 installation position (4)



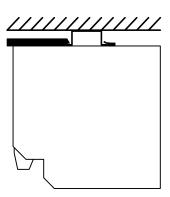


Figure 4-19 6EP1457-3BA00 installation position (5)

4.2 Other mounting positions

Installation



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 modular 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 AC 400-500 V, 50/60 Hz.

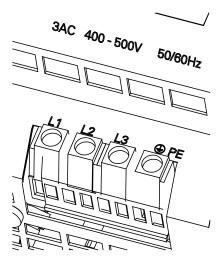


Figure 5-1 Line connection (example: 6EP1436-3BA00)

The line supply is connected using terminal L1, L2, L3 and PE (see Figure 5-1 Line connection (example: 6EP1436-3BA00) (Page 29)), 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.

5.1 Line-side connection

Protection

| SITOP modular 3ph | Required line-side protection |
|-------------------|--|
| 6EP1436-3BA00 | 3-pole, coupled miniature circuit-breaker (IEC 898) characteristic C, 6-16 A or |
| (24 V / 20 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) |
| 6EP1437-3BA00 | 3-pole, coupled miniature circuit-breaker (IEC 898) characteristic C, 10-16 A or |
| (24 V / 40 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) |
| 6EP1457-3BA00 | 3-pole, coupled miniature circuit-breaker (IEC 898) characteristic C, 10-16 A or |
| (48 V / 20 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 modular 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 33)).

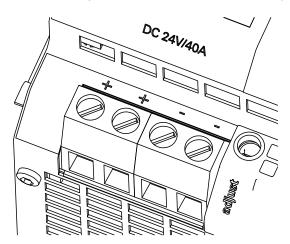


Figure 5-2 Connection of the output voltage (example: 6EP1437-3BA00)

The output voltage is connected via the + and - terminals at the output of the power supply (see Figure 5-2 Connection of the output voltage (example: 6EP1437-3BA00) (Page 31)). 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.

5.2 Output-side connection

Technical data

Note

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

6.1 Input

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) |
|---|--|---|--|
| Input | 3-phase, AC | | |
| Rated voltage Ue rated | 400500 V | | |
| Voltage range | 320550 V | | 320550 V |
| Remark | 320360 V permitted for Ua 340 V | < 27 V; startup above Ue = | 320360 V permitted for Ua < 52 V; startup above Ue = 340 V |
| Wide-range input | Yes | | |
| Overvoltage strength | 2.3 × Ue rated, 1.3 ms | | |
| Power failure buffering at la rated | 6 ms | 6 ms | 6 ms |
| Power-failure buffering | at Ue = 400 V | | |
| Rated line frequency | 50/60 Hz | | |
| Line frequency range | 4763 Hz | | |
| Input current / at rated value of input voltage 400 V | 1.1 A | 2.2 A | 2.2 A |
| Input current / at rated value of input voltage 500 V | 0.9 A | 1.8 A | 1.8 A |
| Switch-on current limitation (+ 25° C), max. | 35 A | 70 A | 70 A |
| I²t, max | 0.7 A ² s | 2.8 A ² s | 2.8 A ² s |
| Integrated input fuse | None | | |
| Protection in the line feeder cable (IEC 898) | required: 3-pole, coupled miniature circuit-breaker 6 16 A characteristic C or circuit breaker 3RV2011-1DA10 (setting 3 A) or 3RV2711-1DD10 (UL 489) | 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) | |

