

Power Supply SITOP

Catalog KT 10.1 • 2009



SITOP

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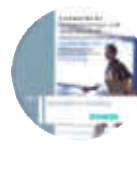


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SITOP

Power supply SITOP

Catalog KT 10.1 · 2009



The products and systems described in this catalog are manufactured/distributed under application of a certified quality management system in accordance with DIN EN ISO 9001 (Certified Registration No. 1108). The certificate is recognized by all IQNet countries.

Supersedes:
Catalog KT 10.1 · 2008

Refer to the Industry Mall for current updates of this catalog:
www.siemens.com/automation/mall

The products contained in this catalog can also be found in the e-Catalog CA 01.
Order No.:
E86060-D4001-A510-C7-7600

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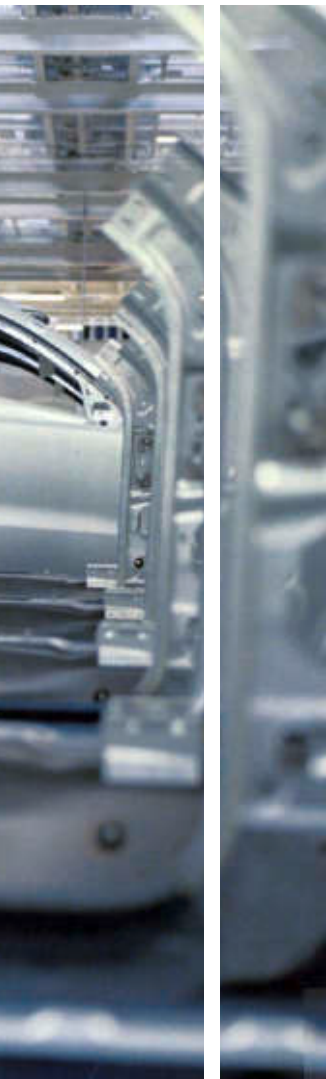
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SITOP 24 V

SITOP

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Answers for Industry.

Siemens Industry responds to the challenges in manufacturing automation, process automation, and building automation. Our drives and automation solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) are used in all sectors. In the manufacturing as well as in the process industry. In industrial and non-residential buildings.

We can provide you with automation systems, drives, low-voltage controls and distribution, and industrial software, from standard products right up to complete sector-specific solutions. With the industrial software, our customers from the manufacturing sector can optimize their entire value added chain – from product design and development, through production and sales, right up to service. With our electrical and mechanical components, we offer you integral technologies for the entire drive train – from the clutch to the gears, from the motor to control and drive solutions for all sectors of mechanical engineering. With the technology platform TIP, we offer you integrated solutions for energy distribution. The high quality of our products sets standards in the industry. A high degree of envi-

ronmental protection is part of our strict and consistently implemented environmental management program. The possible environmental effects of a product are examined back at the product-development stage: Many of our products and systems therefore meet the EC directive RoHS (Restriction of Hazardous Substances). Our sites are, of course, certified in accordance with DIN EN ISO 14001. But environmental protection also involves utilizing valuable resources as efficiently as possible. The best example of this is provided by our energy-efficient drives, which require up to 60% less power.

Take a closer look yourself at the options our automation and drives products have to offer. And discover how you can increase your competitiveness with us on a lasting basis.

ERP – Enterprise Resource Planning

Management Level

MES – Manufacturing Execution Systems



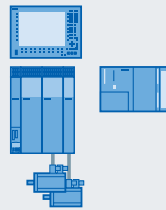
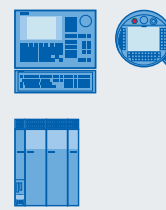
Operations Level

SIMATIC PCS 7
Process Control (DCS)

Control Level

Industrial Software for

- Design and Engineering
- Installation and Commissioning
- Operation
- Maintenance
- Modernization and Upgrade
- Energy Management

SIMOTION
Motion Control SystemSINUMERIK
Computer Numeric Control

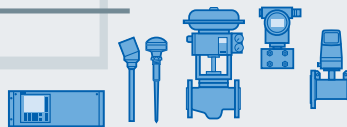
Field Level

■ PROFIBUS PA

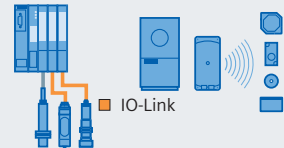


■ HART

Process Instrumentation



SIMATIC Sensors

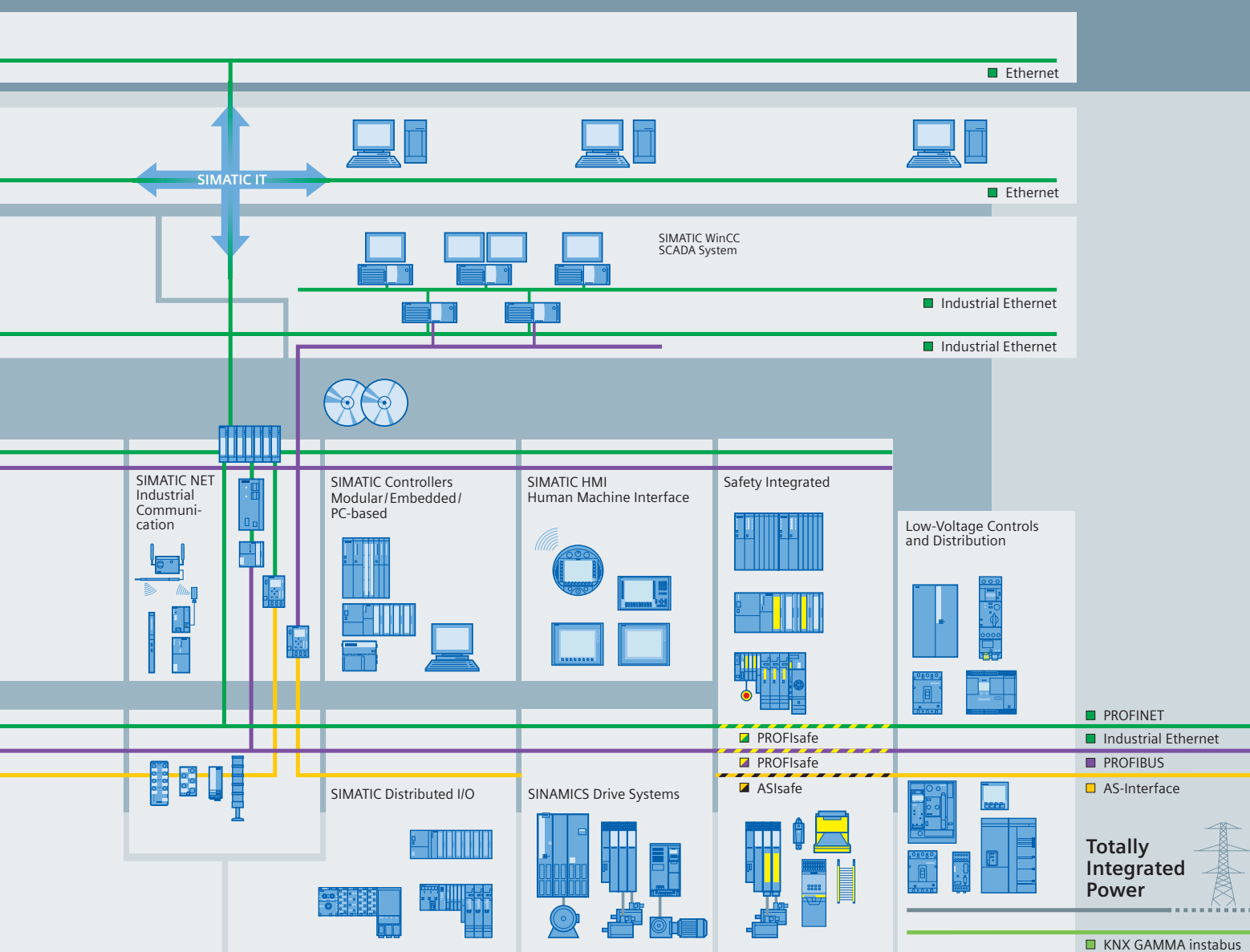
Totally
Integrated
Automation

02.03.2009

Set the standards for productivity and competitiveness.

Totally Integrated Automation.

With Totally Integrated Automation (TIA), Siemens is the only vendor to offer an integrated basis for implementing customer-specific automation solutions – in all sectors, from incoming to outgoing logistics.



TIA excels through its unique uniformity.

Thanks to reduced interfacing overhead, it provides maximum transparency at all levels – from the field level, through the plantmanagement level to the corporate management level. Needless to say, you will also benefit throughout the entire life cycle of your plant – from its initial planning to its operation and its ultimate modernization. And thanks to the integration in the development of our products and systems, we can offer you maximum security of investment due to the avoidance of unnecessary interfaces.

Even during the development of our products and systems, the unique integration of our products and systems is a defined property.

The result: the best interaction of all components – from controllers, HMI components, and drives, all the way to the process control system. This reduces the complexity of the automation solution in your plant. You can notice this, for example, in the form of time and money saved during the engineering of the automation solution, as well as during operation with the integrated diagnostic options of Totally Integrated Automation for increasing the availability of your plant.

SITOP

Introduction

Overview of product families

SITOP

SITOP – reliable 24-V power supply

Efficient operation of a machine or plant requires a reliable, constant power supply. The quality and reliability of the SITOP stabilized power supplies ensure high levels of safety in DC power supply in industrial engineering and building management systems.

They supply a stabilized 24 volts but also other output voltages. Even in the case of large input voltage variations, the output voltage is kept stable with a high degree of accuracy. This enables the use of primary switched-mode power supplies in many applications for the supply of sensitive electronic systems – all the way up to loads requiring high currents up to 40 A.

The fan-free power supplies are characterized by their compact and rugged design, high levels of efficiency and high overload capacity. The large input voltage range and the international approvals mean that use is possible in almost all supply networks worldwide.

The complete SITOP range

In addition to the power supplies, the perfectly coordinated complete range offers a unique choice of modules – from those that protect the 24-V power supply against interference on the primary and secondary side, right up to those providing all-round protection.

For example, with the innovative SITOP UPS500 capacitor-based uninterruptible power supply or with the new SITOP PSE200U selectivity module for reliable selectivity in the output circuit.

modular

Technology power supply for demanding solutions: SITOP modular

The first modular power supply meets the highest requirements for reliable 24 volts in global use. The rugged standard mounting rail devices in a metal enclosure can be expanded with all SITOP DC UPSs and expansion modules. This modularity offers unsurpassed benefits with respect to flexibility, simple handling and price/performance.

Even without expansion modules, the primary switched-mode power supplies offer extensive functions. The wide-range input enables connection to the most diverse supply networks worldwide and compensates even for large voltage fluctuations. Even brief interruptions in the power supply are bridged. The single-phase power supplies with 5 A and 10 A output current even have an ultra-wide-range input and are thus also suitable for operation on two phases of a 3-phase supply network.

The new 3-phase 20 A and 40 A power supplies are impressive proof that high functionality and performance power do not automatically require a lot of space. With widths of only 70 mm and 150 mm, they are among the most compact of their performance class.

Despite its slim design, SITOP modular has significant performance reserves and thus offers a high degree of security. The integral power-boost function briefly supplies up to 3 times the rated current and 50 % extra power is available for 5 seconds. Loads with a high starting current can thus be switched on without any problems. You can choose between automatic restart and switch-off in response to overload.



Information on the structure of the catalog

The **24-V power supplies** are sorted according to type of mains connection (single-phase, 2-phase and 3-phase) and according to output current (ascending to 40 A). **A color is assigned to each product family** to make it obvious at a glance to which product family a device belongs. The essential features of the product families are described on the following pages.

Introduction

Overview of product families

smart

Powerful standard power supply: SITOP smart

Slimline dimensions, strong performance. The SITOP smart range of power supplies requires less space on the standard mounting rail and offers high functionality at a reasonable price. Due to the flexible overload response, even loads with high starting currents can be switched on without problems. If required, 50 % extra power is made available for 5 seconds. The 1-phase versions also continuously supply 120 % of the rated power provided the ambient temperature does not exceed 45 °C. Numerous certificates facilitate universal and global use as well as use in areas subject to explosion hazard.

- Space-saving, rugged design for universal applications
- Extra-Power ($1.5 \times I_{\text{rated}}$ for 5 s) for brief operational overload
- Permanent overload capacity ($1.2 \times I_{\text{rated}}$) to 45 °C ambient temperature
- Constant current with automatic restart
- Green LED for "24 V OK"
- Adjustable output voltage from 22.8 to 28.0 V for compensating voltage drops
- For 24 V standard applications from 2.5 A to 10 A
- 48-V 10 A power supply for small cable cross-sections
- No lateral installation clearances required
- Temperature range from 0 to +60 °C
- Certified in accordance with CE, UL, CSA, ATEX and GL for universal use
- Functionally expandable with DC UPS modules, redundancy module, selectivity module and diagnostics module



- Ultra-wide-range input for universal and safe use
- Extra-Power ($1.5 \times I_{\text{rated}}$ for 5 s) for brief operational overload
- Power-Boost ($3 \times I_{\text{rated}}$ for 25 ms) for triggering protective equipment
- Selectable short-circuit response: Constant current with automatic restart or latching shutdown
- Switchable output characteristic for uniform power distribution in case of parallel operation
- Efficiency up to 93 % minimizes heat generation and energy consumption
- Signaling contact and 3 LEDs for sensing the operating state
- Output voltage adjustable up to 28.8 V for compensating voltage drops
- For demanding applications from 5 to 40 A
- 48-V 20 A power supply for small cable cross-sections
- Rugged and compact metal housing
- No lateral installation clearances required
- The innovated SITOP PSU300M 20 A and 40 A 3-phase power supplies require less than half the installation space
- Temperature range from 0 to +60 °C
- Optionally with boards coated for protection
- Certified in accordance with CE and cULus/CSA
- Functionally expandable with all SITOP expansion modules and DC UPS

modular



SITOP

Introduction

Overview of product families



LOGO!Power

Flat power supply for distribution boards: LOGO!Power

The mini power supplies are available with 24 V and alternative output voltages of 5 V, 12 V and 15 V, and they can even be installed in built-in miniature distribution boards thanks to their flat stepped profiles. The function "Constant current in event of overload" even allows the connection of difficult loads such as DC/DC converters or motors. The wide-range input, a wide temperature range and extensive certification make the low-cost LOGO! power supplies the universal devices for use in a host of applications.

- Mini power supply for low installation depths thanks to flat step profile
- Wide-range input 85 to 264 V AC for universal safe use
- Three performance classes to 4 A at 24 V, two for 5 V, 12 V and 15 V
- Reliable use in system networks with LOGO! Logic module
- Constant current under overload conditions for reliable connection of difficult loads
- Green LED for "Output voltage OK"
- Large setting range for output voltage
- Large temperature range from -20 °C to +55 °C
- Certified in accordance with UL/cUL, ATEX, FM and GL for universal use



SIMATIC design

Optimal supply to SIMATIC controllers, and more: SITOP in SIMATIC design:

The original power supplies of the SIMATIC controllers provide the PLC network optimally with 24 V, but also other loads.

- System-tested 24 V for reliable power supply in the SIMATIC system network
- Optimum functional coordination with SIMATIC S7 and ET200
- Flexible mounting onto S7-300 DIN rail, ET200pro rack or standard mounting rail
- Space-saving, rugged design for universal applications

Design S7-1200 design: 24 V/2.5 A. The compact PM1207 power module requires little space in the micro PLC network. It provides the supply to CPUs with 24-V input, to signal modules, and to 24-V loads connected to the modules. Automatic range switching ensures problem-free mains connection.

Design S7-200: 24 V/3.5 A. The flat power supply is especially suitable where installation height and control cabinet depth are restricted.

Design S7-300: 24 V/2 A, 5 A and 10 A. The new power supplies now require even less space on the S7 rail and range switching to single-phase 120/ 230 V AC systems now takes place automatically. The 2 A and 5 A devices are also available as outdoor versions and can easily handle temperatures between -25 °C and +70 °C as well as higher vibration and shock loads.

SIMATIC ET200pro design: 24 V/8 A. The SIMATIC ET200pro PS power supply in degree of protection IP67 functions as a power supply for electronics/sensors and load voltage of the I/O device, and it has a signaling contact for "24 V OK" and "Over-temperature" as well as a second connector for looping through the input voltage.



Introduction

Overview of product families



Special designs and application areas

Equipped for special tasks and conditions – power supplies in special design, for special applications

The SITOP power supplies cover even individual infeed tasks. They can handle restricted installation space and harsh environmental conditions. The standard power supply units also fulfill exceptional requirements.

The smallest ones: 24 V/0.375 and 0.5 A. At only 22.5 mm, these mini devices are the slimmest of the SITOP family and are therefore especially suitable for supplying low-voltage devices.

The universal types: 24 V/2.5 A, 4 A and 10 A. These devices with universal input can be connected to single-phase AC as well as to DC systems.

The DC/DC converter: 24 V/2 A. With an input range from 38 V to 121 V DC for supply from battery and DC systems.

SITOP PSA100E: The single-phase power supply for the basic industrial requirement of 2.5 to 12 A can be mounted on a standard mounting rail or straight onto the wall.

Flat design: 24 V/5 A and 10 A. The compact metal housing can be accommodated where only limited installation depth is available, even in masked machine supporting frames or hinged frames

SITOP PSU300P: 24 V/8 A. The rugged metal housing in degree of protection IP67 is designed for cabinet-free use at temperatures from -25 to +55 °C. It has the same design as the SIMATIC ET200pro PS but without the 2nd connector for looping through the input voltage.

Alternative voltages

Not just 24-V power supplies with alternative output voltages

SITOP provides a reliable supply of precisely stabilized DC voltage not just to 24-V loads, but also to loads with "alternative" supply voltage.

SITOP DC/DC: 12 V/2.5 A. The DC/DC converter in a slim standard mounting rail housing is supplied with 24 V. A SITOP DC UPS can also be used to provide an uninterruptible 12 V supply, for example.

SITOP flexi: 3 to 52 V/10 A. Limitless diversity thanks to variable output. Flexible adjustment between 3 and 52 V enables a standard device to be used for different special voltages.

SITOP dual: 2 x 15 V/3.5 A. The electronics power supply for the control cabinet. The industry-standard rail-mounted device has two 15 V outputs. For, say, electronic loads supplied with ± 15 volts.

LOGO!Power: 5, 12, 15 V. The mini power supply with these output voltages is available in two performance classes. Further features on Page 1/8.

SITOP smart: 48 V/10 A. SITOP modular: 48 V/20 A. The high output voltage enables smaller core cross-sections of the load supply lines.



SITOP

Introduction

Overview of product families



Expansion modules

Reliable protection against the most varied hazard sources: SITOP expansion modules

A power supply unit cannot on its own guarantee fault-free 24-V supply. Power failures, extreme variations in the mains voltage, or a faulty load can bring plant operation to a standstill and cause high costs. The expansion modules offer everything from extensive protection against interference on the primary and secondary side, right up to complete all-round protection.

- The **signaling module** with signal contacts and remote ON/OFF function optimally integrates SITOP modular (devices without integral signaling contact) into automated plants.
- For maximum availability, the **redundancy module** decouples SITOP power supplies of the same type.
- The **buffer module** bridges short power failures up to 3 seconds with capacitors as energy storage.
- The **SITOP select diagnostics module and the new SITOP PSE200U selectivity module** offer selective protection of individual 24 V paths against overload and short-circuits. With this protection and by means of fast fault localization, downtimes can be reduced to a minimum. New features of the selectivity module include the finely adjustable current range (from 0.5 A), remote reset, and a reset button for each channel.



DC UPS

24 V that can always be relied on – even when the power fails: Uninterruptible power supply

Supply network irregularities in the millisecond range are compensated for supremely well by all our power supplies. Large fluctuations or even power failures, however, require special measures: The buffer module (see SITOP expansion modules) ensures optimal protection in the case of brief power failures up to 3 seconds. Longer power failures into the minute range can be bridged with the new maintenance-free SITOP UPS500 with capacitor technology. The DC UPS modules with battery modules secure continued operation for hours! Both DC UPS systems can be integrated simply into PC-based automation solutions using a free software tool.

The **new SITOP UPS500** is completely maintenance-free because it saves the energy in high-capacity **double-layer capacitors**, that have a long service life even in high temperatures, and do not need to be replaced. The installation location does not have to be ventilated because no gas is emitted. The innovative DC UPS buffers 24 V into the minute range and makes it possible to back up data and to shut down PC-based applications safely (e.g. with SIMATIC PC).

The SITOP UPS500S is designed for installing on a standard mounting rail and it can be modularly expanded to extend the backup time. The UPS500P in degree of protection IP65 is suitable for distributed use.

The **SITOP DC UPS with battery modules** using lead gel batteries up to 12 Ah enables process operation to continue for hours. The availability, battery supply line, aging status, and charge status are permanently monitored. The integral battery management system ensures optimal charging of the battery modules and a long service life.



Introduction

Selection guide

1

In order to enable you to find the right controlled power supply for any application as quickly as possible, we have presented in the table below an overview of all the power supplies in the catalog sorted according to input voltages, output voltages and output current.

Selection guide

Input voltage			AC voltage single-phase 120 V, 230 V AC	AC voltage three-phase 400 V, 500 V 3 AC	DC voltage 24 V DC	Other DC voltages
Output voltage	Output current	Order No.				
5 V DC	3 A	6EP1 311-1SH02	Page 12/6			
	6.3 A	6EP1 311-1SH12	Page 12/6			
12 V DC	1.9 A	6EP1 321-1SH02	Page 12/6			
	4.5 A	6EP1 322-1SH02	Page 12/7			
15 V DC	1.9 A	6EP1 351-1SH02	Page 12/7			
	4 A	6EP1 352-1SH02	Page 12/7			
	2 × 3.5 A	6EP1 353-0AA00	Page 12/2			
24 V DC	0.375 A	6EP1 731-2BA00				Page 2/2
	0.5 A	6EP1 331-2BA10	Page 2/2			
	1.3 A	6EP1 331-1SH02	Page 2/2			
	2 A	6EP1 732-0AA00				Page 2/3
		6ES7 307-1BA01-0AA0	Page 2/3			
		6ES7 305-1BA80-0AA0			Page 2/3	Page 2/3
	2.5 A	6EP1 332-2BA10	Page 3/2			
		6EP1 332-1SH71	Page 3/2			
		6EP1 332-1SH12	Page 3/3			Page 3/3
		6EP1 332-1SH42	Page 3/2			
		6EP1 621-2BA00			Page 12/2	
		6EP1 232-1AA00	Page 3/3			
	3.5 A	6EP1 332-1SH31	Page 4/2			
	3.7 A	6EP1 332-2BA00	Page 4/2			
	4 A	6EP1 332-1SH22	Page 4/3			Page 4/3
		6EP1 332-1SH51	Page 4/2			
		6EP1 232-1AA10	Page 4/3			
	5 A	6EP1 333-3BA00	Page 5/2	Page 8/2		
		6EP1 333-2AA01	Page 5/2			
		6EP1 333-2BA01	Page 5/2			
		6ES7 307-1EA01-0AA0	Page 5/3			
		6ES7 307-1EA80-0AA0	Page 5/3			
		6EP1 333-1AL12	Page 5/3			
	6 A	6EP1 233-1AA00	Page 5/3			
	8 A	6EP1 433-2CA00		Page 8/2		
		6ES7 148-4PC00-0HA0		Page 8/2		
	10 A	6EP1 334-3BA00	Page 6/2	Page 8/2		
		6EP1 334-2AA01	Page 6/2			
		6EP1 334-2BA01	Page 6/2			
		6ES7 307-1KA02-0AA0	Page 6/3			
		6EP1 334-1AL12	Page 6/3			
		6EP1 334-1SH01	Page 6/3			Page 6/3
		6EP1 434-2BA00		Page 8/3		
	12 A	6EP1 234-1AA00	Page 6/3			
	20 A	6EP1 336-3BA00	Page 7/2			
		6EP1 436-3BA00		Page 8/3		
		6EP1 436-3BA10		Page 8/3		
		6EP1 436-2BA00		Page 8/3		
	30 A	6EP1 437-2BA00		Page 9/2		

Continued on page 1/12.

SITOP

Introduction

Selection guide

1

Selection guide (continued)

Input voltage			AC voltage single-phase 120 V, 230 V AC	AC voltage three-phase 400 V, 500 V 3 AC	DC voltage 24 V DC	Other DC voltages
Output voltage	Output current	Order No.				
	40 A	6EP1 337-3BA00	Page 7/2			
		6EP1 437-3BA00	Page 9/2			
		6EP1 437-3BA10	Page 9/2			
		6EP1 437-2BA10	Page 9/3			
Expansion modules	Signaling module	6EP1 961-3BA10	Page 10/2			
	Buffer module	6EP1 961-3BA01	Page 10/2			
	Redundancy module	6EP1 961-3BA20	Page 10/2			
	Selectivity module	6EP1 961-2BA10	Page 10/4			
		6EP1 961-2BA20	Page 10/4			
	Diagnostics module	6EP1 961-2BA00	Page 10/4			
	Inrush current limiter	6EP1 967-2AA00	Page 10/7			
SITOP UPS 500	7 A	6EP 1933-2NC01	Page 11/5			
		6EP 1933-2NC11	Page 11/5			
	15 A	6EP1 933-2EC41	Page 11/5			
		6EP1 933-2EC51	Page 11/5			
DC UPS modules	6 A	6EP1 931-2DC21	Page 11/16			
		6EP1 931-2DC31	Page 11/16			
		6EP1 931-2DC42	Page 11/16			
	15 A	6EP1 931-2EC21	Page 11/16			
		6EP1 931-2EC31	Page 11/16			
		6EP1 931-2EC42	Page 11/16			
	40 A	6EP1 931-2FC21	Page 11/16			
		6EP1 931-2FC42	Page 11/16			
Battery modules	1.2 Ah	6EP1 935-6MC01	Page 11/20			
	2.5 Ah	6EP1 935-6MD31	Page 11/20			
	3.2 Ah	6EP1 935-6MD11	Page 11/20			
	7 Ah	6EP1 935-6ME21	Page 11/21			
	12 Ah	6EP1 935-6MF01	Page 11/21			
48 V DC	10 A	6EP1 456-2BA00	Page 12/3			
	20 A	6EP1 457-3BA00	Page 12/3			
3 - 52 V DC	10 A/120 W	6EP1 353-2BA00	Page 12/2			

Note:

Some power supplies are already listed in the catalog as SIPLUS versions. You can request other devices in versions of varying ruggedness on the Internet at www.siemens.com/siplus under "Enquiry form for special solutions".

SITOP 24 V 1-phase



2/2
2/2
2/3
2/3
2/3

Output currents up to 2 A

The smallest ones
 LOGO!Power
 The S7-300 version
 The DC/DC converter
 The outdoor version

2/6

Selection and ordering data

SITOP 24 V

1-phase

Output currents up to 2 A

Overview

Product	The smallest ones		LOGO!Power
Power supply, type	0.5 A	0.375 A	1.3 A
Order No.	6EP1 331-2BA10	6EP1 731-2BA00 ¹⁾	6EP1 331-1SH02
			
	The optimum power supply units for automation solutions in the lower performance range; with wide-range input for AC or DC voltages; thanks to their compact and slim design, they are particularly suitable for solutions where space is limited and in conjunction with low-voltage switchgear.	The optimum power supply units for automation solutions in the lower performance range; with wide-range input for AC or DC voltages; thanks to their compact and slim design, they are particularly suitable for solutions where space is limited and in conjunction with low-voltage switchgear.	The power supplies of the LOGO!Power range are optimally matched to the LOGO! logic modules in their functionality and design. With the wide-range input 85 V to 264 V AC and the possibility of mounting in small distribution boards, they can be used universally in the most diverse application areas in the low-end performance range.
Dimension drawing	Page 15/2, Dimension drawing 1	Page 15/2, Dimension drawing 1	Page 15/2, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in rated}$	1-phase AC 120-230 V AC wide-range input	DC voltage 48-220 V DC wide-range input	1-phase AC 100-240 V AC Wide-range input
Voltage range	93 ... 264 V	30 ... 264 V (30 ... 187 V AC)	85 ... 264 V
Overvoltage resistance Mains buffering at $I_{out rated}$ Rated line frequency; range	$2.3 \times V_{in rated}$, 1.3 ms > 10 ms at $V_{in} = 230$ V 50/60 Hz, 47 ... 63 Hz	> 10 ms at $V_{in} = 220$ V –	$2.3 \times V_{in rated}/1.3$ ms > 40 ms at $V_{in} = 187$ V 50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in rated}$ Making current limit (+25 °C) P_t	0.22-0.13 A < 23 A, typ. 1 ms 0.3 A ² s	0.3-0.06 A < 35 A, typ. 3 ms 1.2 A ² s	0.7-0.35 A < 15 A < 0.8 A ² s
Built-in incoming fuse Recommended miniature circuit breaker (IEC 898) in the mains power input	T 2 A/250 V (not accessible) From 3 A, Characteristic C	F 4 A/250 V (not accessible) From 6 A, Characteristic C, suitable for DC	Internal From 16 A, Characteristic B or from 10 A, Characteristic C
Output			
Rated voltage value $V_{out rated}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance • Static mains compensation • Static load balancing	±3 % Approx. 0.2 % Approx. 0.7 %	±3 % Approx. 0.1 % Approx. 0.1 %	±3 % Approx. 0.1 % Approx. 1.5 %
Residual ripple Spikes (bandwidth: 20 MHz)	< 150 mV _{pp} (typ. 50 mV _{pp}) < 240 mV _{pp} (typ. 150 mV _{pp})	< 150 mV _{pp} (typ. 50 mV _{pp}) < 240 mV _{pp} (typ. 50 mV _{pp})	< 200 mV _{pp} (typ. 10 mV _{pp}) < 300 mV _{pp} (typ. 20 mV _{pp})
Adjustment range Status display On/off behavior	– Green LED for 24 V OK No overshoot of V_{out} (soft start)	– Green LED for 24 V OK No overshoot of V_{out} (soft start)	22.2 ... 26.4 V Green LED for 24 V OK No overshoot of V_{out} (soft start)
Startup delay/voltage rise Rated current value $I_{out rated}$	< 1.5 s/typ. 20 ms 0.5 A	< 2.5 s/typ. 90 ms 0.375 A	< 0.5 s/typ. 15 ms 1.3 A
Current range • Up to +60 °C • Derating	0 ... 0.5 A 0 ... 0.5 A (up to +70 °C)	0 ... 0.375 A 0 ... 0.255 A (up to +70 °C)	0 ... 1.3 A (up to +55 °C) –
Dynamic overcurrent on • Power-up on short circuit • Short circuit during operation	Constant current approx. 0.6 A Constant current approx. 0.6 A	Typ. 2.7 A for 200 ms	
Parallel switching for enhanced performance	Not permitted	Not permitted	Yes, 2 units
Continuation of the table	Page 2/4, column 1	Page 2/4, column 2	Page 2/4, column 3

¹⁾ SIPLUS module 6AG1 931-2BA00-3AA0 for use under medial load (e.g. sulfur chloride atmosphere).

1-phase

Output currents up to 2 A

The S7-300 version

2 A

6ES7 307-1BA01-0AA0



The proven power supply in SIMATIC S7-300 design; with PS-CPU connecting comb and for mounting direct on S7 rail.

The DC/DC converter

2 A

6EP1 732-0AA00



The DC/DC converter for supply from battery and DC systems; with a wide input voltage range from 38 V to 121 V DC.

The outdoor version

2 A

6ES7 305-1BA80-0AA0²⁾

The power supply unit for extreme environmental conditions in SIMATIC S7-300 design; can be snapped onto S7 rail; with PS-CPU connecting comb.

Page 15/2, Dimension drawing 3

Page 15/4, Dimension drawing 1

Page 15/3, Dimension drawing 2

1-phase AC
120/230 V AC
 automatic
 range switch-over
 85 ... 132 V/170 ... 264 V

$2.3 \times V_{in \text{ rated}}$, 1.3 ms
 $> 20 \text{ ms at } V_{in} = 93/187 \text{ V}$
 50/60 Hz, 47 ... 63 Hz

0.9/0.5 A
 $< 22 \text{ A}$, $< 3 \text{ ms}$
 $< 1.0 \text{ A}^2\text{s}$

T 1.6 A/250 V (not accessible)
 3 A, Characteristic C

DC voltage
48-110 V DC
 wide-range input
 38 ... 121 V

$> 5 \text{ ms at } V_{in} = 48 \text{ V}$
 –

1.2-0.5 A
 $< 33 \text{ A}$

T 2.5 A (not accessible)
 10 to 25 A, Characteristic B,
 or 6 to 25 A, Characteristic C,
 suitable for DC

DC voltage
24-110 V DC
 wide-range input
 16.8 ... 138 V

154 V; 0.1 s
 $> 10 \text{ ms at } V_{in \text{ rated}}$
 –

2.7-0.6 A (4.0-0.9 A)
 $< 20 \text{ A}$, $< 10 \text{ ms}$
 $< 5 \text{ A}^2\text{s}$

T 6.3 A/250 V (not accessible)
 From 10 A, Characteristic C,
 suitable for DC

Controlled, isolated DC voltage
24 V DC

$\pm 3 \%$
 Approx. 0.1 %
 Approx. 0.2 %

$< 50 \text{ mV}_{pp}$ (typ. $< 5 \text{ mV}_{pp}$)
 $< 150 \text{ mV}_{pp}$ (typ. $< 20 \text{ mV}_{pp}$)

–
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

$< 2 \text{ s/typ. } 10 \text{ ms}$
2 A

0 ... 2 A
 –

Typ. 9 A for 90 ms
 Typ. 9 A for 90 ms

Yes

Controlled, isolated DC voltage
24 V DC

$\pm 1 \%$
 Approx. 0.1 %
 Approx. 0.4 %

$< 100 \text{ mV}_{pp}$
 $< 300 \text{ mV}_{pp}$

23.5 ... 26.5 V
 Green LED for 24 V OK
 Overshoot of V_{out} on startup
 max. 25 V

$< 3 \text{ s/typ. } 30 \text{ ms}$
2 A

0 ... 2 A
 0 ... 2 A (up to $+70^\circ\text{C}$)

Yes, 2 units

Controlled, isolated DC voltage
24 V DC

$\pm 3 \%$
 Approx. 0.2 %
 Approx. 0.4 %

$< 150 \text{ mV}_{pp}$ (typ. $< 30 \text{ mV}_{pp}$)
 $< 240 \text{ mV}_{pp}$ (typ. $< 150 \text{ mV}_{pp}$)

–
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

$< 3 \text{ s/typ. } 5 \text{ ms}$
2 A (3 A at $V_{in} > 24 \text{ V}$)

0 ... 2 A (3 A)
 –

Typ. 9 A for 270 ms
 Typ. 9 A for 270 ms

Yes, 2 units

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Page 2/5, column 5

Page 2/5, column 6

²⁾ SIPLUS module 6AG1 305-1BA80-2AA0 for temperature range -25 to $+60^\circ\text{C}$ and use under medial load (e.g. sulfur chloride atmosphere). This SIPLUS power supply conforms with standards for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).

SITOP 24 V

1-phase

Output currents up to 2 A

2

Continued from	Page 2/2, column 1	Page 2/2, column 2	Page 2/2, column 3
Power supply, type (repeated)	0.5 A	0.375 A	1.3 A
Order No. (repeated)	6EP1 331-2BA10	6EP1 731-2BA00	6EP1 331-1SH02
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 74 %	Approx. 66 %	Approx. 82 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 4.2 W	Approx. 4.6 W	Approx. 7 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	Typ. $\pm 0.3\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}	$< 0.2\%$ V_{out}
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. $\pm 0.7\%$ V_{out}	Typ. $\pm 0.4\%$ V_{out}	Typ. $\pm 1.5\%$ V_{out} (I_{out} : 10/90/10 %)
Load step settling time			
• 50 to 100 %	Typ. 1.5 ms	Typ. 2 ms	Typ. 20 ms (10 to 90 %)
• 100 to 50 %	Typ. 1.5 ms	Typ. 2 ms	Typ. 20 ms (90 to 10 %)
Protection and monitoring			
Output overvoltage protection	Yes, according to EN 60950	Yes, according to EN 60950	Yes, according to EN 60950
Current limitation	0.55 ... 0.65 A	0.41 ... 0.49 A	Typ. 2 A
Short-circuit protection	Constant current characteristic up to 0 V	Electronic shutdown, automatic restart	Constant current characteristic
Sustained short-circuit current rms value	< 0.65 A	< 0.9 A	< 4 A
Overload/short-circuit indicator	–	–	–
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178
Protection class	Class I	Class I	Class II (without protective conductor)
Leakage current	< 3.5 mA	< 3.5 mA	
German Technical Inspectorate approval	Yes	Yes	Yes; CB scheme
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273
Explosion protection	–	–	ATEX EX II 3G Ex nA IIC T3
FM approval	–	–	Class I Div. 2, Group A, B, C, D T4
Marine approval	–	–	GL, ABS
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	Not applicable	Not applicable	Not applicable
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	–25 ... +70 °C with natural convection	–25 ... +70 °C with natural convection	–20 ... +55 °C with natural convection
Transport/storage temperature range	–40 ... +70 °C	–40 ... +70 °C	–40 ... +70 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections			
• Supply input L, N, PE (DC input: L+1, M1, PE)	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded
• Output +	1 screw terminal for 0.5 ... 2.5 mm ²	1 screw terminal for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
• Output –	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
Dimensions (W × H × D) in mm	22.5 × 80 × 91	22.5 × 80 × 91	54 × 90 × 55
Weight, approx.	0.11 kg	0.14 kg	0.17 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15
Accessories			
	–	–	–

1-phase

Output currents up to 2 A

Page 2/3, column 4	Page 2/3, column 5	Page 2/3, column 6
2 A	2 A	2 A
6ES7 307-1BA01-0AA0	6EP1 732-0AA00	6ES7 305-1BA80-0AA0
Approx. 84 % Approx. 9 W	Approx. 84 % Approx. 9 W	Approx. 75 % Approx. 16 W (24 W)
Typ. $\pm 0.1\%$ V_{out} Typ. $\pm 0.8\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out} Typ. $\pm 0.8\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out} Typ. $\pm 2.5\%$ V_{out}
< 1 ms (typ. 0.5 ms) < 1 ms (typ. 0.5 ms)	< 5 ms (typ. 2.5 ms) < 5 ms (typ. 2.5 ms)	< 5 ms (typ. 2.5 ms) < 5 ms (typ. 2.5 ms)
Additional control loop, shutdown at < 28.8 V, automatic restart 2.2 ... 2.6 A	Yes, suppressor diode at output 2.1 ... 3 A	Additional control loop, shutdown at approx. 30 V, automatic restart 3.3 ... 3.9 A
Electronic shutdown, automatic restart < 2 A –	Electronic shutdown, automatic restart < 2 A –	Electronic shutdown, automatic restart < 2 A –
Yes, safety extra low output voltage V_{out} according to EN 60950-1 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 Class I	Yes, safety extra low output volt- age V_{out} according to EN 60950 and EN 50178, creepage dis- tances and clearances > 5 mm Class I
< 3.5 mA (typ. 0.5 mA) Yes Yes	< 3.5 mA (typ. 0.7 mA) Yes Yes	< 3.5 mA (typ. 0.7 mA) Yes Yes
cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No. 142), File E179336	UL-listed (UL 508), File E143289, CSA (CSA C22.2 No. 14)
ATEX 94/9/EC EX II 3G; EEx, nA, II, T4 U UL 1604 Class I Div. 2 Group A, B, C, D Class I Div. 2 Group A, B, C, D T4 In S7-300 system IP20	– – – IP20	– – GL IP20
EN 55022 Class B Not applicable EN 61000-6-2	EN 55022 Class B Not applicable EN 61000-6-2	EN 55011 Class A Not applicable EN 61000-6-2
0 ... +60 °C with natural convection –40 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	0 ... +70 °C with natural convection –40 ... +70 °C Climate class 3K3 according to EN 60721, no condensation	–25 ... +70 °C with natural convection –40 ... +85 °C Climate class 3K5 according to EN 60721, transient condensation permitted
1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded 2 screw terminals for 0.5 ... 2.5 mm ² 2 screw terminals for 0.5 ... 2.5 mm ²	1 screw terminal each for 2 × 0.5 ... 2.5/1.5 mm ² single-core/finely stranded 1 screw terminal for 2 × 0.5 ... 2.5 mm ² 1 screw terminal for 2 × 0.5 ... 2.5 mm ²	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded 3 screw terminals for 0.5 ... 2.5 mm ² 3 screw terminals for 0.5 ... 2.5 mm ²
40 × 125 × 120 0.4 kg Can be mounted onto S7 rail	80 × 135 × 120 0.5 kg Snaps onto DIN rail EN 60715 35 × 15	80 × 125 × 120 0.75 kg Can be mounted onto S7 rail
Mounting adapter for standard mounting rail (6EP1 971-1BA00)	–	Mounting adapter for standard mounting rail (6ES7390-6BA00-0AA0)

SITOP 24 V

1-phase

Output currents up to 2 A

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
The smallest ones					
	120-230 V AC 48-220 V DC	24 V DC 24 V DC	0.5 A 0.375 A	6EP1 331-2BA10 6EP1 731-2BA00	
LOGO!Power					
	100-240 V AC	24 V DC	1.3 A	6EP1 331-1SH02	
The S7-300 version					
	120/230 V AC	24 V DC	2 A	6ES7 307-1BA01-0AA0	
The DC/DC converter					
	48-110 V DC	24 V DC	2 A	6EP1 732-0AA00	
The outdoor version					
	24-110 V DC	24 V DC	2 A	6ES7 305-1BA80-0AA0	

SITOP 24 V 1-phase



3/2
3/2
3/2
3/3
3/3

Output current 2.5 A

SITOP smart
LOGO!Power
The S7-1200 PM1207
The universal types
SITOP PSA100E

3/6

Selection and ordering data

SITOP 24 V

1-phase

Output current 2.5 A

Overview

Product	SITOP smart	LOGO!Power	The S7-1200 version
Power supply, type	2.5 A	2.5 A	2.5 A
Order No.	6EP1 332-2BA10	6EP1 332-1SH42	6EP1 332-1SH71
			
	The single-phase power supply for universal use; complies with EU directive 94/9/EEC (ATEX 100a); slim design; with 50 % extra power for 5 s and 120 % rated power up to 45 °C.	The power supplies of the LOGO!Power range are optimally matched to the LOGO! logic modules in their functionality and design. With the wide-range input 85 V to 264 V AC and the possibility of mounting in small distribution boards, they can be used universally in the most diverse application areas in the low-end performance range.	The power supply PM1207 (Power Module) is optimized for the new SIMATIC S7-1200 controllers in terms of design and functionality and serves as an external supply for the inputs and outputs which, to prevent an imbalance, must not be drawn from the CPU encoder supply.
Dimension drawing	Page 15/4, Dimension drawing 2	Page 15/5, Dimension drawing 1	Page 15/5, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in \text{ rated}}$	1-phase AC 120/230 V AC set by means of selector switch	1-phase AC 100-240 V AC Wide-range input	120/230 V AC Automatic range selection
Voltage range	85 ... 132 V/170 ... 264 V	85 ... 264 V	85 ... 132 V/176 ... 264 V
Overvoltage resistance Mains buffering at $I_{out \text{ rated}}$	$2.3 \times V_{in \text{ rated}}$, 1.3 ms > 20 ms at $V_{in} = 93/187 \text{ V}$	$2.3 \times V_{in \text{ rated}}$, 1.3 ms > 40 ms at $V_{in} = 187 \text{ V}$	$2.3 \times V_{in \text{ rated}}$, 1.3 ms > 20 ms at $V_{in} = 93/187 \text{ V}$
Rated line frequency; range	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$ Making current limit (+25 °C) $I^2 t$	1.1/0.65 A < 27 A, typ. 3 ms < 0.3 A ² s	1.22-0.66 A < 30 A < 3 A ² s	1.2/0.67 A < 13 A, < 3 ms ($V_{in} = 230 \text{ V}$) < 0.5 A ² s
Built-in incoming fuse Recommended miniature circuit breaker (IEC 898) in the mains power input	T 2 A/250 V (not accessible) From 3 A, Characteristic C	Internal From 16 A, Characteristic B or from 10 A, Characteristic C	T 3.15 A/250 V (not accessible) 16 A, Characteristic B; 10 A, Characteristic C
Output			
Rated voltage value $V_{out \text{ rated}}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance • Static mains compensation • Static load balancing	±3 % Approx. 0.1 % Approx. 0.5 %	±3 % Approx. 0.1 % Approx. 1.5 %	±3 % Approx. ±0.1 % Approx. ±0.2 %
Residual ripple Spikes (bandwidth: 20 MHz)	< 150 mV _{pp} (typ. 10 mV _{pp}) < 240 mV _{pp} (typ. 50 mV _{pp})	< 200 mV _{pp} (typ. 10 mV _{pp}) < 300 mV _{pp} (typ. 40 mV _{pp})	< 150 mV _{pp} < 240 mV _{pp}
Adjustment range Status display On/off behavior	22.8 ... 28.0 V Green LED for 24 V OK Overshoot of V_{out} approx. 4 %	22.2 ... 26.4 V Green LED for 24 V OK No overshoot of V_{out} (soft start)	– Green LED for 24 V OK No overshoot of V_{out} (soft start)
Startup delay/voltage rise	< 0.1 s at 230 V AC/typ. 50 ms	< 0.5 s/typ. 10 ms	< 2 (6) s at 230 (120) V/ typ. 10 ms
Rated current value $I_{out \text{ rated}}$	2.5 A	2.5 A	2.5 A
Current range • Up to +60 °C • Derating	0 ... 2.5 A 0 ... 3 A (up to +45 °C)	0 ... 2.5 A (up to +55 °C) –	0 ... 2.5 A –
Dynamic overcurrent on • Power-up on short circuit • Short circuit during operation	Typ. 7 A for 100 ms Typ. 7 A for 200 ms		Typ. 6 A for 100 ms Typ. 6 A for 100 ms
Parallel switching for enhanced performance	Yes, 2 units	Yes, 2 units	Yes, 2 units
Continuation of the table	Page 3/4, column 1	Page 3/4, column 2	Page 3/4, column 3

1-phase

Output current 2.5 A

The universal types

2.5 A

6EP1 332-1SH12



The universal power supplies for all supply networks, with a wide-range input from 93 to 264 V AC and 110 to 350 V DC for supply from all typical networks.