6.2 Output

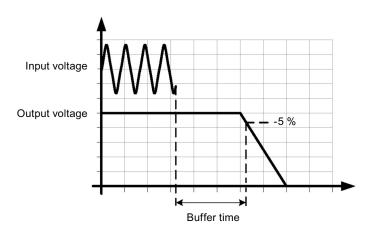


Figure 6-1 Power-failure buffering

6.2 Output

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) | |
|---|---|--------------------------------|--------------------------------|--|
| Output | Regulated, isolated DC voltage | | | |
| Rated voltage value Ua rated DC | 24 V | | 48 V | |
| Total tolerance, static ± | 3 % | 3 % | 3 % | |
| Static line regulation, approx. | 0.1 % | 0.1 % | 0.1 % | |
| Static load regulation, approx. | 0.2 % | 0.2 % | 0.2 % | |
| Residual ripple in the load range | 100 mV | 100 mV | 100 mV | |
| Peak-peak, max. | | | | |
| Spikes peak-peak, max. (bandwidth, approx. 20 MHz) | 200 mV | 200 mV | 200 mV | |
| Adjustment range | 2428.8 V | | 4256 V | |
| Product function / output voltage can be adjusted | Yes | | | |
| Output voltage setting | Using a potentiometer | | | |
| Remark | | | | |
| | Max. 480 W | Max. 960 W | Max. 960 W | |
| Status display | LED green for 24 V O.K | | LED green for 48 V O.K | |
| Signaling | via signaling module (6EP1961-3BA10) possible | | | |
| Response when switching on/off | No overshoot of Ua (soft start) | | | |
| Starting delay, max. | 2,5 s | 2,5 s | 2,5 s | |
| Voltage rise, typ. | 20 ms | 40 ms | 20 ms | |

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) | |
|--|---|---|---|--|
| Voltage rise time / of the output voltage / maximum | 500 ms | 500 ms | 500 ms | |
| Rated current la rated | 20 A | 40 A | 20 A | |
| Current range | 020 A | 040 A | 020 A | |
| Remark | +60°+70° C derating: 2% Ia rated/K | +60°+70° C derating: 2% la rated/K | | |
| Output active power / typical | 480 W | 960 W | 960 W | |
| Constant overload current / for a short circuit when powering up / typical | 23 A | 46 A | 23 A | |
| Short-time overload current / for a short circuit in operation / typical | 60 A | 120 A | 60 A | |
| Duration of the overload capability, overcurrent / for a short circuit in operation | 25 ms | 25 ms | 25 ms | |
| • Remark | Every minute | Every minute | Every minute | |
| Can be connected in parallel to increase the power rating | Yes | | | |
| Remark | Switchable characteristic curve with switch A (see Status displays and signaling (Page 12)) | | | |
| Number of devices that can be connected in parallel to increase the power rating, units | 2 | | | |
| Output characteristic | See Figure 6-3 6EP1436- 3BA00 single operation output characteristic curve (Page 36) | See Figure 6-4 6EP1437- 3BA00 single operation output characteristic curve (Page 36) | See Figure 6-5 6EP1457- 3BA00 single operation output characteristic curve (Page 36) | |

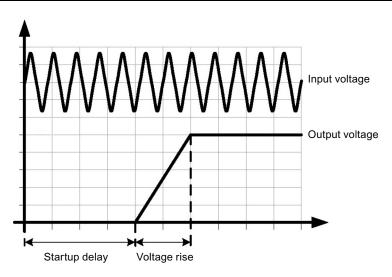


Figure 6-2 Startup delay/voltage rise

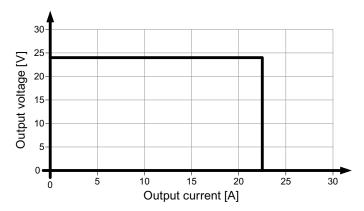


Figure 6-3 6EP1436-3BA00 single operation output characteristic curve

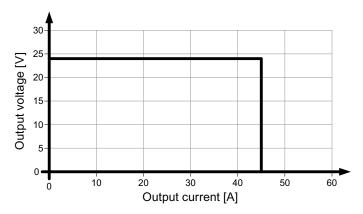


Figure 6-4 6EP1437-3BA00 single operation output characteristic curve

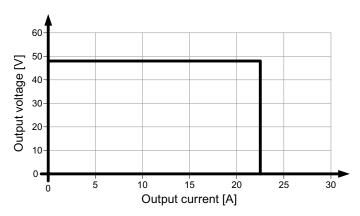


Figure 6-5 6EP1457-3BA00 single operation output characteristic curve

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.

Selector switch A on:

Parallel operation. The output voltage falls with increasing output current.

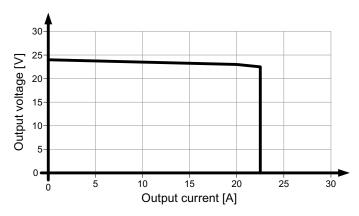


Figure 6-6 6EP1436-3BA00 parallel operation output characteristic curve

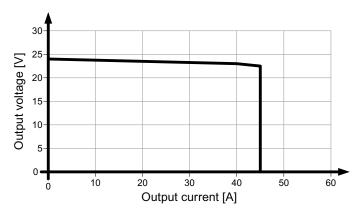


Figure 6-7 6EP1437-3BA00 parallel operation output characteristic curve

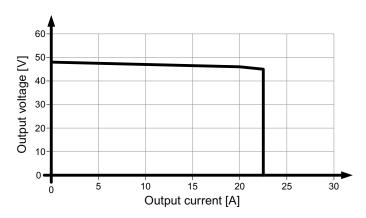


Figure 6-8 6EP1457-3BA00 parallel operation output characteristic curve

6.2 Output

Selector switch B on:

Latching shutdown. The device is shutdown if the overload lasts longer than 100 ms. Turning the power supply off for longer than five seconds causes a reset.

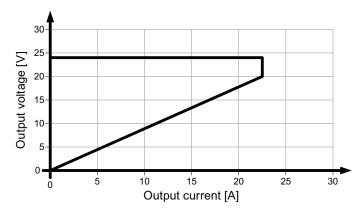


Figure 6-9 6EP1436-3BA00 latching shutdown output characteristic curve

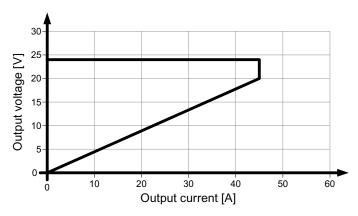


Figure 6-10 6EP1437-3BA00 latching shutdown output characteristic curve

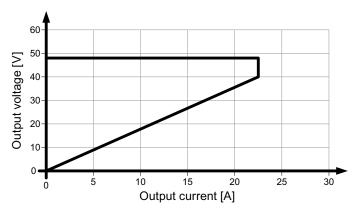


Figure 6-11 6EP1457-3BA00 latching shutdown output characteristic curve

6.3 Efficiency

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) |
|---|--------------------------------|--------------------------------|--------------------------------|
| Efficiency at Ua rated, la rated, approx. | 90 % | 90 % | 90 % |
| Power loss at Ua rated, la rated, approx. | 53 W | 106 W | 106 W |
| No-load operation power loss, approx. | 3 W | 4 W | 17 W |
| Power loss in the "latching shutdown" state | 3 W | 4 W | 5 W |

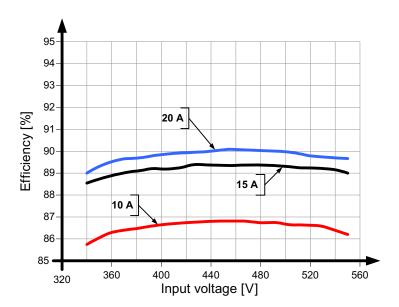


Figure 6-12 6EP1436-3BA00 efficiency

6.3 Efficiency

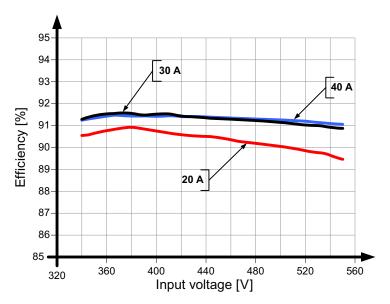


Figure 6-13 6EP1437-3BA00 efficiency

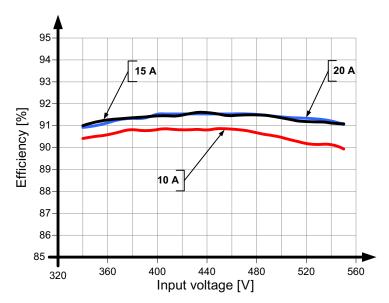


Figure 6-14 6EP1457-3BA00 efficiency

6.4 Closed-loop control

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) |
|--|--------------------------------|--------------------------------|--------------------------------|
| Dyn. line regulation (Ue rated ±15%), max. | 1 % | 1 % | 1 % |
| Dyn. load regulation (la: 10/90/10%), Ua ± typ. | 3 % | 3 % | 3 % |
| Load step regulation time 10 to 90%, typ. | 2 ms | 2 ms | 2 ms |
| Load step regulation time 90 to 10%, typ. | 2 ms | 2 ms | 2 ms |
| Dyn. load regulation (la: 50/100/50%), Ua ± typ. | 2 % | 2 % | - |
| Load step regulation time 50 to 100%, typ. | 4 ms | 4 ms | - |
| Load step regulation time 100 to 50%, typ. | 4 ms | 4 ms | - |
| Regulation time / maximum | 10 ms | 10 ms | 10 ms |