SITOP PSA100E

2.5 A

6EP1 232-1AA00



The power supply is optimally tailored to standard requirements in the industrial environment; rugged metal enclosure; flexible mounting either on standard rails or directly on a wall; removable terminals.

Page 15/4, Dimension drawing 1

Page 15/6, Dimension drawing 1

1-phase AC or DC
 120-230 V AC
 wide-range input

93 ... 264 V AC or
 110 ... 350 V DC

$2.3 \times V_{in \text{ rated}}$, 1.3 ms
 $> 20 \text{ ms}$ at $V_{in} = 120 \text{ V}$, $> 80 \text{ ms}$
 (typ. 100 ms) at $V_{in} = 187 \text{ V}$
 0/50/60 Hz, 47 ... 63 Hz

1.3-0.7 A
 $< 33 \text{ A}$, $< 3 \text{ ms}$ ($V_{in} = 230 \text{ V}$)
 $< 3.5 \text{ A}^2\text{s}$

T 3.15 A (not accessible)
 Two-pole miniature circuit
 breaker from 10 A, Characteristic
 C or from 6 A, Characteristic D

1-phase AC
 230 V AC

187 ... 264 V

–
 $> 10 \text{ ms}$

50/60 Hz; 47 ... 63 Hz

0.65 A
 $< 30 \text{ A}$
 $< 0.8 \text{ A}^2\text{s}$

Internal
 From 6 A, Characteristic C

Controlled, isolated DC voltage
 24 V DC

$\pm 1 \%$
 Approx. 0.1 %
 Approx. 0.2 %

$< 50 \text{ mV}_{pp}$ (typ. 40 mV_{pp})
 $< 100 \text{ mV}_{pp}$ (typ. 40 mV_{pp})

–
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

 $< 0.6 \text{ s/typ. } 20 \text{ ms}$

2.5 A

Controlled, isolated DC voltage
 24 V DC

$\pm 3 \%$
 Approx. 0.1 %
 Approx. 0.5 %

$< 150 \text{ mV}_{pp}$
 $< 250 \text{ mV}_{pp}$

23 ... 26 V
 Green LED for 24 V OK
 Overshoot of V_{out}
 $< 1 \%$

 $< 1.5 \text{ s/} < 100 \text{ ms}$

2.5 A

0 ... 2.5 A

–

0 ... 2.5 A (up to +45 °C)
 0 ... 1.25 A (up to +70 °C)

Approx. 2.8 A constant current
 Approx. 2.8 A constant current

Yes, up to 10 units

Yes, 2 units

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SITOP 24 V

1-phase

Output current 2.5 A

3

Continued from	Page 3/2, column 1	Page 3/2, column 2	Page 3/2, column 3
Power supply, type	2.5 A	2.5 A	2.5 A
Order No.	6EP1 332-2BA10	6EP1 332-1SH42	6EP1 332-1SH71
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 85 %	Approx. 87 %	Approx. 83 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 9 W	Approx. 9 W	Approx. 12 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	Typ. $\pm 0.3\%$ V_{out}	$< 0.2\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. $\pm 1\%$ V_{out}	Typ. $\pm 1.5\%$ V_{out} (I_{out} : 10/90/10 %)	Typ. $\pm 3\%$ V_{out}
Load step settling time			
• 50 to 100 %	Typ. 0.2 ms	Typ. 20 ms (10 to 90 %)	< 5 ms
• 100 to 50 %	Typ. 0.2 ms	Typ. 20 ms (90 to 10 %)	< 5 ms
Protection and monitoring			
Output overvoltage protection	< 33 V	Yes, according to EN 60950	< 33 V
Current limitation	Typ. 3.2 to 3.4 A, overload capability 150 % $I_{out rated}$ up to 5 s/min	Typ. 3.4 A	2.65 A
Short-circuit protection	Constant current characteristic	Constant current characteristic	Constant current characteristic
Sustained short-circuit current rms value	Approx. 5 A	< 8 A	–
Overload/short-circuit indicator	–	–	–
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage according to EN 60950 and EN 50178
Protection class	Class I	Class II (without protective conductor)	Class I
Leakage current	< 3.5 mA (typ. 0.4 mA)	–	< 3.5 mA
Safety approval	Yes; CB scheme	Yes; CB scheme	Yes
CE mark	Yes	Yes	Yes
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)	cULus-Listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-Recognized (UL 60950, CSA C22.2 No. 60950), File E151273	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259
Explosion protection	ATEX EX II 3G Ex nA II T4 U; UL 1604	ATEX EX II 3G Ex nA IIC T3	–
FM approval	–	Class I Div. 2, Group A, B, C, D T4	–
Marine approval	GL	GL, ABS	–
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	Not applicable	Not applicable	Not applicable
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	–20 ... +55 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–40 ... +85 °C	–40 ... +70 °C	–25 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections			
• Supply input L, N, PE	One screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded	One screw terminal each (L, N) for 0.5 ... 2.5 mm ² single-core/finely stranded	One screw terminal each for 0.5 ... 2.5 mm ²
• Output +	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
• Output –	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
Dimensions (W × H × D) in mm	32.5 × 125 × 125	72 × 90 × 55	70 × 100 × 75
Weight, approx.	0.32 kg	0.25 kg	0.3 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 -35×7.5/15, wall mounting
Accessories			
	–	–	–

1-phase

Output current 2.5 A

3

Page 3/3, column 4	Page 3/3, column 5
2.5 A	2.5 A
6EP1 332-1SH12	6EP1 232-1AA00

Approx. 85 % Approx. 11 W	Approx. 84 % Approx. 11 W
Typ. $\pm 0.3 \% V_{out}$ Typ. $\pm 0.5 \% V_{out}$	$< 0.3 \% V_{out}$ Typ. $\pm 2.0 \% V_{out}$
< 2 ms (typ. 1 ms) < 2 ms (typ. 1 ms)	Typ. 0.2 ms Typ. 0.2 ms
Yes, according to EN 60950 2.8 A	< 35 V 3 A
Constant current characteristic up to 0 V	Electronic shutdown, automatic restart
< 3 A	< 2 A
–	–
Yes, safety extra low output voltage V_{out} according to EN 60950 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I
< 3.5 mA Yes Yes	< 3.5 mA (typ. 0.4 mA) Yes; CB scheme Yes
cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259
–	–
–	–
–	–
IP20	IP20
EN 55022 Class B Not applicable EN 61000-6-2	EN 55022 Class B Not applicable EN 61000-6-2
0 ... +60 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	–10 ... +70 °C for natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation
One screw terminal each for $2 \times 0.5 \dots 1.5 \text{ mm}^2$ finely stranded, $2 \times 0.5 \dots 2.5 \text{ mm}^2$ single-core 1 screw terminal for $2 \times 0.5 \dots 2.5 \text{ mm}^2$ 1 screw terminal for $2 \times 0.5 \dots 2.5 \text{ mm}^2$	Removable screw terminal, each $1 \times 0.5 \dots 2.5 \text{ mm}^2$ Removable screw terminal, $1 \times 0.5 \dots 2.5 \text{ mm}^2$ Removable screw terminal, $1 \times 0.5 \dots 2.5 \text{ mm}^2$
$80 \times 135 \times 120$ 0.5 kg Snaps onto DIN rail EN 60715 35x15, wall mounting	$52 \times 170 \times 110$ 0.8 kg Snaps onto DIN rail EN 60715 35x7.5/15, wall mounting
–	–

SITOP 24 V

1-phase

Output current 2.5 A

Selection and ordering data

Product	Input Voltage $V_{in \text{ rated}}$	Output Voltage $V_{out \text{ rated}}$	Current $I_{out \text{ rated}}$	Order No.	Price in euros per PU
SITOP smart					
	120/230 V AC	24 V DC	2.5 A	6EP1 332-2BA10	
LOGO!Power					
	100-240 V AC	24 V DC	2.5 A	6EP1 332-1SH42	
The S7-1200 version					
	120/230 V AC	24 V DC	2.5 A	6EP1 332-1SH71	
The universal types					
	120-230 V AC	24 V DC	2.5 A	6EP1 332-1SH12	
SITOP PSA100E					
	230 V AC	24 V DC	2.5 A	6EP1 232-1AA00	

SITOP 24 V

1-phase

4



4/2	Output current 4 A
4/2	LOGO!Power
4/2	The S7-200 version
4/3	The Class2 version
4/3	The universal types
4/3	SITOP PSA100E

4/6	Selection and ordering data
-----	-----------------------------

SITOP 24 V

1-phase

Output current 4 A

Overview

Product	LOGO!Power	The S7-200 type	The Class2 version
Power supply, type	4 A	3.5 A	3.7 A
Order No.	6EP1 332-1SH51	6EP1 332-1SH31 ¹⁾	6EP1 332-2BA00
			
	The power supplies of the LOGO!Power range are optimally matched to the LOGO! logic modules in their functionality and design. With the wide-range input 85 V to 264 V AC, they can be used universally in the low-end performance range.	Optimally matched in design and functionality to the SIMATIC S7-200 micro PLC; flat design, particularly suitable for low cabinet depths.	The Class2 version with output limited to 100 W maximum.
Dimension drawing	Page 15/6, Dimension drawing 2	Page 15/7, Dimension drawing 1	Page 15/7, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in \text{ rated}}$	1-phase AC 100-240 V AC Wide-range input	1-phase AC 120/230 V AC Set via wire jumper	1-phase AC 120/230 V AC Set via wire jumper
Voltage range	85 ... 264 V	93 ... 132 V/187 ... 264 V	93 ... 132 V/187 ... 264 V
Overvoltage resistance	$2.3 \times V_{in \text{ rated}}$, 1.3 ms	$2.3 \times V_{in \text{ rated}}$, 1.3 ms	$2.3 \times V_{in \text{ rated}}$, 1.3 ms
Mains buffering at $I_{out \text{ rated}}$	> 40 ms at $V_{in} = 187 \text{ V}$	> 20 ms at $V_{in} = 187 \text{ V}$	> 10 ms at $V_{in} = 93/187 \text{ V}$
Rated line frequency; range	50/60 Hz; 47 ... 63 Hz	50/60 Hz, 47 ... 63 Hz	50/60 Hz, 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$	1.95-0.97 A	1.65/0.95 A	1.8/0.7 A
Making current limit (+ 25 °C)	< 30 A	< 33 A, < 3 ms ($V_{in} = 230 \text{ V}$)	< 32 A, typ. 3 ms ($V_{in} = 230 \text{ V}$)
I_{t}	< 2.5 A ² s	< 1.0 A ² s	< 0.8 A ² s
Built-in incoming fuse	Internal	T 2.5 A/250 V (not accessible)	T 3.15 A/250 V (not accessible)
Recommended miniature circuit breaker (IEC 898) in the mains power input	From 16 A, Characteristic B or from 10 A, Characteristic C	Two-pole miniature circuit breaker from 10 A, Characteristic C or from 6 A, Characteristic D	From 6 A, Characteristic C
Output			
Rated voltage value $V_{out \text{ rated}}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance	±3 %	±5 % (typ. ±2 %)	±3 %
• Static mains compensation	Approx. 0.1 %	Approx. 0.1 %	Approx. 0.1 %
• Static load balancing	Approx. 1.5 %	Approx. 0.2 %	Approx. 0.2 %
Residual ripple	< 200 mV _{pp} (typ. 10 mV _{pp})	< 150 mV _{pp} (typ. 30 mV _{pp})	< 150 mV _{pp}
Spikes (bandwidth: 20 MHz)	< 300 mV _{pp} (typ. 20 mV _{pp})	< 240 mV _{pp} (typ. 110 mV _{pp})	< 240 mV _{pp}
Adjustment range	22.2 ... 26.4 V	–	22.8 ... 26.4 V ²⁾
Status display	Green LED for 24 V OK	–	Green LED for 24 V OK
On/off behavior	No overshoot of V_{out} (soft start)	No overshoot of V_{out} (soft start)	No overshoot of V_{out} (soft start)
Startup delay/voltage rise	< 0.5 s/typ. 35 ms	< 1 s/typ. 80 ms	< 3 s/typ. 80 ms
Rated current $I_{out \text{ rated}}$	4 A	3.5 A	3.7 A
Current range	0 ... 4 A (up to +55 °C)	0 ... 3.5 A	0 ... 3.7 A
• Up to +60 °C	–	–	–
• Derating	–	–	–
Dynamic overcurrent on	–	–	–
• Power-up on short circuit	–	Typ. 5 A for 100 ms	–
• Short circuit during operation	–	Typ. 5 A for 100 ms	–
Parallel switching for enhanced performance	Yes, 2 units	Yes, up to 5 units	Yes, 2 units ²⁾
Continuation of the table	Page 4/4, column 1	Page 4/4, column 2	Page 4/4, column 3

¹⁾ SIPLUS module 6AG1 203-1SH31-2AA0 for extended temperature range –25 °C to +70 °C and use under medial load (e.g. chlorine sulfur atmosphere).

²⁾ Only permissible at ambient temperature 0 °C to +50 °C.

1-phase

Output current 4 A

The universal types

4 A

6EP1 332-1SH22



The universal power supplies for all supply networks, with a wide-range input from 93 to 264 V AC and 110 to 350 V DC for supply from all typical networks.

SITOP PSA100E

4 A

6EP1 232-1AA10



The power supply is tailored to standard requirements in the industrial environment; rugged metal enclosure; flexible mounting either on standard rails or directly on a wall; removable terminals.

Page 15/4, Dimension drawing 1

Page 15/6, Dimension drawing 1

1-phase AC or DC
120-230 V AC
 wide-range input
 93 ... 264 V AC or
 110 ... 350 V DC

$2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 120$ V, > 80 ms
 (typ. 100 ms) at $V_{in} = 187$ V
 0/50/60 Hz, 47 ... 63 Hz

1.8-1.1 A
 < 33 A, < 3 ms ($V_{in} = 230$ V)
 < 3.5 A²s

T 3.15 A (not accessible)
 Two-pole miniature circuit
 breaker from 10 A,
 Characteristic C, or from 6 A,
 Characteristic D

1-phase AC
230 V AC

187 ... 264 V

—
 > 10 ms

50/60 Hz; 47 ... 63 Hz

1.1 A
 < 30 A
 < 0.8 A²s

Internal
 From 6 A, Characteristic C

Controlled, isolated DC voltage
24 V DC

± 1 %
 Approx. 0.1 %
 Approx. 0.2 %

< 50 mV_{pp} (typ. 40 mV_{pp})
 < 100 mV_{pp} (typ. 40 mV_{pp})

—
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 0.6 s/typ. 20 ms
4 A

Controlled, isolated DC voltage
24 V DC

± 3 %
 Approx. 0.1 %
 Approx. 0.5 %

< 150 mV_{pp}
 < 250 mV_{pp}

23 ... 26 V
 Green LED for 24 V OK
 Overshoot of V_{out}
 < 1 %

< 1.5 s/ < 200 ms
4 A

0 ... 2.5 A
 0 ... 4 A (up to +50 °C)

0 ... 4 A (up to +45 °C)
 0 ... 2 A (up to +70 °C)

Approx. 4.4 A constant current
 Approx. 4.4 A constant current

Yes, up to 10 units

Yes, 2 units

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Page 4/5, column 5

SITOP 24 V

1-phase

Output current 4 A

Continued from	Page 4/2, column 1	Page 4/2, column 2	Page 4/2, column 3
Power supply, type	4 A	3.5 A	3.7 A
Order No.	6EP1 332-1SH51	6EP1 332-1SH31	6EP1 332-2BA00
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 89 %	Approx. 84 %	> 80 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 12 W	Approx. 16 W	Approx. 22 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	< 0.2 % V_{out}	Typ. $\pm 0.3\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. $\pm 1.5\%$ V_{out} (I_{out} : 10/90/10 %)	Typ. $\pm 3\%$ V_{out}	Typ. $\pm 2.5\%$ V_{out}
Load step settling time			
• 50 to 100 %	Typ. 20 ms (10 to 90 %)	< 5 ms	Typ. 0.2 ms
• 100 to 50 %	Typ. 20 ms (90 to 10 %)	< 5 ms	Typ. 0.2 ms
Protection and monitoring			
Output overvoltage protection	Yes, according to EN 60950	Yes, according to EN 60950	Yes, according to EN 60950
Current limitation	Typ. 4.7 A	3.8 A	Typ. 3.8 ... 4.1 A
Short-circuit protection	Constant current characteristic	Constant current characteristic up to typ. 14 V, electronic shutdown below that, automatic restart	Electronic shutdown, automatic restart
Sustained short-circuit current rms value	< 10 A	< 4 A	–
Overload/short-circuit indicator	–	–	–
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950	Yes, safety extra low output voltage V_{out} according to EN 60950
Protection class	Class II (without protective conductor)	Class I	Class I
Leakage current	–	< 3.5 mA	< 3.5 mA (typ. 0.4 mA)
Safety approval	Yes; CB scheme	Yes	Yes; CB scheme
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289; cURus-recognized (UL 1950, CSA C22.2 No. 60950), File E151273; UL 1310
Explosion protection	ATEX EX II 3G Ex nA IIC T3	–	–
FM approval	Class I Div. 2, Group A, B, C, D T4	–	–
Marine approval	GL, ABS	–	–
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	EN 61000-3-2	EN 61000-3-2	EN 61000-3-2
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	–20 ... +55 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–40 ... +70 °C	–25 ... +85 °C	–25 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, without condensation	Climate class 3K3 according to EN 60721, without condensation	Climate class 3K3 according to EN 60721, without condensation
Mechanics			
Connections			
• Supply input L, N, PE	1 screw terminal each (L, N) for 0.5 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 1.5 mm ² single-core/finely stranded	One screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded
• Output +	2 screw terminals each for 0.5 ... 2.5 mm ²	1 screw terminal for 0.5 ... 1 mm ²	1 screw terminal for 0.5 ... 2.5 mm ²
• Output –	2 screw terminals each for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 1 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
Dimensions (W × H × D) in mm	90 × 90 × 55	160 × 80 × 62	75 × 125 × 125
Weight, approx.	0.34 kg	0.5 kg	0.75 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15, wall mounting	Snaps onto DIN rail EN 60715 35×7.5/15
Accessories			
	–	Mounting bracket (6EP1971-1AA01)	–

1-phase

Output current 4 A

Page 4/3, column 4	Page 4/3, column 5
4 A	4 A
6EP1 332-1SH22	6EP1 232-1AA10
Approx. 85 % Approx. 17 W	Approx. 87 % Approx. 15 W
Typ. $\pm 0.3 \% V_{out}$ Typ. $\pm 0.5 \% V_{out}$	$< 0.3 \% V_{out}$ Typ. $\pm 3.0 \% V_{out}$
< 2 ms (typ. 1 ms) < 2 ms (typ. 1 ms)	Typ. 0.2 ms Typ. 0.2 ms
Yes, according to EN 60950 4.4 A	< 35 V Typ. 4.4 A
Constant current characteristic up to 0 V	Electronic shutdown, automatic restart
< 5 A –	< 3 A –
Yes, safety extra low output voltage V_{out} according to EN 60950 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I
< 3.5 mA Yes Yes	< 3.5 mA (typ. 0.4 mA) Yes; CB scheme Yes
cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No.107.1), File E197259
– – – IP20	– – – IP20
EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55022 Class B – EN 61000-6-2
0 ... +50 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, without condensation	–10 ... +70 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, without condensation
One screw terminal each for $2 \times 0.5 \dots 1.5 \text{ mm}^2$ finely stranded, $2 \times 0.5 \dots 2.5 \text{ mm}^2$ single-core 1 screw terminal for $2 \times 0.5 \dots 2.5 \text{ mm}^2$ 1 screw terminal for $2 \times 0.5 \dots 2.5 \text{ mm}^2$	Removable screw terminal, each $1 \times 0.5 \dots 2.5 \text{ mm}^2$ Removable screw terminal for $1 \times 0.5 \dots 2.5 \text{ mm}^2$ Removable screw terminal for $1 \times 0.5 \dots 2.5 \text{ mm}^2$
80 × 135 × 120 0.5 kg Snaps onto DIN rail EN 60715 35×15, wall mounting	52 × 170 × 110 0.8 kg Snaps onto DIN rail EN 60715 35×7.5/15, wall mounting
–	–

4

SITOP 24 V

1-phase

Output current 4 A

Selection and ordering data

Product	Input Voltage $V_{in \text{ rated}}$	Output Voltage $V_{out \text{ rated}}$	Current $I_{out \text{ rated}}$	Order No.	Price in euros per PU
LOGO!Power					
	100-240 V AC	24 V DC	4 A	6EP1 332-1SH51	
The S7-200 type					
	100/230 V AC	24 V DC	3.5 A	6EP1 332-1SH31	
The Class2 version					
	120/230 V AC	24 V DC	3.7 A	6EP1 332-2BA00	
The universal types					
	120-230 V AC	24 V DC	4 A	6EP1 332-1SH22	
SITOP PSA100E					
	230 V AC	24 V DC	4 A	6EP1 232-1AA10	

SITOP 24 V 1-phase and 2-phase



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5/2

5/3

5/3

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5/3

5/3

Output currents 5 A and 6 A

SITOP modular

SITOP smart

The S7-300 version

The outdoor version

The flat design

SITOP PSA100E

5/6**Selection and ordering data**

SITOP 24 V

1-phase and 2-phase

Output currents 5 A and 6 A

Overview

Product	SITOP modular	SITOP smart	
Power supply, type	5 A	5 A	5 A
Order No.	6EP1 333-3BA00 ¹⁾	6EP1 333-2AA01	6EP1 333-2BA01
			
	The modular power supply with 1-phase and 2-phase wide-range input for global use; with switchable output characteristic; functional expansion possible using expansion modules.	The 1-phase power supply for universal use; complies with EU directive 94/9/EEC (ATEX 100a); slim design; with 50 % extra power for 5 s and 120 % rated power up to 45 °C; without limiting supply harmonics.	The 1-phase power supply for universal use; complies with EU directive 94/9/EEC (ATEX 100a); slim design; with 50 % extra power for 5 s and 120 % rated power up to 45 °C.
Dimension drawing	Page 15/8, Dimension drawing 1	Page 15/8, Dimension drawing 2	Page 15/8, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in \text{ rated}}$	1-phase and 2-phase AC 120-230/230-500 V AC Set by means of selector switch on device	1-phase AC 120/230 V AC Set by means of selector switch on device	1-phase AC 120/230 V AC Set by means of selector switch on device
Voltage range	85 ... 264 V/176 ... 500 V	85 ... 132 V/170 ... 264 V	85 ... 132 V/170 ... 264 V
Overvoltage resistance	1300 V_{peak} , 1.3 ms	$2.3 \times V_{in \text{ rated}}$, 1.3 ms	$2.3 \times V_{in \text{ rated}}$, 1.3 ms
Mains buffering at $I_{out \text{ rated}}$	> 25 ms at $V_{in} = 120/230 \text{ V}$	> 20 ms at $V_{in} = 93/187 \text{ V}$	> 20 ms at $V_{in} = 93/187 \text{ V}$
Rated line frequency; range	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$	2.2-1.2/1.2-0.61 A	2.1/1.15 A	2.1/1.15 A
Making current limit (+25 °C)	< 35 A	< 32 A, typ. 3 ms	< 32 A, typ. 3 ms
I^2t	< 1.7 A ² s	< 0.8 A ² s	< 0.8 A ² s
Built-in incoming fuse	T 3.15 A (not accessible)	T 3.15 A/250 V (not accessible)	T 3.15 A/250 V (not accessible)
Recommended miniature circuit breaker (IEC 898) in the mains power input	From 6 A (10 A) Characteristic C (B); with 2-phase operation: miniature circuit breaker with two-pole connection or circuit breaker 3RV1021-1EA10	From 6 A, Characteristic C	From 6 A, Characteristic C
Output			
Rated voltage value $V_{out \text{ rated}}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance	±3 %	±3 %	±3 %
• Static mains compensation	Approx. 0.1 %	Approx. 0.1 %	Approx. 0.1 %
• Static load balancing	Approx. 0.1 %	Approx. 0.5 %	Approx. 0.5 %
Residual ripple	< 50 mV _{pp}	< 150 mV _{pp} (typ. 50 mV _{pp})	< 150 mV _{pp} (typ. 50 mV _{pp})
Spikes (bandwidth: 20 MHz)	< 200 mV _{pp}	< 240 mV _{pp} (typ. 150 mV _{pp})	< 240 mV _{pp} (typ. 150 mV _{pp})
Adjustment range	24 ... 28.8 V (max. 120 W)	22.8 ... 28 V	22.8 ... 28 V
Status display	Green LED for 24 V OK	Green LED for 24 V OK	Green LED for 24 V OK
On/off behavior	Overshoot of V_{out} approx. 3 %	Overshoot of V_{out} approx. 4 %	Overshoot of V_{out} approx. 4 %
Startup delay/voltage rise	< 1 s/< 50 ms	< 0.1 s at 230 V AC/typ. 50 ms	< 0.1 s at 230 V AC/typ. 50 ms
Rated current value $I_{out \text{ rated}}$	5 A	5 A	5 A
Current range	0 ... 5 A	0 ... 5 A	0 ... 5 A
• Up to +60 °C	–	0 ... 6 A (up to +45 °C)	0 ... 6 A (up to +45 °C)
• Derating	–	–	–
Dynamic overcurrent on	–	–	–
• Power-up on short circuit	Approx. 5.5 A constant current	Typ. 17 A for 100 ms	Typ. 17 A for 100 ms
• Short circuit during operation	Typ. 15 A for 25 ms	Typ. 17 A for 200 ms	Typ. 17 A for 200 ms
Parallel switching for enhanced performance	Yes, 2 units (switchable characteristic)	Yes, 2 units	Yes, 2 units
Continuation of the table	Page 5/4, column 1	Page 5/4, column 2	Page 5/4, column 3

¹⁾ SITOP modular plus 6EP1 333-3BA00-8AC0, PCB with protective coating.

1-phase and 2-phase

Output currents 5 A and 6 A

The S7-300 version

5 A

6ES7 307-1EA01-0AA0



The proven power supply in SIMATIC S7-300 design; with PS-CPU connecting comb and for mounting directly on S7 rail.

The outdoor version

5 A

6ES7 307-1EA80-0AA0²⁾

The power supply for extreme environmental conditions in SIMATIC S7-300 design; can be snapped onto S7 rail; with PS-CPU connecting comb.

The flat design

5 A

6EP1 333-1AL12



The flat design is of great advantage where only low mounting depths are available, e.g. for use with distributed I/O, in machine benches or alcoves; design matched to SIMATIC ET 200B.

SITOP PSA100E

6 A

6EP1 233-1AA00



The power supply is tailored to standard requirements in the industrial environment; rugged metal enclosure; flexible mounting either on standard rails or directly on a wall; removable terminals.

Page 15/3, Dimension drawing 1

Page 15/3, Dimension drawing 2

Page 15/9, Dimension drawing 1

Page 15/6, Dimension drawing 1

1-phase AC
120/230 V AC
 Automatic range switching
 85 ... 132 V/170 ... 264 V

$2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 93/187$ V
 50/60 Hz; 47 ... 63 Hz

2.3/1.2 A
 < 20 A, < 3 ms
 < 1.2 A²s

T 3.15 A/250 V (not accessible)
 From 6 A, Characteristic C

1-phase AC
120/230 V AC
 Set by means of selector switch on device
 93 ... 132 V/187 ... 264 V

$2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 93/187$ V
 50/60 Hz; 47 ... 63 Hz

2.1/1.2 A
 < 45 A, < 3 ms
 < 1.8 A²s (typ. 1.2 A²s)

T 3.15 A/250 V (not accessible)
 From 10 A, Characteristic C or from 6 A, Characteristic D

1-phase AC
120/230 V AC
 Set by means of selector switch on device
 85 ... 132 V/170 ... 264 V

$2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 93/187$ V
 50/60 Hz; 47 ... 63 Hz

2.2/1.2 A
 < 32 A, < 3 ms
 < 0.8 A²s

T 3.15 A/250 V (not accessible)
 From 6 A, Characteristic C

1-phase AC
230 V AC
 187 ... 264 V

—
 > 10 ms
 50/60 Hz; 47 ... 63 Hz

1.4 A
 < 35 A
 < 1.2 A²s

Internal
 From 10 A, Characteristic C

Controlled, isolated DC voltage
24 V DC

± 3 %
 Approx. 0.1 %
 Approx. 0.5 %

< 50 mV_{pp} (typ. 10 mV_{pp})
 < 150 mV_{pp} (typ. 20 mV_{pp})

—
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 2 s/typ. 10 ms

5 A

0 ... 5 A

—

Typ. 20 A for 100 ms
 Typ. 20 A for 100 ms

Yes

Controlled, isolated DC voltage
24 V DC

± 3 %
 Approx. 0.2 %
 Approx. 0.4 %

< 150 mV_{pp} (typ. 40 mV_{pp})
 < 240 mV_{pp} (typ. 90 mV_{pp})

—
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 3 s/typ. 100 ms

5 A

0 ... 5 A

0 ... 5 A (up to +70 °C)

Typ. 20 A for 180 ms
 Typ. 20 A for 80 ms

Not permitted

Controlled, isolated DC voltage
24 V DC

± 1 %
 Approx. 0.1 %
 Approx. 0.5 %

< 150 mV_{pp} (typ. 40 mV_{pp})
 < 240 mV_{pp} (typ. 100 mV_{pp})

22 ... 29 V
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 2 s/typ. 40 ms

5 A

0 ... 5 A

—

Typ. 20 A for 500 ms
 Typ. 20 A for 500 ms

Yes, 2 units

Controlled, isolated DC voltage
24 V DC

± 3 %
 Approx. 0.1 %
 Approx. 0.5 %

< 150 mV_{pp}
 < 250 mV_{pp}

23 ... 26 V
 Green LED for 24 V OK
 Overshoot of V_{out}
 < 5 %

< 0.3 s/ < 500 ms

6 A

0 ... 6 A (up to +45 °C)

0 ... 3 A (up to +70 °C)

Yes, 2 units

Page 5/5, column 4

Page 5/5, column 5

Page 5/5, column 6

Page 5/5, column 7

²⁾ SIPLUS module 6AG1 307-1EA80-2AA0 for temperature range -25 °C to +60 °C and use under medium load (e.g. sulfur chloride atmosphere). This SIPLUS power supply conforms with standards for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).

SITOP 24 V

1-phase and 2-phase

Output currents 5 A and 6 A

Continued from	Page 5/2, column 1	Page 5/2, column 2	Page 5/2, column 3
Power supply, type (repeated)	5 A	5 A	5 A
Order No. (repeated)	6EP1 333-3BA00	6EP1 333-2AA01	6EP1 333-2BA01
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 87 %	Approx. 87 %	Approx. 87 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 18 W	Approx. 17 W	Approx. 17 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	Typ. $\pm 0.1\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. $+3\%$ V_{out}	Typ. $\pm 1\%$ V_{out}	Typ. $\pm 1\%$ V_{out}
Load step settling time			
• 50 to 100 %	< 5 ms (typ. 2 ms)	Typ. 0.2 ms	Typ. 0.2 ms
• 100 to 50 %	< 5 ms (typ. 2 ms)	Typ. 0.2 ms	Typ. 0.2 ms
Protection and monitoring			
Output overvoltage protection	< 35 V	< 33 V	< 33 V
Current limitation	Typ. 5.5 A	Typ. 6.4 ... 6.6 A, overload capability 150 % $I_{out rated}$ up to 5 s/min	Typ. 6.4 ... 6.6 A, overload capability 150 % $I_{out rated}$ up to 5 s/min
Short-circuit protection	Alternatively, constant current characteristic approx. 5.5 A or latching shutdown	Constant current characteristic	Constant current characteristic
Sustained short-circuit current rms value	Approx. 5.5 A	Approx. 10 A	Approx. 10 A
Overload/short-circuit indicator	LED yellow for "overload", LED red for "latching shutdown"	–	–
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178
Protection class	Class I	Class I	Class I
Leakage current	< 3.5 mA (typ. 0.25 mA)	< 3.5 mA (typ. 0.4 mA)	< 3.5 mA (typ. 0.4 mA)
Safety approval	Yes	Yes; CB scheme	Yes; CB scheme
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259, cCSAus (CSA C22.2 No. 60950-1, UL 60950-1)	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 EEx nA II T4 U; UL 1604	ATEX EX II 3G EEx nA II T4 U; UL 1604
FM approval	–	–	–
Marine approval	–	GL	GL
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	EN 61000-3-2	–	EN 61000-3-2
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–25 ... +85 °C	–40 ... +85 °C	–40 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections			
• Supply input L, N, PE	1 screw terminal each for 0.2 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded
• Output +	2 screw terminals for 0.2 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
• Output –	2 screw terminals for 0.2 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
Dimensions (W × H × D) in mm	70 × 125 × 125	50 × 125 × 125	50 × 125 × 125
Weight, approx.	1.2 kg	0.5 kg	0.5 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15
Accessories			
	Buffer module (6EP161-3BA00) Signal. module (6EP161-3BA10) Redundancy module (6EP161-3BA20)	–	–

1-phase and 2-phase

Output currents 5 A and 6 A

Page 5/3, column 4	Page 5/3, column 5	Page 5/3, column 6	Page 5/3, column 7
5 A	5 A	5 A	6 A
6ES7 307-1EA01-0AA0	6ES7 307-1EA80-0AA0	6EP1 333-1AL12	6EP1 233-1AA00
Approx. 87 % Approx. 18 W	Approx. 84 % Approx. 23 W	Approx. 88 % Approx. 17 W	Approx. 87 % Approx. 22 W
Typ. ± 0.1 % V_{out} Typ. ± 1 % V_{out}	Typ. ± 0.3 % V_{out} Typ. ± 3 % V_{out}	Typ. ± 0.3 % V_{out} Typ. ± 0.5 % V_{out}	< 0.3 % V_{out} Typ. ± 2.0 % V_{out}
Typ. 0.3 ms Typ. 0.3 ms	< 5 ms (typ. 0.2 ms) < 5 ms (typ. 0.2 ms)	< 5 ms (typ. 0.1 ms) < 5 ms (typ. 0.1 ms)	Typ. 0.1 ms Typ. 0.1 ms
Additional control loop, shutdown at < 28.8 V, automatic restart 5.5 ... 6.5 A	Additional control loop, shutdown at approx. 30 V, automatic restart 5.5 ... 6.5 A	Additional control loop, shutdown at approx. 33 V, automatic restart 5.5 ... 6.5 A	< 35 V Typ. 6.6 A
Electronic shutdown, automatic restart < 7 A –	Electronic shutdown, automatic restart < 5 A –	Electronic shutdown, automatic restart < 5 A –	Electronic shutdown, automatic restart < 3.6 A –
Yes, safety extra low output voltage V_{out} according to EN 60950-1 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178, creepage dis- tances and clearances > 8 mm Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I
< 3.5 mA (typ. 0.5 mA) Notified Body Yes	< 3.5 mA (typ. 0.3 mA) Yes Yes	< 3.5 mA (typ. 0.26 mA) Yes Yes	< 3.5 mA (typ. 0.8 mA) Yes; CB scheme Yes
cULus-listed (UL 508, CSA C22.2 No. 142) File E143289	UL-listed (UL 508) File E143289, CSA (CSA C22.2 No. 14)	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259
ATEX 94/9/EC EX II 3G; EEx, nA, II, T4 U; UL 1604 Class I Div. 2 Group A, B, C, D Class I Div. 2 Group A, B, C, D, T 4 In S7-300 system IP20	– – GL IP20	– – – IP20	– – – IP20
EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55011 Class A – EN 61000-6-2	EN 55022 Class B – EN 61000-6-2	EN 55022 Class B – EN 61000-6-2
0 ... +60 °C with natural convection –40 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	–25 ... +70 °C with natural convection –40 ... +85 °C Climate class 3K5 according to EN 60721, transient condensa- tion permitted	0 ... +60 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	–10 ... +70 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation
1 screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 3 screw terminals for 0.5 ... 2.5 mm ² 3 screw terminals for 0.5 ... 2.5 mm ²	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 3 screw terminals for 0.5 ... 2.5 mm ² 3 screw terminals for 0.5 ... 2.5 mm ²	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 3 screw terminals for 0.5 ... 2.5 mm ² 3 screw terminals for 0.5 ... 2.5 mm ²	Removable screw terminal each for 1 × 0.5 ... 2.5 mm ² Removable screw terminal, 1 × 0.5 ... 2.5 mm ² Removable screw terminal, 1 × 0.5 ... 2.5 mm ²
60 × 125 × 120 0.6 kg Can be mounted onto S7 rail	80 × 125 × 120 0.57 kg Can be mounted onto S7 rail	160 × 130 × 60 0.6 kg Snaps onto DIN rail EN 60715 35×7.5/15	52 × 170 × 110 0.9 kg Snaps onto DIN rail EN 60715 35×7.5/15, wall mounting
Mounting adapter for standard mounting rail (6EP1 971-1BA00)	Mounting adapter for standard mounting rail (6ES7390-6BA00-0AA0)	Mounting bracket (6EP1971-1AA01)	–

SITOP 24 V

1-phase and 2-phase

Output currents 5 A and 6 A

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
SITOP modular					
	120-230/230-500 V AC	24 V DC	5 A	6EP1 333-3BA00	
SITOP smart					
	120/230 V AC	24 V DC	5 A	6EP1 333-2AA01	
	120/230 V AC	24 V DC	5 A	6EP1 333-2BA01	
The S7-300 version					
	120/230 V AC	24 V DC	5 A	6ES7 307-1EA01-0AA0	
The outdoor version					
	120/230 V AC	24 V DC	5 A	6ES7 307-1EA80-0AA0	
The flat design					
	120/230 V AC	24 V DC	5 A	6EP1 333-1AL12	
SITOP PSA100E					
	230 V AC	24 V DC	6 A	6EP1 233-1AA00	

SITOP 24 V

1-phase and 2-phase



	Output currents 10 A and 12 A
6/2	SITOP modular
6/2	SITOP smart
6/3	The S7-300 version
6/3	The flat design
6/3	The universal type
6/3	SITOP PSA100E

6/6 Selection and ordering data

SITOP 24 V

1-phase and 2-phase

Output currents 10 A and 12 A

Overview

Product	SITOP modular	SITOP smart	
Power supply, type	10 A	10 A	10 A
Order No.	6EP1 334-3BA00 ¹⁾²⁾	6EP1 334-2AA01	6EP1 334-2BA01 ³⁾
			
The product families are highlighted in the same colors. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.	The modular power supply with 1-phase and 2-phase wide-range input for global use; with switchable output characteristics; functional expansion possible using expansion modules.	The single-phase power supply for universal use; complies with EU directive 94/9/EEC (ATEX 100a); slim design; with 50 % extra power for 5 s and 120 % rated power up to 45 °C; without limiting supply harmonics.	The single-phase power supply for universal use; complies with EU directive 94/9/EEC (ATEX 100a); slim design; with 50 % extra power for 5 s and 120 % rated power up to 45 °C.
Dimension drawing	Page 15/9, Dimension drawing 2	Page 15/10, Dimension drawing 1	Page 15/10, Dimension drawing 1

Technical specifications

Input			
Rated voltage value $V_{in \text{ rated}}$	1-phase and 2-phase AC 120-230/230-500 V AC Set by means of selector switch on device	1-phase AC 120/230 V AC Set by means of selector switch on device	1-phase AC 120/230 V AC Set by means of selector switch on device
Voltage range	85 ... 264 V/176 ... 550 V	85 ... 132 V/170 ... 264 V	85 ... 132 V/170 ... 264 V
Overvoltage resistance Mains buffering at $I_{out \text{ rated}}$ Rated line frequency; range	1300 V_{peak} , 1.3 ms > 25 ms at $V_{in} = 120/230 \text{ V}$ 50/60 Hz; 47 ... 63 Hz	$2.3 \times V_{in \text{ rated}}$, 1.3 ms > 20 ms at $V_{in} = 93/187 \text{ V}$ 50/60 Hz; 47 ... 63 Hz	$2.3 \times V_{in \text{ rated}}$, 1.3 ms > 20 ms at $V_{in} = 93/187 \text{ V}$ 50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$ Making current limit (+ 25 °C) I_t^2	4.4-2.4/2.4-1.1 A < 35 A < 4.0 A ² s	4.1/2.4 A < 65 A, typ. 3 ms < 3.3 A ² s	4.1/2.0 A < 65 A, typ. 3 ms < 3.3 A ² s
Built-in incoming fuse Recommended miniature circuit breaker (IEC 898) in the mains power input	T 6.3 A (not accessible) From 6 A (10 A) Characteristic C (B); with 2-phase operation: miniature circuit breaker with two-pole connection or circuit breaker 3RV1021-1EA10	T 6.3 A/250 V (not accessible) From 10 A, Characteristic C	T 6.3 A/250 V (not accessible) From 10 A, Characteristic C
Output			
Rated voltage value $V_{out \text{ rated}}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance • Static mains compensation • Static load balancing	±3 % Approx. 0.1 % Approx. 0.1 %	±3 % Approx. 0.1 % Approx. 0.5 %	±3 % Approx. 0.1 % Approx. 0.5 %
Residual ripple Spikes (bandwidth: 20 MHz)	< 50 mV _{pp} < 200 mV _{pp}	< 150 mV _{pp} (typ. 50 mV _{pp}) < 240 mV _{pp} (typ. 150 mV _{pp})	< 150 mV _{pp} (typ. 50 mV _{pp}) < 240 mV _{pp} (typ. 150 mV _{pp})
Adjustment range Status display On/off behavior	24 ... 28.8 V (max. 240 W) Green LED for 24 V OK Overshoot of V_{out} approx. 3 %	22.8 ... 28 V Green LED for 24 V OK Overshoot of V_{out} approx. 4 %	22.8 ... 28 V Green LED for 24 V OK Overshoot of V_{out} approx. 4 %
Startup delay/voltage rise Rated current value $I_{out \text{ rated}}$	< 1 s / < 50 ms 10 A	< 0.1 s at 230 V AC/typ. 50 ms 10 A	< 0.1 s at 230 V AC/typ. 50 ms 10 A
Current range • Up to +60 °C • Derating	0 ... 10 A 0 ... 10 A	0 ... 10 A 0 ... 12 A (up to +45 °C)	0 ... 10 A 0 ... 12 A (up to +45 °C)
Dynamic overcurrent on • Power-up on short circuit • Short circuit during operation	Approx. 12 A constant current Typ. 30 A for 25 ms	Typ. 30 A for 100 ms Typ. 33 A for 200 ms	Typ. 30 A for 100 ms Typ. 33 A for 200 ms
Parallel switching for enhanced performance	Yes, 2 units (switchable characteristic)	Yes, 2 units	Yes, 2 units
Continuation of the table	Page 6/4, column 1	Page 6/4, column 2	Page 6/4, column 3

¹⁾ SIPLUS module 6AG1 334-3BA00-4AA0 for use under medial load (e.g. sulfur chloride atmosphere).

²⁾ SITOP modular plus 6EP1 334-3BA00-8AB0, PCB with protective coating.

³⁾ SIPLUS module 6AG1 344-2BA01-4AA0 for use under medial load (e.g. sulfur chloride atmosphere).

1-phase and 2-phase

Output currents 10 A and 12 A

The S7-300 version

10 A

6ES7 307-1KA02-0AA0



The proven power supply in SIMATIC S7-300 design; with PS-CPU connecting comb and for mounting direct on S7 rail.

Page 15/10, Dimension drawing 2

The flat design

10 A

6EP1 334-1AL12



The flat design is of great advantage where only low mounting depths are available, e.g. for use with distributed I/O, in machine benches or alcoves; design matched to SIMATIC ET 200B.

Page 15/9, Dimension drawing 1

The universal type

10 A

6EP1 334-1SH01



The universal power supply for all supply networks, with a wide-range input from 93 to 264 V AC and 110 to 350 V DC for supply from all typical networks.

Page 15/11, Dimension drawing 1

SITOP PSA100E

12 A

6EP1 234-1AA00



The power supply is optimally tailored to standard requirements in the industrial environment; rugged metal enclosure; flexible mounting either on standard rails or directly on a wall; removable terminals.

Page 15/6, Dimension drawing 1

1-phase AC
120/230 V AC
 Automatic range switch

85 ... 132 V/170 ... 264 V

$2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 93/187$ V
 50/60 Hz; 47 ... 63 Hz

4.2/1.9 A
 < 55 A, < 3 ms
 < 3.3 A²s

T 6.3 A/250 V (not accessible)
 From 10 A, Characteristic C

1-phase AC
120/230 V AC
 Set by means of selector switch on device
 85 ... 132 V/170 ... 264 V

$2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 93/187$ V
 50/60 Hz; 47 ... 63 Hz

4.0/2.5 A
 < 65 A, < 3 ms
 < 3.3 A²s

T 6.3 A/250 V (not accessible)
 From 10 A, Characteristic C

1-phase AC or DC
120-230 V AC
 wide-range input

93 ... 264 V AC or
 110 ... 350 V DC
 $2.3 \times V_{in rated}$, 1.3 ms
 > 20 ms at $V_{in} = 93/187$ V
 0/50/60 Hz; 47 ... 63 Hz

2.5-1.3 A
 < 20 A, < 3 ms
 < 1.5 A²s

T 6.3 A (not accessible)
 From 16 A, Characteristic C

1-phase AC
230 V AC

187 ... 264 V

—
 > 10 ms
 50/60 Hz; 47 ... 63 Hz

2.5 A
 < 50 A
 < 3.3 A²s

Internal
 From 10 A, Characteristic C

Controlled, isolated DC voltage
24 V DC

± 3 %
 Approx. 0.1 %
 Approx. 0.5 %

< 50 mV_{pp} (typ. 15 mV_{pp})
 < 150 mV_{pp} (typ. 60 mV_{pp})

—
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 2 s/typ. 10 ms
10 A

0 ... 10 A

—

Typ. 38 A for 80 ms
 Typ. 38 A for 80 ms

Yes

Page 6/5, column 4

Controlled, isolated DC voltage
24 V DC

± 1 %
 Approx. 0.1 %
 Approx. 0.5 %

< 150 mV_{pp} (typ. 50 mV_{pp})
 < 240 mV_{pp} (typ. 200 mV_{pp})

22 ... 29 V
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 2 s/typ. 40 ms
10 A

0 ... 10 A

—

Typ. 35 A for 700 ms
 Typ. 35 A for 700 ms

Yes, 2 units

Page 6/5, column 5

Controlled, isolated DC voltage
24 V DC

± 1 %
 Approx. 0.1 %
 Approx. 0.2 %

< 100 mV_{pp}
 < 100 mV_{pp}

—
 Green LED for 24 V OK
 No overshoot of V_{out}
 (soft start)

< 3 s/typ. 100 ms
10 A

0 ... 10 A

—

Approx. 11 A constant current
 Approx. 11 A constant current

Yes, 2 units

Page 6/5, column 6

Controlled, isolated DC voltage
24 V DC

± 3 %
 Approx. 0.1 %
 Approx. 0.5 %

< 150 mV_{pp}
 < 250 mV_{pp}

23 ... 26 V
 Green LED for 24 V OK
 Overshoot of V_{out}
 < 5 %

< 0.3 s/ < 500 ms
12 A

0 ... 12 A (up to +45 °C)
 0 ... 6 A (up to +70 °C)

Yes, 2 units

Page 6/5, column 7

SITOP 24 V

1-phase and 2-phase

Output currents 10 A and 12 A

Continuation of the table	Page 6/2, column 1	Page 6/2, column 2	Page 6/2, column 3
Power supply, type (repeated)	10 A	10 A	10 A
Order No. (repeated)	6EP1 334-3BA00	6EP1 334-2AA01	6EP1 334-2BA01
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 87 %	Approx. 90 %	Approx. 91 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 36 W	Approx. 27 W	Approx. 24 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	Typ. $\pm 0.1\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out}
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. $+3\%$ V_{out}	Typ. $\pm 1\%$ V_{out}	Typ. $\pm 1\%$ V_{out}
Load step settling time			
• 50 to 100 %	< 5 ms (typ. 2 ms)	Typ. 0.2 ms	Typ. 0.2 ms
• 100 to 50 %	< 5 ms (typ. 2 ms)	Typ. 0.2 ms	Typ. 0.2 ms
Protection and monitoring			
Output overvoltage protection	< 35 V	< 33 V	< 33 V
Current limitation	Typ. 12 A	Typ. 12.5 ... 13.5 A, overload capability 150 % $I_{out rated}$ up to 5 s/min	Typ. 12.5 ... 13.5 A, overload capability 150 % $I_{out rated}$ up to 5 s/min
Short-circuit protection	Alternatively, constant current characteristic approx. 12 A or latching shutdown	Constant current characteristic	Constant current characteristic
Sustained short-circuit current rms value	Approx. 12 A	Approx. 16 A	Approx. 16 A
Overload/short-circuit indicator	LED yellow for "overload", LED red for "latching shutdown"	–	–
Safety			
Primary/secondary isolation	Safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Safety extra-low output voltage V_{out} according to EN 60950 and EN 50178
Protection class	Class I	Class I	Class I
Leakage current	< 3.5 mA (typ. 0.32 mA)	< 3.5 mA (typ. 0.8 mA)	< 3.5 mA (typ. 0.8 mA)
Safety approval	Yes	Yes; CB scheme	Yes; CB scheme
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	Yes, cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	Yes, cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259, cCSAus (CSA C22.2 No. 60950-1, UL 60950-1)	Yes, 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 EEx nA II T4 U; UL 1604	ATEX EX II 3G EEx nA II T4 U; UL 1604
FM approval	–	–	–
Marine approval	–	GL	GL
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	EN 61000-3-2	–	EN 61000-3-2
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–25 ... +85 °C	–40 ... +85 °C	–40 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections			
• Supply input L, N, PE	1 screw terminal each for 0.2 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded
• Output +	2 screw terminals for 0.2 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
• Output –	2 screw terminals for 0.2 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²	2 screw terminals for 0.5 ... 2.5 mm ²
Dimensions (W × H × D) in mm	90 × 125 × 125	70 × 125 × 125	70 × 125 × 125
Weight, approx.	1.4 kg	0.75 kg	0.8 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15
Accessories			
	Buffer module (6EP161-3BA00) Signal. module (6EP161-3BA10) Redundancy module (6EP161-3BA20)	–	–

1-phase and 2-phase

Output currents 10 A and 12 A

Page 6/3, column 4	Page 6/3, column 5	Page 6/3, column 6	Page 6/3, column 7
10 A	10 A	10 A	12 A
6ES7 307-1KA02-0AA0	6EP1 334-1AL12	6EP1 334-1SH01	6EP1 234-1AA00
Approx. 90 % Approx. 27 W	Approx. 89 % Approx. 30 W	Approx. 85 % Approx. 42 W	Approx. 88 % Approx. 39 W
Typ. $\pm 0.1\%$ V_{out} Typ. $\pm 2\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out} Typ. $\pm 0.6\%$ V_{out}	Typ. $\pm 0.3\%$ V_{out} Typ. $\pm 1.5\%$ V_{out}	< 0.3 % V_{out} Typ. $\pm 3.5\%$ V_{out}
< 0.1 ms < 0.1 ms	< 5 ms (typ. 0.1 ms) < 5 ms (typ. 0.2 ms)	< 20 ms (typ. 10 ms) < 20 ms (typ. 10 ms)	Typ. 0.1 ms Typ. 0.1 ms
Additional control loop, shutdown at < 28.8 V, automatic restart 11 ... 12 A	Additional control loop, shutdown at approx. 33 V, automatic restart 11 ... 13 A	Yes, according to EN 60950 11 ... 13 A	< 35 V Typ. 13.2 A
Electronic shutdown, automatic restart	Electronic shutdown, automatic restart	Constant current characteristic approx. 11 A	Electronic shutdown, automatic restart
< 12 A –	< 10 A –	< 14 A –	< 7.5 A –
Yes, safety extra low output voltage V_{out} according to EN 60950-1 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 Class I	Yes, safety extra low output volt- age V_{out} according to EN 60950 and EN 50178 Class I
< 3.5 mA (typ. 0.6 mA) Yes Yes	< 3.5 mA (typ. 0.27 mA) Yes Yes	< 3.5 mA Yes Yes	< 3.5 mA (typ. 0.8 mA) Yes; CB scheme Yes
cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	Yes, cULus-listed (UL 508, CSA C22.2 No.107.1), File E197259
ATEX 94/9/EC EX II 3G; EEx, nA, II, T4 U; UL 1604 Class I Div. 2 Group A, B, C, D Class I Div. 2, Group A, B, C, D, T4 In S7-300 system IP20	– – – IP20	– – – IP20	– – – IP20
EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55022 Class B – EN 61000-6-2	EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55022 Class B – EN 61000-6-2
0 ... +60 °C with natural convection –40 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	0 ... +60 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	0 ... +60 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	–10 ... +70 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation
1 screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 4 screw terminals for 0.5 ... 2.5 mm ² 4 screw terminals for 0.5 ... 2.5 mm ²	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 3 screw terminals for 0.5 ... 2.5 mm ² 3 screw terminals for 0.5 ... 2.5 mm ²	1 screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 3 screw terminals for 0.5 ... 2.5 mm ² 3 screw terminals for 0.5 ... 2.5 mm ²	Removable screw terminal, each 1 × 0.5 ... 2.5 mm ² Removable screw terminal, 1 × 0.5 ... 2.5 mm ² Removable screw terminal, 1 × 0.5 ... 2.5 mm ²
80 × 125 × 120 0.8 kg Can be mounted onto S7 rail	160 × 130 × 60 0.72 kg Snaps onto DIN rail EN 60715 35×7.5/15	200 × 125 × 135 1.8 kg Snaps onto DIN rail EN 60715 35×15 or onto S7 rail	52 × 170 × 110 0.9 kg Snaps onto DIN rail EN 60715 35×7.5/15, wall mounting
Mounting adapter for standard mounting rail (6EP1 971-1BA00)	Mounting bracket (6EP1971-1AA01)	–	–

SITOP 24 V

1-phase and 2-phase

Output currents 10 A and 12 A

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
SITOP modular					
	120-230/230-500 V AC	24 V DC	10 A	6EP1 334-3BA00	
SITOP smart					
	120/230 V AC	24 V DC	10 A	6EP1 334-2AA01	
	120/230 V AC	24 V DC	10 A	6EP1 334-2BA01	
The S7-300 version					
	120/230 V AC	24 V DC	10 A	6ES7 307-1KA02-0AA0	
The flat design					
	120/230 V AC	24 V DC	10 A	6EP1 334-1AL12	
The universal type					
	120 - 230 V AC	24 V DC	10 A	6EP1 334-1SH01	
SITOP PSA100E					
	230 V AC	24 V DC	12 A	6EP1 234-1AA00	

SITOP 24 V

1-phase and 2-phase



7/2

Output currents 20 A and 40 A
SITOP modular

7/4

Selection and ordering data

SITOP 24 V

1-phase and 2-phase

Output currents 20 A and 40 A

Overview

Product	SITOP modular	SITOP modular
Power supply, type	20 A	40 A
Order No.	6EP1 336-3BA00 ¹⁾	6EP1 337-3BA00
		
The modular power supply units with 1-phase and 2-phase inputs for global use; with switchable output characteristics; functional expansion possible using expansion modules.		
Dimension drawing	Page 15/11, Dimension drawing 2	Page 15/12, Dimension drawing 1

The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.

Technical specifications

Input		
Rated voltage value $V_{in \text{ rated}}$	1-phase/2-phase AC 120/230 V AC Set by means of wire jumper on the device	1-phase/2-phase AC 120/230 V AC Set by means of wire jumper on the device
Voltage range	85 ... 132/176 ... 264 V (startup from $V_{in} > 93/183$ V)	85 ... 132/176 ... 264 V (startup from $V_{in} > 95/190$ V)
Overvoltage strength	$2.3 \times V_{in \text{ rated}}$, 1.3 ms	$2.3 \times V_{in \text{ rated}}$, 1.3 ms
Mains buffering at $I_{out \text{ rated}}$	> 20 ms at $V_{in} = 230$ V	> 20 ms at $V_{in} = 230$ V
Rated line frequency; range	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$	7.7/3.5 A	15.0/8.0 A
Switch-on current limit (+25 °C)	< 60 A	< 125 A
I^2t	< 9.9 A ² s	< 26 A ² s
Built-in incoming fuse	Yes	Yes
Recommended miniature circuit breaker (IEC 898) in the mains power input	10 A, Characteristic C (2-pole-linked with 2-phase operation) or circuit breaker 3RV1421-1JA10 (120 V) or 3RV1421-1FA10 (230 V)	20 A, Characteristic C (2-pole-linked with 2-phase operation) or circuit breaker 3RV1421-4BA10 (120 V) or 3RV1421-1JA10 (230 V)
Output		
Rated voltage value $V_{out \text{ rated}}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance	±3 %	±3 %
• Static mains compensation	Approx. 0.1 %	Approx. 0.1 %
• Static load balancing	Approx. 0.1 %	Approx. 0.1 %
Residual ripple	< 100 mV _{pp} (typ. 30 mV _{pp})	< 100 mV _{pp} (typ. 60 mV _{pp})
Spikes (bandwidth: 20 MHz)	< 200 mV _{pp} (typ. 60 mV _{pp})	< 200 mV _{pp} (typ. 120 mV _{pp})
Adjustment range	24 ... 28.8 V (max. 480 W)	24 ... 28.8 V (max. 960 W)
Status display	Green LED for 24 V OK	Green LED for 24 V OK
On/off behavior	Overshoot of V_{out} approx. 3 %	Overshoot of V_{out} approx. 3 %
Startup delay/voltage rise	< 0.1 s / < 50 ms	< 0.1 s / < 50 ms
Rated current $I_{out \text{ rated}}$	20 A	40 A
Current range	0 ... 20 A	0 ... 40 A
• Up to +60 °C	—	—
• Derating	—	—
Dynamic overcurrent on		
• Power-up on short circuit	Approx. 23 A constant current	Approx. 46 A constant current
• Short circuit during operation	Typ. 60 A for 25 ms	Typ. 120 A for 25 ms
Parallel switching for enhanced performance	Yes, 2 units (switchable characteristic)	Yes, 2 units (switchable characteristic)
Continuation of the table	Page 7/3, column 1	Page 7/3, column 2

¹⁾ SITOP modular plus 6EP1 336-3BA00-8AC0, PCB with protective coating.

1-phase and 2-phase

Output currents 20 A and 40 A

Continued from	Page 7/2, column 1	Page 7/2, column 2
Power supply, type (repeated)	20 A	40 A
Order No. (repeated)	6EP1 336-3BA00	6EP1 337-3BA00
Efficiency		
Efficiency at $V_{out\ rated}$, $I_{out\ rated}$	Approx. 89 %	Approx. 88 %
Power loss at $V_{out\ rated}$, $I_{out\ rated}$	Approx. 59 W	Approx. 131 W
Closed-loop control		
Dyn. mains compensation ($V_{in\ rated} \pm 15\%$)	$< 1\% V_{out}$	$< 1\% V_{out}$
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. $\pm 2\% V_{out}$	Typ. $\pm 2\% V_{out}$
Load step settling time • 50 to 100 % • 100 to 50 %	$< 5\text{ ms}$ (typ. 2 ms) $< 5\text{ ms}$ (typ. 2 ms)	$< 5\text{ ms}$ (typ. 2 ms) $< 5\text{ ms}$ (typ. 2 ms)
Protection and monitoring		
Output overvoltage protection	$< 35\text{ V}$	$< 35\text{ V}$
Current limitation	Typ. 23 A	Typ. 46 A
Short-circuit protection	Alternatively, constant current characteristic approx. 23 A or latching shutdown	Alternatively, constant current characteristic approx. 46 A or latching shutdown
Sustained short-circuit current rms value	Approx. 23 A	Approx. 46 A
Overload/short-circuit indicator	LED yellow for "overload", LED red for "latching shutdown"	LED yellow for "overload", LED red for "latching shutdown"
Safety		
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178
Protection class	Class I	Class I
Leakage current	$< 3.5\text{ mA}$ (typ. 0.4 mA)	$< 3.5\text{ mA}$ (typ. 0.4 mA)
Safety approval	Yes	Yes
CE mark	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259
Degree of protection (EN 60529)	IP20	IP20
EMC		
Emitted interference	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	EN 61000-3-2	–
Noise immunity	EN 61000-6-2	EN 61000-6-2
Operating data		
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–25 ... +85 °C	–25 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics		
Connections • Supply input L, N, PE	One screw terminal each for 0.2 ... 4 mm ² single-core/finely stranded	One screw terminal each for 0.2 ... 4 mm ² single-core/finely stranded
• Output +	2 screw terminals for 0.5 ... 4 mm ²	2 screw terminals for 0.5 ... 10 mm ²
• Output –	2 screw terminals for 0.5 ... 4 mm ²	2 screw terminals for 0.5 ... 10 mm ²
Dimensions (W × H × D) in mm	160 × 125 × 125	240 × 125 × 125
Weight, approx.	2.2 kg	2.9 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15
Accessories		
	Buffer module (6EP1961-3BA00) Signaling module (6EP1961-3BA10) Redundancy module (6EP1961-3BA20)	Buffer module (6EP1961-3BA00) Signaling module (6EP1961-3BA10) Redundancy module (6EP1961-3BA20)

SITOP 24 V

1-phase and 2-phase

Output currents 20 A and 40 A

Selection and ordering data

Product	Input Voltage $V_{in \text{ rated}}$	Output Voltage $V_{out \text{ rated}}$	Current $I_{out \text{ rated}}$	Order No.	Price in euros per PU
SITOP modular					
	120/230 V AC	24 V DC	20 A	6EP1 336-3BA00	
SITOP modular					
	120/230 V AC	24 V DC	40 A	6EP1 337-3BA00	

SITOP 24 V 3-phase



	Output currents 5 A to 20 A
8/2	SITOP modular
8/2	SITOP PSU300P
8/3	The well-proven
8/3	SITOP PSU300M
8/3	SITOP modular

8/6	Selection and ordering data
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SITOP 24 V

3-phase

Output currents 5 A to 20 A

Overview

Product	SITOP modular	SITOP modular	SITOP PSU300P
Power supply, type	5 A	10 A	8 A
Order No.	6EP1 333-3BA00	6EP1 334-3BA00	6EP1 433-2CA00
			
	The modular power supply units with wide-range input for 2-phase connection to three-phase supply networks; for global use; with switchable output characteristics; functional expansion possible using expansion modules.	The modular power supply units with wide-range input for 2-phase connection to three-phase supply networks; for global use; with switchable output characteristics; functional expansion possible using expansion modules.	The power supplies with IP67 degree of protection, SITOP PSU300P and SIMATIC ET200pro PS ¹⁾ , serve as electronics/encoder and load power supplies for the new I/O device. With a signaling contact for "24 V OK" and "Over-temperature", and in the case of SIMATIC ET200pro with a second plug-in connector for input voltage loop-through.
Dimension drawing	Page 15/8, Dimension drawing 1	Page 15/9, Dimension drawing 2	Page 15/12, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in rated}$	2-phase AC 120-230/230-500 V 2 AC Set by means of selector switch on device	2-phase AC 120-230/230-500 V 2 AC Set by means of selector switch on device	3-phase AC 400-480 V 3 AC Wide-range input
Voltage range	85 ... 264/176 ... 550 V	85 ... 264/176 ... 550 V	340 ... 550 V (320 ... 340 V for max. 1 min)
Overvoltage resistance	1300 V_{peak} , 1.3 ms	1300 V_{peak} , 1.3 ms	Implemented internally with varistors
Mains buffering at $I_{out rated}$ Rated line frequency; range	Typ. 150 ms at $V_{in} = 400$ V 50/60 Hz; 47 ... 63 Hz	Typ. 120 ms at $V_{in} = 400$ V 50/60 Hz; 47 ... 63 Hz	> 15 ms at $V_{in} = 400$ V 50/60 Hz; 45 ... 66 Hz
Rated current value $I_{in rated}$ Making current limit (+25 °C) I_{ct}	2.2-1.2/1.2-0.61 A < 35 A < 1.7 A ² s	4.4-2.4/2.4-1.1 A < 35 A < 4.0 A ² s	0.5 A (at $V_{in} 400$ V) < 40 A < 3.5 A ² s
Built-in incoming fuse Required protection in the main supply conductor	T 3, 15 A Miniature circuit breaker 6 A (10 A) Characteristic C (B), 2-pole connection or circuit breaker 3RV1021-1DA10, setting 3 A	T 6.3 A Miniature circuit breaker 6 A (10 A) Characteristic C (B), 2-pole connection or circuit breaker 3RV1021-1DA10, setting 3 A	Internal, 4 A Circuit breaker 2.2 ... 3.2 A 3RV1021-1DA10 or 3RV1721-1DD10 (UL 489)
Output			
Rated voltage value $V_{out rated}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance • Static mains compensation • Static load balancing	±3 % Approx. 0.1 % Approx. 0.1 %	±3 % Approx. 0.1 % Approx. 0.1 %	< ±3 ... -5 % Approx. 0.5 % Approx. 0.5 %
Residual ripple Spikes (bandwidth: 20 MHz)	< 50 mV _{pp} < 200 mV _{pp}	< 50 mV _{pp} < 200 mV _{pp}	< 200 mV _{pp} < 250 mV _{pp}
Adjustment range Status display Signaling (max. 30 V, 10 mA)	24 ... 28.8 V (max. 120 W) Green LED for 24 V OK –	24 ... 28.8 V (max. 240 W) Green LED for 24 V OK –	– Green LED for 24 V OK • Power Good (High level 1L+ for V_{out} in range 21.3 ... 29 V) • Overtemperature warning at least 30 s before switch-off (High level 1L+ when the max. internal temperature is exceeded) Overshoot of V_{out} < 2 %
On/off behavior	Overshoot of V_{out} approx. 3 %	Overshoot of V_{out} approx. 3 %	Overshoot of V_{out} < 2 %
Startup delay/voltage rise Rated current $I_{out rated}$	< 1 s/< 50 ms 5 A	< 1 s/< 50 ms 10 A	< 1.5 s/< 400 ms 8 A
Current range • Up to +60 °C • Derating	0 ... 5 A –	0 ... 10 A –	0 ... 8 A (up to +55 °C) –
Continuation of the table	Page 8/4, column 1	Page 8/4, column 2	Page 8/4, column 3

¹⁾ Available with a second plug connector for loop-through of the input voltage as SIMATIC ET200pro PS (6ES7148-4PC00-0HA0).

3-phase

Output currents 5 A to 20 A

The well-proven

10 A

6EP1 434-2BA00



The well-proven power supplies with three-phase wide-range input voltage for supplying all standard applications in automation engineering.

SITOP PSU300M

20 A

6EP1 436-3BA10



Modular power supply with three-phase wide-range input for global use; slim design; with 50 % extra power and switchable output characteristic; with integrated signaling contact for "24 V OK" function expansion possible using additional modules.

SITOP modular

20 A

6EP1 436-3BA00³⁾

Modular power supply with three-phase wide-range input for use around the world in a wide variety of applications; functional expansion possible using additional modules.

The well-proven

20 A

6EP1 436-2BA00



The well-proven power supplies with three-phase wide-range input voltage for supplying all standard applications in automation engineering.

Page 15/13, Dimension drawing 1

Page 15/13, Dimension drawing 2

Page 15/11, Dimension drawing 2

Page 15/13, Dimension drawing 1

3-phase AC
400 - 500 V 3 AC
wide-range input

360 ... 550 V
(340 ... 360 V for max. 2 s or for
max. $0.9 \times I_{out rated}$)

 $2.3 \times V_{in rated}, 1.3 ms$

> 6 ms at $V_{in} = 360 V$
50/60 Hz; 47 ... 63 Hz

0.65 A (at 400 V)
< 25 A
< $1.0 A^2s$

None
3-pole connected miniature
circuit breaker, Char. C up to
25 A (recommended: 6 A) or
circuit breaker 3RV1021-1DA10,
setting 3 A or
3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage
24 V DC

±3 %

< 150 mV_{pp} (typ. 60 mV_{pp})
< 240 mV_{pp} (typ. 120 mV_{pp})

22.8 ... 26.4 V²⁾
Green LED for 24 V OK

–

No overshoot of V_{out} (soft start)

< 3 s/typ. 40 ms

10 A

0 ... 10 A (up to +55 °C)

–

Page 8/5, column 4

3-phase AC
400-500 V 3 AC
Wide-range input

320 ... 575 V

 $2.3 \times V_{in rated}, 1.3 ms$

> 15 ms at $V_{in} = 400 V$
50/60 Hz; 47 ... 63 Hz

1.2-1.0 A
< 18 A
< $0.8 A^2s$

None
3-pole connected miniature
circuit breaker 6 ... 16 A Charac-
teristic C or circuit breaker
3RV1021-1DA10, setting 3 A or
3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage
24 V DC

±3 %
Approx. ±0.1 %
Approx. ±0.2 %

< 100 mV_{pp}
< 200 mV_{pp}

24 ... 28.8 V (max. 480 W)
Green LED for 24 V OK
relay contact (NO contact, rating
60 V DC/0.3 A) for 24 V OK

No overshoot of V_{out} (soft start)

< 2.5 s/< 500 ms

20 A0 ... 20 A
14 A (up to +70 °C)

–

Page 8/5, column 5

3-phase AC
400 - 500 V 3 AC
wide-range input

320 ... 550 V
(startup from $V_{in} > 340 V$)

 $2.3 \times V_{in rated}, 1.3 ms$

> 6 ms at $V_{in} = 400 V$
50/60 Hz; 47 ... 63 Hz

1.1-0.9 A
< 35 A
< $0.7 A^2s$

None
3-pole connected miniature
circuit-breaker 6 to 16 A Charac-
teristic C or circuit breaker
3RV1021-1DA10, setting 3 A or
3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage
24 V DC

±3 %
Approx. 0.1 %
Approx. 0.2 %

< 100 mV_{pp}
< 200 mV_{pp}

24 ... 28.8 V (max. 480 W)
Green LED for 24 V OK

–

No overshoot of V_{out} (soft start)

< 2.5 s/< 500 ms

20 A

0 ... 20 A

–

Page 8/5, column 6

3-phase AC
400 - 500 V 3 AC
wide-range input

360 ... 550 V (340 ... 360 V for
max. 2 s or for
max. $0.9 \times I_{out rated}$)

 $2.3 \times V_{in rated}, 1.3 ms$

> 3 ms at $V_{in} = 360 V$
50/60 Hz; 47 ... 63 Hz

1.2 A (at 400 V)
< 25 A
< $1.0 A^2s$

None
3-pole connected miniature
circuit breaker, Char. C up to
25 A (recommended: 6 A) or
circuit breaker
3RV1021-1DA10, setting 3 A or
3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage
24 V DC

±3 %

< 150 mV_{pp} (typ. 60 mV_{pp})
< 240 mV_{pp} (typ. 120 mV_{pp})

22.8 ... 26.4 V²⁾
Green LED for 24 V OK

–

No overshoot of V_{out} (soft start)

< 3 s/typ. 40 ms

20 A

0 ... 20 A (up to +55 °C)

–

Page 8/5, column 7

²⁾ Only permissible at ambient temperature 0 °C to 45 °C.

³⁾ SITOP modular plus 6EP1 436-3BA00-8A00, PCB with protective coating.

SITOP 24 V

3-phase

Output currents 5 A to 20 A

Continued from	Page 8/2, column 1	Page 8/2, column 2	Page 8/2, column 3
Power supply, type (repeated)	5 A	10 A	8 A
Order No. (repeated)	6EP1 333-3BA00	6EP1 334-3BA00	6EP1 433-2CA00
Output			
Dynamic overcurrent on • Power-up on short circuit • Short circuit during operation	Approx. 5.5 A constant current Typ. 15 A for 25 ms	Approx. 12 A constant current Typ. 30 A for 25 ms	Approx. 50 A for 100 ms Approx. 50 A for 100 ms
Parallel switching for enhanced performance	Yes, 2 units (switchable characteristic)	Yes, 2 units (switchable characteristic)	No
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 87 %	Approx. 87 %	Typ. 88 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 18 W	Approx. 36 W	Typ. 25 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	Typ. 0.1 % V_{out}	Typ. 0.1 % V_{out}	Typ. 0.5 % V_{out}
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. +3 % V_{out}	Typ. +3 % V_{out}	Typ. $\pm 1\%$ V_{out}
Load step settling time • 50 to 100 % • 100 to 50 %	< 5 ms (typ. 2 ms) < 5 ms (typ. 2 ms)	< 5 ms (typ. 2 ms) < 5 ms (typ. 2 ms)	< 2 ms < 2 ms
Protection and monitoring			
Output overvoltage protection	< 35 V	< 35 V	< 33 V
Current limitation	Typ. 5.5 A	Typ. 12 A	Typ. 9.4 A
Short-circuit protection	Alternatively, constant current characteristic approx. 5.5 A or latching shutdown	Alternatively, constant current characteristic approx. 12 A or latching shutdown	Electronic shutdown, automatic restart
Sustained short-circuit current rms value	Approx. 5.5 A	Approx. 12 A	< 10 A
Overload/short-circuit indicator	LED yellow for "overload", LED red for "latching shutdown"	LED yellow for "overload", LED red for "latching shutdown"	–
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I
Protection class			
Leakage current	< 3.5 mA (typ. 0.25 mA)	< 3.5 mA (typ. 0.32 mA)	< 3.5 mA
Safety approval	Yes	Yes	Yes; CB scheme
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	Prepared for UL-listed (UL 508)
Degree of protection (EN 60529)	IP20	IP20	IP67, enclosure type 4 indoor
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class A
Supply harmonics limitation	EN 61000-3-2	EN 61000-3-2	–
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	–25 ... +55 °C with natural convection
Transport/storage temperature range	–25 ... +85 °C	–25 ... +85 °C	–40 ... +70 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections • Supply input L1, L2, L3, PE	One screw terminal each for 0.2 ... 2.5 mm ² single-core/finely stranded	One screw terminal each for 0.2 ... 2.5 mm ² single-core/finely stranded	Plug connector HAN Q4/2
• Output +	2 screw terminals for 0.2 ... 2.5 mm ²	2 screw terminals for 0.2 ... 2.5 mm ²	1 × 2.5 mm ² (2-pole cable for +/- with open, labeled ends, 2 × 2.5 mm ²)
• Output –	2 screw terminals for 0.2 ... 2.5 mm ²	2 screw terminals for 0.2 ... 2.5 mm ²	1 × 2.5 mm ² (2-pole cable for +/- with open, labeled ends, 2 × 2.5 mm ²)
• Alarm signals	–	–	M12 plug-in connector, 5-pin
Dimensions (W × H × D) in mm	70 × 125 × 125	90 × 125 × 125	310 × 135 × 90 + additional height of connector
Weight, approx. Installation	1.2 kg Snaps onto DIN rail EN 60715 35×7.5/15	1.4 kg Snaps onto DIN rail EN 60715 35×7.5/15	2.8 kg Can be mounted onto ET200pro mounting rail
Accessories			
	Buffer module (6EP161-3BA00) Signal module (6EP161-3BA10) Redundancy module (6EP161-3BA20)	Buffer module (6EP161-3BA00) Signal module (6EP161-3BA10) Redundancy module (6EP161-3BA20)	Power connector (3RK1911-2BE50 (2.5 mm ²))

3-phase

Output currents 5 A to 20 A

Page 8/3, column 4	Page 8/3, column 5	Page 8/3, column 6	Page 8/3, column 7
10 A	20 A	20 A	20 A
6EP1 434-2BA00	6EP1 436-3BA10	6EP1 436-3BA00	6EP1 436-2BA00
Constant current approx. 18 A Constant current approx. 18 A Yes, 2 units ¹⁾	Approx. 23 A constant current Typ. 60 A for 25 ms Yes, 2 units (switchable characteristic)	Approx. 23 A constant current Typ. 60 A for 25 ms Yes, 2 units (switchable characteristic)	Constant current approx. 30 A Constant current approx. 30 A Yes, 2 units ¹⁾
Approx. 89 % Approx. 30 W	Approx. 93 % Approx. 36 W	Approx. 90 % Approx. 53 W	Approx. 89 % Approx. 59 W
< 1 % V_{out} Typ. ± 2 % V_{out}	< 1 % V_{out} Typ. ± 2 % V_{out}	< 1 % V_{out} Typ. ± 2 % V_{out}	< 1 % V_{out} Typ. ± 2 % V_{out}
< 2 ms < 2 ms	< 10 ms (typ. 2 ms) < 10 ms (typ. 2 ms)	< 10 ms (typ. 4 ms) < 10 ms (typ. 4 ms)	< 2 ms < 2 ms
Yes, according to EN 60950 Typ. 10.5 ... 13 A	< 35 V Typ. 23 A, overload capability 150 % $I_{out rated}$ up to 5 s/min	< 35 V Typ. 23 A	Yes, according to EN 60950 Typ. 21 ... 26 A
Constant current characteristic < 20 A –	Alternatively, constant current characteristic approx. 23 A or latching shutdown Approx. 23 A LED yellow for "overload", LED red for "latching shutdown"	Alternatively, constant current characteristic approx. 23 A or latching shutdown Approx. 23 A LED yellow for "overload", LED red for "latching shutdown"	Constant current characteristic < 30 A –
Yes, safety extra low output voltage V_{out} according to EN 60950 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class I	Yes, safety extra low output voltage V_{out} according to EN 60950 Class I
< 0.35 mA (typ. 0.35 mA) Yes; CB scheme Yes	< 3.5 mA Yes Yes	< 3.5 mA Yes Yes	< 0.35 mA (550 V/60 Hz) Yes; CB scheme Yes
cULus-listed (UL 508, CSA C22.2 No. 142), File E143289 IP20	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259 IP20	UL-listed (UL 508) File E197259, CSA (CSA C22.2 No. 14, CSA C22.2 No. 107.1) IP20	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289 IP20
EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55022 Class B EN 61000-3-2 EN 61000-6-2
0 ... +55 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	–10 ... +60 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	0 ... +60 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation	0 ... +55 °C with natural convection –25 ... +85 °C Climate class 3K3 according to EN 60721, no condensation
One screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 1 screw terminal for 0.33 ... 10 mm ² 2 screw terminals for 0.33 ... 10 mm ² –	One screw terminal each for 0.2 ... 4 mm ² solid/ finely stranded 2 screw terminals for 0.2 ... 4 mm ² 2 screw terminals for 0.2 ... 4 mm ² 2 screws terminals for 0.14 ... 1.5 mm ²	One screw terminal each for 0.2 ... 4 mm ² single-core/ finely stranded 2 screw terminals for 0.33 ... 4 mm ² 2 screw terminals for 0.33 ... 4 mm ² –	One screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 1 screw terminal for 0.33 ... 10 mm ² 2 screw terminals for 0.33 ... 10 mm ² –
280 × 125 × 92 2 kg Snaps onto DIN rail EN 60715 35×7.5/15	70 × 125 × 125 1.2 kg Snaps onto DIN rail EN 60715 35×7.5/15	160 × 125 × 125 2 kg Snaps onto DIN rail EN 60715 35×7.5/15	280 × 125 × 92 2 kg Snaps onto DIN rail EN 60715 35×7.5/15
90° mounting bracket (6EP1971-2BA00)	Buffer module (6EP1961-3BA01) Redundancy module (6EP1961-3BA20)	Buffer module (6EP1961-3BA00) Signal module (6EP1961-3BA10) Redundancy module (6EP1961-3BA20)	90° mounting bracket (6EP1971-2BA00)

¹⁾ Only permissible at ambient temperature 0 °C to 45 °C.

SITOP 24 V

3-phase

Output currents 5 A to 20 A

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
SITOP modular					
	120-230/230-500 V 2 AC	24 V DC	5 A	6EP1 333-3BA00	
SITOP modular					
	120-230/230-500 V 2 AC	24 V DC	10 A	6EP1 334-3BA00	
SITOP PSU300P					
	400-480 V 3 AC	24 V DC	8 A	6EP1 433-2CA00	
SIMATIC ET200pro PS					
	400-480 V 3 AC	24 V DC	8 A	6ES7 148-4PC00-0HA0	
The well-proven					
	400-500 V 3 AC	24 V DC	10 A	6EP1 434-2BA00	
SITOP PSU300M					
	400-500 V 3 AC	24 V DC	20 A	6EP1 436-3BA10	
SITOP modular					
	400-500 V 3 AC	24 V DC	20 A	6EP1 436-3BA00	
The well-proven					
	400-500 V 3 AC	24 V DC	20 A	6EP1 436-2BA00	

SITOP 24 V 3-phase



	Output currents 30 A and 40 A
9/2	The well-proven
9/2	SITOP PSU300M
9/2	SITOP modular
9/3	The well-proven

9/6	Selection and ordering data
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SITOP 24 V

3-phase

Output currents 30 A and 40 A

Overview

Product	The well-proven	SITOP PSU300M	SITOP modular
Power supply, type	30 A	40 A	40 A
Order No.	6EP1 437-2BA00	6EP1 437-3BA10	6EP1 437-3BA00 ²⁾³⁾
			
The product families are highlighted in the same colors. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.	The well-proven power supplies with three-phase wide-range input for supplying power for all standard applications in automation.	Modular power supply with 3-phase wide-range input for use around the world; small frame size; with 50 % extra power and switchable output characteristic; with integrated signaling contact for "24 V OK"; functional expansion possible using expansion modules.	Modular power supplies with three-phase wide-range input for use around the world in a wide variety of applications; functional expansion possible using expansion modules.
Dimension drawing	Page 15/14, Dimension drawing 1	Page 15/14, Dimension drawing 1	Page 15/12, Dimension drawing 1

Technical specifications

Input			
Rated voltage value $V_{in rated}$	3-phase AC 400 - 500 V 3 AC wide-range input	3-phase AC 400 - 500 V 3 AC wide-range input	3-phase AC 400 - 500 V 3 AC wide-range input
Voltage range	360 ... 550 V (340 ... 360 V for max. 2 s or for max. $0.9 \times I_{out rated}$)	320 ... 575 V	320 ... 550 V (startup from $V_{in} > 340 V$)
Overvoltage resistance Mains buffering at $I_{out rated}$ Rated line frequency; range	$2.3 \times V_{in rated}$, 1.3 ms > 4.5 ms at $V_{in} = 360 V$ 50/60 Hz; 47 ... 63 Hz	> 15 ms at $V_{in} = 400 V$ 50/60 Hz; 47 ... 63 Hz	$2.3 \times V_{in rated}$, 1.3 ms > 6 ms at $V_{in} = 400 V$ 50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in rated}$ Making current limit (+25 °C) $I^2 t$	1.4 A (at 400 V) < 25 A < $1.0 A^2 s$	2.6-2.1 A < 56 A < $2.24 A^2 s$	2.2 A ($V_{in} = 400 V$) < 70 A < $2.8 A^2 s$
Built-in incoming fuse Required protection in the main supply conductor	None 3-pole connected miniature circuit breaker, Char. C up to 25 A (recommended: 6 A) or circuit breaker 3RV1021-1DA10, setting 3 A or 3RV1721-1DD10 (UL 489)	None 3-pole connected miniature circuit breaker 10 to 16 A characteristic C or circuit breaker 3RV1021-1DA10, setting 3 A or 3RV1721-1DD10 (UL 489)	None 3-pole connected miniature circuit breaker 10 to 16 A characteristic C or circuit breaker 3RV1021-1DA10, setting 3 A or 3RV1721-1DD10 (UL 489)
Output			
Rated voltage value $V_{out rated}$	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC	Controlled, isolated DC voltage 24 V DC
Total tolerance • Static mains compensation • Static load balancing	±3 %	±3 % < ±0.1 % < ±0.1 %	±3 % Approx. 0.1 % Approx. 0.2 %
Residual ripple Spikes (bandwidth: 20 MHz)	< 150 mV _{pp} (typ. 50 mV _{pp}) < 240 mV _{pp} (typ. 200 mV _{pp})	< 100 mV _{pp} < 200 mV _{pp}	< 100 mV _{pp} < 200 mV _{pp}
Adjustment range Status display Signaling	22.8 ... 26.4 V ¹⁾ Green LED for 24 V OK —	24 ... 28.8 V (max. 960 W) Green LED for 24 V OK Relay contact (NO contact, rating 60 V DC/0.3 A) for 24 V OK No overshoot of V_{out} (soft start)	24 ... 28.8 V (max. 960 W) Green LED for 24 V OK —
On/off behavior	Slight overshoot of V_{out} (< 2 V for max. 500 ms)	No overshoot of V_{out} (soft start)	No overshoot of V_{out} (soft start)
Startup delay/voltage rise Rated current $I_{out rated}$	< 3 s/typ. 40 ms 30 A	< 2.5 s/< 500 ms 40 A	< 2.5 s/< 500 ms 40 A
Current range • Up to +60 °C • Derating	0 ... 30 A (up to +55 °C) —	0 ... 40 A 25 A (up to +70 °C)	0 ... 40 A —
Dynamic overcurrent on • Power-up on short circuit • Short circuit during operation	Approx. 60 A for 600 ms Approx. 60 A for 600 ms	Approx. 44 A constant current Typ. 120 A for 25 ms	Approx. 46 A constant current Typ. 120 A for 25 ms
Parallel switching for enhanced performance	Yes, 2 units ¹⁾	Yes, 2 units (switchable characteristic)	Yes, 2 units (switchable characteristic)
Continuation of the table	Page 9/4, column 1	Page 9/4, column 2	Page 9/4, column 3

¹⁾ Only permissible at ambient temperature 0 °C to 45 °C.

²⁾ SIPLUS module 6AG1 437-3BA00-4AA0 for use under medial load (e.g. sulfur chloride atmosphere).

³⁾ SITOP modular plus 6EP1 437-3BA00-8AA0, PCB with protective coating.

3-phase

Output currents 30 A and 40 A

The well-proven

40 A

6EP1 437-2BA10



The well-proven power supplies with three-phase wide-range input for supplying power for all standard applications in automa-
tion.

Page 15/14, Dimension drawing 1

3-phase AC
400 - 500 V 3 AC
wide-range input

360 ... 550 V (340 ...
360 V for max. 2 s or for
max. $0.9 \times I_{out rated}$)

$2.3 \times V_{in rated}$, 1.3 ms
> 3 ms at $V_{in} = 360 V$
50/60 Hz; 47 ... 63 Hz

1.9 A (at 400 V)
< 25 A
< $1.0 A^2s$

None
3-pole connected miniature
circuit breaker, Char. C up to
25 A (recommended: 6 A) or
circuit breaker
3RV1021-1DA10, setting 3 A or
3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage
24 V DC
 $\pm 3 \%$

< 150 mV_{pp} (typ. 50 mV_{pp})
< 240 mV_{pp} (typ. 200 mV_{pp})
22.8 ... 26.4 V¹⁾
Green LED for 24 V OK
—

Slight overshoot of V_{out}
(< 2 V for max. 500 ms)
< 3 s/typ. 40 ms
40 A

0 ... 40 A (up to +55 °C)
—

Approx. 70 A for 600 ms
Approx. 70 A for 600 ms
Yes, 2 units¹⁾

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SITOP 24 V

3-phase

Output currents 30 A and 40 A

Continued from	Page 9/2, column 1	Page 9/2, column 2	Page 9/2, column 3
Power supply, type (repeated)	30 A	40 A	40 A
Order No. (repeated)	6EP1 437-2BA00	6EP1 437-3BA10	6EP1 437-3BA00
Efficiency			
Efficiency at V_{out} rated, I_{out} rated	Approx. 90 %	Approx. 92 %	Approx. 90 %
Power loss at V_{out} rated, I_{out} rated	Approx. 80 W	Approx. 83 W	Approx. 106 W
Closed-loop control			
Dyn. mains compensation (V_{in} rated ± 15 %)	$< 1 \% V_{out}$	$< 1 \% V_{out}$	$< 1 \% V_{out}$
Dynamic load smoothing (I_{out} : 50/100/50 %)	Typ. -4% , $+2 \%$ V_{out}	Typ. $\pm 3 \%$ V_{out}	Typ. $\pm 2 \%$ V_{out}
Load step settling time			
• 50 to 100 %	< 3 ms	< 10 ms	< 10 ms (typ. 4 ms)
• 100 to 50 %	< 3 ms	< 10 ms	< 10 ms (typ. 4 ms)
Protection and monitoring			
Output overvoltage protection	Yes, according to EN 60950	< 35 V	< 35 V
Current limitation	Typ. 31.5 ... 39 A	Typ. 44 A, overload capability 150 % I_{out} rated up to 5 s/min	Typ. 46 A
Short-circuit protection	Electronic shutdown, automatic restart	Alternatively, constant current characteristic approx. 44 A or latching shutdown	Alternatively, constant current characteristic approx. 46 A or latching shutdown
Sustained short-circuit current rms value	< 48 A	Approx. 44 A	Approx. 46 A
Overload/short-circuit indicator	–	LED yellow for "overload", LED red for "latching shutdown"	LED yellow for "overload", LED red for "latching shutdown"
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178
Protection class	Class I	Class I	Class I
Leakage current	< 0.78 mA (550 V/60 Hz)	< 3.5 mA	< 3.5 mA
Safety approval	Yes; CB scheme	Yes	Yes
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	UL-listed (UL 508) File E197259, CSA (CSA C22.2 No. 14, CSA C22.2 No. 107.1)
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	EN 61000-3-2	EN 61000-3-2	EN 61000-3-2
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... $+55$ °C with natural convection	-10 ... $+60$ °C with natural convection	0 ... $+60$ °C with natural convection
Transport/storage temperature range	-25 ... $+85$ °C	-25 ... $+85$ °C	-25 ... $+85$ °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections			
• Supply input L1, L2, L3, PE	One screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded	One screw terminal each for 0.2 ... 4 mm ² single-core/finely stranded	One screw terminal each for 0.2 ... 4 mm ² single-core/finely stranded
• Output +	1 screw terminal for 0.33 ... 10 mm ²	2 screw terminals for 0.33 ... 10 mm ²	2 screw terminals for 0.33 ... 10 mm ²
• Output –	2 screw terminals for 0.33 ... 10 mm ²	2 screw terminals for 0.33 ... 10 mm ²	2 screw terminals for 0.33 ... 10 mm ²
Alarm signal	–	2 screw terminals for 0.14 ... 2.5 mm ²	–
Dimensions (W × H × D) in mm	280 × 180 × 92	150 × 125 × 150	240 × 125 × 125
Weight, approx.	3.6 kg	3.4 kg	3.2 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15
Accessories			
	90° mounting bracket (6EP1971-2BA00)	Buffer module (6EP1961-3BA01) Redundancy module (6EP1961-3BA20)	Buffer module (6EP1961-3BA00) Signaling module (6EP1961-3BA10) Redundancy module (6EP1961-3BA20)

3-phase

Output currents 30 A and 40 A

Page 9/3, column 4
40 A
6EP1 437-2BA10

Approx. 90 %

Approx. 107 W

< 1 % V_{out}

Typ. -4 %, +2 % V_{out}

< 3 ms
< 3 ms

Yes, according to EN 60950
Typ. 42 ... 52 A

Electronic shutdown,
automatic restart

< 62 A

—

Yes, safety extra low output
voltage V_{out}
according to EN 60950
Class I

< 0.78 mA (550 V/60 Hz)
Yes; CB scheme
Yes

cULus-listed (UL 508,
CSA C22.2 No. 142),
File E143289
IP20

EN 55022 Class B
EN 61000-3-2
EN 61000-6-2

0 ... +55 °C with natural
convection
-25 ... +85 °C
Climate class 3K3 according to
EN 60721, no condensation

One screw terminal each for
0.5 ... 2.5 mm² single-core/
finely stranded
1 screw terminal for
0.33 ... 10 mm²
2 screw terminals for
0.33 ... 10 mm²
—

280 × 180 × 92
3.6 kg
Snaps onto DIN rail
EN 60715 35×7.5/15

90° mounting bracket
(6EP1971-2BA00)

SITOP 24 V

3-phase

Output currents 30 A and 40 A

Selection and ordering data

Product	Input Voltage $V_{in \text{ rated}}$	Output Voltage $V_{out \text{ rated}}$	Current $I_{out \text{ rated}}$	Order No.	Price in euros per PU
The well-proven					
	400-500 V 3 AC	24 V DC	30 A	6EP1 437-2BA00	
SITOP PSU300M					
	400-500 V 3 AC	24 V DC	40 A	6EP1 437-3BA10	
SITOP modular					
	400-500 V 3 AC	24 V DC	40 A	6EP1 437-3BA00	
The well-proven					
	400-500 V 3 AC	24 V DC	40 A	6EP1 437-2BA10	

SITOP 24 V

Expansion modules



- | | |
|------|---|
| 10/2 | SITOP modular signaling module |
| 10/2 | SITOP modular redundancy module |
| 10/2 | SITOP modular buffer module |
| 10/4 | SITOP PSE200U selectivity module |
| 10/4 | SITOP select diagnostics module |
| 10/7 | SITOP inrush current limiter |
| 10/9 | 90° mounting bracket |
| 10/9 | Mounting adapter for DIN rail |
| 10/9 | Connector for devices in IP65 and IP67 degree of protection |

10/10 Selection and ordering data

SITOP 24 V

Expansion modules

Overview

Product	SITOP modular	SITOP modular	SITOP modular
Power supply, type	Signaling module	Redundancy module	Buffer module
Order No.	6EP1 961-3BA10 ¹⁾	6EP1 961-3BA20 ²⁾	6EP1 961-3BA01
			
The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.	Message signals about the operating status of the power supply can be provided with a signaling module in combination with a SITOP modular (6EP1 .3.-3BA00) regulated power supply, and the power supply can be switched ON/OFF remotely; automatic contacting with the power supply.	The redundancy module is used to decouple two SITOP modular regulated power supplies in parallel operation. The 24 V supply is reliably maintained when one power supply fails.	With short-term power failures, the load current can be backed up without interruption via the buffer module in combination with a SITOP modular controlled power supply. The buffer module is connected in parallel to the output of the power supply.
Dimension drawing	Page 15/15, Dimension drawing 1	Page 15/16, Dimension drawing 1	Page 15/15, Dimension drawing 2

Technical specifications

Input/output			
Rated input voltage $V_{in \text{ rated}}$ Input voltage range Control input	– – Non-isolated input for remote ON/OFF switching of the power supply	Controlled, isolated DC voltage 24 V DC 24 ... 28.8 V	Controlled, isolated DC voltage 24 V DC 24 ... 28.8 V
Rated output voltage value $V_{out \text{ rated}}$ Rated current value $I_{out \text{ rated}}$	– –	V_{in} – approx. 0.5 V 20 A (max. aggregate current 40 A)	V_{in} – approx. 1 V 40 A
Mains buffering Buffering time, max.	– –	– –	100 ms at 40 A ... 800 ms at 5 A load current 3 s
Protection and monitoring			
Current limiting, static Short-circuit protection	– –	– –	Typ. 40 A Electronically
Signaling/alarm signals			
Status display	–	Green LED for "Infeed 1 and infeed 2 OK"	Green LED for "Supply voltage > 20.5 V"
Signaling	Isolated relay contacts (changeover contacts, rating 6 A/240 V AC) for "Output voltage OK" and "Power supply availability OK"	Isolated relay contact (changeover contacts, rating 6 A/240 V AC) for "Infeed 1 and infeed 2 OK", switching threshold adjustable 20 ... 25 V	–
Continuation of the table	Page 10/3, column 1	Page 10/3, column 2	Page 10/3, column 3

¹⁾ SIPLUS module 6AG1 961-3BA10-7AA0 for extended temperature range -25 °C to +70 °C and use under medial load (e.g. sulfur chloride atmosphere). 6AG1 961-3BA10-6AA0 with hard gold-plated contacts.