6.5 Protection and monitoring

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) |
|--|---|--------------------------------|--------------------------------|
| Output overvoltage protection | < 35 V | < 35 V | Yes, according to EN 60950 |
| Current limitation, typ. | 23 A | 48 A | 23 A |
| Property of the output/short-circuit proof | Yes | | |
| Short-circuit protection | Optional constant current characteristic curve or latching shutdown | | |
| Continuous short-circuit current / rms value / typical | 23 A | 46 A | 23 A |
| Overload / short-circuit display | Yellow LED for "overload", red LED for "latching shutdown" | | |

6.6 MTBF

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) |
|-------------------|-------------------------------------|-----------------------------|
| | | 6EP1457-3BA00 (48 V / 20 A) |
| Mean Time Between | SN29500: | SN29500: |
| Failures | >500000 h (typ. 700000 h) at 40° C, | >400000 h at 40° C, |
| | rated load, 24 h operation | rated load, 24 h operation |

6.7 Mechanical system

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) 6EP1457-3BA00 (48 V / 20 A) |
|---|--|---|
| Connection system | Screw-type terminal | 021 1107 027 100 (10 V / 20 / V) |
| Connections / line supply | L1, L2, L3, PE: 1 screw terminal each fe | or 0.2 6 (4) mm² solid (finely stranded) |
| Connections / output | +, -: 2 screw terminals each for 0.2 6 (4) mm² solid (finely stranded) | +, -: 2 screw terminals each for 0.5 16 mm² mm² solid, 2.5 10 mm² finely stranded |
| Width of the housing | 160 mm | 240 mm |
| Height of the housing | 125 mm | 125 mm |
| Depth of the housing | 121 mm | 121 mm |
| Installation width | 163 mm | 244 mm |
| Mounting height | 225 mm | 225 mm |
| Weight, approx. | 2 kg | 3,2 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 EN 60715 35x7,5/15 mounting rails | Can be snapped onto standard EN 60715 35x15 mounting rails |

6.8 Accessories

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1457-3BA00 (48 V / 20 A) |
|------------------------|--|-----------------------------|
| | 6EP1437-3BA00 (24 V / 40 A) | |
| Electrical accessories | Redundancy module, buffer module, signaling module | Signaling module |

6.9 Dimension drawing

See Section Dimensions and weight (Page 15)

CAD data that can be downloaded from the Internet:

6EP1436-3BA00

(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00650)

6EP1437-3BA00

(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00653)

6EP1457-3BA00

(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00656)

6.9 Dimension drawing

Safety, approvals, EMC

7.1 Safety

| | 6EP1436-3BA00 (24 V / 20 A) |
|--------------------------------------|---|
| | 6EP1437-3BA00 (24 V / 40 A) |
| | 6EP1457-3BA00 (48 V / 20 A) |
| Primary/secondary galvanic isolation | Yes |
| Galvanic isolation | SELV output voltage Ua according to EN 60950-1 and EN 50178 |
| Protection class | Class I |
| Degree of protection (EN 60529) | IP20 |
| Leakage current, typ. | 1 mA |
| Leakage current, max. | 3.5 mA |
| Test voltage | See Table 7-1 Test voltage (Page 46) |

7.2 Test voltage

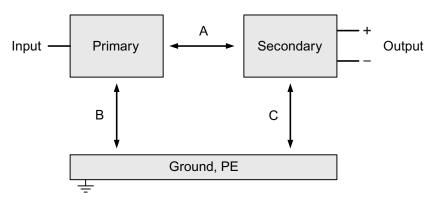


Figure 7-1 Test voltage diagram

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 with one another

Test (C)

• Connect the output terminals 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 VDC | 2200 VDC | 700 VDC |
| | 60 s | 3000 VAC | 1500 VAC | 500 VAC |
| Production test | 1 s | 2200 VDC | 2200 VDC | 500 VDC |
| | 1 s | 1500 VAC | 1500 VAC | 350 VAC |
| Field test | 1 s | 2200 VDC | 2200 VDC | 500 VDC |
| | 1 s | 1500 VAC | 1500 VAC | 350 VAC |

Remark:

Tripping current for DC measurement: 0 mA

Tripping current for AC measurement: <100 mA

7.3 Approvals

| | 6EP1436-3BA00 (24 V / 20 A) | 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) | |
|-----------------------|---|-----------------------------------|--------------------------------|--|
| CE marking | Yes, (2004/108/EG and | Yes, (2004/108/EG and 2006/95/EG) | | |
| 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 Gc; ANSI/ISA-12.12.01 - | | | |
| CB approval | No | | | |
| SEMI F47 compliance | Fulfilled | | | |
| Marine approvals | GL, ABS | GL and ABS being prepa | red GL, ABS | |