²⁾ SIPLUS module 6AG1 437-3BA20-7AA0 for extended temperature range -40 °C to +70 °C and use under medial load (e.g. sulfur chloride atmosphere).

Expansion modules

Continued from	Page 10/2, column 1	Page 10/2, column 2	Page 10/2, column 3
Power supply, type (repeated)	Signaling module	Redundancy module	Buffer module
Order No. (repeated)	6EP1 961-3BA10	6EP1 961-3BA20	6EP1 961-3BA01
Safety			
Galvanic isolation	Yes, safety extra low voltage acc. to EN 60950 (relay contacts)	Yes, safety extra low voltage acc. to EN 60950 (relay contact)	Yes, SELV acc. to EN 60950
Protection class	Class I	Class I	Class I
Safety approval	Yes	Yes	Yes
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	UL-listed (UL 508) File E197259, CSA (CSA C22.2 No. 14, CSA C22.2 No. 107.1)	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259	UL-listed (UL 508) File E197259, CSA (CSA C22.2 No. 14, CSA C22.2 No. 107.1)
Explosion Protection	–	UL 1604	–
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–25 ... +85 °C	–25 ... +85 °C	–25 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections	Screw terminals for 0.14 ... 2.5 mm ² single-core/finely stranded	Input, output, and ground: one screw terminal each for 0.33 ... 10 mm ² , single-core/finely stranded; relay contact: one screw terminal each for 0.5 ... 2.5 mm ² , single-core/finely stranded	One screw terminal each for + and – for 0.5 ... 10 mm ² single-core/finely stranded
Dimensions (W × H × D) in mm	26 × 125 × 116	70 × 125 × 125	70 × 125 × 125
Weight, approx.	0.15 kg	1.0 kg	1.2 kg
Installation	Snaps directly onto side of basic unit (6EP1 .3.-3BA00)	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15

SITOP 24 V

Expansion modules

Overview

Product	SITOP PSE200U	SITOP PSE200U	SITOP select
Power supply, type	Selectivity module, 4 × 3 A	Selectivity module, 4 × 10 A	Diagnostics module 4 × 10 A
Order No.	6EP1 961-2BA10	6EP1 961-2BA20	6EP1 961-2BA00
			
The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.	The selectivity module is used in conjunction with 24 V power supplies to distribute the load current over several current circuits and to monitor the individual currents. Faults in individual circuits caused by overload or short-circuit are detected and selectively switched off so that further load current paths remain unaffected by the fault. This achieves fast fault diagnostics and minimizes standstill times.	The selectivity module is used in conjunction with 24 V power supplies to distribute the load current over several current circuits and to monitor the individual currents. Faults in individual circuits caused by overload or short-circuit are detected and selectively switched off so that further load current paths remain unaffected by the fault. This achieves fast fault diagnostics and minimizes standstill times.	The diagnostics module is used in conjunction with 24 V power supplies to distribute the load current over several current circuits and to monitor the individual currents. Faults in individual circuits caused by overload or short-circuit are detected and selectively switched off so that further load current paths remain unaffected by the fault. This achieves fast fault diagnostics and minimizes standstill times.
Dimension drawing	Page 15/17, Dimension drawing 1	Page 15/17, Dimension drawing 1	Page 15/16, Dimension drawing 2

Technical specifications

Input			
Rated voltage $V_{in \text{ rated}}$ Voltage range	Controlled DC voltage 24 V DC 22 ... 30 V	Controlled DC voltage 24 V DC 22 ... 30 V	Controlled DC voltage ¹⁾ 24 V DC 22 ... 30 V
Overvoltage strength	35 V	35 V	35 V; 100 ms
Input current $I_{in \text{ rated}}$	12 A	40 A	40 A
Output			
Rated voltage $V_{out \text{ rated}}$ Total tolerance	Controlled DC voltage $V_{in} - \text{approx. } 0.2 \text{ V}$ In accordance with the supplying input voltage	Controlled DC voltage $V_{in} - \text{approx. } 0.2 \text{ V}$ In accordance with the supplying input voltage	Controlled DC voltage $V_{in} - \text{approx. } 0.3 \text{ V}$ In accordance with the supplying input voltage
Number of output channels	4	4	4
Rated current value $I_{out \text{ rated}}$ Adjustment range	3 A per channel 0.5 ... 3 A per channel via potentiometer	10 A per channel 3 ... 10 A per channel via potentiometer	10 A per channel 2 ... 10 A per channel via potentiometer
Parallel switching of several channels	Not permitted	Not permitted	Not permitted
Channel connection	Simultaneous connection of all channels after power up of the supply voltage > 20 V, delay time of 25 ms, 100 ms or adjustable "load optimised" via DIP switch for sequential connection	Simultaneous connection of all channels after power up of the supply voltage > 20 V, delay time of 25 ms, 100 ms or adjustable "load optimised" via DIP switch for sequential connection	Simultaneous connection of all channels after power up of the supply voltage, delay time of 24 ms or 100 ms programmable for sequential connection
Efficiency			
Efficiency at $V_{out \text{ rated}}, I_{out \text{ rated}}$ Power loss at $V_{out \text{ rated}}, I_{out \text{ rated}}$	Approx. 97 % Approx. 9 W	Approx. 97 % (typ. 99 %) Approx. 30 W (typ. 10 W)	Approx. 97 % Approx. 30 W
Switch-off characteristic per channel			
Overcurrent switch-off	$I_{out} = 1.0 \dots 1.3 \times \text{set value}$, switch-off after approx. 5 s	$I_{out} = 1.0 \dots 1.3 \times \text{set value}$, switch-off after approx. 5 s	$I_{out} = 1.0 \dots 1.3 \times \text{set value}$, switch-off after approx. 5 s
Current limitation	$I_a = 1.3 \times \text{set value}$, switch-off not before typ. 100 ms	$I_a = 1.3 \times \text{set value}$, switch-off not before typ. 100 ms	$I_{out} = 1.35 \times \text{set value}$, switch-off after approx. 50 ... 100 ms
Immediate switch-off	$I_{out} > \text{set value}$ and $V_{in} < 20 \text{ V}$, switch-off after approx. 0.5 ms	$I_{out} > \text{set value}$ and $V_{in} < 20 \text{ V}$, switch-off after approx. 0.5 ms	$I_{out} > \text{set value}$ and $V_{in} < 20 \text{ V}$, switch-off after approx. 0.5 ms
Residual current at switch-off	–	–	Typ. 20 mA
Reset	Using keys for each channel	Using keys for each channel	Using keys on the module
Remote reset	Non-isolated 24 V input (signal level "high" at >15 V)	Non-isolated 24 V input (signal level "high" at >15 V)	–
Continuation of the table	Page 10/5, column 1	Page 10/5, column 2	Page 10/5, column 3

¹⁾ SITOP select is not designed for operation with DC UPS module 40 A (6EP1 931-2FC21/-2FC42).

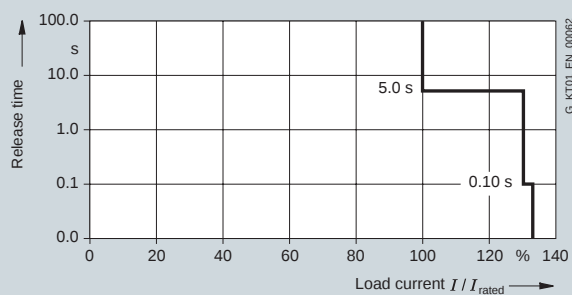
Expansion modules

Continued from	Page 10/4, column 1	Page 10/4, column 2	Page 10/4, column 3
Power supply, type (repeated)	Selectivity module, 4 × 3 A	Selectivity module, 4 × 10 A	Diagnostics module 4 × 10 A
Order No. (repeated)	6EP1 961-2BA10	6EP1 961-2BA20	6EP1 961-2BA00
Protection and monitoring			
Device/Line protection	5 A internal fuse per channel (not accessible)	15 A internal fuse per channel (not accessible)	FKS blade-type fuse per channel (equipped with 15 A fuse in as-delivered state)
Status displays	Three-color LED per channel: • Green LED for "Output switched through" • Yellow LED for "Output switched off manually" • Red LED for "Output switched off due to overcurrent"	Three-color LED per channel: • Green LED for "Output switched through" • Yellow LED for "Output switched off manually" • Red LED for "Output switched off due to overcurrent"	Two-color LED per channel: • Green LED for "Output switched through" • Red LED for "Output switched off due to overcurrent"
Signaling	Common signal contact (changeover contact, rating 0.5 A/24 V DC)	Common signal contact (changeover contact, rating 0.5 A/24 V DC)	Common signal contact (NO contact, rating 0.5 A/24 V DC)
Safety			
Protection class	In accordance with EN 60950 and EN 50178	In accordance with EN 60950 and EN 50178	In accordance with EN 60950 and EN 50178
Degree of protection (EN 60529)	Class III	Class III	Class III
CE mark	IP20	IP20	IP20
UL/cUL (CSA) approval	Yes	Yes	Yes
Explosion protection	ATEX EX II 3G Ex nAC II T4	ATEX EX II 3G Ex nAC II T4	cULus-listed (UL 508, CSA C22.2 No. 14), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273 ATEX EX II 3G Ex nAC IIC T4 U; UL 1604
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–25 ... +85 °C	–25 ... +85 °C	–25 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation	Climate class 3K3 according to EN 60721, no condensation
Mechanics			
Connections			
• Input +24 V	2 screw terminal for 0.5 ... 10 mm ²	2 screw terminal for 0.5 ... 10 mm ²	2 screw terminals for 0.33 ... 10 mm ²
• Input 0 V	2 screw terminals for 0.5 ... 4 mm ²	2 screw terminals for 0.5 ... 4 mm ²	2 screw terminals for 0.22 ... 4 mm ²
• Output 1 ... 4	1 screw terminal each for 0.5 ... 4 mm ²	1 screw terminal each for 0.5 ... 4 mm ²	1 screw terminal each for 0.22 ... 4 mm ²
• Signaling contact	3 screw terminals for 0.5 ... 4 mm ²	3 screw terminals for 0.5 ... 4 mm ²	2 screw terminals for 0.22 ... 4 mm ²
• Remote reset	1 screw terminal for 0.5 ... 4 mm ²	1 screw terminal for 0.5 ... 4 mm ²	–
Dimensions (W × H × D) in mm	70 × 80 × 72	70 × 80 × 72	72 × 90 × 90
Weight, approx.	0.2 kg	0.2 kg	0.4 kg
Installation	Snap onto DIN rail EN 60715 35×7.5/15	Snap onto DIN rail EN 60715 35×7.5/15	Snap onto DIN rail EN 60715 35×7.5/15

SITOP 24 V

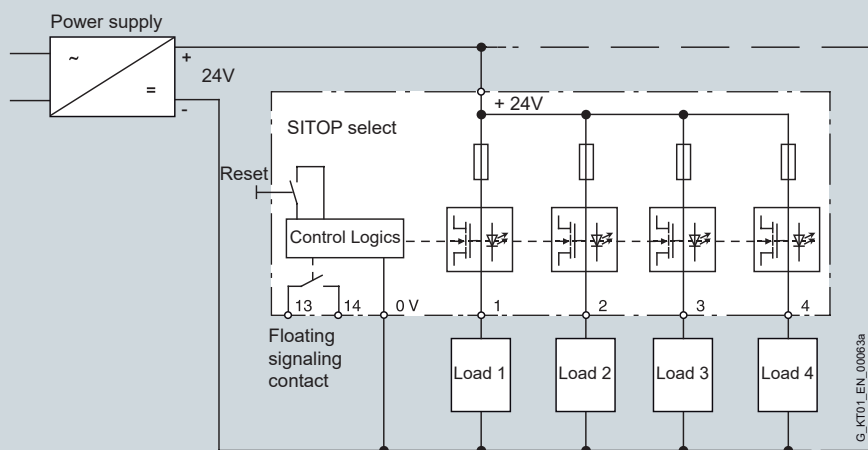
Expansion modules

Characteristics

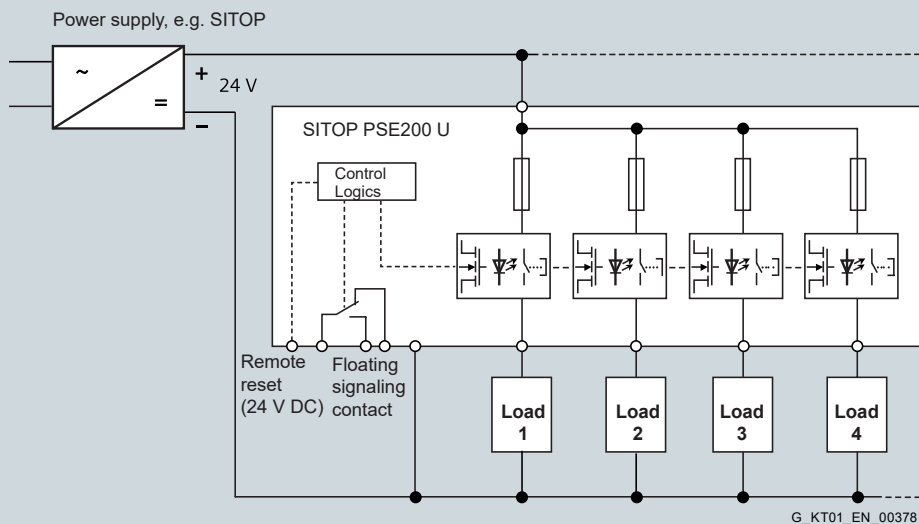


Switch-off characteristic

Circuit diagrams



Switching principle SITOP select



Switching principle SITOP PSE200U

Expansion modules

Overview

Product	SITOP
Power supply, type	Inrush current limiter
Order No.	6EP1 967-2AA00

The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.



The SITOP inrush current limiter is used to reliably reduce the starting currents that are caused, for example, by capacitors or with pulse-controlled power supplies by the rectifier circuit on the input side with capacitor charging. In 1-phase AC networks, it is supplied with rated voltages of 100 V, 120 V or 230 V and in 2-phase and 3-phase AC networks with 208 V to 480 V on the line side upstream of capacitors and power supplies and it limits the inrush current temperature-independently up to e. g. < 10 A at 230 V. In static operation the limit resistance is bypassed after ca. 120 ms and the resulting power loss is reduced.

Dimension drawing	Page 15/17, Dimension drawing 2
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Technical specifications

Input	
Rated voltage $V_{in \text{ rated}}$ Voltage range	AC voltage 1-phase, 2-phase, 50/60 Hz 100 ... 480 V AC 85 ... 575 V AC
Overvoltage strength	–
Input current $I_{in \text{ rated}}$	–
Output	
Rated voltage $V_{out \text{ rated}}$	In accordance with the supply voltage
Rated current value $I_{out \text{ rated}}$	Max. 10 A
Mains buffering	–
Buffering time, max.	–
Parallel switching for enhanced performance	No
Protection and monitoring	
Current limiting, static	–
Short-circuit protection	Must be ensured with an upstream protective device
Continuation of the table	Page 10/8, column 1

SITOP 24 V

Expansion modules

Continued from	Page 10/7, column 1
Power supply, type (repeated)	Inrush current limiter
Order No. (repeated)	6EP1 967-2AA00

Signaling/alarm signals

Status display	Green LED
Alarm signals	–

Safety

	In accordance with EN 60950 and EN 50178
Galvanic isolation	No
Protection class	Class II
CE mark	Yes
UL/cUL (CSA) approval	Yes, cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259
Degree of protection (EN 60529)	IP20

EMC

Emitted interference	EN 61000-6-3
Noise immunity	EN 61000-6-2

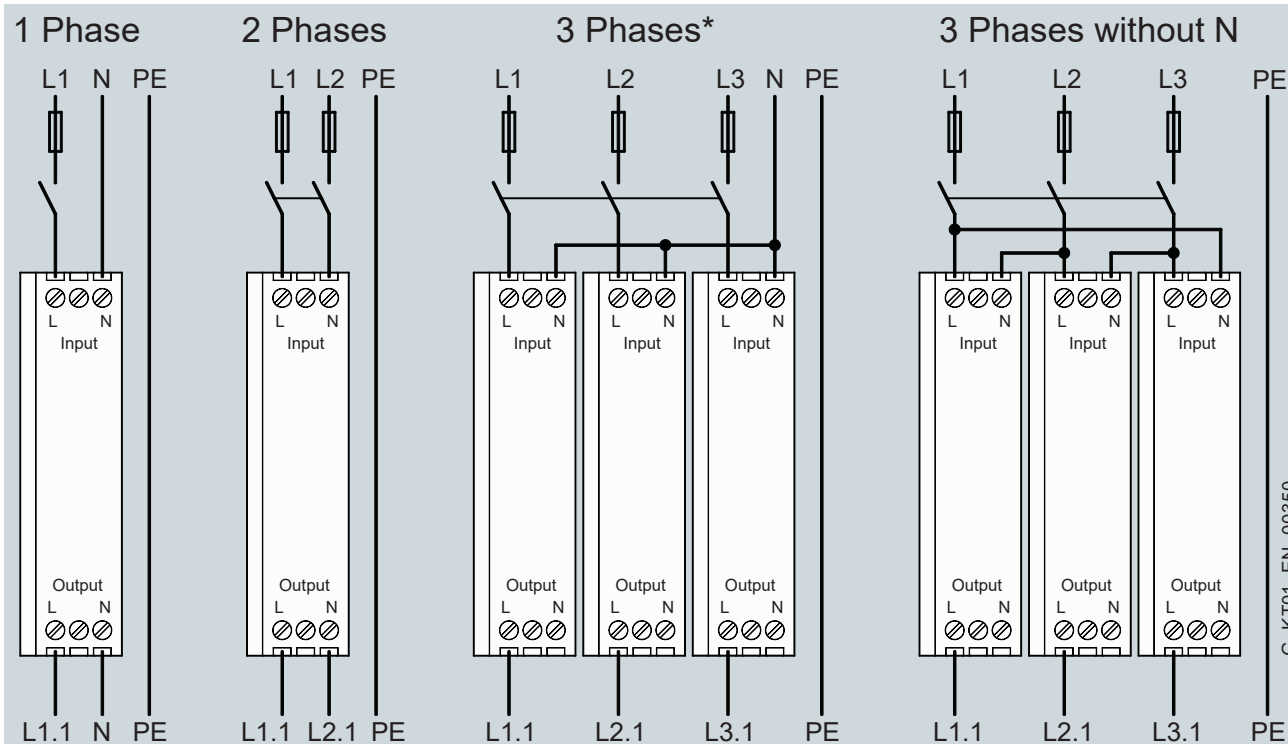
Operating data

Ambient temperature range	0 ... +60 °C with natural convection
Transport/storage temperature range	– 40 ... +85 °C
Humidity class	Climate class 3K3 according to EN 60721, no condensation

Mechanics

Connections	Input and output (L1, N): One screw terminal each for 0.2 ... 2.5 mm ² , single-core/finely stranded;
Dimensions (W × H × D) in mm	22.5 × 80 × 91
Weight, approx.	0.12 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15

Circuit diagrams

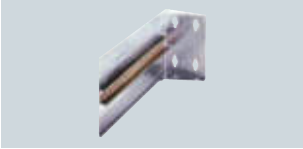


* **Note:** For 3-phase applications N shall only be wired on the input side for internal power supply. N must not be wired on the output side.

SITOP inrush current limiter connection diagram

Expansion modules

Accessories

Product	90° mounting bracket	90° mounting bracket
Mounting bracket	For a depth of 240 mm	For a depth of 320 mm
Order No.	6EP1 971-1AA01	6EP1 971-2BA00
The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.		
	The combination of a SITOP power supply and a 90° mounting bracket results in a minimum surface area requirement on the rear panel of the control cabinet (the width of the power supply becomes the depth, and the depth becomes the width). The mounting bracket is suitable for control cabinets with a depth of 240 or 320 mm or more.	
Dimension drawing	Page 15/18, Dimension drawing 1	Page 15/18, Dimension drawing 2

Technical specifications

Mounting bracket	For a depth of 240 mm	For a depth of 320 mm
Dimensions (W × H × D) in mm	50 × 159 × 236	100 × 150 × 320
Sheet thickness	2 mm	1.5 mm
Mounting rail, attached	DIN rail EN 60715 35×7.5	DIN rail EN 60715 35×15
Weight, approx.	0.9 kg	0.9 kg
Installation	Can be screwed onto a flat surface (keyhole mounting for hooking onto M5 screws, drill hole distance 147.5 mm height)	Can be screwed onto a flat surface (keyhole mounting for hooking onto M6 screws, drill hole distance 90 mm height, 50 mm side distance)
Accessories, included	2 M5 combi screws and 2 M5 self-tapping screws	4 M6 combi screws
Suitable, for example, for	SITOP 24 V/3.5 A (6EP1 332-1SH31) SITOP 24 V/5 A (6EP1 333-1AL12) SITOP 24 V/10 A (6EP1 334-1AL12)	SITOP 24 V/10 A (6EP1 434-2BA00) SITOP 24 V/20 A (6EP1 336-3BA00, 6EP1 436-2BA00, 6EP1 436-3BA00) SITOP 24 V/30 A (6EP1 437-2BA00) SITOP 24 V/40 A (6EP1 337-3BA00, 6EP1 437-2BA10, 6EP1 437-3BA00) SITOP 48 V/20 A (6EP1 457-3BA00)

Mounting adapter for DIN rail

The 24 V/2 A (6ES7 305-1BA80-0AA0) and 24 V/5 A (6ES7 307-1EA80-0AA0) single-phase power supplies are special mechanical versions for SIMATIC S7-300 which can be snapped onto the standard mounting rails. An adapter (6SE7 390-6BA00-0AA0) for mounting on the standard mounting rail EN 60715 35×15 is available individually as accessory.

The 24 V/2 A (6ES7 307-1BA01-0AA0), 24 V/5 A (6ES7-307-1EA01-0AA0) and 10A (6ES7-307-1KA02-0AA0) power supplies are variants for SIMATIC S7-300 and can be snapped onto the S7 mounting rail.

A mounting adapter (6EP1 971-1BA00) for the installation on the standard rail EN 60715 35×15/7.5 is individually available as spare part.

Connector for devices in IP65 and IP67 degree of protection

For the SITOP PSU300P power supply (6EP1 433-2CA00) in IP67 and IP65 degree of protection, a power connection plug (3RK1 911-2BE50) is available as a spare part.

For the maintenance-free DC UPS modules SITOP UPS500P (6EP1 933-2NC01, 6EP1 933-2NC11) in IP65 degree of protection, a connector kit (6EP1 975-2ES00) for input and output with pre-assembled 2 m USB cable is available as spare part.

SITOP 24 V

Expansion modules

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
SITOP modular	Signaling module				
	–	–	–	6EP1 961-3BA10	
SITOP modular	Redundancy module				
	24 V DC	V_{in} – approx. 0.5 V	20 A	6EP1 961-3BA20	
SITOP modular	Buffer module				
	24 V DC	V_{in} – approx. 1 V	40 A	6EP1 961-3BA01	
SITOP PSE200U	Selectivity module				
	24 V DC	V_{in} – approx. 0.2 V	3 A per channel 10 A per channel	6EP1 961-2BA10 6EP1 961-2BA20	
SITOP select	Diagnostics module				
	24 V DC	V_{in} – approx. 0.3 V	10 A per channel	6EP1 961-2BA00	
SITOP	Inrush current limiter				
	100-480 V AC	100-480 V AC	10 A	6EP1 967-2AA00	

Product	Description	Order No.	Price in euros per PU
90° mounting bracket			
	For a depth of 240 mm	6EP1 971-1AA01	
90° mounting bracket			
	For a depth of 320 mm	6EP1 971-2BA00	
Mounting adapter			
	For DIN rail EN 60715 35x 15/7.5	6EP1 971-1BA00	
Mounting adapter			
	For DIN rail EN 60715 35x 15/7.5	6ES7 390-6BA00-0AA0	
Power connection plug			
	For SITOP PSU300P (6EP1 433-2CA00)	3RK1 911-2BE50	
Connector set			
	For SITOP UPS500P (6EP1 933-2NC01/-2NC11)	6EP1 675-2ES00	

SITOP 24 V DC uninterruptible power supply



11/2	Overview
11/3	DC UPS software
11/4	DC UPS with capacitors
11/4	Overview
11/5	SITOP UPS500S 15 A
11/5	SITOP UPS500P 7 A
11/10	SITOP UPS501S
11/11	DC UPS with battery modules
11/11	Overview
11/16	DC UPS module 6 A
11/16	DC UPS module 15 A
11/16	DC UPS module 40 A
11/20	Battery module 1.2 Ah
11/20	Battery module 2.5 Ah
11/20	Battery module 3.2 Ah
11/21	Battery module 7 Ah
11/21	Battery module 12 Ah
11/24	Selection and ordering data

SITOP 24 V

DC uninterruptible power supplies

Overview

Overview

Backup module (see chapter 10)

Expansion module with electrolyte capacitors for bridging temporary power failures. Can be combined with SITOP modular

Selection criteria:

- Low-cost protection against power failures for max. 3 seconds
- Supports the power supply unit when there is a temporarily increased power demand
- High load current up to 40 A



SITOP DC UPS module

DC UPS module with maintenance-free lead-gel batteries for energy storage. Bridging of power failures even for hours.

Selection criteria:

- The 24 V power supply is maintained for a long time, e.g. in order to continue processes.
- High load current up to 40 A

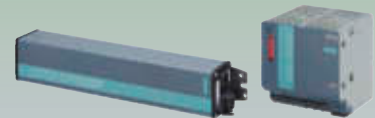


SITOP UPS500

DC UPS with high-capacity double-layer capacitors. Bridging of power failures for several minutes.

Selection criteria:

- Backup of data and closing of applications within minutes.
- Absolutely maintenance-free
- High ambient temperatures up to 60 °C
- No ventilation is required since no gas is emitted
- For distributed applications without control cabinet



G_KT01_EN_00375

The uninterruptible power supply DC with battery modules consists of DC UPS modules with 6 A, 15 A, or 40 A output current and the battery modules 1.2 Ah, 3.2 Ah, 7 Ah and 12 Ah (contains lead-acid batteries with corrosion-resistant lead-calcium high-performance grid plates and fiber-glass mat) and 2.5 Ah (contains high-purity lead-acid "high-temperature batteries").

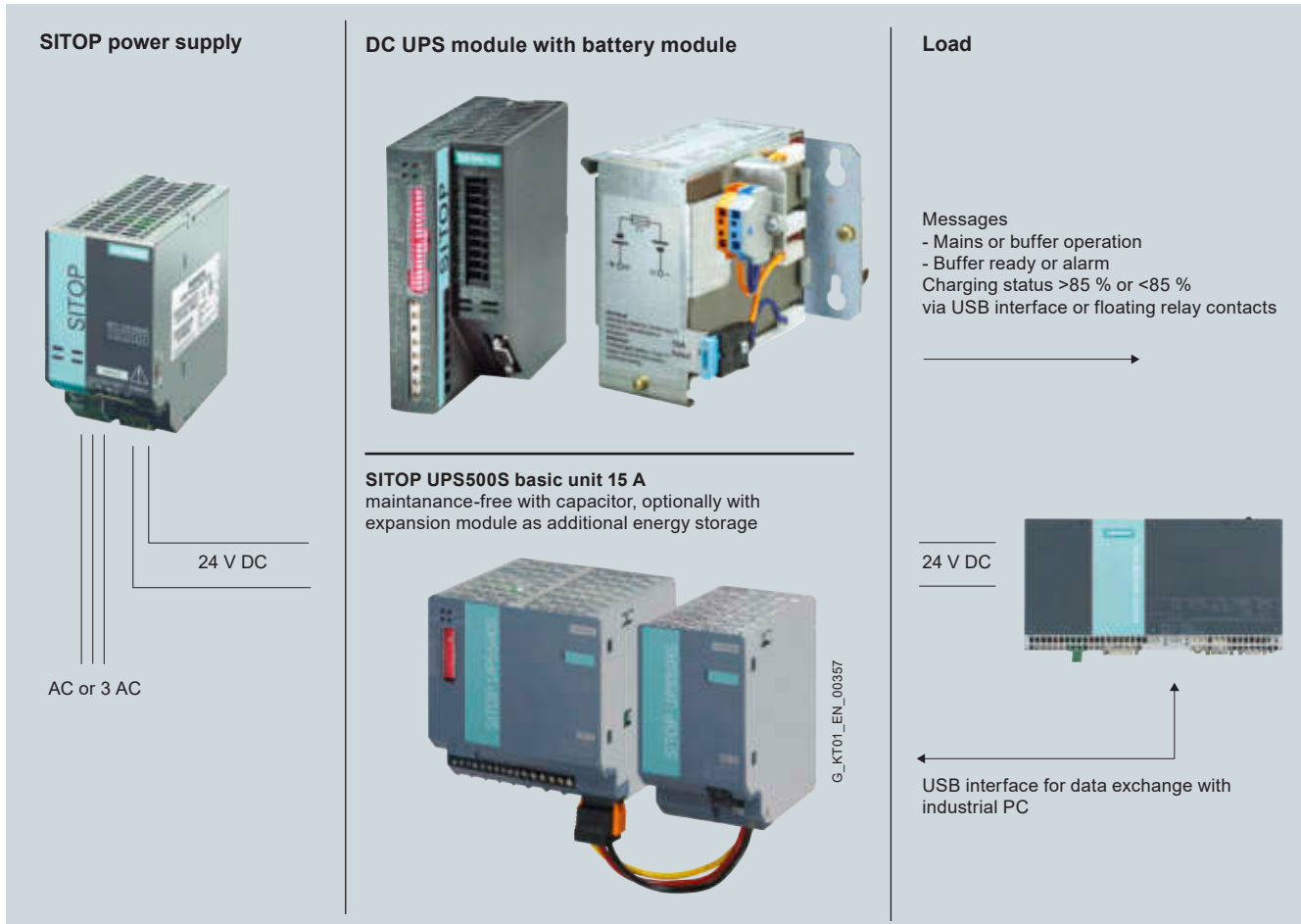
The maintenance-free SITOP UPS500 with capacitors as energy storage units is especially well suited for use at high ambient temperatures. Another advantage of these high-capacity double-layer capacitors is the shorter charge times.

For flexible use, there is the SITOP UPS500S - 15 A basic unit in 2.5 kW and 5 kW versions. A maximum of 3 SITOP UPS501S expansion modules with 5 kW can be connected in parallel to increase the buffer times. The IP65 version SITOP UPS500P disposes of capacitors for 5 or 10 kW and provides up to 7 A of output current.

DC uninterruptible power supplies

Overview

Overview (continued)

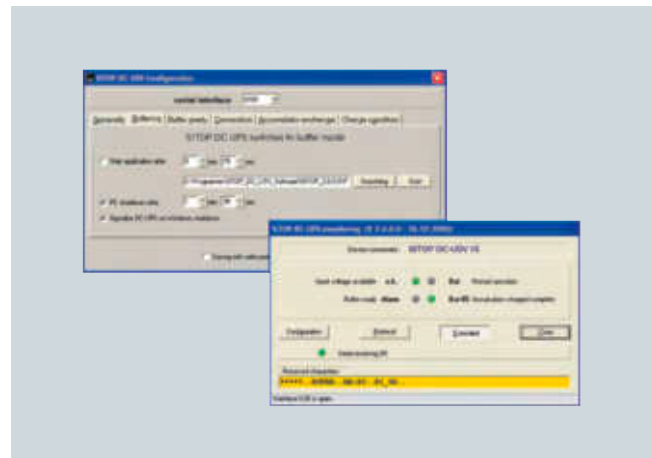


DC UPS software

The uninterruptible power supplies DC are optionally available with USB interface or serial interface. All relevant messages about the status of the uninterruptible power supply DC can be transferred to a PC (e.g. SIMATIC IPC) via this interface.

SITOP DC UPS software provides the user with a software tool that is extremely easy to operate and can be used to further process the signals sent from the uninterruptible power supply DC on the PC. In monitoring mode, the statuses of the uninterruptible power supply DC are visualized on the PC. Secure shutdown on power failure and automatic restart of the PC are supported. It is also possible to freely define responses to the different operating states of the uninterruptible power supply DC, permitting extremely flexible integration into a wide variety of applications.

The software runs under the operating systems, Windows 2000, Windows XP and Windows Vista. It is available as freeware on the SITOP homepage and can be downloaded free of charge.
www.siemens.com/sitop



SITOP DC UPS software monitoring and configuration window

SITOP 24 V

DC uninterruptible power supplies

DC UPS with capacitors

Overview

Uninterruptible power supplies normally store the electrical energy in lead-acid batteries. Temperatures such as those prevalent in control cabinets considerably shorten the service life of the battery, however, and the batteries must be replaced on a regular basis – annually at an ambient temperature of 40 °C, for example. The innovative SITOP UPS500, however, is based on absolutely maintenance-free capacitors with a long service life. Even at temperatures of 50 °C they still have more than 80 % of their capacity after 8 years, so there is no need to replace the en-

ergy stores. Because the capacitors do not emit any gas, the control cabinet does not have to be ventilated.

Another advantage is the significantly shorter charging times of the double-layer capacitors, which ensure that the buffer is ready very quickly after loss of power.

The IP65 version SITOP UPS500P has capacitors for 5 or 10 kW and provides up to 7 A of output current. The oblong metal enclosure is also suitable for installing on support arm systems.

Selection table SITOP UPS500 (optional with SITOP UPS501S expansion module) and mains buffering times

Buffering and charging times										
SITOP UPS500S/501S configurations									UPS500P	
Basic unit	2.5 kW	5 kW	2.5 kW	5 kW	2.5 kW	5 kW	2.5 kW	5 kW	5 kW	10 kW
Expansion modules	–	–	1 × 5 kW	1 × 5 kW	2 × 5 kW	2 × 5 kW	3 × 5 kW	3 × 5 kW	–	–
Total energy	2.5 kW	5 kW	7.5 kW	10 kW	12.5 kW	15 kW	17.5 kW	20 kW	5 kW	10 kW
Load current	Buffer times									
0.5 A	134 s	236 s	390 s	478 s	632 s	748 s	851 s	1007 s	284 s	647 s
0.8 A	90 s	167 s	266 s	346 s	440 s	527 s	580 s	706 s	190 s	435 s
1 A	75 s	138 s	219 s	296 s	365 s	414 s	490 s	572 s	153 s	351 s
2 A	38 s	76 s	122 s	156 s	203 s	230 s	265 s	306 s	80 s	152 s
3 A	26 s	52 s	82 s	106 s	136 s	159 s	186 s	213 s	53 s	108 s
4 A	19 s	39 s	61 s	81 s	101 s	120 s	139 s	160 s	40 s	84 s
5 A	15 s	31 s	49 s	65 s	81 s	95 s	111 s	130 s	30 s	68 s
7 A	12 s	26 s	40 s	55 s	67 s	80 s	94 s	106 s	25 s	57 s
6 A	10 s	21 s	34 s	47 s	58 s	69 s	81 s	82 s	21 s	49 s
8 A	8 s	18 s	29 s	40 s	50 s	59 s	69 s	79 s	–	–
10 A	6 s	15 s	23 s	32 s	39 s	47 s	54 s	62 s	–	–
12 A	4 s	12 s	19 s	26 s	32 s	38 s	44 s	52 s	–	–
15 A	3 s	9 s	14 s	20 s	25 s	30 s	35 s	40 s	–	–
Load current	Buffer times									
2 A	54 s	120 s	158 s	223 s	263 s	318 s	355 s	417 s	130 s	360 s
1 A	110 s	205 s	311 s	425 s	503 s	625 s	695 s	816 s	-	-

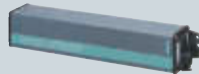
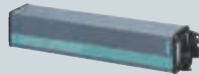
Important information for selecting the energy storage units:

When the mains buffering times were determined, the discharge period of new or non-aged, completely charged capacitors was used as a basis. At a continuous ambient temperature of +50 °C, a loss of capacity of approx. 20 % must be considered after a service life of 8 years.

DC uninterruptible power supplies

DC UPS with capacitors

Overview

Product	SITOP UPS500S 15 A	SITOP UPS500P 7 A
Power supply, type	Basic unit 15 A	Basic device 7 A, IP65
Order No.	6EP1 933-2EC41 (with USB interface and 2.5 kW) 6EP1 933-2EC51 (with USB interface and 5 kW)	6EP1 933-2NC01 (with USB interface and 5 kW) 6EP1 933-2NC11 (with USB interface and 10 kW)
The product families are highlighted in the same colors. For an explana- tion of the product groups, see Chapter 1, pages 1/6 to 1/10.	 • Compact design, only 120 mm wide • Two versions with integrated energy storage units: 2.5 kW or 5 kW • Can be expanded easily using a user-friendly plug-in system with the expansion module 5 kW • Absolutely uninterruptible bridging of power failures, as soon as the DC UPS input voltage falls below the value set by the DIP switches • High level of safety and availability through monitoring of operational readiness, and monitoring of the capacitor charge (message "> 85 % charged") • Support for automatic warm restart of industrial PCs through selectable shutdown characteristics • With USB interface	 • Compact design, degree of protection IP65 • For distributed use, e.g. on support arms • Integrated energy storage: 5 kW or 10 kW • Ambient temperature range for operation: 0 to +55 °C • High degree of efficiency 96.9 % or low power loss, approx. 6 W with 7 A load current • USB interface • Indication of the operating states normal operation, buffer mode, alarm message "Buffer not ready" and indication of the capacitor charge > 85 %
		
Dimension drawing	Page 15/19, Dimension drawing 1	Page 15/19, Dimension drawing 3

Technical specifications

Input L+/ M with normal operation		
Rated voltage $V_{in rated}$ ¹⁾ Voltage range	Controlled DC voltage 24 V DC 22 ... 29 V	Controlled DC voltage 24 V DC 22.5 ... 29 V
Connection threshold for buffering	22.5 V DC $\pm$ 0.1 V (factory setting), adjustable in the range 22 ... 25.5 V DC (in 0.5 V steps)	22.5 V DC $\pm$ 0.1 V DC
Rated current value $I_{in rated}$	15.2 A + approx. 2.3 A with empty energy storage (capacitor)	7 A + approx. 2 A with empty energy storage (capacitor)
Continuation of the table	Page 11/6, column 1	Page 11/6, column 2

SITOP 24 V

DC uninterruptible power supplies

DC UPS with capacitors

Continued from	Page 11/5, column 1	Page 11/5, column 2
Power supply, type (repeated)	Basic unit 15 A	Basic device 7 A, IP65
Order No. (repeated)	6EP1 933-2EC41 (with USB interface and 2.5 kW) 6EP1 933-2EC51 (with USB interface and 5 kW)	6EP1 933-2NC01 (with USB interface and 5 kW) 6EP1 933-2NC11 (with USB interface and 10 kW)
Mains buffering		
Mains buffering or buffering times without expansion modules	6EP1 933-2EC41: 15 A for 3 s or 10 A for 6 s or 5 A for 15 s or 2 A for 38 s 6EP1 933-2EC51: 15 A for 9 s or 10 A for 15 s or 5 A for 31 s or 2 A for 76 s	7 A for 49 s or 5 A for 68 s or 3 A for 108 s or 1 A for 351 s
Mains buffering or buffering times with expansion modules	For longer buffering times, see table	Not applicable
On/off control circuit	External isolated NO contact required (loading max. 15 V DC/max. 10 mA). Buffering is terminated by dis- connecting the control circuit.	Not applicable
Methods of setting the buffering time	Adjustable using DIP switches to a maximum buffering time up to forced shutdown at approx. 7 V internal capacitor voltage (output remains constant at 24 V up to that point) or to a time limit of 5 ... 315 s (in 10 s increments) if the energy content is sufficient for the required current	Not applicable
Interruption	Adjustable with DIP switch, either: • Interruption of the output volt- age despite returning input volt- age for 5 s following expiry of set buffering time to support au- tomatic restarting of industrial PCs Or • No forced interruption at the end of the set buffer time	Not applicable
Continuation of the table	Page 11/7, column 1	Page 11/7, column 2

¹⁾ All SITOP 24 V DC power supplies are permissible without restriction.