7.4 EMC

| | | 6EP1436-3BA00 (24 V / 20 A) |
|--|--------------|--|
| | | 6EP1437-2BA20 (24 V / 40 A) |
| | | 6EP1457-3BA00 (48 V / 20 A) |
| Electrostatic discharge | EN 61000-4-2 | 8 kV contact, 8 kV air |
| Electromagnetic fields | EN 61000-4-3 | 801000 MHz 25 V/m 10002700 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 |
| Surge voltages | EN 61000-4-5 | 3 kV symmetrical at the line supply connections |
| | | 6 kV symmetrical at the line supply connections |
| | | 500 V symmetrical/asymmetrical on DC output cables |
| High-frequency fields | EN 61000-4-6 | 10 V; 0.1580 MHz |
| Magnetic fields | EN 61000-4-8 | 30 A/m; 50 Hz |
| Emitted interference | EN 55022 | Class B |
| Line harmonics limitation | EN 61000-3-2 | Class A |
| Generic standards | EN61000-6-2 | Immunity for industrial environments |
| | EN61000-6-3 | Emission for residential areas |
| | · · | |

7.4 EMC

Ambient conditions

| | 6EP1436-3BA00 (24 V / 20 A) 6EP1437-3BA00 (24 V / 40 A) | 6EP1457-3BA00 (48 V / 20 A) | | |
|-------------------------|--|----------------------------------|--|--|
| Ambient temperature | 0 +70° C with natural convection | 0 +60 °C with natural convection | | |
| | 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 | -40 +85° C | | | |
| temperature | Tests (packed for shipping) according to: | | | |
| | • EN 60068-2-1 cold | | | |
| | EN 60068-2-2 dry heat | | | |
| | EN 60068-2-30 humid heat, cyclic | | | |
| Humidity class | Climatic class 3K3 according to EN 6072 | 1, without condensation | | |
| Mechanical stressing in | Tested according to: | | | |
| operation | EN 60068-2-6 Vibration, test Fc: 0.075 mm deflection in the range 10 – 1 g acceleration in the range 58 – 150 EN 60068-2-27 shock, test Ea: | | | |
| | acceleration 150 m/s ² , test duration 1 | 1 ms | | |
| 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 4-4 Mounting height derating (Page 20) | | | |
| | Overvoltage category: III up to 2000 m (EN 50178) II from 2000 m up to 6000 m (EN 50178) Storage: | 78) | | |
| | • 1080 660 hPa (-1000 +3500 m) | | | |

Applications 9

9.1 Parallel connection to increase power rating

To increase the power rating, SITOP modular 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.
- Changeover the switch

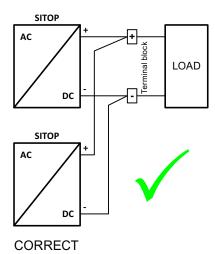
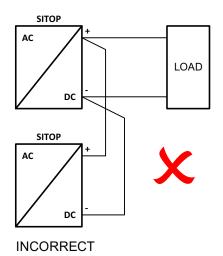


Figure 9-1 Parallel connection



9.1 Parallel connection to increase power rating

NOTICE

Protective circuit for the parallel connection of more than two power supplies

For connection of 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 SITOP modular 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 24 V 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 53)). 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 54)).

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.

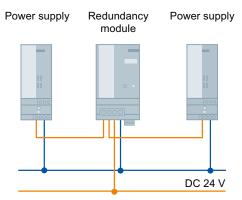


Figure 9-2 Redundant configuration with two power supplies and SITOP PSE202U redundancy module

9.2 Parallel connection for redundancy

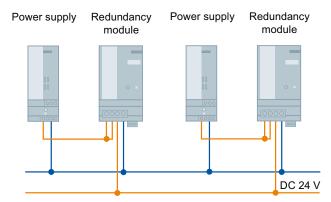


Figure 9-3 Redundant configuration with two power supplies and two SITOP PSE202U redundancy modules

You can find additional information at:

SITOP PSE202U manual (http://support.automation.siemens.com/WW/view/en/42248598)

9.3 Series connection for increased voltage

To achieve an output voltage of 48 VDC, two 24 V SITOP modular power supplies of the same type can be connected in series. In this case, connect the "-" terminal of the first power supply to the "+" terminal of the second power supply. The "+" terminal of the first power supply and the "-" terminal of the second power supply are routed to the load.

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

In the case of an asymmetric load distribution, it is not possible to guarantee correct functionality.



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 cannot be guaranteed in the case of a fault

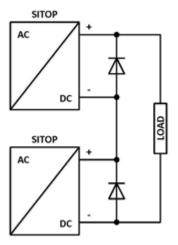


Figure 9-4 Series connection

9.4 Overload protection in the 24 V output circuit

If an overload occurs, the electronic current limiting function limits the SITOP modular output current to a maximum value (refer to Chapter Technical data (Page 33)). 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 channels (versions with adjustable output current range for each channel from 0.5-3 A and 3-10 A) is available; this monitors the 24 V branches for overloading and short-circuiting (Figure 9-5 Electronic protection of 24 V loads using the SITOP PSE200U selectivity module (Page 56)). 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 a channel 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 versions with single channel signaling, function blocks for evaluation purposes are available for SIMATIC S7-1200/300/400, for STEP 7 Classic and TIA Portal at no charge.

You can find additional information at:

SITOP PSE200U selectivity module manuals (http://support.automation.siemens.com/WW/view/en/10807226/130000)

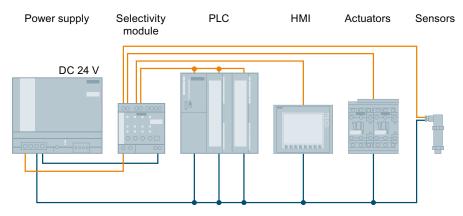


Figure 9-5 Electronic protection of 24 V loads using the SITOP PSE200U selectivity module

9.5 Protection against short-time voltage dips

For a drop in the line-side supply voltage, the SITOP modular power supply still maintains the output voltage for a short time in the millisecond range (see Chapter Technical data (Page 33)).

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 PSE201M buffer module.

The SITOP PSE201M buffer module, based on electrolytic capacitors, is connected in parallel to the 24 V power supply output (Figure 9-6 Buffering brief power failures using the SITOP PSE201M buffer module (Page 57)). 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 PSE201M manual (http://support.automation.siemens.com/WW/view/en/41129219)

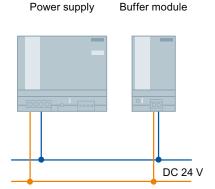


Figure 9-6 Buffering brief power failures using the SITOP PSE201M buffer module

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 58)).

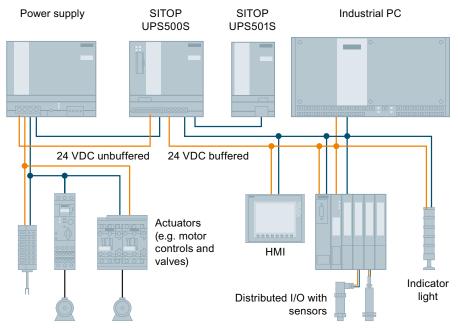


Figure 9-7 24 V buffering to allow the saving of process data and controlled shutdown of PCs

Using DC-UPS with battery modules (lead acid accumulators), buffer times in the range of hours can be implemented.

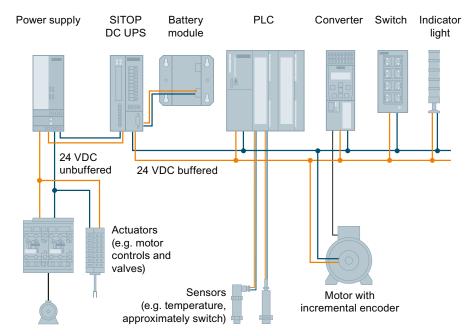


Figure 9-8 24 V buffering to maintain communication, signaling functions, sensor measured values and position values

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:

DC UPS with capacitors manual

(http://support.automation.siemens.com/WW/view/en/48932766/133300)

DC UPS with batteries manual

(http://support.automation.siemens.com/WW/view/en/48934855/133300)

9.6 Protecting against longer power failures

Environment 10

The device is 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

Technical support

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

- Phone: +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.de/sitop/manuals)

SITOP power supply homepage

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

Information material

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

CAx data

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

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

SITOP Selection Tool

Simply and quickly select the optimum the power supply or DC-UPS: SITOP Selection Tool (http://www.siemens.de/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.siemens.de/automation/partner)
- In Catalog CA 01