DC uninterruptible power supplies

DC UPS with capacitors

Continued from	Page 11/6, column 1	Page 11/6, column 2
Power supply, type (repeated)	Basic unit 15 A	Basic device 7 A, IP65
Order No. (repeated)	6EP1 933-2EC41 (with USB interface and 2.5 kW) 6EP1 933-2EC51 (with USB interface and 5 kW)	6EP1 933-2NC01 (with USB interface and 5 kW) 6EP1 933-2NC11 (with USB interface and 10 kW)
Output L+/M in normal operation		
Rated voltage value $V_{out rated}$	24 V DC (controlled)	24 V DC (controlled)
Voltage range	23.3 ... 24.7 V DC or 24 V DC $\pm 3\%$	23.3 ... 24.7 V DC or 24 V DC $\pm 3\%$
Startup delay	Approx. 600 ms	Approx. 600 ms
Voltage rise	Approx. 25 ms	Approx. 25 ms
Output current I_{out}	0 ... 15 A	0 ... 7 A
Dynamic current with overload	Electronic current limitation to typically 25 A for approx. 200 ms, then electronic shutdown of the output with automatic restart attempts (approx. 20 s intervals between restart attempts)	Electronic shutdown at typ. 30 A, automatic restart after 20 s
Dynamic current with short-circuit	Electronic current limitation to typically 25 A for approx. 110 ms, then electronic shutdown of the output with automatic restart attempts (approx. 20 s intervals between restart attempts)	Electronic shutdown at typ. 30 A, automatic restart after 20 s
Output L+/M with buffer mode		
Rated voltage value $V_{out rated}$	24 V DC	24 V DC
Approximate voltage range	23.3 ... 24.7 V DC or 24 V DC $\pm 3\%$	23.3 ... 24.7 V DC or 24 V DC $\pm 3\%$
Output current I_{out}	0 ... 15 A	0 ... 7 A
Dynamic current with overload	Electronic current limitation to typically 25 A for approx. 200 ms, then electronic shutdown of the output (restart following return to normal operation)	Electronic shutdown at typ. 30 A, automatic restart after 20 s
Dynamic current with short-circuit	Electronic current limitation to typically 25 A for approx. 110 ms, then electronic shutdown of the output (restart following return to normal operation)	Electronic shutdown at typ. 30 A, automatic restart after 20 s
Charging current	Approx. 1 A (factory setting), adjustable to 1 A or 2 A (charging is carried out with closed and open on/off circuit)	2 A permanently set
Charging time after a discharge	6EP1 933-2EC41: 110 s with 1 A, 54 s with 2 A 6EP1 933-2EC51: 205 s with 1 A, 120 s with 2 A	Approx. 300 s
Charging time with expansion modules	For longer charging times, see table	Not applicable
Continuation of the table	Page 11/8, column 1	Page 11/8, column 2

SITOP 24 V

DC uninterruptible power supplies

DC UPS with capacitors

Continued from	Page 11/7, column 1	Page 11/7, column 2
Power supply, type (repeated)	Basic unit 15 A	Basic device 7 A, IP65
Order No. (repeated)	6EP1 933-2EC41 (with USB interface and 2.5 kW) 6EP1 933-2EC51 (with USB interface and 5 kW)	6EP1 933-2NC01 (with USB interface and 5 kW) 6EP1 933-2NC11 (with USB interface and 10 kW)
Efficiency/heat loss		
At $V_{out rated}$, $I_{out rated}$ approx.	97.5 % / 9 W	96.5 % / 5.2 W
Protection and monitoring		
Reverse polarity protection	Against reversed input voltage	Against reversed input voltage
Overload protection	Electronic shutdown of the output in accordance with "dynamic current with overload" in normal operation (automatic restart attempts) or in buffer mode (restart following return to normal operation)	Electronic shutdown of the output in accordance with "dynamic current with overload" in normal operation (automatic restart attempts) or in buffer mode (restart following return to normal operation) Thermal overload protection
Short-circuit protection	Electronic shutdown of the output in accordance with "dynamic current with short-circuit" in normal operation (automatic restart attempts) or in buffer mode (restart following return to normal operation), built-in (non-accessible) 20 A fuse	Electronic shutdown of the output in accordance with "dynamic current with overload" in normal operation (automatic restart attempts) or in buffer mode (restart following return to normal operation) Thermal overload protection
Signaling		
Normal operation	Green LED (OK) and isolated relay contact (changeover contact) ²⁾	Green LED (OK)
Buffer mode (capacitor supplies load alone or in addition to the PS in the case of overload)	Yellow LED (Bat) and isolated relay contact (changeover contact) ²⁾	Yellow LED (Bat)
Alarm (buffer not ready, or prewarning from < 12 V capacitor voltage)	Red LED (alarm) and isolated relay contact (changeover contact) ²⁾	Red LED (Alarm)
"Capacitor charge > 85 %" ¹⁾	Second green LEDs (Bat > 85 %) and isolated relay contact (NO contact) ²⁾	Second green LED (Bat > 85 %)
Continuation of the table	Page 11/9, column 1	Page 11/9, column 2

¹⁾ 85 % with regard to residual capacity still available depending on aging. The original capacity (= capacity when new) reduces by only approx. 20 % within 8 years of operation even at a high ambient temperature of the device of +50 °C, for example, so that 80 % residual capacity still remains. The backup times also reduce by approximately 20 % in 8 years (at +50 °C) with small currents (up to approximately 5 A), and by approximately 30 % with high load currents (over 10 A).

Note: The lower the ambient temperature, the smaller the capacity reduction (approximately one half per 10 °C lower ambient temperature, that is at +40 °C, for example, only 10 % capacity reduction in 8 years)

²⁾ Permissible contact rating: 60 V DC/1 A or 30 V AC/1 A.

DC uninterruptible power supplies

DC UPS with capacitors

Continued from	Page 11/8, column 1	Page 11/8, column 2
Power supply, type (repeated)	Basic unit 15 A	Basic device 7 A, IP65
Order No. (repeated)	6EP1 933-2EC41 (with USB interface and 2.5 kW) 6EP1 933-2EC51 (with USB interface and 5 kW)	6EP1 933-2NC01 (with USB interface and 5 kW) 6EP1 933-2NC11 (with USB interface and 10 kW)
USB interface		
	Output of all alarm signals and receipt of the "Remote timer start" signal. Technical design: Specification 2.0 with full speed, i.e. 2 Mbit/s. Supplied with +5 V by DC UPS ("self powered"). Required connection to the PC: Commercially available 4-core shielded cable, 90 ohm, max. 5 m, USB series "A" connector to PC and USB series "B" connector to DC UPS	Output of all alarm signals and receipt of the "Remote timer start" signal. Techn. design: Specification 2.0 at full speed, i.e. 2 Mbit/s. Supplied with +5 V by DC UPS ("self-powered"). Required connection to PC: see connector set
Software	A software tool (runs under Windows 2000, Windows XP and Windows Vista) for reading out and processing the signals can be downloaded from the Internet at http://www.siemens.com/sitop-usp This site also provides more information on the interface.	A software tool (runs under Windows 2000, Windows XP and Windows Vista) for reading out and processing the signals can be downloaded from the Internet at http://www.siemens.com/sitop-usp This site also provides more information on the interface.
Control signals		
On/off control signal	Buffering is terminated by opening the control circuit or by means of DIP switches on the device (DIP switch must be in "Off" position). All other functions are retained.	Not applicable
"Remote timer start" via USB interface Starts mains buffering for the set buffer time		
Safety		
Primary/secondary isolation	No	
Protection class	Class III (ext. circuit and power supply unit: SELV in accordance with EN 60950 required)	
EMC		
Emitted interference	Radio interference suppression according to EN 55022, limit-value curve B	
Noise immunity	Noise immunity according to EN 61000-6-2	
Ambient conditions		
Ambient temperature during operation	0 ... +60 °C with natural convection	0 ... +55 °C with natural convection
Transport/storage temperature	-40 ... +70 °C	-40 ... +70 °C
Degree of protection (EN 60529)	IP20	IP65
Humidity class	Conditions of use in accordance with EN 60721, climate class 3K3 (relative humidity 5 % to 85 % and absolute humidity 1 g/m ³ to 25 g/m ³ ; no condensation)	
Continuation of the table	Page 11/10, column 1	Page 11/10, column 2

SITOP 24 V

DC uninterruptible power supplies

DC UPS with capacitors

Continued from	Page 11/9, column 1	Page 11/9, column 2
Power supply, type (repeated)	Basic unit 15 A	Basic device 7 A, IP65
Order No. (repeated)	6EP1 933-2EC41 (with USB interface and 2.5 kW) 6EP1 933-2EC51 (with USB interface and 5 kW)	6EP1 933-2NC01 (with USB interface and 5 kW) 6EP1 933-2NC11 (with USB interface and 10 kW)

Approvals

CE mark	Yes	Yes
UL/cUL (CSA) approvals	cULus-Listed (UL 508, CSA C22.2 No. 107.1) File E197259; cCSAus (CSA C22.2 No. 60950-1-03, UL 60950-1)	–

Mechanics

Input connections 24 V DC	2 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	Connector set ¹⁾
Output connections 24 V DC	4 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	Connector set ¹⁾
Connections for control circuit and alarm signals	10 screw terminals for 0.5 ... 2.5 mm ² /20 ... 13 AWG	Not applicable
USB connection	Yes	Yes
Dimensions (W × H × D) in mm	120 × 125 × 125	400 (without connector) × 80 × 80 470 (without connector) × 80 × 80
Weight	Approx. 1.0 kg	Approx. 1.9 kg Approx. 2.2 kg
Installation	Snaps onto DIN rail EN 60715 35× 7.5/15	Screw mounting

Overview

Product	SITOP UPS501S
Power supply, type	Extension module
Order No.	6EP1 935-5PG01

The product families are highlighted in the same colors. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.



- Additional energy storage (5 kW)
- Up to 3 expansion modules can be connected to a SITOP UPS500S to extend the buffer times
- Complete with balancing and safety circuits

Dimension drawing	Page 15/19, Dimension drawing 2
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Technical specifications

Mechanics

Connections	Can be easily connected to SITOP UPS500S via a user-friendly plug-in system
Dimensions (W × H × D) in mm	Approx. 70 × 125 × 125
Weight	Approx. 0.7 kg
Installation	Snaps onto DIN rail EN 60715 35× 7.5/15

¹⁾ The connector set contains connection plugs for input and output and pre-assembled USB cables, 2 m long (connector set not included in the scope of supply SITOP UPS500P1) MLFB: 6EP1 975-2ES00.

DC uninterruptible power supplies

DC UPS modules and battery modules

Overview

By combining a DC UPS module with at least one 24 V battery module and a SITOP power supply unit, longer power failures can be bridged without any interruption.

This combination is used, for example, in machine tool manufacture, the textile industry, all types of production lines and filling systems, and in conjunction with 24 V industrial PCs. This prevents the negative effects which often result from power failures.

DC UPS modules: 6 A, 15 A, 40 A

Battery modules:

- 1.2 Ah (contains lead-acid batteries with corrosion-resistant lead-calcium, high-capacity grid plates and fiberglass mat)
- 3.2 Ah (contains lead-acid batteries with corrosion-resistant lead-calcium, high-capacity grid plates and fiberglass mat)
- 7 Ah (contains lead-acid batteries with corrosion-resistant lead-calcium, high-capacity grid plates and fiberglass mat)
- 12 Ah (contains lead-acid batteries with corrosion-resistant lead-calcium, high-capacity grid plates and fiberglass mat)
- 2.5 Ah (contains "high-temperature battery" lead-acid type)

Selection table for battery modules and mains buffering times

Load current	Battery module 1.2 Ah (6EP1935-6MC01)	Battery module 3.2 Ah (6EP1935-6MD11)	Battery module 7 Ah (6EP1935-6ME21)	Battery module 12 Ah (6EP1935-6MF01)	Battery module 2.5 Ah (6EP1935-6MD31)
1 A	30 min	2.5 h	6 h	11 h	2 h
2 A	11 min	45 min	2.5 h	5 h	45 min
3 A	4 min	25 min	1.5 h	3 h	30 min
4 A	2 min	20 min	45 min	2 h	20 min
6 A	1 min	10 min	30 min	1 h	13 min
8 A	–	4 min	20 min	40 min	9 min
10 A	–	1.5 min	15 min	30 min	7 min
12 A	–	1 min	10 min	25 min	5.5 min
14 A	–	50 s	8 min	20 min	4.5 min
16 A	–	40 s	6 min	15 min	4 min
20 A	–	–	2 min	11 min	–

Important information for selecting the battery capacity:

- The mains buffering times are based on the discharge period of new or non-aged, fully charged battery modules at a battery temperature of not less than +25 °C down to a battery voltage of 21 V (with voltage drops in the DC UPS, approximately 20.4 V DC still remain for the load).

Battery aging reduces the still available battery capacity up to the end of the service life to typically around 50 % of the original capacity value when new (1.2 Ah or 3.2 Ah or 7 Ah, etc.) and the internal resistance increases. When the message "Battery charge > 85 %" appears, only around 50 % × 85 % = approx. 43 % of the originally available capacity can be assumed at the end of the battery service life.

At battery temperatures below +25 °C, the available capacity drops by another 30 % at +5 °C battery temperature from approx. 43 % to approx. 70 %. There is then only around 30 % of the original capacity available.

A significantly larger battery capacity must therefore be selected when configuring the plant: A drop to approx. 50 % is compensated for by selecting 1 / approx. 0.5 = approx. double the battery capacity (required as per the table for the relevant load current and the relevant buffering time). Available capacity of approx. 43 % is compensated for by selecting 1 / approx. 0.43 = approx. 2.33 times battery capacity. Available capacity of approx. 30 % is compensated for by selecting 1 / approx. 0.3 = approx. 3.33 times battery capacity.

Recommendation:

- Instead of installing double the battery capacity to cope with battery aging, regular battery replacement midway through the expected service life (reduction of capacity to approx. 50 %) can be more advisable for the following reasons: Until the halfway point of the expected battery service life (or slightly beyond), capacity does not drop below 100 %. With regular replacement after halfway through expected service life, only single battery capacity (instead of double capacity) must be installed regarding aging (→neutral in price with regard to battery module costs but requires only half the space).

Replacing after half the service life dispenses in particular with the large scatter range of the residual capacity at the end of the service life, which is not accurately defined by battery manufacturers (after the full time, many batteries are above, but many are also below the average of 50 % residual capacity, that is, even if double the capacity is installed, the influence of aging at the end of service life is not reliably compensated for, but only typically) → In the case of replacement after half the expected service life, the configured buffering time is maintained significantly more reliably.

SITOP 24 V

DC uninterruptible power supplies

DC UPS modules and battery modules

Overview (continued)

In the case of batteries stored in cool conditions (not exceeding +25 °C) and for not longer than approximately 4 months, the following service life can be assumed, strongly dependent on battery temperature:

Battery temperature	Drop to approx. 50 % of residual capacity	Recommendation: Replace (with 100 % residual capacity) every	Alternative recommendation
+20 °C	4 years	2 years	
+30 °C	2 years	1 year	
+40 °C	1 year	0.5 years	Install double capacity and replace (1 × per year)

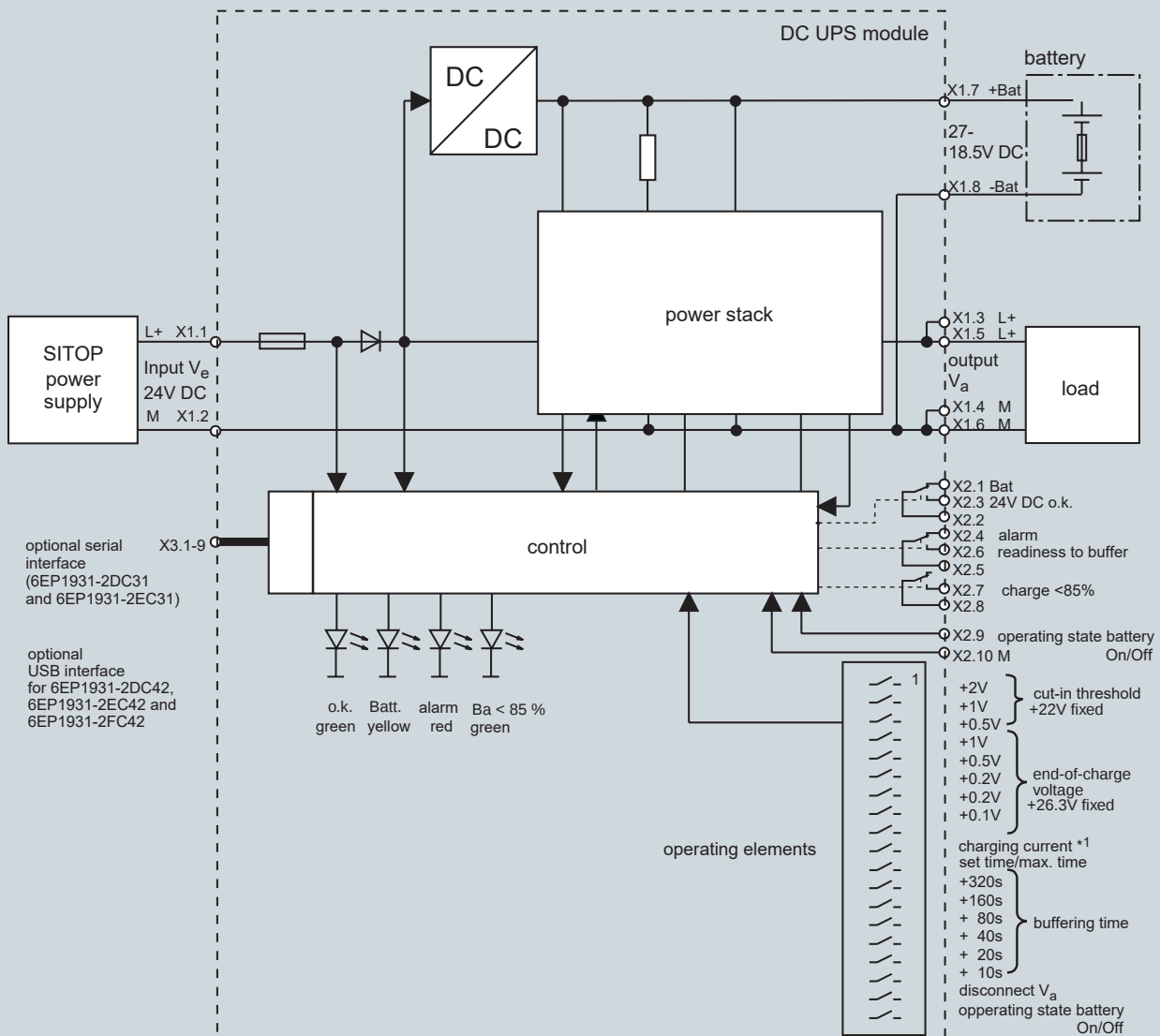
In normal cases (installation in the coolest location in the control cabinet at approx. +30 °C), the battery with single installed battery capacity should be replaced in accordance with the selection table after 1 year of operation!

- On the DC UPS module 40 A, at least 2 battery modules from 7 Ah must be switched in parallel. When connecting battery modules in parallel, you must ensure identical capacity and aging.
- After a power failure, the battery module is disconnected from the loads at the end of the selected buffering time either automatically or electronically by opening the On/Off control circuit, and as soon as the 24 V input voltage is available again, it is quickly re-charged with the charge current of the relevant DC UPS module (with I - V charge characteristic: First constant current I for fast charging, and changeover to constant voltage V to maintain the charge when the battery is almost full).

DC uninterruptible power supplies

DC UPS modules and battery modules

Integration



*1: charging current 0.2 A or 0.4 A for 6EP1931-2DC../0.35 A or 0.7 A for 6EP1931-2EC../1 A or 2 A for 6EP1931-2FC..

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DC uninterruptible power supplies

DC UPS modules and battery modules

Function

The following timing diagrams show examples of the characteristic of the input and output voltage at the terminals of the DC UPS module as well as the signal characteristic of the alarm signals (relays) and of the remote signal (port).

"Long" power failure with DC UPS without serial or USB port (Fig. 11/1)

Power restoration only once buffer time t_p has expired (t_3 follows t_4):

Upon failure of the input voltage on the DC UPS module (time t_1), the battery "Bat" immediately takes over the DC supply, and the output voltage V_{out} is then retained absolutely without interruption.

The isolated changeover contact "OK/Bat" switches over to its off position "Bat".

At the same point in time t_1 , the buffer time t_p set on the DIP switches is started automatically.

The fact that the DIP switch is set to "Interruption output V_{out} " in this example has no effect because the input voltage returns at time t_3 only once the set buffer time (time t_4) has expired.

"Short" power failure with DC UPS without serial or USB port (Fig. 11/2)

Power restoration before buffer time t_p has expired (t_3 before t_4):

Upon failure of the input voltage on the DC UPS module (time t_1), the battery "Bat" immediately takes over the DC supply, and the output voltage V_{out} is then retained absolutely without interruption.

The isolated changeover contact "OK/Bat" switches over to its off position "Bat".

At the same point in time t_1 , the buffer time t_p set on the DIP switches is started automatically.

With the DIP switch set to "Interruption output V_{out} ", the output voltage V_{out} is automatically interrupted for 5 s once the set buffer time t_p (time t_4) has expired.

The battery has already been disconnected because the input voltage has returned at the time t_3 .

If the DIP switch is not set to "Interruption output V_{out} ", there is no interruption in this example because the input voltage has already returned at time t_3 prior to expiry of the set buffer time (time t_4).

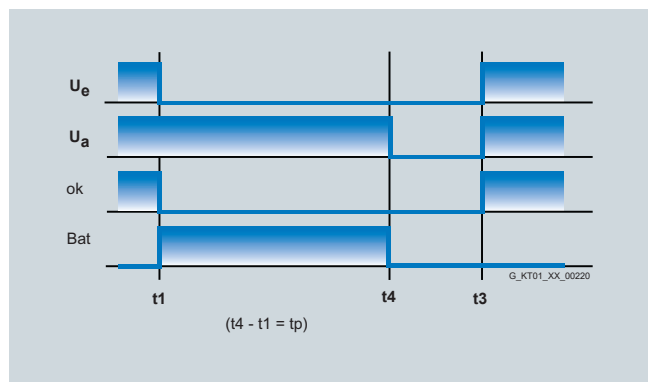


Figure 11/1 "Long power failure"

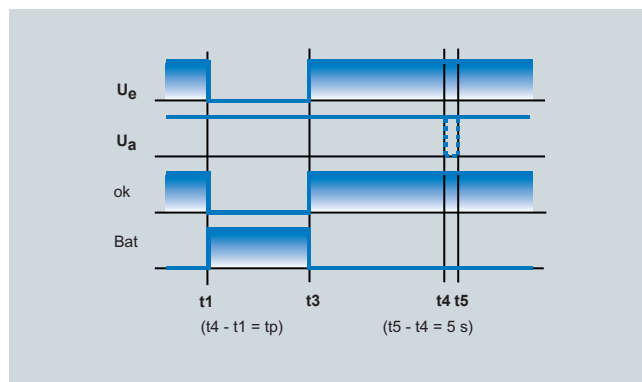


Figure 11/2 "Short power failure"

DC UPS without serial or USB port (6EP1931-2DC21/-2EC21/-2FC21)

DIP switch settings on device: buffer time t_p (from 5 s to 635 s with bottom row nos. 2 to 7) /
/ t = according to setting (with bottom row no. 1 to left) /  = with setting for interruption V_{out}
(with bottom row no. 8 to left)

Legend:

V_{in} : Input voltage at terminals X1.1 – X1.2
 V_{out} : Output voltage at terminals X1.3 – X1.4 and X1.5 – X1.6
 ok: Signal for input voltage V_{in} OK or above the set battery connection threshold
 Bat: Signal for battery operation (batteries connected to output, batteries supply the load)
 Remote: Signal for remote timer start with signal level = 0 at pin 7 of 9-pin serial interface (pin 7 is usually the positive power supply for the interface)

t_1 : Input voltage V_{in} missing or falls below the set connection threshold
 t_2 : Buffer time set on DIP switches is started by remote timer start (signal level = 0)
 t_3 : Input voltage V_{in} rises above set connection threshold
 t_4 : End of set buffer time (output is switched off and/or battery is disconnected)
 t_5 : Output is connected again 5 s after shutdown
 t_p : Buffer time set on the DIP switches (bottom row nos. 2 to 7)

DC uninterruptible power supplies

DC UPS modules and battery modules

Function (continued)

"Long" power failure with DC UPS with serial or USB port (Fig. 11/3)

Power restoration only once buffer time t_p has expired (t3 follows t4):

Upon failure of the input voltage on the DC UPS module (time t1), the battery "Bat" immediately takes over the DC supply, and the output voltage V_{out} is then retained absolutely without interruption.

The isolated changeover contact "OK/Bat" switches over to its off position "Bat".

The buffer time t_p set on the DIP switches is started at the user-selectable time t2 by means of the signal "Remote timer start" (signal level = 0 at pin 7 of the 9-pin serial interface following previous signal chart according to operating instructions).

The fact that the DIP switch is set to "Interruption output V_{out} " in this example has no effect because the input voltage returns at time t3 only once the set buffer time (time t4) has expired.

Note: Without a remote signal level = 0 with a setting $t = \text{max.}$ duration, there is no interruption to the output voltage in this case because the set buffer time is not started (or interruption only if the exhaustive discharge protection disconnects the accumulator and the input voltage has not returned by then).

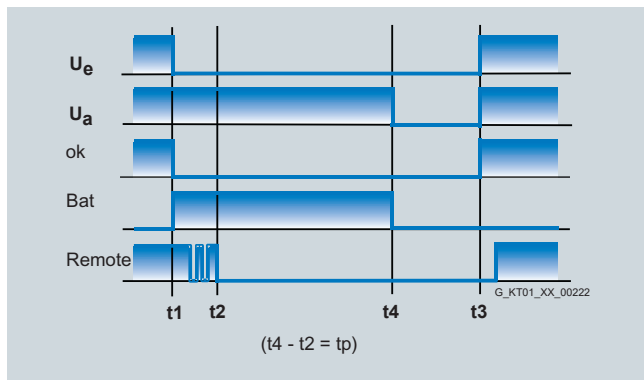


Figure 11/3 "Long power failure"

DC UPS with serial or USB port (6EP1931-2DC31/-2DC42/-2EC31/-2EC42/-2FC42)

DIP switch settings on device: buffer time t_p (from 5 s to 635 s with bottom row nos. 2 to 7) / $t = \text{max.}$ time (with bottom row no. 1 to right) / interruption of U_{out} (with bottom row no. 8 to left)

Legend:

V_{in} : Input voltage at terminals X1.1 – X1.2
 V_{out} : Output voltage at terminals X1.3 – X1.4 and X1.5 - X1.6
 ok: Signal for input voltage V_{in} OK or above the set battery connection threshold
 Bat: Signal for battery operation (batteries connected to output, batteries supply the load)
 Remote: Signal for remote timer start with signal level = 0 at pin 7 of 9-pin serial interface (pin 7 is usually the positive power supply for the interface)

"Short" power failure with DC UPS with serial or USB port (Fig. 11/4)

Power restoration before buffer time t_p has expired (t3 before t4):

Upon failure of the input voltage on the DC UPS module (time t1), the battery "Bat" immediately takes over the DC supply, and the output voltage V_{out} is then retained absolutely without interruption.

The isolated changeover contact "OK/Bat" switches over to its off position "Bat".

The buffer time t_p set on the DIP switches is started at the user-selectable time t2 by means of the signal "Remote timer start" (signal level = 0 at pin 7 of the 9-pin serial interface following previous signal chart according to operating instructions).

With the DIP switch set to "Interruption output V_{out} ", the output voltage V_{out} is automatically interrupted for 5 s once the set buffer time t_p (time t4) has expired.

The battery has already been disconnected because the input voltage has returned at the time t3.

The interruption to the output voltage V_{out} for 5 s permits an automatic restart for many industrial PCs, even if the line voltage (or the input voltage V_{in} on the DC UPS module) returns during shutdown of the PC, as in this example.

Note: Without a remote signal level = 0 with a setting $t = \text{max.}$ duration, there is no interruption in the output voltage here because the set buffer time is not started.

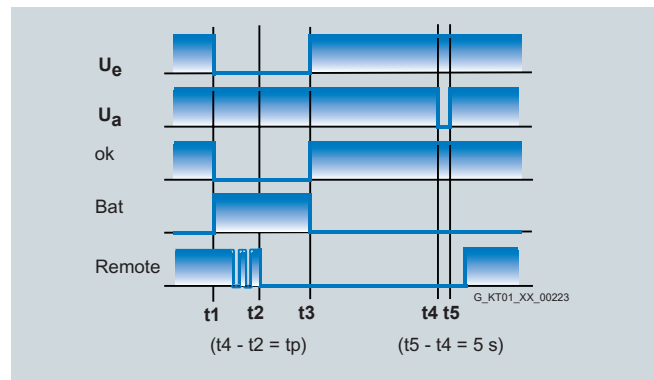


Figure 11/4 "Short power failure"

t1: Input voltage V_{in} missing or falls below the set connection threshold
 t2: Buffer time set on DIP switches is started by remote timer start (signal level = 0)
 t3: Input voltage V_{in} rises above set connection threshold
 t4: End of set buffer time (output is switched off and/or battery is disconnected)
 t5: Output is connected again 5 s after shutdown
 tp: Buffer time set on the DIP switches (bottom row nos. 2 to 7)

SITOP 24 V

DC uninterruptible power supplies

DC UPS modules and battery modules

Overview

Product	DC UPS module	DC UPS module	DC UPS module
Power supply, type	6 A	15 A	40 A
Order No.	6EP1 931-2DC21 6EP1 931-2DC31 (with serial interface) 6EP1 931-2DC42 (with USB interface)	6EP1 931-2EC21 ¹⁾ 6EP1 931-2EC31 (with serial interface) 6EP1 931-2EC42 (with USB interface)	6EP1 931-2FC21 6EP1 931-2FC42 (with USB interface)
			
Dimension drawing	Page 15/20, Dimension drawing 1	Page 15/20, Dimension drawing 1	Page 15/20, Dimension drawing 2

The product families are highlighted in the same colors. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.

Technical specifications

Input L+/M in normal operation			
Rated voltage value $V_{in rated}^{2)}$ Voltage range	Controlled DC voltage 24 V DC 22 ... 29 V	Controlled DC voltage 24 V DC 22 ... 29 V	Controlled DC voltage 24 V DC 22 ... 29 V
Connection threshold for battery	22.5 V DC ± 0.1 V (factory setting), adjustable in the range 22 ... 25.5 V DC (in 0.5 V increments)	22.5 V DC ± 0.1 V (factory setting), adjustable in the range 22 ... 25.5 V DC (in 0.5 V increments)	22.5 V DC ± 0.1 V (factory setting), adjustable in the range 22 ... 25.5 V DC (in 0.5 V increments)
Rated current $I_{in rated}$	6 A + approx. 0.6 A with empty battery	15 A + approx. 1 A with empty battery	40 A + approx. 2.6 A with empty battery
Mains buffering			
Mains buffering or buffer time	Dependent on connected battery and load current, see selection table battery modules and mains buffering times as well as the relevant important information notes!		
On/off control circuit	External isolated NO contact required (max. load 15 V DC / max. 10 mA). With an open control circuit, the battery is isolated from output L+, thus canceling mains buffering. If there is no input voltage, a quiescent current of approximately 0.3 mA is drawn from the battery disconnected from the output.		
Methods of setting the buffering time	Adjustable using DIP switches to a maximum buffering time up to forced shutdown due to exhaustive discharge protection (at approx. 19 V) or to a time limit of 5 ... 635 s (in 10 s steps)		
Interruption	Adjustable using DIP switch, either: • Interruption in output voltage despite returning input voltage for min. 5 s following expiry of set buffer time to support automatic restarting of industrial PCs • No forced interruption on expiry of the set buffer time		
Output L+/M in normal operation			
Rated voltage value $V_{out rated}$	24 V DC (output voltage of SITOP power supply)	24 V DC (output voltage of SITOP power supply)	24 V DC (output voltage of SITOP power supply)
Voltage range	Input voltage V_{in} less approx. 0.5 V DC	Input voltage V_{in} less approx. 0.5 V DC	Input voltage V_{in} less approx. 0.5 V DC
Startup delay	Approx. 1 s	Approx. 1 s	Approx. 1 s
Voltage rise	Typ. 60 ms	Typ. 60 ms	Typ. 360 ms
Output current I_{out}	0 ... 6 A	0 ... 15 A	0 ... 40 A
Dynamic current with overload	Electronic current limitation to $1.05 \dots 1.4 \times I_{out rated}$ for approx. 80 ms, then electronic shutdown of the output with automatic restart attempts (approx. 20 s intervals between restart attempts)		
Dynamic current with short-circuit	Electronic current limitation to $1.5 \dots 3 \times I_{out rated}$ for approx. 20 ms, then electronic shutdown of the output with automatic restart attempts (approx. 20 s intervals between restart attempts)		
Output L+/M with battery operation			
Rated voltage value $V_{out rated}$	24 V DC (from battery module)	24 V DC (from battery module)	24 V DC (from battery module)
Approximate voltage range	27 ... 19 V DC at $I_{out} = 0.05 \times C \times 1/h$ or 24 V at $I_{out} = 1 \times C \times 1/h$ or 23 V at $I_{out} = 2 \times C \times 1/h$ (C = total connected battery capacity in Ah), 19 V switch-off threshold for deep discharge protection		
Output current $I_{out}^{3)}$	0 ... 6 A (permanently permissible)	0 ... 15 A (permanently permissible)	0 ... 40 A (permanently permissible)
Dynamic current with overload	Electronic current limitation to $1.05 \dots 1.4 \times I_{out rated}$ for approx. 80 ms, then latching switch-off of output (restart following return to normal operation)		
Dynamic current with short-circuit	Electronic current limitation to $1.5 \dots 3 \times I_{out rated}$ for approx. 20 ms, then latching switch-off of output (restart following return to normal operation)		
Continuation of the table	Page 11/17, column 1	Page 11/17, column 2	Page 11/17, column 3

DC uninterruptible power supplies

DC UPS modules and battery modules

Continued from	Page 11/16, column 1	Page 11/16, column 2	Page 11/16, column 3
Power supply, type (repeated)	6 A	15 A	40 A
Order No. (repeated)	6EP1 931-2DC21 6EP1 931-2DC31 (with serial interface) 6EP1 931-2DC42 (with USB interface)	6EP1 931-2EC21 ¹⁾ 6EP1 931-2EC31 (with serial port) 6EP1 931-2EC42 (with USB port)	6EP1 931-2FC21 6EP1 931-2FC42 (with USB interface)
Output +Bat/-Bat in normal operation			
Output +Bat/-Bat in normal operation	I-V charging characteristic (first constant current I, then constant voltage V)	I-V charging characteristic (first constant current I, then constant voltage V)	I-V charging characteristic (first constant current I, then constant voltage V)
End-of-charge voltage V	26.6 V DC ±0.1 V (factory setting for +40 °C battery temperature), adjustable in the range 26.3 to 29.3 V (in 0.1 V increments)	26.6 V DC ±0.1 V (factory setting for +40 °C battery temperature), adjustable in the range 26.3 to 29.3 V (in 0.1 V steps)	26.6 V DC ±0.1 V (factory setting for +40 °C battery temperature), adjustable in the range 26.3 to 29.3 V (in 0.1 V steps)
Charging current I	Approx. 0.4 A (factory setting), adjustable to 0.2 A or 0.4 A (charging is carried out with closed and open on/off circuit) At a battery voltage of < 6 V (batteries defective), charging is not carried out as a protective measure.	Approx. 0.7 A (factory setting), adjustable to 0.35 A or 0.7 A (charging is carried out with closed and open on/off circuit) At a battery voltage of < 6 V (batteries defective), charging is not carried out as a protective measure.	Approx. 2 A (factory setting), adjustable to 1 A or 2 A (charging is carried out with closed and open on/off circuit) At a battery voltage of < 6 V (batteries defective), charging is not carried out as a protective measure.
Efficiency/heat loss			
At V _{out rated} , I _{out rated} approx.	95 % / 7 W	96.2 % / 14 W	97.2 % / 28.6 W
With battery operation, approx.	94.5 % / 8 W	96 % / 15 W	96.9 % / 33.6 W
Protection and monitoring			
Reverse polarity protection	Against polarity reversal on input voltage and batteries	Against polarity reversal on input voltage and batteries	Against polarity reversal on input voltage and batteries
Overload protection	In accordance with "dynamic current with overload" in normal operation (automatic restart attempts) or in battery mode (restart following return to normal operation)		
Short-circuit protection	In accordance with "dynamic current with short-circuit" in normal operation (automatic restart attempts) or in battery mode (restart following return to normal operation). Built-in (not accessible) 16 A fuse (6 A and 15 A on DC UPS module) or 64 A fuse (40 A on DC UPS module).		
Exhaustive discharge protection	Automatic shutdown when battery voltage falls below approx. 19 V. At a battery voltage of < 6 V (batteries defective), charging is not carried out as a protective measure.		
Monitoring "Wire breakage in battery circuit"	Alarm signal if battery circuit not closed or if it opens during operation (cyclic test approximately every 20 s)		
Monitoring "Battery replacement required"	Alarm signal flashing at approx. 0.25 Hz repetition frequency (approx. 2 s alarm, approx. 2 s no alarm, approx. 2 s alarm, etc.). Check every 4 hours with 6 ohm load for 1 s if no buffer mode or switch-off has taken place within 4 hours.	Alarm signal flashing at approx. 0.25 Hz repetition frequency (approx. 2 s alarm, approx. 2 s no alarm, approx. 2 s alarm, etc.). Check every 4 hours with 3 ohm load for 1 s if no buffer mode or switch-off has taken place within 4 hours.	Alarm signal flashing at approx. 0.25 Hz repetition frequency (approx. 2 s alarm, approx. 2 s no alarm, approx. 2 s alarm, etc.). Check every 4 hours with 1 ohm load for 1 s if no buffer mode or switch-off has taken place within 4 hours. No monitoring if switch position of compatibility switch is "On"!
Monitoring "Battery charge > 85 %"	Indication whether batteries are charged to at least 85 % of residual capacity still available depending on aging		
Signaling ⁴⁾			
Normal operation	Green LED (OK) and isolated changeover contact "24 V DC OK/Bat" at setting "24 V DC OK" ⁵⁾		
Buffer or battery mode (battery supplies load alone or in addition to PS in the case of overload)	Yellow LED (Bat) and isolated changeover contact "24 V DC OK/Bat" at setting "Bat" (= de-energized position)		
Alarm (buffer not ready or prewarning from < 20.4 V battery voltage)	Red LED (alarm) and isolated changeover contact at setting "Alarm" (= de-energized position). Causes of the buffer not being ready during normal operation can include: Off status or open on/off control circuit, battery module not connected, polarity reversal or defective battery (battery voltage < 18.5 V) or wire breakage between battery and UPS module. Scanning and thus updating of the signal every 20 s. Causes for absence of buffer readiness during buffer mode can be: Accumulator voltage has dropped below 20.4 V DC (= pre-warning before shutdown through exhaustive discharge protection) and shutdown of the accumulator due to overload, short-circuit, exhaustive discharge protection or expired buffer time. The red LED then goes out.		
"Battery replacement required"	Red LED (alarm) flashing at 0.25 Hz and floating changeover contact (alarm) switching at approx. 0.25 Hz		
"Battery charge > 85 %"	Second green LED (Bat > 85 %) and floating NO contact closed (de-energized position = open)		
Continuation of the table	Page 11/18, column 1	Page 11/18, column 2	Page 11/18, column 3

SITOP 24 V

DC uninterruptible power supplies

DC UPS modules and battery modules

Continued from	Page 11/17, column 1	Page 11/17, column 2	Page 11/17, column 3
Power supply, type (repeated)	6 A	15 A	40 A
Order No. (repeated)	6EP1 931-2DC21 6EP1 931-2DC31 (with serial interface) 6EP1 931-2DC42 (with USB interface)	6EP1 931-2EC21 ¹⁾ 6EP1 931-2EC31 (with serial interface) 6EP1 931-2EC42 (with USB interface)	6EP1 931-2FC21 6EP1 931-2FC42 (with USB interface)
Signaling ⁴⁾			
Compatibility switch (only with 6EP1931-2FC21)	–	–	The following can be selected using DIP switches: Switch position "Off" - "significant properties analogous to new DC UPS range" or "On" switch position - "analogous to previous DC UPS module 40 (6EP1931-2FC01)". With compatibility switch in "On" position: Output of the Alarm signal changes: - The red LED flashes on wire-break between rechargeable battery and UPS DC module with 1/3 Hz and isolated changeover contact (alarm) switching at approx. 1/3 Hz. A battery test does not take place
Optional interface and software			
Serial interface	Only on 6EP1 931-2.C31 Output of all alarm signals and receipt of the "Remote timer start" signal. Technical design: PC-compatible. 8N1 send and receive, 9600 baud, 8 data bits, 1 stop bit, no parity bit. Required connection to the PC: 1 : 1 interconnected 9-pole sub D extension cable (connector/socket); only pin 2 (RXD), pin 3 (TDX) and pin 7 (RTS) are required.	–	
USB interface	Only on 6EP1 931-2.C42 Output of all alarm signals and receipt of the "Remote timer start" signal. Technical design: Specification 2.0 with full speed, i.e. 2 Mbit/s. Supplied with +5 V by DC UPS ("self powered"). Required connection to the PC: Commercially available 4-core shielded cable, 90 ohm, max. 5 m, USB series "A" connector to PC and USB series "B" connector to DC UPS		
Software	A software tool for reading out and processing the signals (can run under Windows 2000, Windows XP and Windows Vista) is available for downloading from the Internet at http://www.siemens.com/sitop . Further information about the interface is available there.		
Control signals			
On/off control signal	Buffering is terminated or the battery is disconnected from the output by opening the control circuit or by means of DIP switches on the device (DIP switch must be in "Off" position). All other functions are retained.		
"Remote timer start" via serial interface or USB	Starts mains buffering for the set buffer time	Starts mains buffering for the set buffer time	Starts mains buffering for the set buffer time
Safety			
Primary/secondary isolation	No	No	No
Protection class	Class III (ext. circuit and power supply unit: safety extra low voltage required in accordance with EN 60950)	Class III (ext. circuit and power supply unit: safety extra low voltage required in accordance with EN 60950)	Class III (ext. circuit and power supply unit: safety extra low voltage required in accordance with EN 60950)
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Noise immunity	Noise immunity according to EN 61000-6-2	Noise immunity according to EN 61000-6-2	Noise immunity according to EN 61000-6-2
Ambient conditions			
Ambient temperature during operation	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature	–40 ... +70 °C	–40 ... +70 °C	–40 ... +70 °C
Degree of protection (EN 60529)	IP20	IP20	IP20
Humidity class	Conditions of use in accordance with EN 60721, climate class 3K3 (relative humidity 5 % to 85 % and absolute humidity 1 g/m ³ to 25 g/m ³ ; no condensation)	Conditions of use in accordance with EN 60721, climate class 3K3 (relative humidity 5 % to 85 % and absolute humidity 1 g/m ³ ... 25 g/m ³ ; no condensation)	Conditions of use in accordance with EN 60721, climate class 3K3 (relative humidity 5 % to 85 % and absolute humidity 1 g/m ³ to 25 g/m ³ ; no condensation)
Continuation of the table	Page 11/19, column 1	Page 11/19, column 2	Page 11/19, column 3

DC uninterruptible power supplies

DC UPS modules and battery modules

Continued from	Page 11/18, column 1	Page 11/18, column 2	Page 11/18, column 3
Power supply, type (repeated)	6 A	15 A	40 A
Order No. (repeated)	6EP1 931-2DC21 6EP1 931-2DC31 (with serial interface) 6EP1 931-2DC42 (with USB interface)	6EP1 931-2EC21 ¹⁾ 6EP1 931-2EC31 (with serial interface) 6EP1 931-2EC42 (with USB interface)	6EP1 931-2FC21 6EP1 931-2FC42 (with USB interface)
Approvals			
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 107.1) File E197259	cULus-listed (UL 508, CSA C22.2 No. 107.1) File E197259	cULus-listed (UL 508, CSA C22.2 No. 107.1) File E197259
Mechanics			
Input connections 24 V DC	2 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	2 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	2 screw terminals for 0.33 ... 10 mm ² /22 ... 7 AWG
Output connections 24 V DC	4 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	4 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	4 screw terminals for 0.33 ... 10 mm ² /22 ... 7 AWG
Battery module connections 24 V DC	2 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	2 screw terminals for 1 ... 4 mm ² /17 ... 11 AWG	2 screw terminals for 0.33 ... 10 mm ² /22 ... 7 AWG
Connections for control circuit and alarm signals	10 screw terminals for 0.5 ... 2.5 mm ² /20 ... 13 AWG	10 screw terminals for 0.5 ... 2.5 mm ² /20 ... 13 AWG	10 screw terminals for 0.5 ... 2.5 mm ² /20 ... 13 AWG
Dimensions (W × H × D) in mm	50 × 125 × approx. 125	50 × 125 × approx. 125	102 × 125 × 125
Weight, approx.	0.4 kg (with serial or USB interface: 0.45 kg)	0.4 kg (with serial or USB interface: 0.45 kg)	1.1 kg (with USB interface: 1.1 kg)
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15

¹⁾ SIPLUS module 6AG1 931-2EC21-2AA0 for extended temperature range -25 °C to +60 °C and use under medial load (e.g. chlorine-sulfur atmosphere).

²⁾ All SITOP 24 V DC power supplies are permissible without restriction.

³⁾ Two battery modules connected in parallel are required in order to achieve more than 20 A up to max. 40 A output current on the DC UPS module.

⁴⁾ Permissible contact rating: 60 V DC/1 A or 30 V AC/1 A

⁵⁾ "24 V DC OK" means: Voltage of the power supply unit is greater than the battery connection threshold set on the DC UPS module 40

SITOP 24 V

DC uninterruptible power supplies

DC UPS modules and battery modules

Overview

Product	Battery module 1.2 Ah	Battery module 2.5 Ah	Battery module 3.2 Ah
Battery type	Maintenance-free lead-acid batteries	Maintenance-free pure lead batteries	Maintenance-free, closed lead-acid batteries
Order No.	6EP1 935-6MC01	6EP1 935-6MD31	6EP1 935-6MD11
The product families are highlighted in the same colors. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.			
	Battery module for DC UPS module 6 A It has two maintenance-free, closed lead-acid batteries (from the same lot) which are installed in a holder and connected in series with corrosion-resistant lead-calcium high-performance grid plates and glass fiber. Completely prewired with battery retainer and terminals Low self-discharge rate of approximately 3 % per month (at +20 °C)	High-temperature battery module for DC UPS module 6 A and 15 A It has two maintenance-free, closed pure lead-acid batteries (from the same lot), which are installed in a holder and connected in series. Completely prewired with battery retainer and terminals Low self-discharge rate of approximately 3 % per month (at +20 °C)	Battery module for DC UPS module 6 A and 15 A It has two maintenance-free, closed lead-acid batteries (from the same lot) which are installed in a holder and connected in series with corrosion-resistant lead-calcium high-performance grid plates and glass fiber. Complete with battery retainer and terminals Low self-discharge rate of approximately 3 % per month (at +20 °C)
Dimension drawing	Page 15/21, Dimension drawing 5	Page 15/21, Dimension drawing 1	Page 15/21, Dimension drawing 2

Technical specifications

Charging current/charging voltage			
	Maintenance-free, closed lead-acid batteries	Maintenance-free pure lead-acid batteries	Maintenance-free, closed lead-acid batteries
Recommended end-of-charge voltage (stand-by use), dependent on battery temperature	27.8 V at +10 °C 27.3 V at +20 °C 26.8 V at +30 °C 26.6 V at +40 °C	29.0 V at -10 °C 28.6 V at 0 °C 28.3 V at +10 °C 27.9 V at +20 °C 27.5 V at +30 °C 27.2 V at +40 °C 26.8 V at +50 °C 26.4 V at +60 °C	27.8 V at +10 °C 27.3 V at +20 °C 26.8 V at +30 °C 26.6 V at +40 °C
Recommended charging current	Max. 0.3 A	Max. 5 A	Max. 0.8 A
Protection			
Short-circuit protection	Battery fuse 7.5 A/32 V (solid-state circuitry blade-type fuse + support)	Battery fuse 15 A/32 V (solid-state circuitry blade-type fuse + support)	Battery fuse 15 A/32 V (solid-state circuitry blade-type fuse + support)
Battery protection	Valve control	Valve control	Valve control
Safety			
Protection class	Class III	Class III	Class III
UL/cUL (CSA) approval	cURus-recognized (UL 1778, CSA C22.2 No. 107.1), File E219627	cURus-recognized (UL 1778, CSA C22.2 No. 107.1), File E219627	cURus-recognized (UL 1778, CSA C22.2 No. 107.1), File E219627
Degree of protection (EN 60529)	IP00	IP00	IP00
Operating data ¹⁾			
Ambient temperature range	+5 ... +40 °C	-40 ... +60 °C with natural convection	+5 ... +40 °C with natural convection
Transport/storage temperature range	-20 ... +50 °C	-40 ... +60 °C	-20 ... +50 °C
Self-discharge rate	Approx. 3 % per month at 20 °C battery temperature (increases with the temperature)	Approx. 3 % per month at 20 °C battery temperature (increases with the temperature)	Approx. 3 % per month at 20 °C battery temperature (increases with the temperature)
Continuation of the table	Page 11/22, column 1	Page 11/22, column 2	Page 11/22, column 3

¹⁾ For storage, mounting and operation of lead-acid batteries, the relevant DIN/VDE regulations or country-specific regulations (e.g. VDE 0510 Part 2/EN 50272-2) must be observed. You must ensure that the battery site is sufficiently ventilated. Possible sources of ignition must be at least 50 cm away.

DC uninterruptible power supplies

DC UPS modules and battery modules

Battery module 7 Ah

Maintenance-free,
closed lead-acid batteries

6EP1 935-6ME21



Battery module for DC UPS module 6 A, 15 A, and 40 A (for > 20 to 40 A, 2 modules are required in parallel).

It has two maintenance-free, closed lead-acid batteries (from the same lot) which are installed in a holder and connected in series with corrosion-resistant lead-calcium high-performance grid plates and glass fiber.

Completely pre-wired with terminals and battery retainer

Low self-discharge rate of approximately 3 % per month (at +20 °C)

Page 15/21, Dimension drawing 3

Battery module 12 Ah

Maintenance-free,
closed lead-acid batteries

6EP1 935-6MF01



Battery module for DC UPS module 6 A and 15 A and DC UPS module 40 A (for > 20 to 40 A, 2 modules are required in parallel)

It has two maintenance-free, closed lead-acid batteries (from the same lot) which are installed in a holder and connected in series with corrosion-resistant lead-calcium high-performance grid plates and glass fiber.

Completely pre-wired with terminals and battery retainer

Low self-discharge rate of approximately 3 % per month (at +20 °C)

Page 15/21, Dimension drawing 4

Maintenance-free, closed lead-acid batteries

27.8 V at +10 °C
27.3 V at +20 °C
26.8 V at +30 °C
26.6 V at +40 °C

Max. 1.75 A

Battery fuse 20 A/32 V
(solid-state circuitry blade-type
fuse + support)

Valve control

Class III

cURus-recognized
(UL 1778, CSA C22.2 No. 107.1),
File E219627

IP00

+5 ... +40 °C

–20 ... +50 °C

Approx. 3 % per month at 20 °C
battery temperature

Page 11/23, column 4

Maintenance-free, closed lead-acid batteries

27.8 V at +10 °C
27.3 V at +20 °C
26.8 V at +30 °C
26.6 V at +40 °C

Max. 3 A

Battery fuse 20 A/32 V
(solid-state circuitry blade-type
fuse + support)

Valve control

Class III

cURus-recognized
(UL 1778, CSA C22.2 No. 107.1),
File E219627

IP00

+5 ... +40 °C

–20 ... +50 °C

Approx. 3 % per month at 20 °C
battery temperature

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DC uninterruptible power supplies

DC UPS modules and battery modules

Continuation of the table	Page 11/20, column 1	Page 11/20, column 2	Page 11/20, column 3
Battery type (repeated)	Maintenance-free lead-acid batteries	Maintenance-free pure lead batteries	Maintenance-free, closed lead-acid batteries
Order No. (repeated)	6EP1 935-6MC01	6EP1 935-6MD31	6EP1 935-6MD11
Service life¹⁾			
The service life of the lead-acid batteries (when capacity falls to 50 % of original capacity) depends on the battery temperature as follows:	Approx. 4 years at +20 °C Approx. 2 years at +30 °C Approx. 1 year at +40 °C	Approx. > 10 years at +20 °C Approx. 7 years at +30 °C Approx. 3 years at +40 °C Approx. 1.5 years at +50 °C Approx. 1 year at +60 °C	Approx. 4 years at +20 °C Approx. 2 years at +30 °C Approx. 1 year at +40 °C
Mechanics			
Connection	1 screw terminal each for 0.08 to 2.5 mm ² for +BAT and –BAT	1 screw terminal each for 0.08 to 2.5 mm ² for +BAT and –BAT	1 screw terminal each for 0.08 to 2.5 mm ² for +BAT and –BAT
Accessories, included	Accessories pack with solid-state circuitry fuse 7.5 A	Accessories pack with solid-state circuitry fuse 15 A	Accessories pack with solid-state circuitry fuse 15 A
Dimensions (W × H × D) in mm	96 × 106 × 108	265 × 151 × 91	190 × 151 × 82
Weight, approx.	1.8 kg	3.8 kg	3.2 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15 or keyhole mounting for hooking in to M4 screws	Snaps onto DIN rail EN 60715 35×7.5/15 or keyhole mounting for hooking in to M4 screws	Snaps onto DIN rail EN 60715 35×7.5/15 or keyhole mounting for hooking in to M4 screws

¹⁾ Along with the storage and operating temperature, other factors such as the duration of the storage period and the charge status during storage have a decisive influence on the possible useful life. Batteries should therefore be stored as briefly as possible, always fully charged, and within the temperature range 0 to +20 °C.

DC uninterruptible power supplies

DC UPS modules and battery modules

Page 11/21, column 4

Maintenance-free,
closed lead-acid batteries

6EP1 935-6ME21

Approx. 4 years at +20 °C
Approx. 2 years at +30 °C
Approx. 1 year at +40 °C

Page 11/21, column 5

Maintenance-free,
closed lead-acid batteries

6EP1 935-6MF01

Approx. 4 years at +20 °C
Approx. 2 years at +30 °C
Approx. 1 year at +40 °C

1 screw terminal each for
0.08 to 4 mm² for +BAT
and –BAT

Accessories pack with spare
solid-state circuitry fuse 15 A
and 20 A

186 × 168 × 121

6.0 kg

Can be screwed onto flat surface
("keyhole mounting" for hooking
onto M4 screws)

1 screw terminal each for
0.08 to 4 mm² for +BAT
and –BAT

Accessories pack with spare
solid-state circuitry fuse 15 A
and 20 A

253 × 168 × 121

9.0 kg

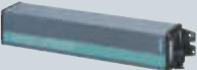
Can be screwed onto flat surface
("keyhole mounting" for hooking
onto M4 screws)

SITOP 24 V

DC uninterruptible power supplies

DC UPS

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
SITOP UPS500S					
	24 V DC	24 V DC	15 A	6EP1 933-2EC41 6EP1 933-2EC51	
SITOP UPS501S					
	24 V DC	24 V DC	15 A	6EP1 935-5PG01	
SITOP UPS500P					
	24 V DC	24 V DC	7 A	6EP1 933-2NC01 6EP1 933-2NC11	
Connector set					
	Connector set with connector for input and output with pre-assembled USB cable (2 m long)			6EP1 975-2ES00	
DC UPS module					
	24 V DC	24 V DC	6 A	6EP1 931-2DC21 6EP1 931-2DC31 6EP1 931-2DC42	
	24 V DC	24 V DC	15 A	6EP1 931-2EC21 6EP1 931-2EC31 6EP1 931-2EC42	
	24 V DC	24 V DC	40 A	6EP1 931-2FC21 6EP1 931-2FC42	
Battery module 1.2 Ah					
				6EP1 935-6MC01	
Battery module 2.5 Ah					
				6EP1 935-6MD31	
Battery module 3.2 Ah					
				6EP1 935-6MD11	
Battery module 7 Ah					
				6EP1 935-6ME21	
Battery module 12 Ah					
				6EP1 935-6MF01	

SITOP

Alternative voltages



12/2	SITOP DC/DC
12/2	SITOP flexi
12/2	SITOP dual
12/3	SITOP smart
12/3	SITOP modular
12/6	LOGO!Power 5 V/3 A
12/6	LOGO!Power 5 V/6.3 A
12/6	LOGO!Power 12 V/1.9 A
12/7	LOGO!Power 12 V/4.5 A
12/7	LOGO!Power 15 V/1.9 A
12/7	LOGO!Power 15 V/4 A

12/10 Selection and ordering data

SITOP

Alternative voltages

Overview

Product	SITOP DC/DC	SITOP flexi	SITOP dual
Power supply, type	12 V	3 ... 52 V	2 × 15 V
Order No.	6EP1 621-2BA00	6EP1 353-2BA00	6EP1 353-0AA00
The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.			
	DC/DC converter for connection to 24 V DC networks over permanent wiring. Output voltage 12 V DC; floating, short circuit-proof, open circuit-proof.	The power supply with flexible output voltage from 3 to 52 V; suitable for all application areas requiring a special voltage other than 24 V.	The industrial power supply with two 15 V outputs that can be switched in parallel and in series; can be used, for example, to supply electronic loads with ±15 V.
Dimension drawing	Page 15/22, Dimension drawing 1	Page 15/22, Dimension drawing 2	Page 15/22, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in \text{ rated}}$	DC voltage (SELV or PELV) 24 V DC¹⁾	1-phase AC 120/230 V AC Set via wire jumper	1-phase AC 120 - 230 V AC wide-range input
Voltage range	18.5 ... 30.2 V	85 ... 132 V/170 ... 264 V	93 ... 264 V
Overvoltage resistance	–	$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$	Surge voltage in accordance with EN 61000-6-2 Table 4
Mains buffering at $I_{out \text{ rated}}$	–	$> 10 \text{ ms}$ at $V_{in} = 93/187 \text{ V}$ ($P_{out} = 120 \text{ W}$)	$> 10/40 \text{ ms}$ at $V_{in} = 120/187 \text{ V}$
Rated line frequency; range	–	50/60 Hz, 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$ Making current limit (+25 °C) I^2t	2.5 A < 20 A	2.2/0.9 A < 32 A < 0.8 A ² s	1.9-1.15 A < 30 A, typ. 3 ms < 3 A ² s
Built-in incoming fuse Recommended miniature circuit breaker (IEC 898) in the mains power input	(not accessible) 10 A Characteristic B	T 3.15 A/250 V (not accessible) From 6 A Characteristic C	T4 A/250 V (not accessible) From 10 A Characteristic C or from 16 A Characteristic B
Output			
Rated voltage value $V_{out \text{ rated}}$	Controlled, isolated DC voltage 12 V DC	Controlled, isolated DC voltage 3 - 52 V DC	Controlled, isolated DC voltage 2 × 15 V DC
Total tolerance • Static mains compensation • Static load balancing	±3 % Approx. 0.1 % Approx. 0.4 %	±1 % Approx. 0.1 % Approx. 0.2 %	±2 % Approx. 0.2 % Approx. 0.2 %
Sense line connection	–	Yes, maximum voltage control 0.5 V per line	–
Residual ripple Spikes (bandwidth: 20 MHz)	< 100 mV _{pp} < 200 mV _{pp}	< 50 mV _{pp} (typ. 20 mV _{pp}) < 100 mV _{pp} (typ. 80 mV _{pp})	< 50 mV _{pp} (typ. 20 mV _{pp}) < 150 mV _{pp}
Adjustment range	12 ... 14 V	3 ... 52 V, via potentiometer or analog control voltage signal 0 ... 2.5 V	14.5 ... 17 V
Status display	Green LED for 12 V OK	Green LED for 24 V OK	Green LED for $V_{out} > 10 \text{ V}$ (summation display)
Signaling	–	Power good via relay contact, current monitor signal 0 ... 2.5 V	–
On/off behavior	–	No overshoot of V_{out} (soft start)	Overshoot of $V_{out} < 3 \%$
Startup delay/voltage rise	< 0.5 s/typ. 300 ms	< 3 s/typ. 80 ms	< 1 s/–
Rated current value $I_{out \text{ rated}}$	2.5 A	2-10 A (approx. 120 W)	2 × 3.5 A
Continuation of the table	Page 12/4, column 1	Page 12/4, column 2	Page 12/4, column 3

¹⁾ The supply voltage must be separated safety (SELV or PELV) from the AC infeed system.

Alternative voltages

SITOP smart

48 V

6EP1 456-2BA00



The three-phase 48 V power supply for powerful loads that are supplied with double the usual 24 V; with wide-range input; slim design; with 50 % extra power for 5 s.

Page 15/22, Dimension drawing 3

SITOP modular

48 V

6EP1 457-3BA00



The modular 48 V power supply for powerful loads that are supplied with double the usual 24 V; with wide-range input and switchable output characteristic; function expansion possible with expansion module.

Page 15/23, Dimension drawing 1

3-phase AC
400 - 500 V 3 AC
 wide-range input
 360 ... 550 V

 $2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$ > 7 ms at $V_{in} = 400 \text{ V}$

50/60 Hz; 47 ... 63 Hz

1.1-0.9 A
 < 18 A
 < 0.8 A²s

None
 3-pole connected miniature circuit breaker 6 ... 16 A characteristic C or motor circuit breaker 3RV1021-1DA10, setting 3 A or 3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage

48 V DC

±3 %
 Approx. 0.1 %
 Approx. 0.2 %

–

< 350 mV_{pp}
 < 240 mV_{pp}

42 ... 56 V (max. 480 W)

Green LED for 48 V OK

Power good via relay contact (NO contact, rating 60 V/0.3 A) for output voltage OK
 No overshoot of V_{out} (soft start)

< 2.5 s/< 500 ms

10 A

Page 12/5, column 4

3-phase AC
400 - 500 V 3 AC
 wide-range input
 320 ... 550 V
 (startup from $V_{in} > 340 \text{ V}$)

 $2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$ > 6 ms at $V_{in} = 400 \text{ V}$

50/60 Hz; 47 ... 63 Hz

2.2 A ($V_{in} = 400 \text{ V}$)
 < 70 A
 < 2.8 A²s

None
 3-pole connected miniature circuit breaker 10 ... 16 A characteristic C or motor circuit breaker 3RV1021-1DA10, setting 3 A or 3RV1721-1DD10 (UL 489)

Controlled, isolated DC voltage

48 V DC

±3 %
 Approx. 0.1 %
 Approx. 0.2 %

–

< 100 mV_{pp} (typ. 10 mV_{pp})
 < 200 mV_{pp} (typ. 80 mV_{pp})

42 ... 56 V (max. 960 W)

Green LED for 48 V OK

Possible via signaling module (6EP1 961-3BA10)

No overshoot of V_{out} (soft start)

< 2.5 s/typ. 20 ms

20 A

Page 12/5, column 5

SITOP

Alternative voltages

Continued from	Page 12/2, column 1	Page 12/2, column 2	Page 12/2, column 3
Power supply, type (repeated)	12 V	3 ... 52 V	2 × 15 V
Order No. (repeated)	6EP1 621-2BA00	6EP1 353-2BA00	6EP1 353-0AA00
Output (continued)			
Current range • Up to +60 °C • Derating	0 ... 2.5 A –	0 ... 10 A (approx. 120 W) –	2 × 0 ... 2.5 A 2 × 0 ... 3.5 A (up to +45 °C)
Dynamic overcurrent on • Power-up on short circuit • Short circuit during operation	3.3 A 3.3 A	Constant current 2 ... 10 A Constant current 2 ... 10 A	– –
Parallel switching for enhanced performance	Yes, 2 units	Yes, 2 units	Yes, 2 units
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$ Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 83 % Approx. 6.1 W	Approx. 84 % (at 24 V/5 A) Approx. 23 W (at 24 V/5 A)	Approx. 80 % Approx. 27 W
Protection and monitoring			
Output overvoltage protection Current limitation	< 24 V 3.0 ... 3.6 A	Yes, according to EN 60950 2 ... 10 A, adjustable using potentiometer or analog control voltage signal 0 ... 2.5 V	Yes, according to EN 60950 Limit point < 4.9 A; switch-off point < 6 A
Short-circuit protection	Electronic shutdown, automatic restart	Electronic current limiting (2 ... 10 A) in the range 3 ... 12 V or power limiting (approx. 120 W) in the range 12 ... 52 V	Electronic shutdown, automatic restart
Sustained short-circuit current rms value	Approx. 3.6 A	According to the adjusted current regulation	–
Overload/short-circuit indicator	Red LED	Red LED for current or power limiting	–
Safety			
Primary/secondary isolation	Yes, safety extra low output voltage V_{out} according to EN 60950	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950
Protection class	Class II	Class I	Class I
Leakage current Safety approval CE mark	– Yes Yes	< 3.5 mA Yes Yes	< 3.5 mA Yes Yes
UL/cUL (CSA) approval	cCSAus (UL 508, CSA22.2-107, UL60950-1, CSA22.2-60950-1)	cULus-listed (UL 508, CSA C22.2 No. 142), File E143289	cULus-listed (UL 508, CSA C22.2 No. 142), File E179336
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference Supply harmonics limitation Noise immunity	EN 55022 Class B – EN 61000-6-2	EN 55022 Class B EN 61000-3-2 EN 61000-6-2	EN 55011 Class A – EN 61000-6-2
Operating data			
Ambient temperature range	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection	0 ... +60 °C with natural convection
Transport/storage temperature range	–40 ... +85 °C	–25 ... +85 °C	–40 ... +70 °C
Humidity class	Climate class 3K3 according to EN 60721, without condensation	Climate class 3K3 according to EN 60721, without condensation	Climate class 3K3 according to EN 60721, without condensation
Mechanics			
Connections • Supply input L1, N, PE • Output • Alarm signals, control inputs	One screw terminal each for 0.5 ... 2.5 mm ² (L+, N, PE) 2 screw-type terminals each for 0.5 ... 2.5 mm ² (+ and –) –	One screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded 1 screw-type terminal for 0.5 ... 2.5 mm ² (L+) and 2 screw-type terminals for 0.5 ... 2.5 mm ² (M) Screw terminals for 0.14 ... 1.5 mm ²	One screw terminal each for 0.5 ... 2.5 mm ² single-core/finely stranded 1 screw-type terminal each for 0.5 ... 2.5 mm ² (P15_1, GND1, GDN2) and 2 screw-type terminals for 0.5 ... 2.5 mm ² (P15_2) –
Dimensions (W × H × D) in mm Weight, approx. Installation	32.5 × 125 × 125 0.32 kg Snaps onto DIN rail EN 60715 -35×7.5/15	75 × 125 × 125 0.9 kg Snaps onto DIN rail EN 60715 35×7.5/15	75 × 125 × 125 0.75 kg Snaps onto DIN rail EN 60715 35×7.5/15
Accessories			
	–	–	–

Alternative voltages

Page 12/3, column 4

48 V

6EP1 456-2BA00

Page 12/3, column 5

48 V

6EP1 457-3BA00

0 ... 10 A

–

Constant current approx. 11 A
Typ. 15 A for 5 s/min

Yes, 2 units

Approx. 93 %
Approx. 36 W

Yes, according to EN 60950
Typ. 11 A, overload capability
150 %
 I_{out} rated up to 5 s/min

Constant current characteristic
approx. 11 A

Approx. 11 A

–

Yes, safety extra low output
voltage V_{out} according to
EN 60950 and EN 50178
Class I

< 3.5 mA

Yes

Yes

cULus-listed (UL 508,
CSA C22.2 No. 107.1), File
E197259

IP20

EN 55022 Class B
EN 61000-3-2
EN 61000-6-2

0 ... +60 °C with natural
convection
–25 ... +85 °C
Climate class 3K3 according to
EN 60721, without condensation

One screw terminal each for
0.2 ... 4 mm² single-core/
finely stranded
One screw terminal each for
0.2 ... 4 mm² (+, –)

2 screw terminals 0.2 ... 4 mm²
(relay contact 13, 14)

70 × 125 × 125
1.2 kg
Snaps onto DIN rail
EN 60715 35×7.5/15

–

0 ... 20 A

–

Constant current approx. 23 A
Typ. 60 A for 25 ms

Yes, 2 units

Approx. 90 %
Approx. 106 W

Yes, according to EN 60950
Typ. 23 A

Alternatively, constant current
characteristic approx. 23 A or
latching shutdown

Approx. 23 A

LED yellow for "overload", LED
red for "latching shutdown"

Yes, safety extra low output
voltage V_{out} according to
EN 60950
Class I

< 3.5 mA (typ. 0.68 mA)

Yes

Yes

cULus-listed (UL 508,
CSA C22.2 No. 107.1), File
E197259; cCSAus (CSA C22.2,
No. 60950, UL 60950)

IP20

EN 55022 Class B
EN 61000-3-2
EN 61000-6-2

0 ... +60 °C with natural
convection
–25 ... +85 °C
Climate class 3K3 according to
EN 60721, without condensation

One screw terminal each for
0.2 ... 4 mm² single-core/
finely stranded
2 screw terminals each for
0.33 ... 10 mm² (+, –)

–

240 × 125 × 125
3.2 kg
Snaps onto DIN rail
EN 60715 35×7.5/15

Signaling module
(6EP1961-3BA10)

SITOP

Alternative voltages

Overview

Product	LOGO!Power		
Power supply, type	5 V/3 A	5 V/6.3 A	12 V/1.9 A
Order No.	6EP1 311-1SH02	6EP1 311-1SH12	6EP1 321-1SH02
The product families are highlighted in the same color. For an explanation of the product groups, see Chapter 1, pages 1/6 to 1/10.			
	The power supplies of the LOGO!Power range are optimally matched to the LOGO! logic modules in their functionality and design; with the wide-range input 85 V to 264 V AC and option for installing in built-in miniature distribution boards, they can be used universally in the low-end performance range.		
Dimension drawing	Page 15/2, Dimension drawing 2	Page 15/5, Dimension drawing 1	Page 15/2, Dimension drawing 2

Technical specifications

Input			
Rated voltage value $V_{in \text{ rated}}$	1-phase AC 100 - 240 V AC Wide-range input	1-phase AC 100 - 240 V AC Wide-range input	1-phase AC 100 - 240 V AC Wide-range input
Voltage range	85 ... 264 V	85 ... 264 V	85 ... 264 V
Overvoltage resistance	$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$	$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$	$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$
Mains buffering at $I_{out \text{ rated}}$	$> 40 \text{ ms at } V_{in} = 187 \text{ V}$	$> 40 \text{ ms at } V_{in} = 187 \text{ V}$	$> 40 \text{ ms at } V_{in} = 187 \text{ V}$
Rated line frequency; range	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz	50/60 Hz; 47 ... 63 Hz
Rated current value $I_{in \text{ rated}}$	0.36-0.22 A	0.71-0.37 A	0.53-0.3 A
Switch-on current limiting (+25 °C)	$< 15 \text{ A}$	$< 30 \text{ A}$	$< 15 \text{ A}$
I^2t	$< 0.8 \text{ A}^2\text{s}$	$< 3 \text{ A}^2\text{s}$	$< 0.8 \text{ A}^2\text{s}$
Built-in incoming fuse	Internal	Internal	Internal
Recommended miniature circuit breaker (IEC 898) in the mains power input	From 16 A Characteristic B or from 10 A Characteristic C	From 16 A Characteristic B or from 10 A Characteristic C	From 16 A Characteristic B or from 10 A Characteristic C
Output			
Rated voltage value $V_{in \text{ rated}}$	Controlled, isolated DC voltage 5 V DC	Controlled, isolated DC voltage 5 V DC	Controlled, isolated DC voltage 12 V DC
Total tolerance, static	$\pm 3 \%$	$\pm 3 \%$	$\pm 3 \%$
• Static mains compensation	Approx. 0.2 %	Approx. 0.1 %	Approx. 0.2 %
• Static load balancing	Approx. 1.5 %	Approx. 2 %	Approx. 1.5 %
Residual ripple	$< 100 \text{ mV}_{pp}$ (typ. 10 mV _{pp})	$< 100 \text{ mV}_{pp}$ (typ. 15 mV _{pp})	$< 200 \text{ mV}_{pp}$ (typ. 10 mV _{pp})
Spikes (bandwidth approx. 20 MHz)	$< 100 \text{ mV}_{pp}$ (typ. 30 mV _{pp})	$< 100 \text{ mV}_{pp}$ (typ. 30 mV _{pp})	$< 300 \text{ mV}_{pp}$ (typ. 30 mV _{pp})
Adjustment range	4.6 ... 5.4 V	4.6 ... 5.4 V	10.5 ... 16.1 V
Status display	Green LED for 5 V OK	Green LED for 5 V OK	Green LED for 12 V OK
Response on activation/deactivation	No overshoot of V_{out} (soft start)	No overshoot of V_{out} (soft start)	No overshoot of V_{out} (soft start)
Startup delay/voltage rise	$< 0.5 \text{ s/typ. } 15 \text{ ms}$	$< 0.5 \text{ s/typ. } 10 \text{ ms}$	$< 0.5 \text{ s/typ. } 15 \text{ ms}$
Rated current value $I_{out \text{ rated}}$	3 A	6.3 A	1.9 A
Current range up to +55 °C	0 ... 3 A	0 ... 6.3 A	0 ... 1.9 A
Parallel switching for enhanced performance	Yes, 2 units	Yes, 2 units	Yes, 2 units
Continuation of the table	Page 12/8, column 1	Page 12/8, column 2	Page 12/8, column 3

Alternative voltages

LOGO!Power

12 V/4.5 A

6EP1 322-1SH02



15 V/1.9 A

6EP1 351-1SH02



15 V/4 A

6EP1 352-1SH02



The power supplies of the LOGO!Power range are optimally matched to the LOGO! logic modules in their functionality and design; with the wide-range input 85 V to 264 V AC and option for installing in built-in miniature distribution boards, they can be used universally in the low-end performance range.

Page 15/5, Dimension drawing 1

Page 15/2, Dimension drawing 2

Page 15/5, Dimension drawing 1

1-phase AC
100 - 240 V AC
 Wide-range input
 85 ... 264 V

$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$
 $> 40 \text{ ms at } V_{in} = 187 \text{ V}$
 50/60 Hz; 47 ... 63 Hz

1.13-0.61 A
 $< 30 \text{ A}$
 $< 3 \text{ A}^2\text{s}$

Internal
 From 16 A Characteristic B or
 from 10 A Characteristic C

1-phase AC
100 - 240 V AC
 Wide-range input
 85 ... 264 V

$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$
 $> 40 \text{ ms at } V_{in} = 187 \text{ V}$
 50/60 Hz; 47 ... 63 Hz

0.63-0.33 A
 $< 15 \text{ A}$
 $< 0.8 \text{ A}^2\text{s}$

Internal
 From 16 A Characteristic B or
 from 10 A Characteristic C

1-phase AC
100 - 240 V AC
 Wide-range input
 85 ... 264 V

$2.3 \times V_{in \text{ rated}}, 1.3 \text{ ms}$
 $> 40 \text{ ms at } V_{in} = 187 \text{ V}$
 50/60 Hz; 47 ... 63 Hz

1.24-0.68 A
 $< 30 \text{ A}$
 $< 3 \text{ A}^2\text{s}$

Internal
 From 16 A Characteristic B or
 from 10 A Characteristic C

Controlled, isolated DC voltage
12 V DC

$\pm 3 \%$
 Approx. 0.1 %
 Approx. 1.5 %

$< 200 \text{ mV}_{pp}$ (typ. 10 mV_{pp})
 $< 300 \text{ mV}_{pp}$ (typ. 40 mV_{pp})

10.5 ... 16.1 V
 Green LED for 12 V OK
 No overshoot of V_{out} (soft start)

$< 0.5 \text{ s/typ. 10 ms}$
4.5 A
 0 ... 4.5 A

Yes, 2 units

Page 12/9, column 4

Controlled, isolated DC voltage
15 V DC

$\pm 3 \%$
 Approx. 0.1 %
 Approx. 1.5 %

$< 200 \text{ mV}_{pp}$ (typ. 10 mV_{pp})
 $< 300 \text{ mV}_{pp}$ (typ. 30 mV_{pp})

10.5 ... 16.1 V
 Green LED for 15 V OK
 No overshoot of V_{out} (soft start)

$< 0.5 \text{ s/typ. 15 ms}$
1.9 A
 0 ... 1.9 A

Yes, 2 units

Page 12/9, column 5

Controlled, isolated DC voltage
15 V DC

$\pm 3 \%$
 Approx. 0.1 %
 Approx. 1.5 %

$< 200 \text{ mV}_{pp}$ (typ. 10 mV_{pp})
 $< 300 \text{ mV}_{pp}$ (typ. 40 mV_{pp})

10.5 ... 16.1 V
 Green LED for 15 V OK
 No overshoot of V_{out} (soft start)

$< 0.5 \text{ s/typ. 10 ms}$
4 A
 0 ... 4 A

Yes, 2 units

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SITOP

Alternative voltages

Continued from	Page 12/6, column 1	Page 12/6, column 2	Page 12/6, column 3
Power supply, type (repeated)	5 V/3 A	5 V/6.3 A	12 V/1.9 A
Order No. (repeated)	6EP1 311-1SH02	6EP1 311-1SH12	6EP1 321-1SH02
Efficiency			
Efficiency at $V_{out rated}$, $I_{out rated}$	Approx. 76 %	Approx. 83 %	Approx. 80 %
Power loss at $V_{out rated}$, $I_{out rated}$	Approx. 5 W	Approx. 6 W	Approx. 5 W
Closed-loop control			
Dyn. mains compensation ($V_{in rated} \pm 15\%$)	$< 0.2\% V_{out}$	$< 0.2\% V_{out}$	$< 0.2\% V_{out}$
Dynamic load smoothing (I_{out} : 10/90/10 %)	Typ. $\pm 4\% V_{out}$	Typ. $\pm 6.5\% V_{out}$	Typ. $\pm 3\% V_{out}$
Load step settling time			
• 10 to 90 %	Typ. 20 ms	Typ. 20 ms	Typ. 20 ms
• 90 to 10 %	Typ. 20 ms	Typ. 20 ms	Typ. 20 ms
Protection and monitoring			
Current limiting	Typ. 3.8 A	Typ. 8.2 A	Typ. 2.5 A
Short-circuit protection	Constant current characteristic	Constant current characteristic	Constant current characteristic
Sustained short-circuit current rms value	$< 5\text{ A}$	$< 10\text{ A}$	$< 4\text{ A}$
Overload/short-circuit indicator	–	–	–
Safety			
Primary/secondary galvanic isolation	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178
Protection class	Class II (without protective conductor)	Class II (without protective conductor)	Class II (without protective conductor)
Safety approval	Yes; CB scheme	Yes; CB scheme	Yes; CB scheme
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273
Explosion protection	ATEX EX II 3G Ex nA IIC T3	ATEX EX II 3G Ex nA IIC T3	ATEX EX II 3G Ex nA IIC T3
FM approval	Class I Div. 2, Group A, B, C, D, T4	Class I Div. 2, Group A, B, C, D, T4	Class I Div. 2, Group A, B, C, D T4
Marine approval	GL	GL	GL, ABS
Degree of protection (EN 60529)	IP20	IP20	IP20
EMC			
Emitted interference	EN 55022 Class B	EN 55022 Class B	EN 55022 Class B
Supply harmonics limitation	Not applicable	Not applicable	Not applicable
Noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data			
Ambient temperature range	$-20 \dots +55\text{ °C}$ with natural convection	$-20 \dots +55\text{ °C}$ with natural convection	$-20 \dots +55\text{ °C}$ with natural convection
Transport/storage temperature range	$-40 \dots +70\text{ °C}$	$-40 \dots +70\text{ °C}$	$-40 \dots +70\text{ °C}$
Humidity class	Climate class 3K3 according to EN 60721, without condensation	Climate class 3K3 according to EN 60721, without condensation	Climate class 3K3 according to EN 60721, without condensation
Mechanics			
Supply input connections L1, N	One screw terminal each for $0.5 \dots 2.5\text{ mm}^2$ single-core/finely stranded	One screw terminal each for $0.5 \dots 2.5\text{ mm}^2$ single-core/finely stranded	One screw terminal each for $0.5 \dots 2.5\text{ mm}^2$ single-core/finely stranded
Connections			
• Output +	2 screw terminals each for $0.5 \text{ to } 2.5\text{ mm}^2$	2 screw terminals each for $0.5 \text{ to } 2.5\text{ mm}^2$	2 screw terminals each for $0.5 \dots 2.5\text{ mm}^2$
• Output –			
Dimensions (W × H × D) in mm	54 × 90 × 55	72 × 90 × 55	54 × 90 × 55
Weight, approx.	0.17 kg	0.25 kg	0.17 kg
Installation	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15	Snaps onto DIN rail EN 60715 35×7.5/15

Alternative voltages

Page 12/7, column 4	Page 12/7, column 5	Page 12/7, column 6
12 V/4.5 A	15 V/1.9 A	15 V/4 A
6EP1 322-1SH02	6EP1 351-1SH02	6EP1 352-1SH02
Approx. 85 % Approx. 10 W	Approx. 80 % Approx. 7 W	Approx. 85 % Approx. 11 W
< 0.2 % V_{out} Typ. ± 4.2 % V_{out}	< 0.2 % V_{out} Typ. ± 2.8 % V_{out}	< 0.2 % V_{out} Typ. ± 3.3 % V_{out}
Typ. 20 ms Typ. 20 ms	Typ. 20 ms Typ. 20 ms	Typ. 20 ms Typ. 20 ms
Typ. 5.9 A Constant current characteristic < 8 A –	Typ. 2.7 A Constant current characteristic < 4 A –	Typ. 5.0 A Constant current characteristic < 8 A –
Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class II (without protective conductor)	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class II (without protective conductor)	Yes, safety extra low output voltage V_{out} according to EN 60950 and EN 50178 Class II (without protective conductor)
Yes; CB scheme Yes	Yes; CB scheme Yes	Yes; CB scheme Yes
cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273 ATEX EX II 3G Ex nA IIC T3 Class I Div. 2, Group A, B, C, D, T4 GL, ABS IP20	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273 ATEX EX II 3G Ex nA IIC T3 Class I Div. 2, Group A, B, C, D, T4 GL IP20	cULus-listed (UL 508, CSA C22.2 No. 107.1), File E197259; cURus-recognized (UL 60950, CSA C22.2 No. 60950), File E151273 ATEX EX II 3G Ex nA IIC T3 Class I Div. 2, Group A, B, C, D, T4 GL IP20
EN 55022 Class B Not applicable EN 61000-6-2	EN 55022 Class B Not applicable EN 61000-6-2	EN 55022 Class B Not applicable EN 61000-6-2
–20 ... +55 °C with natural convection –40 ... +70 °C Climate class 3K3 according to EN 60721, without condensation	–20 ... +55 °C with natural convection –40 ... +70 °C Climate class 3K3 according to EN 60721, without condensation	–20 ... +55 °C with natural convection –40 ... +70 °C Climate class 3K3 according to EN 60721, without condensation
One screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 2 screw terminals each for 0.5 ... 2.5 mm ²	One screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 2 screw terminals each for 0.5 ... 2.5 mm ²	One screw terminal each for 0.5 ... 2.5 mm ² single-core/ finely stranded 2 screw terminals each for 0.5 to 2.5 mm ²
72 × 90 × 55 0.25 kg Snaps onto DIN rail EN 60715 35×7.5/15	54 × 90 × 55 0.17 kg Snaps onto DIN rail EN 60715 35×7.5/15	72 × 90 × 55 0.25 kg Snaps onto DIN rail EN 60715 35×7.5/15

SITOP

Alternative voltages

Selection and ordering data

Product	Input Voltage V_{in} rated	Output Voltage V_{out} rated	Current I_{out} rated	Order No.	Price in euros per PU
SITOP DC/DC					
	24 V DC	12 V DC	2.5 A	6EP1 621-2BA00	
SITOP flexi					
	120/230 V AC	3 - 52 V DC	2-10 A	6EP1 353-2BA00	
SITOP dual					
	120/230 V AC	2 × 15 V DC	2 × 3.5 A	6EP1 353-0AA00	
SITOP smart					
	400-500 V 3 AC	48 V DC	10 A	6EP1 456-2BA00	
SITOP modular					
	400-500 V 3 AC	48 V DC	20 A	6EP1 457-3BA00	
LOGO!Power					
	100-240 V AC	5 V DC	3 A	6EP1 311-1SH02	
		5 V DC	6.3 A	6EP1 311-1SH12	
		12 V DC	1.9 A	6EP1 321-1SH02	
		12 V DC	4.5 A	6EP1 322-1SH02	
		15 V DC	1.9 A	6EP1 351-1SH02	
		15 V DC	4 A	6EP1 352-1SH02	

Customized power supplies



13/2	Description
13/3	Specification sheet

Customized power supplies

Overview

Our well-proven standard power supplies cannot, of course, satisfy the requirements of every application. We offer you the opportunity to optimize your system to application-specific requirements.

You benefit from the expertise of large-scale production and gain maximum development security and quality.

Our customer-specific solutions are used today in many sectors of mechanical engineering, in automation technology, vehicle electronics, equipment manufacturing and in industrial instrumentation technology.

Our offer is fundamentally open to every application case. If we have awakened your interest or if you would like to receive further details, please complete the fax form with the parameters of your specific application profile and fax it to the stated number. You will also find the form on the Internet at:

www.siemens.com/sitop

You can fill it out on the screen and send it back to us immediately. We will then contact you as soon as possible.



FAX response

Specification sheet for customized power supplies

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Application/operating range:

Electrical requirements:

Input voltage:

V_{in} : _____ Tolerance ΔV_{in} : _____

Frequency:

f_{in} : _____ Tolerance Δf_{in} : _____

Mains buffering time:

T_{in} : _____

Output voltage:

V_{out1} : _____ V_{out2} : _____ V_{out3} : _____ V_{out4} : _____

Output currents:

I_{out1} : _____ I_{out2} : _____ I_{out3} : _____ I_{out4} : _____

Other: _____

Mechanical requirements:

Design/dimensions:
(enclose drawing where appropriate)

Enclosure: _____

Connections:

Other: _____

General requirements:

Efficiency: _____

Ambient temperature: _____

Signaling: _____

Standards:

☐ EN 60950 ☐ UL ☐ cUL (CSA)

☐ EN 61000-6-1/2 ☐ EN 61000-6-3/4

☐ _____

Quantity per annum: _____

Start of delivery: _____

Suggested price: _____

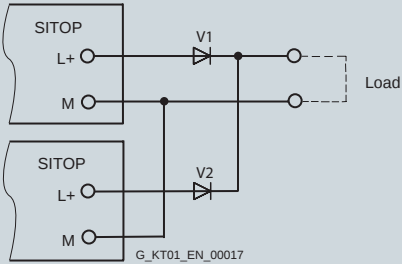
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Customized power supplies

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Technical information and notes on configuration

Power supply in general

Power supplies

In plant building or mechanical equipment manufacture, or in any other situations in which electrical controls are used, a safe and reliable power supply is needed to supply the process with power.

The functional reliability of electronic controls and therefore the reliable operation of automated plants is extremely closely linked to the failsafe option of the load power supply to failure. Final control elements as well as input and output modules will only respond to command signals if the power supply is operating reliably.

In addition to requirements such as safety, particular demands are placed on the electromagnetic compatibility (EMC) of the power supply with reference to the tolerance range of the output voltage as well as its ripple.

Important factors that determine problem-free implementation are, in particular:

- An input current with a low harmonic content
- a low emitted interference and
- an adequate immunity (noise immunity) to interference

EMC	Interference phenomena
Emission (emitted interference)	Interference caused by television and radio reception Interference coupling on data lines or power supply cables
Noise immunity (immunity to interference)	Faults on the power cable due to switching non-resistive loads such as motors or contactors Static discharge due to lightning strikes Electrostatic discharge through the human body Conducted noise induced by radio frequencies

Selected interference phenomena

General notes on DC power supplies

The DC power supply is a static device with one or more inputs and one or more outputs that converts a system of AC voltage and AC current and/or DC voltage and DC current to a system with different values of DC voltage and DC current by means of electromagnetic induction for the purpose of transmitting electrical energy.

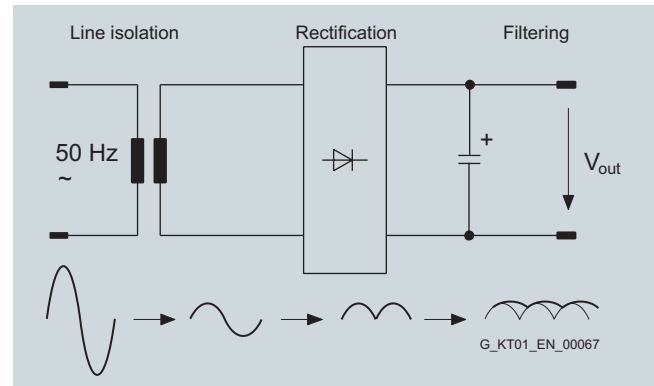
The type of construction of a DC power supply is primarily decided by its intended use.

Non-stabilized DC power supplies

The AC mains voltage is transformed using 50 Hz/60 Hz safety transformers to a protective extra-low voltage and smoothed with down-circuit rectification and capacitor filtering.

In the case of non-stabilized DC power supplies, the DC output voltage is not stabilized at a specific value, but the value is varied in accordance with the variation in (mains) input voltage and the loading.

The ripple is in the Volt range and is dependent on the loading. The value for the ripple is usually specified as a percentage of the DC output voltage level. Non-stabilized DC power supplies are characterized by their rugged, uncomplicated design that is limited to the important factors and focused on a long service life.



Block diagram of a non-stabilized power supply

Stabilized DC power supplies

Stabilized DC power supplies have electronic control circuits that maintain the DC voltage at the output at a specific value with as little variation as possible. Effects such as variation in input voltage or changes in load at the output are electrically compensated in the specified function area.

The ripple in the output voltage for stabilized DC power supplies lies in the millivolt range and is mainly dependent on the loading at the outputs.

Stabilized DC power supplies can be implemented on different functional principles. The most common types of circuit are:

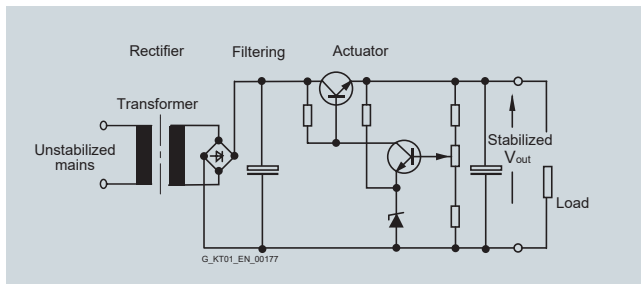
- Linear stabilized power supplies
- Magnetic voltage stabilizers
- Secondary pulsed switched-mode power supplies
- Primary pulsed switched-mode power supplies

The most suitable principle for a particular application case will depend mainly on the application. The objective is to generate a DC voltage to supply the specific load as inexpensively and as accurately as possible.

Power supply in general

Stabilized DC power supplies (continued)

Linear stabilized power supplies



Block diagram: Transformer with in-phase regulation

The transformer with in-phase regulation operates according to a conventional principle. The supply is provided from an AC supply system (one, two or three conductor supply).

A transformer is used to adapt it to form the required secondary voltage.

The rectified and filtered secondary voltage is converted to a stabilized voltage at the output in a regulation section. The regulation section comprises a final control element and a control amplifier. The difference between the stabilized output voltage and the non-stabilized voltage at the filter capacitor is converted into a thermal loss in the final control element. The final control element functions in this case like a rapidly changeable ohmic impedance. The thermal loss that arises in each case is the product of output current and voltage drop over the final control element.

This system is extremely adaptable. Even without further modifications, several output voltages are possible. In the case of multiple outputs, the individual secondary circuits are usually generated from separate secondary windings of the input transformer. Some applications can only be resolved in accordance with this circuit principle. Especially when highly accurate regulation, minimal residual ripple and fast compensation times are required.

The efficiency is, however, poor and the weight and volume are considerable. The transformer with in-phase regulation is therefore only an economical alternative at low power ratings.

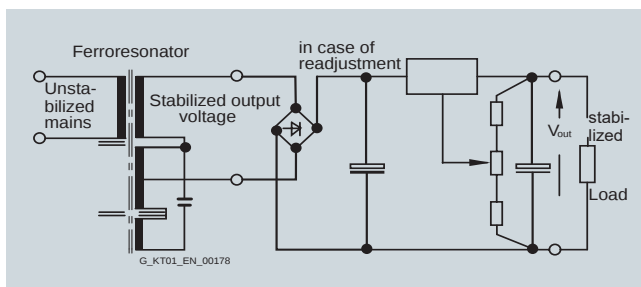
Advantages:

- Simple, well-proven circuit principle
- Good to excellent control characteristics
- Fast compensation time

Disadvantages:

- Relatively high weight and large volume due to the 50 Hz transformer
- Poor efficiency, heat dissipation problems
- Low storage time

Magnetic stabilizer



Block diagram: Magnetic stabilizer

The complete transformer comprises two components. The "ferro resonator" and a series-connected auxiliary regulator. The input winding and the resonance winding of the magnetic stabilizer are decoupled to a large extent by means of the air gap. The magnetic stabilizer supplies a well-stabilized AC voltage. This is rectified and filtered. The transformer itself is operated in the saturation range.

The ferro resonator frequently has a transformer with in-phase regulation connected downstream to improve the control accuracy. Secondary pulsed switched-mode regulators are frequently also connected to the output.

The magnetic stabilizer technique is reliable and rugged but is also large-volume, heavy and relatively expensive.

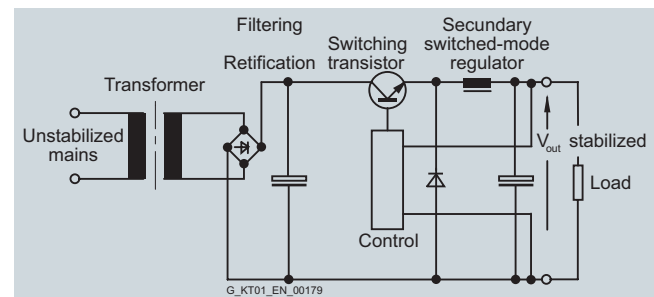
Advantages:

- Good to excellent control characteristics in combination with series-connected linear regulators
- Significantly better efficiency than a transformer with in-phase regulation alone

Disadvantages:

- The ferro resonator is frequency dependent
- The power supplies are large and heavy due to the magnetic components

Secondary pulsed switched-mode power supplies:



Block diagram: Secondary pulsed switched-mode power supply

Isolation from the supply system is implemented in this case with a 50 Hz transformer. Following rectification and filtering, the energy is switched at the output by means of pulsing through a switching transistor in the filtering and storage circuit. Thanks to the transformer at the input that acts as an excellent filter, the mains pollution is low.

The efficiency of this circuit is extremely high.

This concept offers many advantages for power supplies with numerous different output voltages.

To protect the connected loads, however, care must be taken; in the event of the switching transistor breaking down, the full, non-stabilized DC voltage of the filter capacitor will be applied to the output. However, this danger also exists in the case of linear stabilized power supplies.

Advantages:

- Simple design and high efficiency
- Multiple outputs, also galvanically isolated from one another, are easily implemented by means of several secondary windings
- Fewer problems with interference than with primary pulsed switched-mode power supplies

Disadvantages:

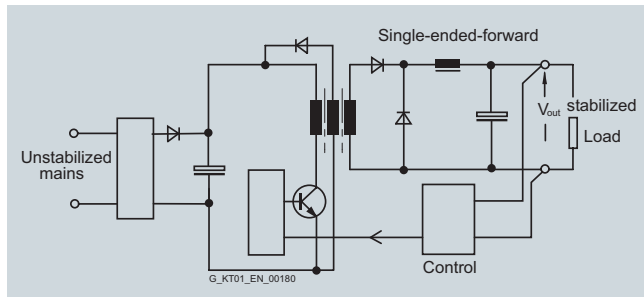
- The 50 Hz transformer makes the power supplies relatively large and heavy
- The output ripple (spikes) correspond to those of a primary pulsed switched-mode power supply

Power supply in general

Stabilized DC power supplies (continued)

Primary pulsed switched-mode power supplies:

The term SMPS (Switch Mode Power Supply) or primary switched-mode regulator is often used in the literature.



Block diagram: Single-ended forward converter

The primary switched-mode regulators are available in many different circuit versions. The most important basic circuits are single-ended forward converters, flyback converters, half-bridge converters, full-bridge converters, push-pull converters and resonance converters.

The general principle of operation of the primary switched-mode regulator is shown in the block diagram of the single-ended forward converter:

The non-stabilized supply voltage is first rectified and filtered. The capacitance of the capacitor in the DC link determines the storage time of the power supply on failure of the input voltage. The voltage at the DC link is approximately 320 V DC for a 230 V supply. A single-ended converter is then supplied with this DC voltage and transfers the primary energy through a transformer to the secondary side with the help of a pulse width regulator at a high switching frequency. The switching transistor has low power losses when functioning as a switch, so that the power balance lies between > 70 % and 90 % depending on the output voltage and current.

The volume of the transformer is small in comparison with a 50 Hz transformer due to the high switching frequency because the transformer size, taking into account the higher switching frequency, is smaller. Using modern semiconductors, clock frequencies of 100 kHz and above can be achieved. However, switching losses increase at excessively high clock frequencies so that in each case a compromise has to be made between high efficiency and the largest possible clock frequency. In most applications, the clock frequencies lie between approximately 20 kHz and 250 kHz depending on the output power.

The voltage from the secondary winding is rectified and filtered. The system deviation at the output is fed back to the primary circuit through an optocoupler. By controlling the pulse width (conducting phase of the switching transistor in the primary circuit), the necessary energy is transferred to the secondary circuit and the output voltage is regulated. During the non-conducting phase of the switching transistor, the transformer is demagnetized through an auxiliary winding. Exactly the same amount of energy is transferred as is removed at the output. The maximum pulse width for the pulse duty factor for these circuits is < 50 %.

Advantages:

- Small magnetic components (transformer, storage reactor, filter) thanks to the high operating frequency
- High efficiency thanks to pulse width regulation
- Compact equipment units
- Forced-air cooling is not necessary up to the kW range
- High storage times are possible in case of power failure by increasing the capacitance in the DC link
- Large input voltage range possible

Disadvantages:

- High circuit costs, many active components
- High costs for interference suppression
- The mechanical design must be in accordance with HF criteria

Primary switched-mode power supplies have taken over from the other switching modes in recent years. This is due, in particular, to their compact size, minimal weight, high efficiency and excellent price/performance ratio.

Summary

The most important characteristics of the circuit types described above are summarized in Table 2.

Comparison criteria	Connection types			
	Primary-switched mode	Secondary-switched mode	Transformer with in-phase regulation	Magnetic stabilizer
Input voltage range	Very large	Medium	Very small	Large
Regulation speed	Medium	Medium	Very fast	Slow
Storage time after power failure	Very long	Long	Very short	Long
Residual ripple	Medium	Medium	Very low	Medium
Power loss	Very small	Small	Large	Very small
Frame size	Very small	Medium	Very large	Large
Weight	Very light	Medium	Heavy	Very heavy
Interference suppression overhead	Very large	Medium	Low	Medium

Comparison criteria for basic circuit variants

Supply system data, line-side connection

Supply system data

When dimensioning and selecting plant components, the supply systems data, supply system conditions and operating modes must be taken into account for these components.

The most important data for a supply system include the rated voltage and rated frequency. These data for the supply system are designated as rated values in accordance with international agreements.

Rated voltages and rated frequencies

Since May 1987, the standard DIN IEC 60038 "IEC rated voltages" has been applicable in the Federal Republic of Germany.

The international standard IEC 60038, Edition 6, 1983, "IEC standard voltages" was included unmodified in this standard.

The IEC 60038 standard is the result of an international agreement to reduce the diverse rated voltage values that are in use for electrical supply networks and traction power supplies, load installations and equipment.

Conversion of low-voltage systems

In the low-voltage range, it is emphasized in IEC 60038 that the 220 V/380 V and 240 V/415 V values for three-phase power supply systems have been replaced by a single, internationally standardized value of 230 V/400 V.

The tolerances for the rated voltages of the supply systems that were specified for the transition period up to 2003 were intended to ensure that equipment rated for the previous voltages could be operated safely until the end of its service life.

Year	Rated voltage	Tolerance range
Up to 1987	220 V/380 V	- 10 % to + 10 %
1988 to 2003	230 V/400 V	- 10 % to + 6 %
Since 2003	230 V/400 V	- 10 % to + 10 %

Conversion of low-voltage systems

The IEC recommendations have been implemented as national regulations in the most important countries, as far as the conditions in the country allow.

International supply voltages and frequencies in low-voltage systems

Country	Supply voltage
Western Europe:	
Austria	50 Hz 230/400 – 500 ¹⁾ – 690 ¹⁾ V
Belgium	50 Hz 230/400 – 127-220 V
Denmark	50 Hz 230/400 V
Finland	50 Hz 230/400-500 ¹⁾ – 660 ¹⁾ V
France	50 Hz 127/220 – 230/400 – 500 ¹⁾ – 380/660 ¹⁾ – 525/910 ¹⁾ V
Germany	50 Hz 230/400 V
Great Britain	50 Hz (230/400 V)
Greece	50 Hz 230/400 – 127/220 ²⁾ V
Iceland	50 Hz 127/220 ²⁾ – 230/400 V
Ireland	50 Hz 230/400 V
Italy	50 Hz 127/220 – 230/400 V
Luxembourg	50 Hz 230/400 V
Norway	50 Hz 230-230/400-500 ¹⁾ – 690 ¹⁾ V
Northern Ireland	50 Hz 230/400 – Belfast 220/380 V
Portugal	50 Hz 230/400 V
Spain	50 Hz 230/400 V
Sweden	50 Hz 230/400 V
Switzerland	50 Hz 230/400 – 500 ²⁾ V
The Netherlands	50 Hz 230/400 – 660 ¹⁾ V
Eastern Europe:	
Albania	50 Hz 230/400 V
Bulgaria	50 Hz 230/400 V
Croatia	50 Hz 230/400 V
Czech Republic	50 Hz 230/400 – 500 ¹⁾ – 690 ¹⁾ V
Hungary	50 Hz 230/400 V
Poland	50 Hz 230/400 V
Romania	50 Hz 230/400 V
Russian Federation	50 Hz 230/400 – 690 ¹⁾ V
Serbia	50 Hz 230/400 V
Slovakia	50 Hz 230/400 – 500 ¹⁾ – 690 ¹⁾ V
Slovenia	50 Hz 230/400 V

¹⁾ Industry only.

²⁾ No further expansion.

Technical information and notes on configuration

Supply system data, line-side connection

International supply voltages and frequencies in low-voltage systems (continued)

Country	Supply voltage
Middle East:	
Afghanistan	50 Hz 220/380 V
Bahrain	50 Hz 230/400 V
Cyprus	50 Hz 240/415 V
Iraq	50 Hz 220/380 V
Israel	50 Hz 230/400 V
Jordan	50 Hz 220/380 V
Kuwait	50 Hz 240/415 V
Lebanon	50 Hz 110/190 – 220/380 V
Oman	50 Hz 220/380 – 240/415 V
Qatar	50 Hz 240/415 V
Saudi Arabia	60 Hz 127/220 – 220/380 – 480 ¹⁾ V (220/380 – 240/415 V 50 Hz: a few remaining areas only)
Syria	50 Hz 115/200 – 220/380 – 400 ¹⁾ V
Turkey	50 Hz 220/380 V (parts of Istanbul: 110/190 V)
United Arab Emirates (Abu Dhabi; Ajman; Dubai; Fujairah; Ras al Khaymah; Sharjah; Um al Qaywayn)	50 Hz 220/380 – 240/415 V
Yemen (North)	50 Hz 220/380 V
Yemen (South)	50 Hz 230/400 V
Far East:	
Bangladesh	50 Hz 230/400 V
Burma	50 Hz 230/400 V
Cambodia	50 Hz 120/208 V – Phnom Penh 220/238 V
Hong Kong	50 Hz 200/346 V
India	50 Hz 220/380 – 230/400 – 240/415 V
Indonesia	50 Hz 127/220 – 220/380 – 400 ¹⁾ V
Japan	50 Hz 100/200 – 400 ¹⁾ V
Korea (North)	60 Hz 220/380 V
Korea (South)	60 Hz 100/200 ²⁾ – 220/380 – 440 ¹⁾ V
Malaysia	50 Hz 240/415 V
Pakistan	50 Hz 230/400 V
People's Republic of China	50 Hz 127/220 – 220/380 V (in mining: 1140 V)
People's Republic of Mongolia	50 Hz 220/380 V
Philippines	60 Hz 110/220 – 440 V
Singapore	50 Hz 240/415 V
South Honshu, Shikoku, Kyushu, Hokkaido, North Honshu	60 Hz 110/220 – 440 ¹⁾ V
Sri Lanka	50 Hz 230/400 V
Taiwan	60 Hz 110/220 – 220 – 440 V
Thailand	50 Hz 220/380 V
Vietnam	50 Hz 220/380 V
North America:	
Canada	60 Hz 600 – 120/240 – 460 – 575 V
USA	60 Hz 120/208 – 120/240 – 277/480 – 600 ¹⁾ V
Central America:	
Bahamas	60 Hz 115/200 – 120/208 V
Barbados	50 Hz 110/190 – 120/208 V
Belize	60 Hz 110/220 – 220/440 V
Costa Rica	60 Hz 120/208 ²⁾ – 120/240 – 127/220 – 254/440 ²⁾ – 227/480 ¹⁾ V
Cuba	60 Hz 120/240 – 220/380 – 277/480 ¹⁾ – 440 ¹⁾ V

¹⁾ Industry only

²⁾ No further expansion

Supply system data, line-side connection

International supply voltages and frequencies in low-voltage systems (continued)

Country	Supply voltage
Central America (continued):	
Dominican Republic	60 Hz 120/208 – 120/240 – 480 ¹⁾ V
El Salvador	60 Hz 110/220 – 120/208 – 127/220 – 220/440 – 240/480 ¹⁾ – 254/440 ¹⁾ V
Guatemala	60 Hz 120/208 – 120/240 – 127/220 – 277/480 ¹⁾ – 480 ¹⁾ – 550 ¹⁾ V
Haiti	50 Hz 220/380 V (Jacmel), 60 Hz 110/220 V
Honduras	60 Hz 110/220 – 127/220 – 277/480 V
Jamaica	50 Hz 110/220 – 440 ¹⁾ V
Mexico	60 Hz 127/220 – 440 ¹⁾ V
Nicaragua	60 Hz 110/220 – 120/240 – 127/220 – 220/440 – 254/40 ¹⁾ V
Panama	60 Hz 120/208 ¹⁾ – 120/240 – 254/440 ¹⁾ – 277/480 ¹⁾ V
Puerto Rico	60 Hz 120/208 – 480 V
Trinidad	60 Hz 110/220 – 120/240 – 230/400 V
South America:	
Argentina	50 Hz 220/380 V
Bolivia	60 Hz 220/380 – 480 V, 50 Hz 110/220 – 220/380 V (exception)
Brazil	60 Hz 110/220 – 220/440 – 127/220 – 220/380 V
Chile	50 Hz 220/380 V
Columbia	60 Hz 110/220 – 150/260 – 440 V
Ecuador	60 Hz 120/208 – 127/220 V
Guyana	50 Hz 110/220 V (Georgetown), 60 Hz 110/220 – 240/480 V
Paraguay	60 Hz 220/380 – 220/440 V
Peru	60 Hz 220 – 220/380/440 V
Surinam	60 Hz 115/230 – 127/220 V
Uruguay	50 Hz 220 V
Venezuela	60 Hz 120/208 – 120/240 – 208/416 – 240/480 V
Africa:	
Algeria	50 Hz 127/220 – 220/380 V
Angola	50 Hz 220/380 V
Benin	50 Hz 220/380 V
Cameroon	50 Hz 127/220 – 220/380 V
Congo	50 Hz 220/380 V
Egypt	50 Hz 110/220 – 220/380 V
Ethiopia	50 Hz 220/380 V
Gabon	50 Hz 220/380 V
Ghana	50 Hz 127/220 – 220/380 V
Guinea	50 Hz 220/380 V
Ivory Coast	50 Hz 220/380 V
Kenya	50 Hz 220/380 V
Liberia	60 Hz 120/208 – 120/240 V
Libya	50 Hz 127/220 ²⁾ – 220/380 V
Madagascar	50 Hz 127/220 – 220/380 V
Malawi	50 Hz 220/380 V
Mali	50 Hz 220/380 V
Mauritius	50 Hz 240/415 V
Morocco	50 Hz 115/200 – 127/220 – 220/380 – 500 ¹⁾ V
Mozambique	50 Hz 220/380 V
Namibia	50 Hz 220/380 V
Niger	50 Hz 220/380 V

¹⁾ Industry only.

²⁾ No further expansion.

Supply system data, line-side connection

International supply voltages and frequencies in low-voltage systems (continued)

Country	Supply voltage
Africa (continued):	
Nigeria	50 Hz 220/415 V
Rwanda	50 Hz 220/380 V
Senegal	50 Hz 127/220 – 220/380 V
Sierra Leone	50 Hz 220/380 V
Somalia	50 Hz 220-220/440 V
South Africa	50 Hz 220/380 – 500 ¹⁾ – 550/950 ¹⁾ V
Sudan	50 Hz 240/415 V
Swaziland	50 Hz 220/380 V
Tanzania	50 Hz 230/400 V
Togo	50 Hz 127/220 – 220/380 V
Tunisia	50 Hz 115/200 – 220/380 V
Uganda	50 Hz 240/415 V
Zaire	50 Hz 220/380 V
Zambia	50 Hz 220/380 V – 415 – 550 ¹⁾ V
Zimbabwe	50 Hz 220/380 V

Connection and fusing on the line side

All SITOP and LOGO!Power supplies are built-in devices. Compliance with the pertinent country-specific regulations is essential for installation and electrical connection of the devices. During installation, protective gear and isolating gear must be provided for activating the power supply.

Power supply units cause a current inrush immediately after connection of the input voltage due to charging of the load capacitor, however, it falls back to the rated input current level after a few milliseconds. Aside from the internal impedances of the power supply, the inrush current is dependent on the size of the input voltage applied as well as the source impedance of the supply network and the line impedance of the supply line. The maximum inrush current for the power supplies is specified in the applicable technical data.

It is important for dimensioning up-circuit protective devices.

Single-phase SITOP and LOGO!Power supplies are equipped with internal device protection (fuses). For connection to the supply system, only one protective device (fuse or MCB) must be provided for line protection in accordance with the rated current of the installed cable. The miniature circuit breakers recommended in the data sheets and operating instructions were selected such that even during the maximum inrush current that can occur under worst-case conditions when switching on the supply voltage, the miniature circuit breaker will not trip. A two-pole connected miniature circuit breaker is required for the connection of certain device types.

Three-phase SITOP power supplies do not have internal device protection. The up-circuit protective device (three-phase coupled miniature circuit breaker or motor protection switch) protects the cables and devices. The protective devices specified in the data sheets and operating instructions are optimized to the characteristics of the relevant power supplies.

¹⁾ Industry only.

Possible system disturbances and causes

Overview

The quality of the mains voltage has become a decisive factor in the functioning, reliability, maintenance costs and service life of highly sensitive electronic installations and devices (computers, industrial controls, instrumentation, etc.).

Mains disturbances cause system failures and affect the function of plants as well as electronic loads. They can also result in total failure of the installation or equipment.

The most frequent types of disturbance are:

- Long-term overvoltages
- Long-term undervoltages
- Interference pulses and transients
- Voltage dips and surges
- Electrical noise
- Momentary network failure
- Long-term network failure

Disturbances in mains voltages can occur individually or in combination. Possible reasons for these disturbances and reactions can include:

Mains disturbances can be caused by a number of things, e.g.:

- Switching operations in the supply system
- Long cable paths in the supply system
- Environmental influences such as thunderstorms
- Mains overloads

Typical causes of mains disturbances generated in-house are:

- Thyristor-controlled drives
- Elevators, air-conditioning, photocopiers
- Motors, reactive-power compensation systems
- Electrical welding, large machines
- Switching of lighting equipment

System disturbances	Percentage of total disturbance	Effect
Overvoltage The supply voltage is exceeded for a long period by more than +6 % (acc. to DIN IEC 60038)	Approx. 15 % – 20 %	Can result in overheating and even thermal destruction of individual components. Causes total failure.
Undervoltage The supply voltage is reduced for a long period by more than + 10 % (acc. to DIN IEC 60038)	Approx. 20 % – 30 %	Can result in undefined operating states of loads. Causes data errors.
Interference pulses Energy-rich pulses (e.g. 700 V/1 ms) and energy-poor transients (e.g. 2500 V/20 µs) result from switching operations in the supply system	Approx. 30 % – 35 %	Can result in undefined operating states of the loads and can lead to the destruction of components.
Voltage dips and surges The voltage level changes suddenly and in an uncontrolled manner, e.g. due to changes in loading and long cable routes	Approx. 15 % – 30 %	Can result in undefined operating states and destruction of components. Cause data errors.
Electrical noise A mix of frequencies superimposed on the mains due to bad grounding and/or strong HF emitters, such as radio transmitters or thunderstorms	Approx. 20 % – 35 %	Can result in undefined operating states of loads. Causes data errors.
Voltage interruption Short-term interruption of the supply voltage (up to approx. 10 ms) due to short-circuiting in neighboring supply systems or starting of large electrical machines.	Approx. 8 % – 10 %	Can result in undefined operating states of loads, especially those with insufficient mains buffering. Causes data errors.
Voltage interruption Long interruption of the supply voltage (longer than approx. 10 ms)	Approx. 2 % – 5 %	Can result in undefined operating states of loads, especially those with insufficient mains buffering. Causes data errors.

Mains disturbances and effects

The SITOP product family offers a range of possibilities for minimizing or preventing the risk of mains disturbances already during the planning stage.

Technical information and notes on configuration

Installation instructions, mounting areas and fixing options

Installation instructions

All SITOP and LOGO!Power supplies are built-in devices. They must be mounted vertically so that the supply air can enter the ventilation slots at the bottom of the devices and leave through the upper part of the devices. If the units are not mounted vertically (at your own risk), the ambient temperature

should not exceed +45 °C and the load current should not exceed approx. 50 % of the rated current value. The minimum distances specified in the relevant operating instructions for the top, bottom and side of the devices must be observed to ensure free air convection.

Mounting areas and fixing options

Power supply	Order No.	Required mounting area	Mounting on a standard mounting rail acc. to EN 60715		Wall mounting
		in mm (W × H)	35 × 7.5 mm	35 × 15 mm	
SITOP 24 V, 1-phase and 2-phase power supplies					
24 V/0.375 A	6EP1731-2BA00	22.5 × 180	X	X	
24 V/0.5 A	6EP1331-2BA10	22.5 × 180	X	X	
24 V/1.3 A	6EP1331-1SH02	54 × 130	X	X	
24 V/2 A	6ES7307-1BA01-0AA0 ³⁾	40 × 205	2)	2)	
	6ES7305-1BA80-0AA0 ³⁾	80 × 225		1)	
	6EP1732-0AA00	80 × 235		X	X
24 V/2.5 A	6EP1332-2BA10	33 × 225	X	X	
	6EP1332-1SH42	72 × 130	X	X	
	6EP1332-1SH71	70 × 140	X	X	X
	6EP1232-1AA00	52 (110) × 230	X	X	X
	6EP1332-1SH12	80 × 335		X	X
24 V/3.5 A	6EP1332-1SH31	160 × 280	X	X	X
24 V/3.7 A	6EP1332-2BA00	75 × 225	X	X	
24 V/4 A	6EP1332-1SH22	80 × 335		X	X
	6EP1332-1SH51	90 × 130	X	X	
	6EP1232-1AA10	52 (110) × 230	X	X	X
24 V/5 A	6EP1333-3BA00	70 × 225	X	X	
	6EP1333-2BA01	50 × 225	X	X	
	6EP1333-2AA01	50 × 225	X	X	
	6ES7307-1EA01-0AA0 ³⁾	60 × 205	2)	2)	
	6ES7307-1EA80-0AA0 ³⁾	80 × 225		1)	
	6EP1333-1AL12	160 × 230	X	X	
24 V/6 A	6EP1233-1AA00	52 (110) × 230	X	X	X
24 V/10 A	6EP1334-3BA00	90 × 225	X	X	
	6EP1334-2BA01	70 × 225	X	X	
	6EP1334-2AA01	70 × 225	X	X	
	6ES7307-1KA02-0AA0 ³⁾	80 × 205	2)	2)	
	6EP1334-1AL12	160 × 230	X	X	
	6EP1334-1SH01	200 × 325		X	
24 V/12 A	6EP1234-1AA00	52 (110) × 230	X	X	X
24 V/20 A	6EP1336-3BA00	160 × 225	X	X	
24 V/40 A	6EP1337-3BA00	240 × 225	X	X	
SITOP 24 V, three-phase power supplies					
24 V/8 A	6EP1433-2CA00 ⁴⁾	approx. 310 × 285			X
	6ES7148-4PC00-0AA0 ⁴⁾	approx. 310 × 285			X
24 V/10 A	6EP1434-2BA00	320 × 225	X	X	
24 V/20 A	6EP1436-3BA10	70 × 225	X	X	
	6EP1436-3BA00	160 × 225	X	X	
	6EP1436-2BA00	320 × 225	X	X	
24 V/30 A	6EP1437-2BA00	320 × 280	X	X	
24 V/40 A	6EP1437-3BA10	150 × 225	X	X	
	6EP1437-3BA00	240 × 225	X	X	
	6EP1437-2BA10	320 × 280	X	X	

Planning aids

Power supply	Order No.	Required mounting area	Mounting on a standard mounting rail acc. to EN 60715		Wall mounting
		in mm (W × H)	35 × 7.5 mm	35 × 15 mm	
SITOP 24 V, uninterruptible power supplies					
SITOP UPS500S (2.5 kW and 5 kW)	6EP1933-2EC41/ -2EC51	120 × 225	X	X	
SITOP UPS501S Extension module	6EP1935-5PG01	70 × 225	X	X	
SITOP UPS500P (5 kW)	6EP1933-2NC01	500 × 178			X
SITOP UPS500P (10 kW)	6EP1933-2NC11	570 × 178			X
DC UPS 6 A (with serial/ USB interface)	6EP1931-2DC21 (-2DC31/-2DC42)	50 × 225	X	X	
DC UPS 15 A (with serial/ USB interface)	6EP1931-2EC21 (-2EC31/-2EC42)	50 × 225	X	X	
DC UPS 40 A (with USB interface)	6EP1931-2FC21 (-2FC42)	102 × 225	X	X	
SITOP 24 V, uninterruptible power supplies					
Battery module 1.2 Ah	6EP1935-6MC01	116 × 126	X	X	X
Battery module 2.5 Ah	6EP1935-6MD31	285 × 171	X	X	X
Battery module 3.2 Ah	6EP1935-6MD11	210 × 171	X	X	X
Battery module 7 Ah	6EP1935-6ME21	206 × 188			X
Battery module 12 Ah	6EP1935-6MF01	273 × 138			X
SITOP 24 V, expansion modules					
Signaling module	6EP1961-3BA10	26 × 225			
Redundancy module	6EP1961-3BA20	70 × 225	X	X	
Buffer module	6EP1961-3BA01	70 × 225	X	X	
Selectivity module	6EP1961-2BA10/ -2BA20	72 × 180	X	X	
Diagnostics module	6EP1961-2BA00	72 × 190	X	X	
Inrush current limiter	6EP1967-2AA00	22.5 × 180	X	X	
SITOP alternative voltages					
12 V/2.5 A	6EP1621-2BA00	32.5 × 225	X	X	
3-52 V/120 W	6EP1353-2BA00	75 × 225	X	X	
2 × 15 V/3.5 A	6EP1353-0AA00	75 × 325	X	X	
48 V/10 A	6EP1456-2BA00	70 × 225	X	X	
48 V/20 A	6EP1457-3BA00	240 × 255	X	X	
5 V/3 A	6EP1311-1SH02	54 × 130	X	X	
5 V/6.3 A	6EP1311-1SH12	72 × 130	X	X	
12 V/1.9 A	6EP1321-1SH02	54 × 130	X	X	
12 V/4.5 A	6EP1322-1SH02	72 × 130	X	X	
15 V/1.9 A	6EP1351-1SH02	54 × 130	X	X	
15 V/4 A	6EP1352-1SH02	72 × 130	X	X	

¹⁾ With additional mounting adapter 6ES7390-6BA00-0AA0.

²⁾ With additional mounting adapter 6EP1 971-1BA00.

³⁾ Installation on S7-rail.

⁴⁾ Installation on mounting rail ET200pro.

Planning aids

As an aid for planning and construction, operating instructions with mounting options, dimension drawings and principle circuits with pin names in different file formats (also suitable for CAD applications) are available for download on the Internet.

More information is available on the Internet at

<http://www.siemens.com/sitop>

Parallel connection for redundant operation and performance enhancement

Parallel connection for redundant operation

Two SITOP power supplies of the same type can be connected in parallel through diodes for a redundant configuration. 100 % redundancy only exists for two power supplies when the total load current is no higher than that which one power supply can supply alone and when the supply for the primary side is also implemented redundantly (i.e. a short-circuit on the primary side will not trigger a shared fuse which would disconnect both power supplies from the mains).

Parallel connection with decoupling diodes for redundant operation is permitted for all SITOP power supplies. The diodes V1 and V2 are used for decoupling. They must have a blocking voltage of at least 40 V and it must be possible to load them with a current equal to or greater than the maximum output current of the respective SITOP power supply. For diode dimensioning, see the following note "General information on selection of diodes".

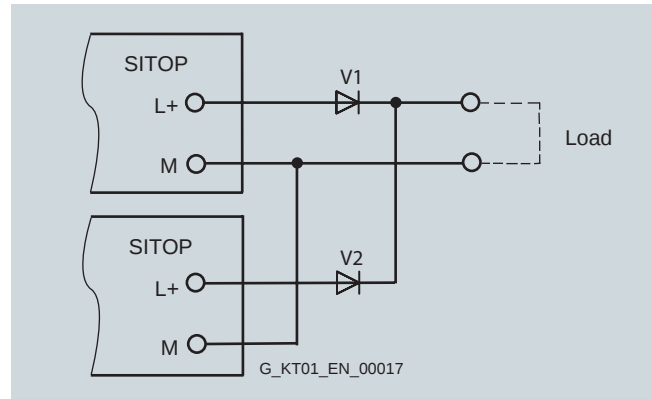
The ready-to-use expansion "SITOP modular redundancy module" is available as a simple alternative to diode dimensioning (Order No.: 6EP1961-3BA20, see Section 8) for redundant connection of two power supplies.

General information on selection of diodes:

The diodes must be dimensioned for the maximum dynamic overcurrent. This can be the dynamic overcurrent during power-up in the short-circuit case, or the dynamic overcurrent during a short-circuit in operation (the largest of the two values should be taken from the relevant technical specifications).

To dissipate the significant power loss of the decoupling diodes (sustained short-circuit current $\times$ diode conductive-state voltage), the diodes must be equipped with suitably dimensioned heat sinks.

An additional safety margin is recommended, because the output capacitor integral to the power supply generates an additional peak current in the short-circuit case. This additional current flows only for a few milliseconds so it is within the period in which diodes are permitted to be loaded with a multiple of the rated current (< 8.3 ms, known as the permissible surge current for diodes).



Parallel connection of two SITOP power supplies for redundant operation

Example

Two 1-phase SITOP modular power supplies with 10 A rated output current, (Order No.: 6EP1 334-3BA00) are connected in parallel. The dynamic overcurrent in the event of a short-circuit during operation is approximately 30 A for 25 ms.

The diodes should therefore have a loading capability of 40 A to be safe, the common heat sink for both diodes must be dimensioned for the maximum possible current of approximately 24 A (sustained short-circuit current rms value) $\times$ diode conductive-state voltage.

Parallel connection for redundant operation and performance enhancement

Parallel connection for performance enhancement

To enhance performance, identical types of most SITOP power supplies can be connected in parallel galvanically (the same principle as parallel connection for redundant operation, but without decoupling diodes):

Advantage

The costs for mounting the diodes onto heat sinks and the not insignificant power losses for the decoupling diodes (current $\times$ diode conducting-state voltage) are avoided.

The types permitted for direct galvanic parallel connection are listed in the relevant technical specifications under "Output, parallel connection for performance enhancement".

Requirement:

- The output cables connected to terminals "+" and "-" of every power supply should be installed with an identical length and cross-section (or the same impedance) to the common external linking point.
- The power supplies connected in parallel must be switched simultaneously using a common switch in the mains supply line (e.g. using the main switch available in control cabinets).
- The output voltages of the power supplies must be measured under no-load operation before they are connected in parallel and are permitted to differ by up to 50 mV. This usually corresponds to the factory default setting. If the output voltage is changed in case of variable power supplies, the "-" terminals should first be connected and then the voltage difference between the "+" output terminals measured under no-load conditions before they are connected. This voltage difference must not exceed 50 mV.

Note:

With a direct galvanic connection in parallel of more than two SITOP power supplies, further circuit measures may be necessary for short-circuit and overload protection!

Parallel connection for redundant operation and performance enhancement

Almost 100 % redundancy

Using the types permitted for direct galvanic parallel connection (see the relevant technical specifications under "Output, parallel connection for performance enhancement"), performance can be increased without the need for decoupling diodes, and simultaneously, redundancy of almost 100 % can be implemented by direct galvanic parallel connection of an additional power supply of the same type to the power supplies required. This means that at least one power supply is required than is necessary for the sum of all load currents.

A decoupling diode is normally required for redundancy to ensure that a power supply that has failed as a result of short-circuiting of the outputs (especially as a result of short-circuiting the output electrolytic capacitor) does not also short-circuit the power supplies that remain intact. A redundancy of almost 100 % can be implemented with this type of circuit.

Example

A load current of up to 40 A is required and the power supplies must operate on both 400 V and 500 V three-phase supplies (without switch-over).

The three-phase type SITOP modular 20 A is suitable for this (Order No.: 6EP1 436-3BA10). For load currents up to 40 A, direct galvanic parallel connection of two SITOP modular power 20 supplies is necessary. By connecting another SITOP modular 20 in parallel, performance enhancement and redundancy are implemented simultaneously (if one of the three power supplies fails to supply an output voltage, the remaining two 20 A power supplies are capable of supplying a total load current of 40 A).

Note:

With a direct galvanic connection in parallel of more than two SITOP power supplies, further circuit measures may be necessary for short-circuit and overload protection!

Series connection to increase the voltage

Series connection to increase the voltage

To generate a load voltage of e. g. 48 V DC, two 24 V SITOP power supplies of the same type can be connected in series. The SITOP outputs "+" and "-" are isolated up to at least 60 V DC against PE (creepages and clearances as well as radio interference suppression capacitors on "+" and "-" against PE) so that with this type of series connection (see Figure), the following points can be grounded:

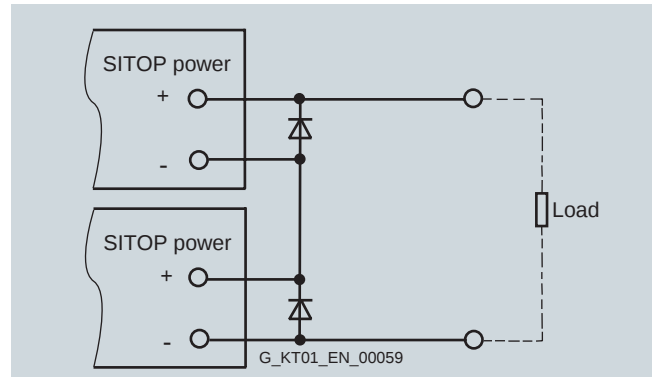
- "-" of the lower power supply (results in +48 V DC against PE)
- Midway "+" / "-" between both power supplies (results in ± 24 VDC against PE)
- "+" of the higher power supply (results in -48 V DC against PE)

Note:

If two devices are connected in parallel, it cannot be guaranteed that the voltage will remain below the maximum permissible SELV voltage of 60 V DC in the event of a fault.

The purpose of diodes V1 and V2 is to protect the electrolytic output capacitor integrated in the power supply against reverse voltages > 1 V. As a result of the not absolutely simultaneous power-up (even when a common mains switch is used for switching on, differences of a few tens of milliseconds can occur between the various startup-up delays), the power supply which starts up more quickly supplies current from output "-" of the slower power supply whose output electrolytic capacitor is then theoretically impermissibly discharged.

The internal LC filter causes the internal rectifier diode on the secondary side of the slower-starting power supply to accept this current a few milliseconds later; this means that the external diode connected with its anode to "-" and cathode to "+" is essential on each power supply. These diodes are, however, only loaded dynamically, so that the 8.3 ms surge current loading capability (specified in the data sheets for suitable diodes) can be used as a basis for dimensioning and it is not usually necessary to cool the diodes using heat sinks.



Series connection of two SITOP power units to double the voltage

Example:

Two single-phase SITOP modular power supplies with 10 A rated output current (Order No.: 6EP1 334-1AL12) should be connected in series for increasing the voltage. They supply approximately 35 A dynamically for 700 ms on power-up in the short-circuit case or also, for example, with loads with a high-capacity input capacitor that momentarily act as a short-circuit at the start.

Suitable diodes for V1 and V2 are, for example, of Type SB 340¹⁾ (Schottky diode in axially wired enclosure DO-201AD with approximately 5.3 mm diameter and approximately 9.5 mm length of body).

40 V are permissible as the blocking voltage, and the stationary direct current load capacity $I_{F AV}$ is 3 A. The dynamic surge current loading capacity $I_{F SM}$ important in this case is sufficient for the selected SITOP power supply at more than 100 A for 8.3 ms. For SITOP power supplies with a lower rated output current, this diode can also be used, but it is over-dimensioned.

- Manufacturer: General Instrument
- Distributor: e.g. RS Components, Spoerle

¹⁾ We do not accept any liability for this diode recommendation.

Battery charging, fusing of the 24 V DC output circuit, selectivity**Battery charging with SITOP power supplies**

The SITOP modular power supplies 5 A to 40 A with stabilized output voltage that can be set between 24.0 V to 28.8 V supply a constant output current of approximately $1.2 \times$ rated current under overload conditions (e.g. a completely discharged 24 V lead-acid battery). In the case of a V/I characteristic set for parallel operation, the battery will be charged with a constant current until approximately 95 % of the set SITOP output voltage has been achieved. The charging current is then continuously reduced from $1.2 \times$ rated current at 95 % of the set voltage to approximately 0 A or the self-discharge current of the battery at 100 % of the set output voltage, that is, resistance characteristic in this range.

As reverse voltage protection and polarity reversal protection, we recommend that a diode suitable for at least $1.2 \times$ rated current of the power supply with a blocking voltage of at least 40 V is connected in series with the "+" output (anode connected to "+" output of the SITOP modular and cathode connected to positive pole of the battery).

The output voltage of the power supply must be set at no-load to the end-of-charge voltage plus the voltage drop at the diode. For an end-of-charge voltage of e. g. 27.0 V DC (usual at 20 °C to 30 °C battery temperature; in each case, compliance with the specifications of the battery manufacturer must be observed!) and 0.8 V voltage drop at the diode, SITOP modular must be set to 27.8 V during no-load operation.

General note for using SITOP power supplies as a battery-charging unit

When SITOP modular is used as a battery charging unit, the regulations of VDE 0510 or the relevant national regulations must be observed, and adequate ventilation of the battery location must be provided. The SITOP modular power supplies are designed as rack-mounting units, and protection against electric shock should therefore be provided by installation in an appropriate housing.

The value recommended by the battery manufacturer must be set as the end-of-charge voltage (depending on the battery temperature). An ideal temperature for the lead-acid battery is between +20 to 30°C and the recommended end-of-charge voltage in this case is usually about 27 V.

Fusing of 24 V power supply circuits and selectivity

With non-stabilized rectifiers (power transformer equipped with rectifier) the output usually had to be protected with a suitable fuse so that its rectifier diodes would not fail in the event of an overload or a short-circuit (this would destroy the DC loads due to the resulting alternating voltage and lead to serious damage in most cases).

On the other hand, the stabilized SITOP power supplies are provided with integral electronic short-circuit protection that automatically protects both the power supply and the supplied 24 V DC circuits against an excess current in the event of an overload/short-circuit. A distinction must be made between the following three cases with respect to fusing on the secondary side:

Example 1: No fusing

Fusing the secondary side (24 V DC) for protecting the load circuits and lines is not required if the respective cross-sections are selected for the maximum possible output current RMS value. Depending on the event (short-circuit or overload) this may either be the short-circuit RMS value or the current limitation value.

Fusing of 24 V power supply circuits and selectivity (continued)

Example SITOP modular 10 A (Order No.: 6EP1334-3BA00)

- 10 A rated current
- Current limitation typ. 12 A
- Short-circuit current rms value approximately 12 A

The technical specifications usually specify typical values, maximum values are approximately 2 A above the typical value. In the example here, a maximum possible output current rms value of approximately 14 must therefore be used for line dimensioning.

Example 2: Reduced conductor cross-sections

If smaller conductor cross-sections are used than specified in the relevant standards (e.g. EN 60204-1), the affected 24 V load infeed cables must be protected with a suitable circuit breaker.

It is then unimportant whether the power supply enters current limiting mode (overload) or delivers the maximum short-circuit current (low-resistance short-circuit).

The load supply is in any case protected against an overload by the line protection matched to the conductor cross-section.

Example 3: Selectivity

In cases where a load which has failed (e.g. because of a short-circuit) has to be rapidly detected or where it is essential to selectively switch it off before the power supply enters current limiting mode (with current limiting mode, the voltage would also fall for all remaining 24 V DC loads), there are two possibilities for the secondary side connection:

- **a selectivity module SITOP PSE200U or a diagnostics module SITOP select for the distribution of the 24 V DC supply over up to 4 load feeders. Each output is adjustable between 0.5 A and 3 A (Order No.: 6EP1961-2BA10) or 3 A and 10 A (Order No.: 6EP1961-2BA20) or 2 A and 10 A (Order No.: 6EP1961-2BA00)**
- Series connection of appropriate 24 V DC fuses or miniature circuit breakers

The basis for selection of the 24 V DC fuse or circuit-breaker is the short-circuit current above the rated current which the SITOP power supplies deliver in the event of a short-circuit during operation (values are specified in the respective technical specifications under "Output, dynamic V/I on short-circuit during operation").

It is not easy to calculate the amount of the short-circuit current flowing into the usually not ideal "short-circuit" and the amount flowing into the remaining loads. This depends on the type of overload (high-resistance or low-resistance short-circuit) and the type of load connected (resistive, inductive and capacitive/electronic loads).

However, it can be assumed with a first approximation in the average case encountered in practice that the difference of dynamic overcurrent minus 50 % SITOP rated output current is available for the immediate tripping of a circuit-breaker within a typical time of 12 ms (with 14 times the rated DC with a circuit-breaker characteristic C acc. to IEC 898, or with 7 times the rated DC with a circuit-breaker characteristic B or with 5 times the rated DC with a circuit-breaker characteristic A). Please refer to the following tables for circuit-breakers appropriate for selected fusing according to this assumption.

Technical information and notes on configuration

Fusing of the 24 V DC output circuit, selectivity

List of ordering data and tripping characteristics of single-pole circuit-breakers 5SY4...

acc. to IEC 898 / EN 60898, for use up to 60 V (250 V AC, switching capacity 10,000 A)

Rated current	Tripping characteristic	Order No.	Range for immediate tripping < 100 ms for operation with direct current (alternating current)	Required DC for immediate tripping in < 100 ms	Required DC for immediate tripping in approx. 12 ms
1 A	Type A	5SY4 101-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	2 ... 5 A DC	5 A DC
1 A	Type C	5SY4 101-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	5 ... 14 A DC	14 A DC
1.6 A	Type A	5SY4 115-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	3.2 ... 8 A DC	8 A DC
1.6 A	Type C	5SY4 115-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	8 ... 22.4 A DC	22.4 A DC
2 A	Type A	5SY4 102-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	4 ... 10 A DC	10 A DC
2 A	Type C	5SY4 102-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	10 ... 28 A DC	28 A DC
3 A	Type A	5SY4 103-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	6 ... 15 A DC	15 A DC
3 A	Type C	5SY4 103-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	15 ... 42 A DC	42 A DC
4 A	Type A	5SY4 104-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	8 ... 20 A DC	20 A DC
4 A	Type C	5SY4 104-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	20 ... 56 A DC	56 A DC
6 A	Type A	5SY4 106-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	12 ... 30 A DC	30 A DC
6 A	Type B	5SY4 106-6	DC: 3 ... 7 (AC: 3 ... 5) × I_{rated}	18 ... 42 A DC	42 A DC
6 A	Type C	5SY4 106-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	30 ... 84 A DC	84 A DC
8 A	Type A	5SY4 108-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	16 ... 40 A DC	40 A DC
8 A	Type C	5SY4 108-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	40 ... 112 A DC	112 A DC
10 A	Type A	5SY4 110-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	20 ... 50 A DC	50 A DC
10 A	Type B	5SY4 110-6	DC: 3 ... 7 (AC: 3 ... 5) × I_{rated}	30 ... 70 A DC	70 A DC
10 A	Type C	5SY4 110-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	50 ... 140 A DC	140 A DC
13 A	Type A	5SY4 113-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	26 ... 65 A DC	65 A DC
13 A	Type B	5SY4 113-6	DC: 3 ... 7 (AC: 3 ... 5) × I_{rated}	39 ... 91 A DC	91 A DC
13 A	Type C	5SY4 113-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	65 ... 182 A DC	182 A DC
16 A	Type A	5SY4 116-5	DC: 2 ... 5 (AC: 2 ... 3) × I_{rated}	32 ... 80 A DC	80 A DC
16 A	Type B	5SY4 116-6	DC: 3 ... 7 (AC: 3 ... 5) × I_{rated}	48 ... 112 A DC	112 A DC
16 A	Type C	5SY4 116-7	DC: 5 ... 14 (AC: 5 ... 10) × I_{rated}	80 ... 224 A DC	224 A DC

Fusing of the 24 V DC output circuit, selectivity

Ordering data and tripping characteristics of Siemens single-pole circuit-breaker terminals type 8WA1 011-...

Suitable for up to 60 V DC (250 V AC)

The following space-saving circuit-breaker terminals for mere short-circuit protection can only be snap-mounted on DIN rail EN 60715-35×15. They are also available with an auxiliary switch (1 NO contact and 1 NC contact) and feature higher sensitivity than circuit-breakers acc. to IEC 898 (EN 60898), Type B.

Tripping times/ranges are within narrower tolerances than those of miniature circuit breakers. When operated with DC, these circuit-breaker terminals do not trip at currents below the rated current; from 1.1 times the rated current, the circuit-breaker terminal may trip after as little as 100 ms.

The circuit-breaker rated value must therefore be above the load inrush current peak value. In general, however, the first three milliseconds of the load inrush current may be ignored because no less than 20 to 100 times the rated current is required to trip the circuit-breaker terminals during this period of time.

- The circuit-breaker terminals already trip after 40 ms at 1.2 to 1.9 times the rated DC
- The circuit-breaker terminals already trip after 20 ms at 1.7 to 2.6 times the rated DC
- The circuit-breaker terminals already trip after 12 ms at 2.2 to 3.8 times the rated DC

Ordering data and tripping characteristics of Siemens single-pole circuit-breaker terminals type 8WA1 011-...

Rated current	2 A	4 A	6 A	10 A
Order No. (without auxiliary switch)	8WA1 011-1SF25	8WA1 011-1SF26	8WA1 011-1SF27	8WA1 011-1SF28
Order No. (with auxiliary switch 1 NO + 1NC)	8WA1 011-6SF25	8WA1 011-6SF26	8WA1 011-6SF27	8WA1 011-6SF28
Required DC for immediate tripping in 40 ms	2.4 ... 3.8 A	4.8 ... 7.6 A	7.2 ... 11.4 A	12 ... 19 A
Required DC for immediate tripping in 20 ms	3.4 ... 5.2 A	6.8 ... 10.7 A	10.2 ... 15.6 A	17 ... 26 A
Required DC for immediate tripping in approx. 12 ms	4.4 ... 7.6 A	8.8 ... 15.2 A	13.2 ... 22.8 A	22 ... 38 A

For more data, refer to the catalog "Low-voltage switchgear" (Catalog LV 1)

Technical information and notes on configuration

Fusing of the 24 V DC output circuit, selectivity

Miniature circuit breakers acc. to EN 60898 (DIN VDE 0641 T11) in 24 V DC circuits, which are powered by SITOP modular or SITOP smart power supplies

Order No.	$I_{\text{out rated}}$	$I_{\text{out dyn}}$	$I >$	Characteristic A										
				1 A	1.6 A	2 A	3 A	4 A	6 A	8 A	10 A	13 A	16 A	
6EP1332-2BA10	2.5 A	7 A/ 200 ms	5.8 A/ 200 ms	✓	○	○	○	○	○	○	○	○	○	
6EP1333-3BA00	5 A	15 A/ 25 ms	12.5 A/ 25 ms	✓	✓	✓	○	○	○	○	○	○	○	
6EP1333-2BA01	5 A	17 A/ 200 ms	14.5 A/ 200 ms	✓	✓	✓	○	○	○	○	○	○	○	
6EP1333-2AA01	5 A	17 A/ 200 ms	14.5 A/ 200 ms	✓	✓	✓	○	○	○	○	○	○	○	
6EP1334-3BA00	10 A	30 A/ 25 ms	25 A/ 25 ms	✓	✓	✓	✓	✓	○	○	○	○	○	
6EP1334-2BA01	10 A	33 A/ 200 ms	28 A/ 200 ms	✓	✓	✓	✓	✓	✓	○	○	○	○	
6EP1334-2AA01	10 A	33 A/ 200 ms	28 A/ 200 ms	✓	✓	✓	✓	✓	✓	○	○	○	○	
6EP1336-3BA00	20 A	60 A/ 25 ms	50 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	○	○	
6EP1436-3BA00	20 A	60 A/ 25 ms	50 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	○	○	
6EP1436-3BA10	20 A	60 A/ 25 ms	50 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	○	○	
6EP1457-3BA00	20 A	60 A/ 25 ms	50 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	○	○	
6EP1337-3BA00	40 A	120 A/ 25 ms	100 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
6EP1437-3BA00	40 A	120 A/ 25 ms	100 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
6EP1437-3BA10	40 A	120 A/ 25 ms	100 A/ 25 ms	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

$I_{\text{out rated}}$: rated output current

$I_{\text{out dyn}}$: Dynamic overcurrent at short-circuit in operation

$I >$: For selective tripping in practice to provide permanent current
($I > = I_{\text{out dyn}} - 0.5 \times I_{\text{out rated}}$)

✓: immediate tripping within 12 ms possible

○: immediate tripping within 12 ms not possible

Fusing of the 24 V DC output circuit,
selectivity

	Characteristic B				Characteristic C									
	6 A	10 A	13 A	16 A	1 A	1.6 A	2 A	3 A	4 A	6 A	8 A	10 A	13 A	16 A
	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	○	○	○	○	✓	○	○	○	○	○	○	○	○	○
	○	○	○	○	✓	○	○	○	○	○	○	○	○	○
	○	○	○	○	✓	✓	○	○	○	○	○	○	○	○
	○	○	○	○	✓	✓	✓	○	○	○	○	○	○	○
	○	○	○	○	✓	✓	✓	○	○	○	○	○	○	○
	✓	○	○	○	✓	✓	✓	✓	○	○	○	○	○	○
	✓	○	○	○	✓	✓	✓	✓	○	○	○	○	○	○
	✓	○	○	○	✓	✓	✓	✓	○	○	○	○	○	○
	✓	✓	✓	○	✓	✓	✓	✓	✓	✓	○	○	○	○
	✓	✓	✓	○	✓	✓	✓	✓	✓	✓	○	○	○	○
	✓	✓	✓	○	✓	✓	✓	✓	✓	✓	○	○	○	○

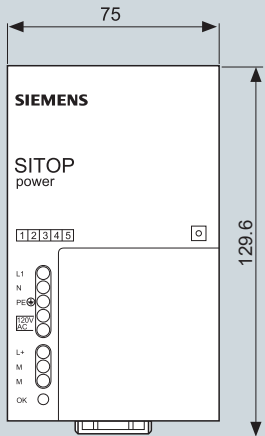
Technical information and notes on configuration

Standards and approvals

Overview of important standards and approvals

EN	European standards
EN 50178	Electronic equipment for use in power installations
EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
EN 60529	Degrees of protection provided by enclosures (IP-Code)
EN 60721	Classification of environmental conditions
EN 60950-1	Information technology equipment – Safety
EN 61000-3-2	Electromagnetic compatibility (EMC) – Part 3-2: Limits for harmonic current emissions (equipment input current ≤16 A per phase)
EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 61000-6-3	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light industrial environments
UL	Underwriters Laboratories
UL 508	Industrial control equipment
UL 1604	Electrical equipment for use in class I and class II, division 2, and class III hazardous (classified) locations
UL 1778	Uninterruptible Power Supply Equipment
UL 60950 -1	Information technology equipment – Safety
CSA	Canadian Standards Association
CSA C22.2 No. 14	Industrial control equipment
CSA C22.2 No. 142	Process control equipment
CSA C22.2 No. 107.1	General Use Power Supplies
CSA C22.2 No. 60950-1	Information technology equipment – Safety
ATEX	Equipment and protective systems intended for use in Potentially Explosive Atmospheres
FM	Factory Mutual Research
ABS	American Bureau of Shipping
GL	Germanischer Lloyd

Dimension drawings



- 15/2 SITOP 24 V
1-phase, 2-phase, 3-phase
- 15/15 Expansion modules
- 15/18 Mounting bracket
- 15/19 Uninterruptible
power supplies
- 15/21 Battery modules
- 15/22 Alternative voltages

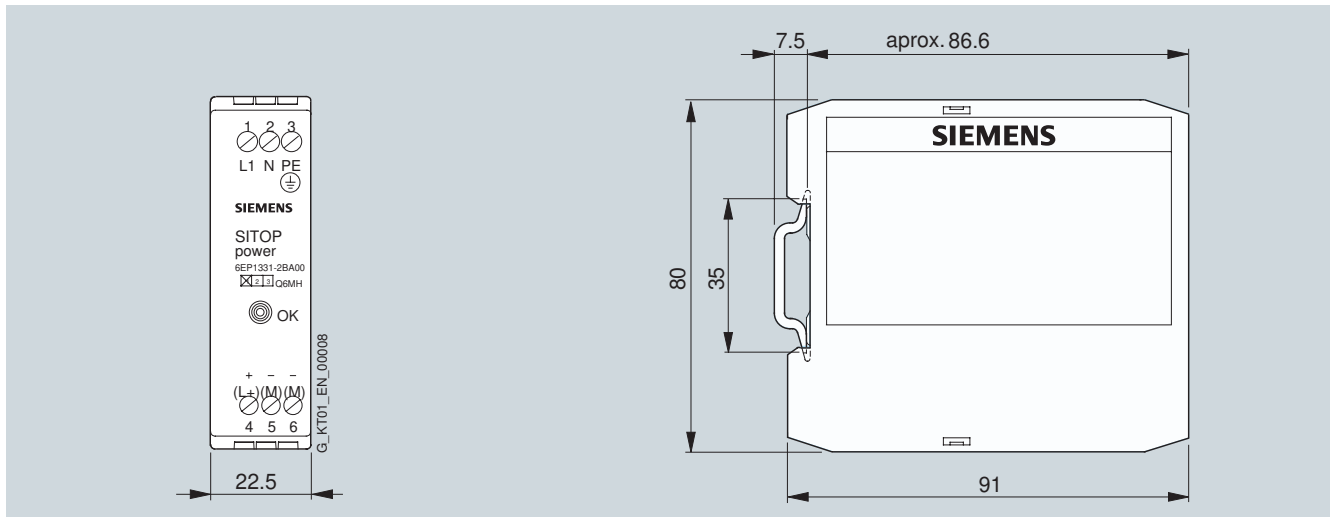
Dimension drawings

SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

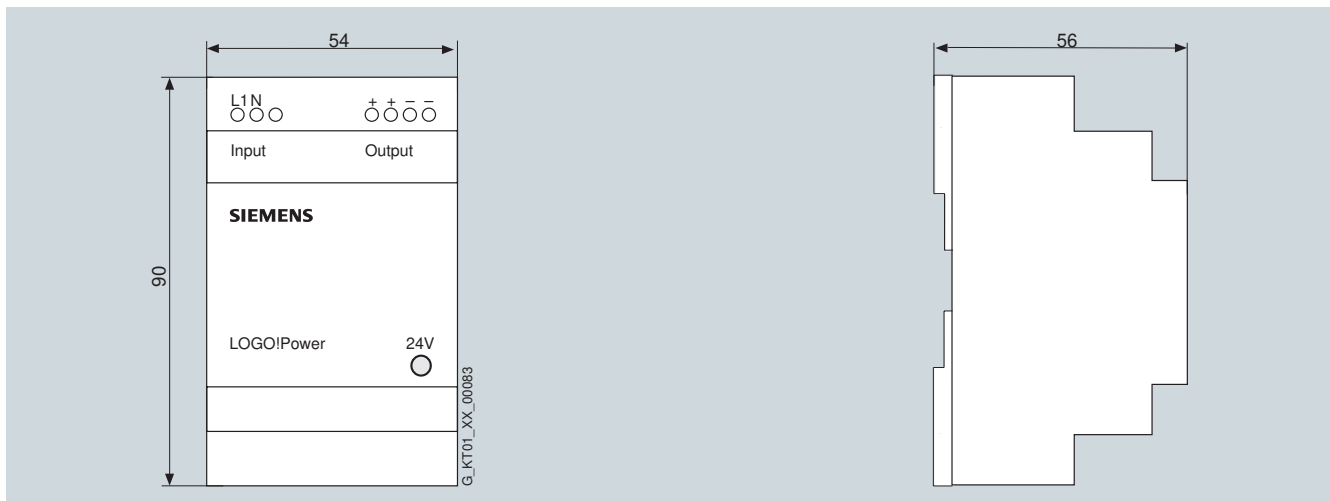
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 331-2BA10, 6EP1 731-2BA00



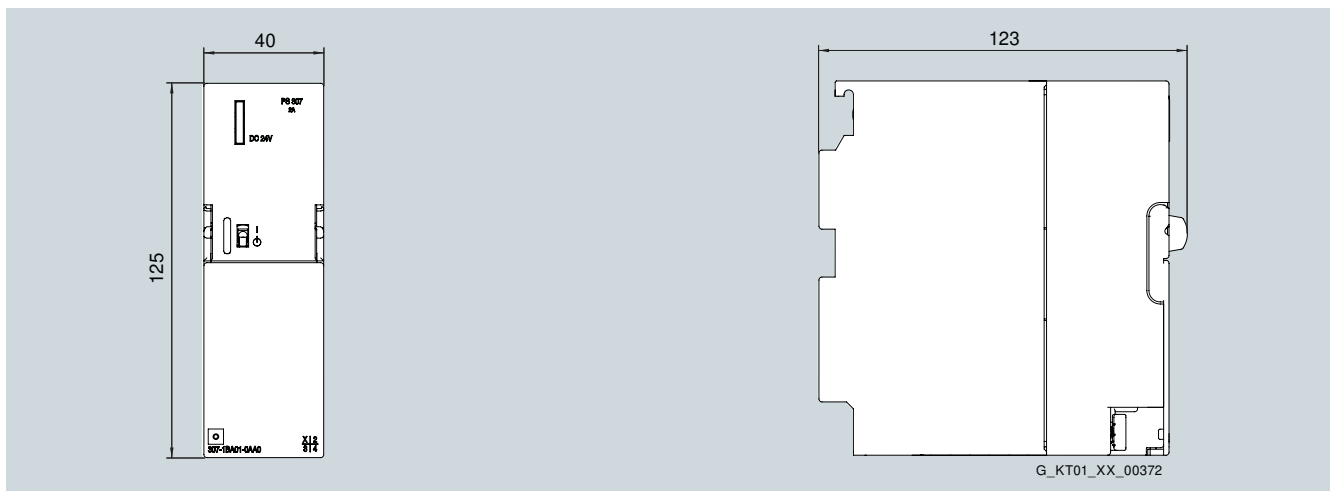
Dimension drawing 2 with dimensions in mm

For devices with order numbers: 6EP1 311-1SH02, 6EP1 321-1SH02, 6EP1 351-1SH02, 6EP1 331-1SH02



Dimension drawing 3 with dimensions in mm

For devices with order number: 6ES7 307-1BA01-0AA0



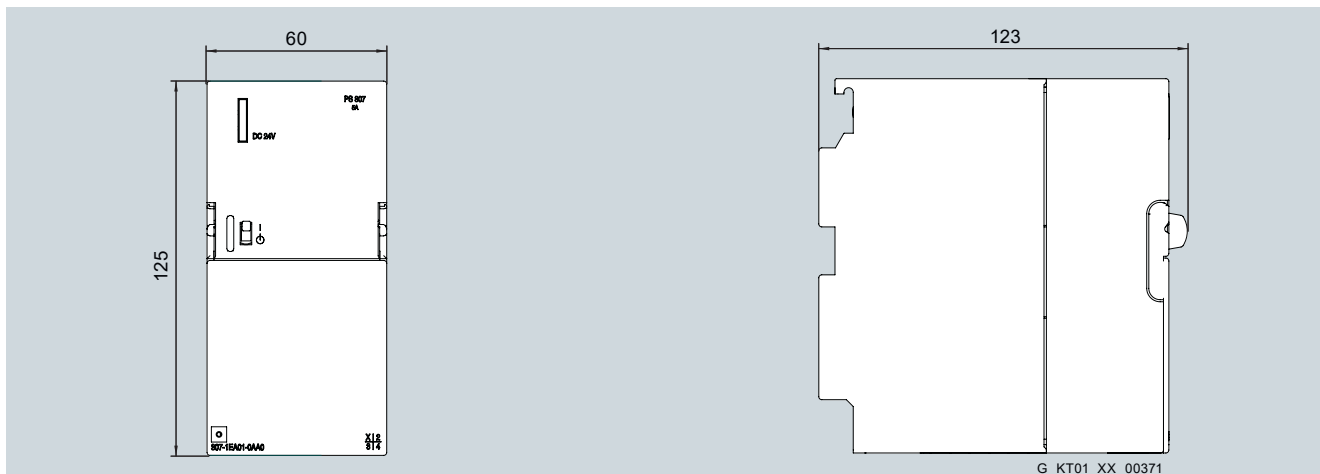
SITOP 24 V

1-phase, 2-phase, 3-phase

Dimension drawings

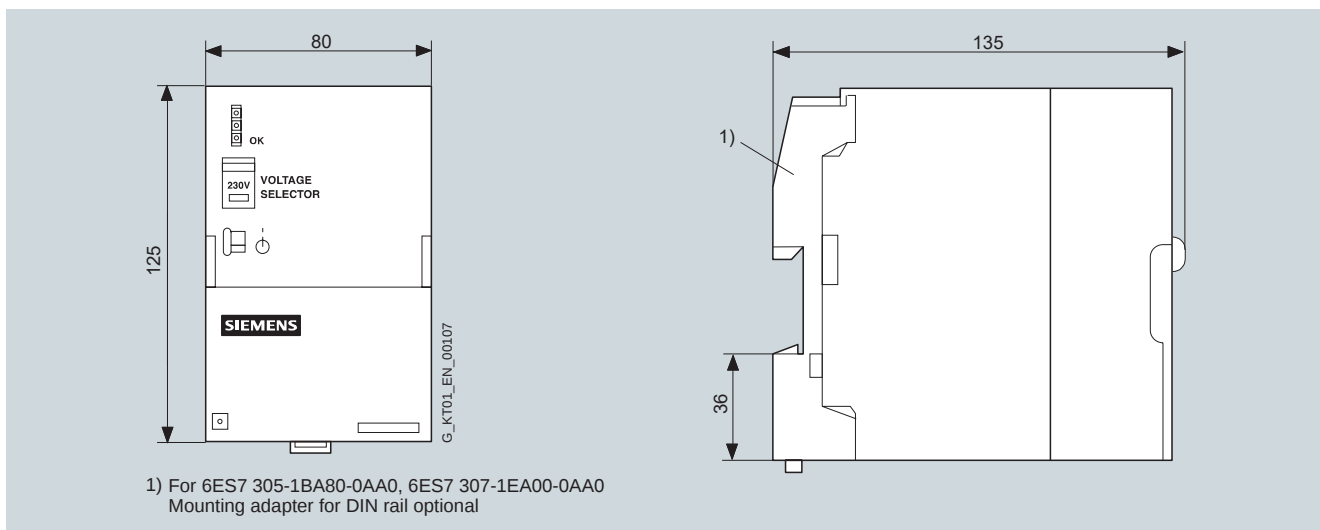
Dimension drawing 1 with dimensions in mm

For devices with order number: 6ES7 307-1EA01-0AA0



Dimension drawing 2 with dimensions in mm

For devices with order numbers: 6ES7 305-1BA80-0AA0, 6ES7 307-1EA80-0AA0



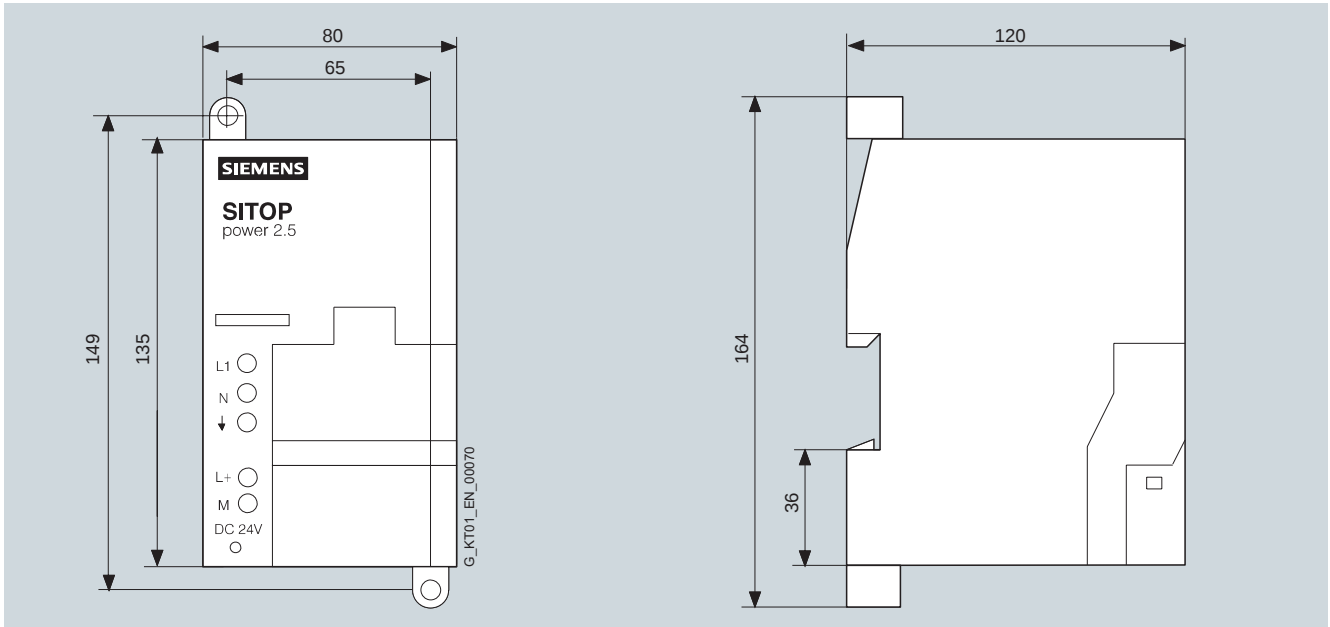
Dimension drawings

SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

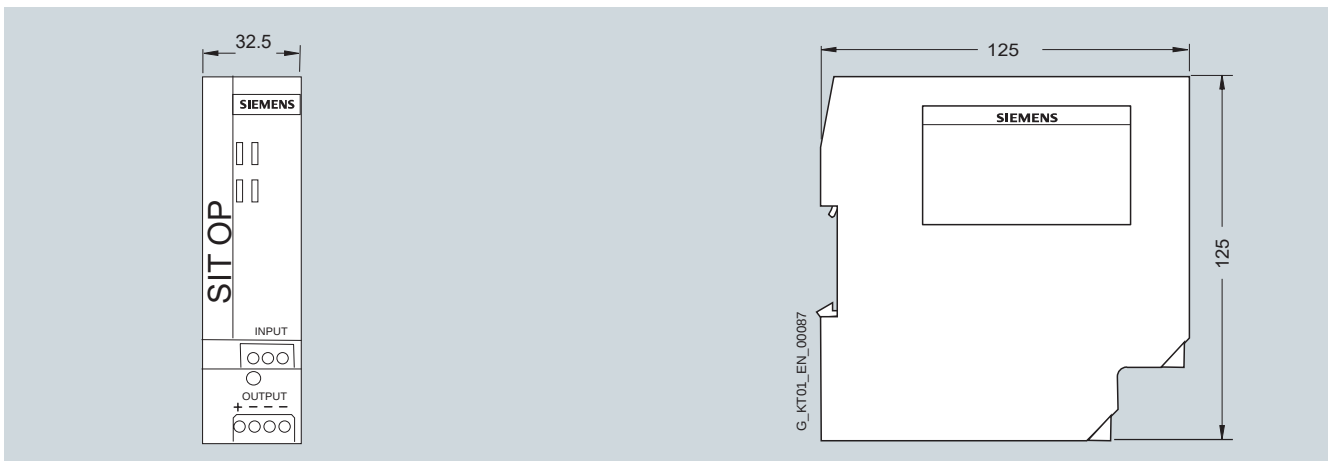
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 732-0AA00, 6EP1 332-1SH12, 6EP1 332-1SH22



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 332-2BA10



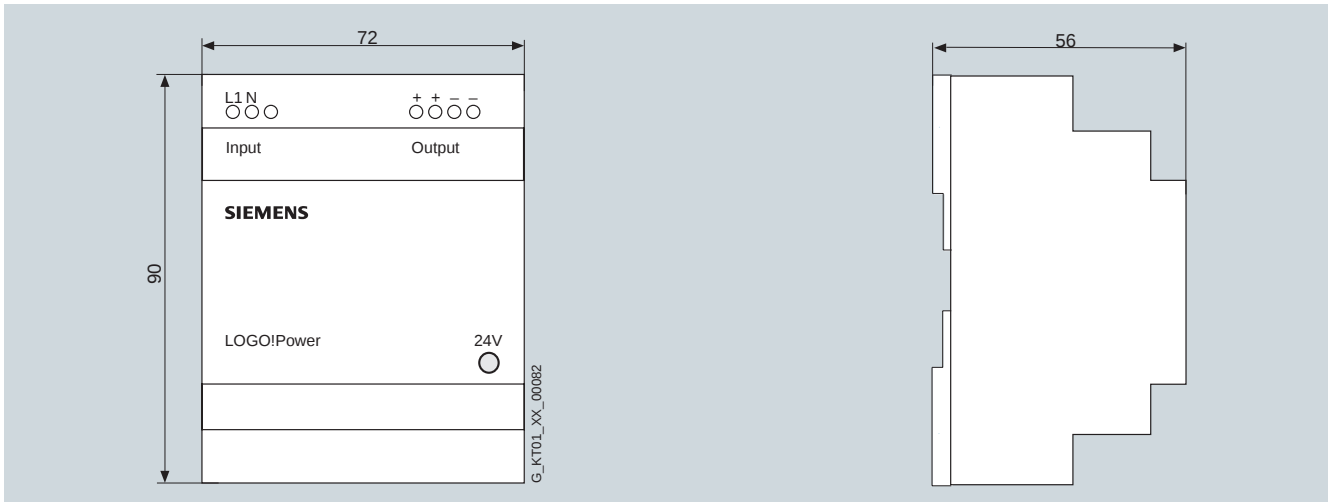
SITOP 24 V

1-phase, 2-phase, 3-phase

Dimension drawings

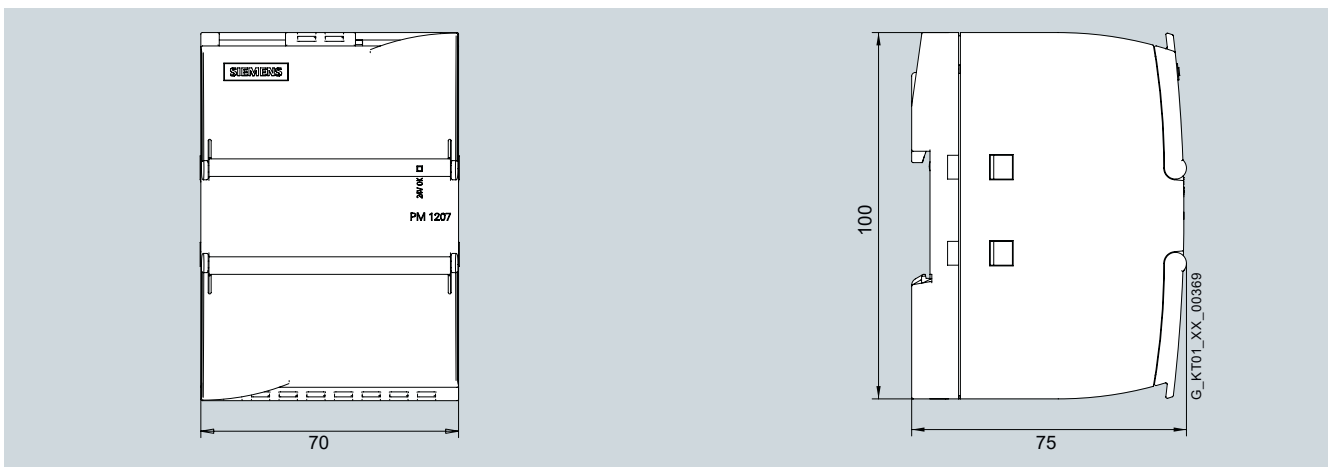
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 311-1SH12, 6EP1 322-1SH02, 6EP1 352-1SH02, 6EP1 332-1SH42



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 332-1SH71



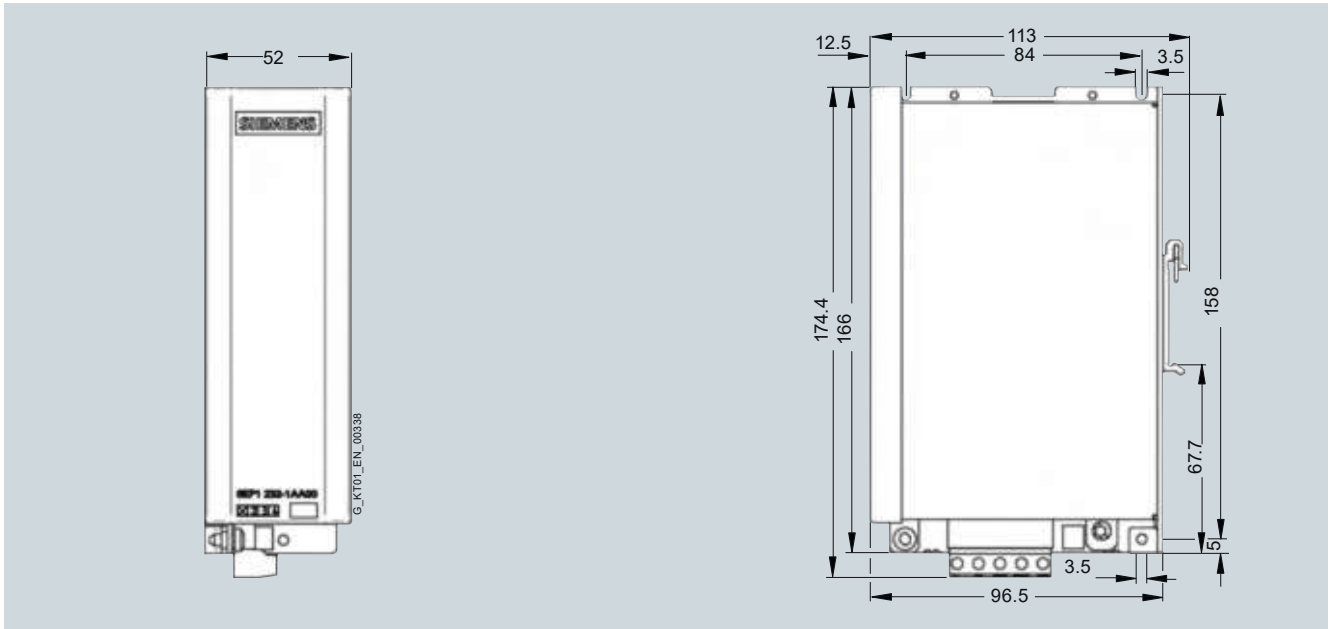
Dimension drawings

SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

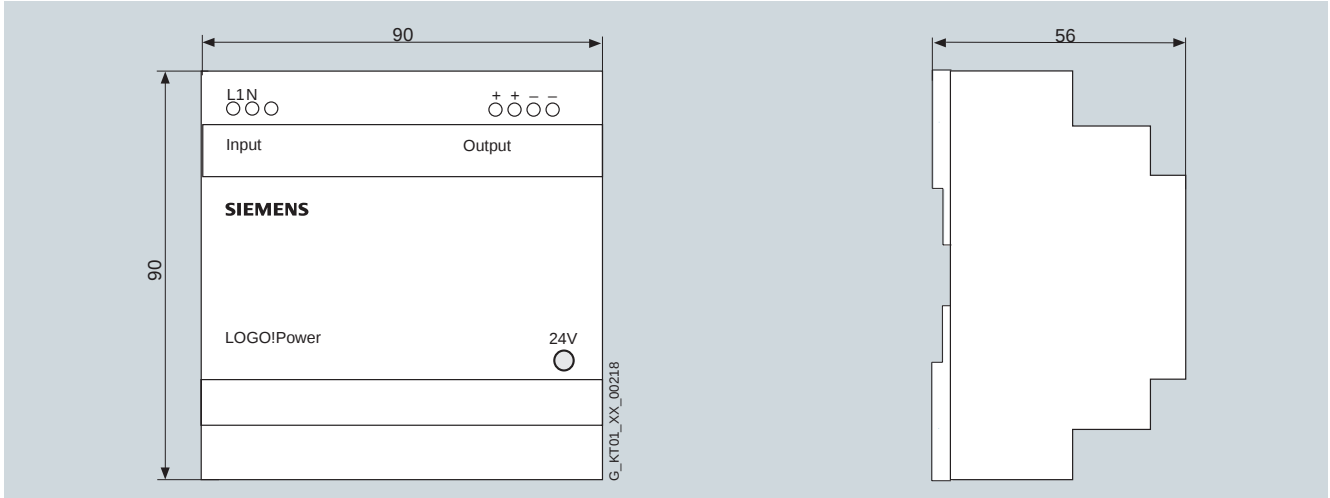
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 232-1AA00, 6EP1 232-1AA10, 6EP1 233-1AA00, 6EP1 234-1AA00



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 332-1SH51

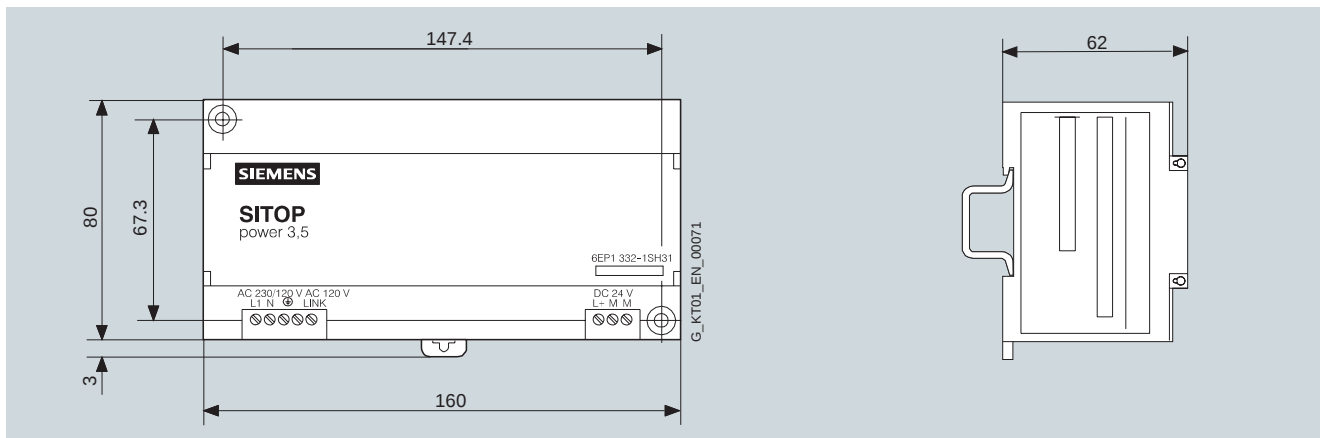


SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

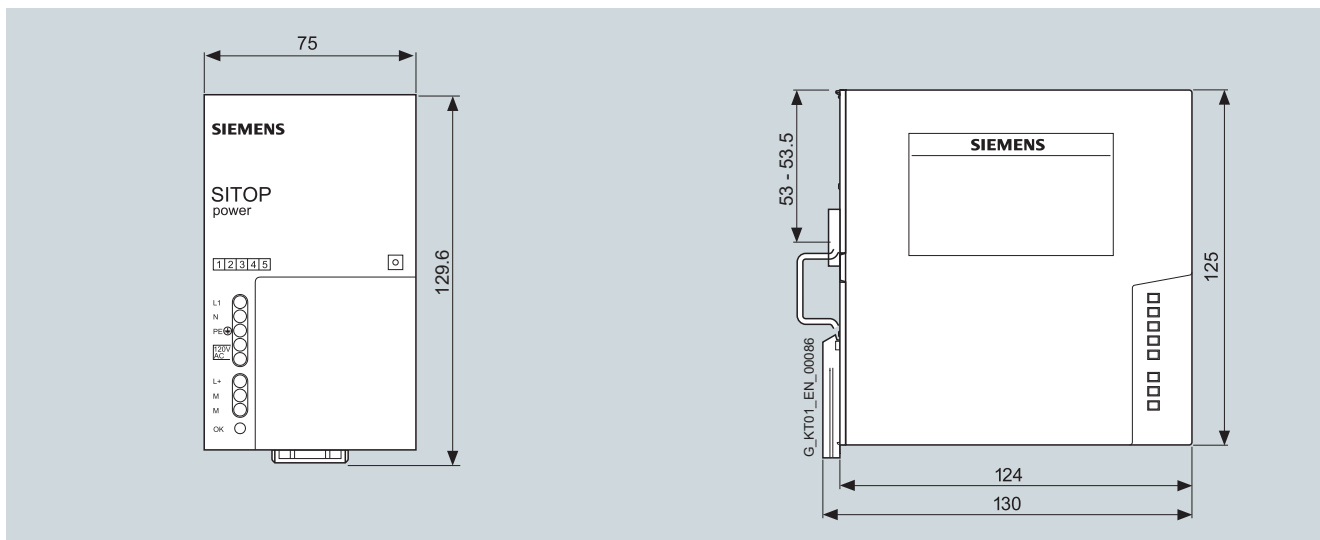
Dimension drawing 1 with dimensions in mm

For devices with order number: 6EP1 332-1SH31



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 332-2BA00

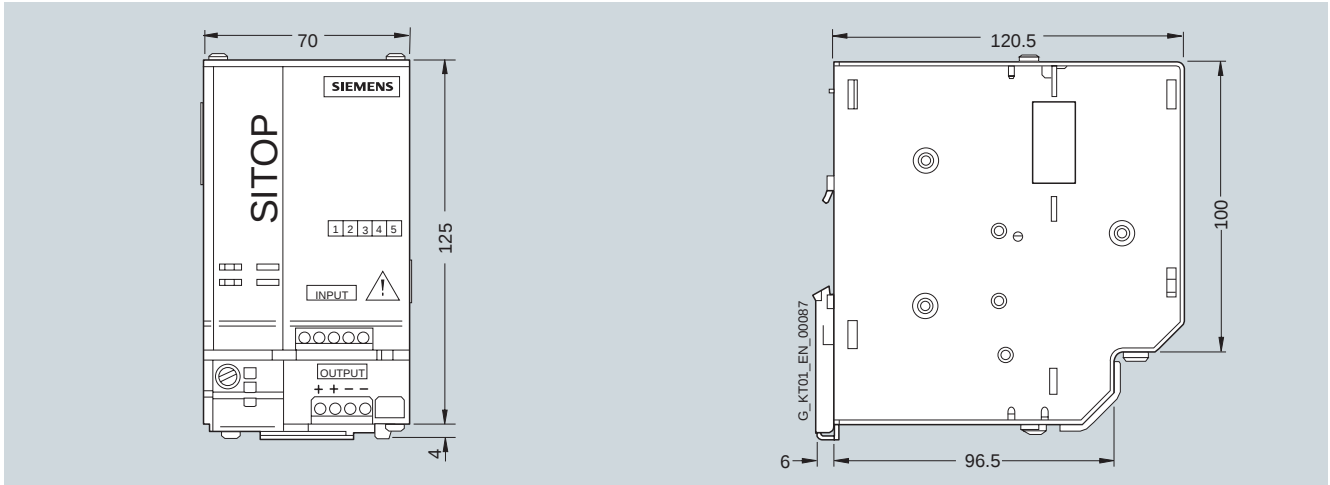


Dimension drawings

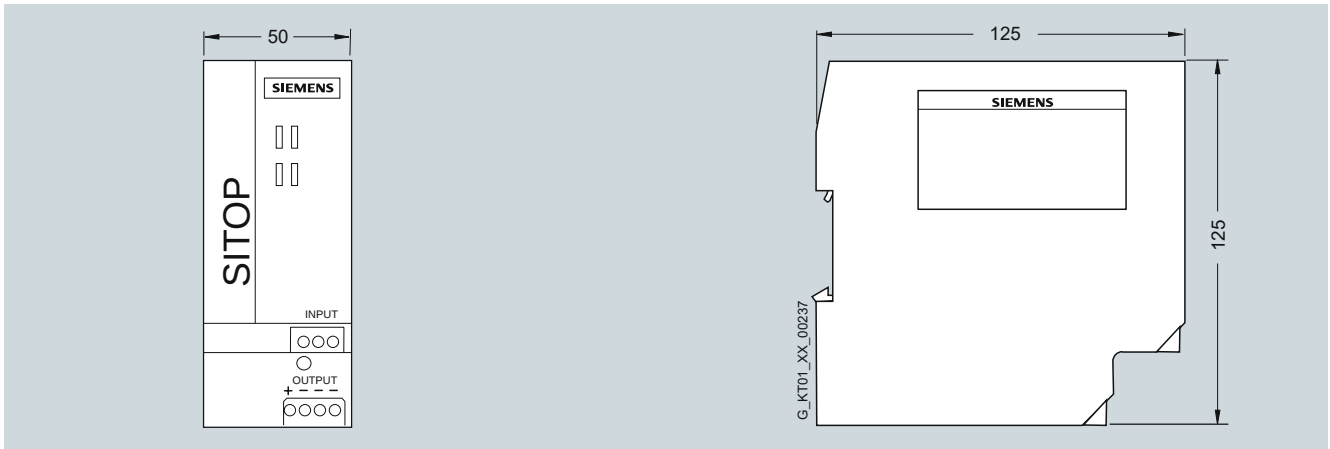
SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

Dimension drawing 1 with dimensions in mm
For devices with order number: 6EP1 333-3BA00



Dimension drawing 2 with dimensions in mm
For devices with order numbers: 6EP1 333-2AA01, 6EP1 333-2BA01

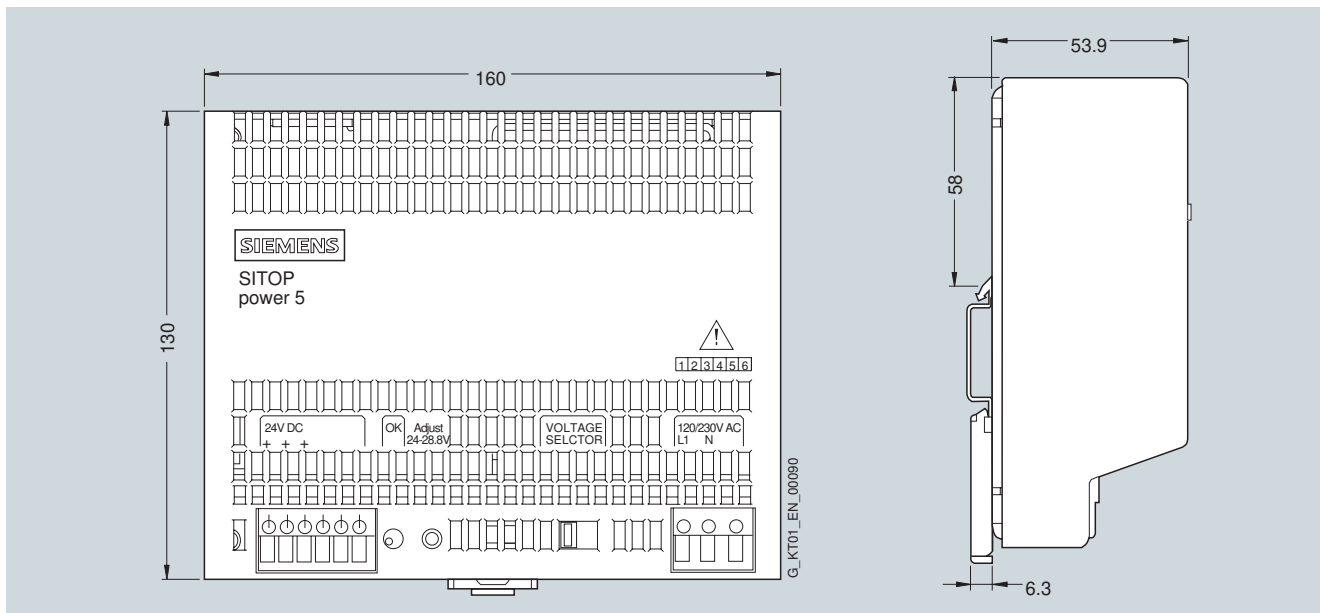


SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

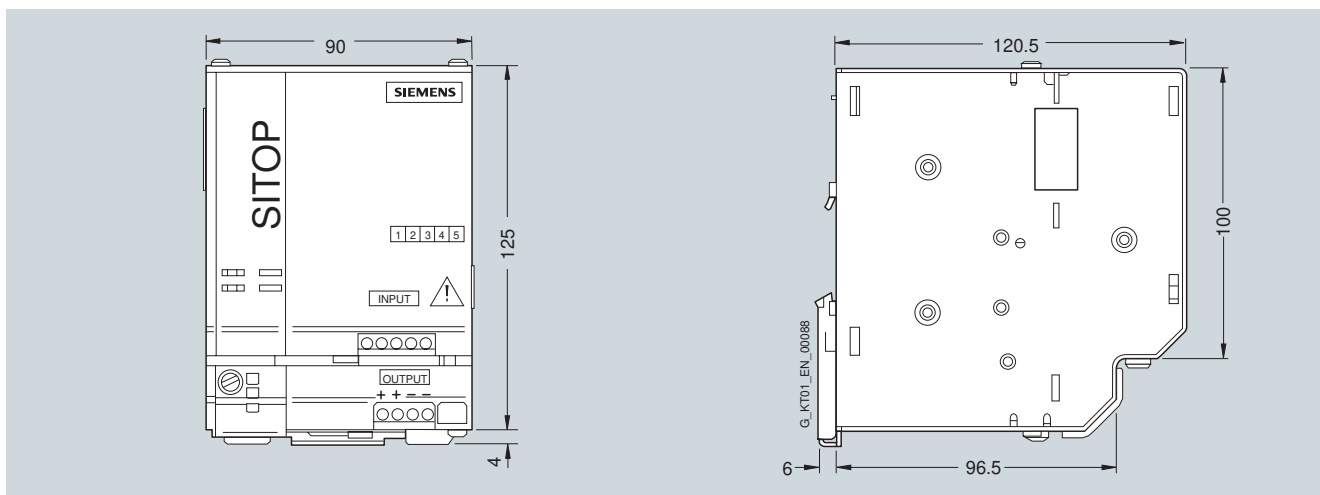
Dimension drawing 1 with dimensions in mm

For devices with order number: 6EP1 333-1AL12, 6EP1 334-1AL12



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 334-3BA00



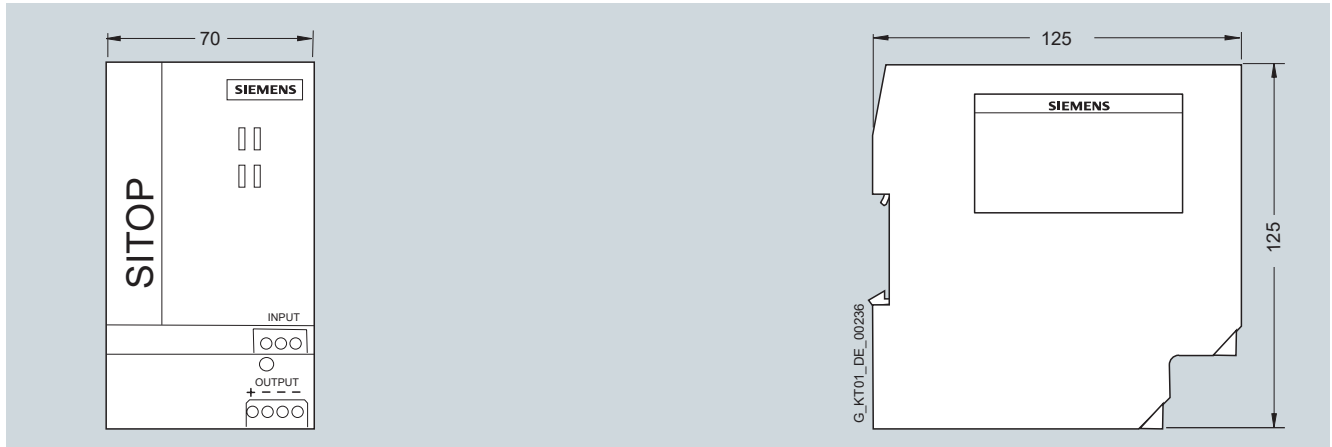
Dimension drawings

SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

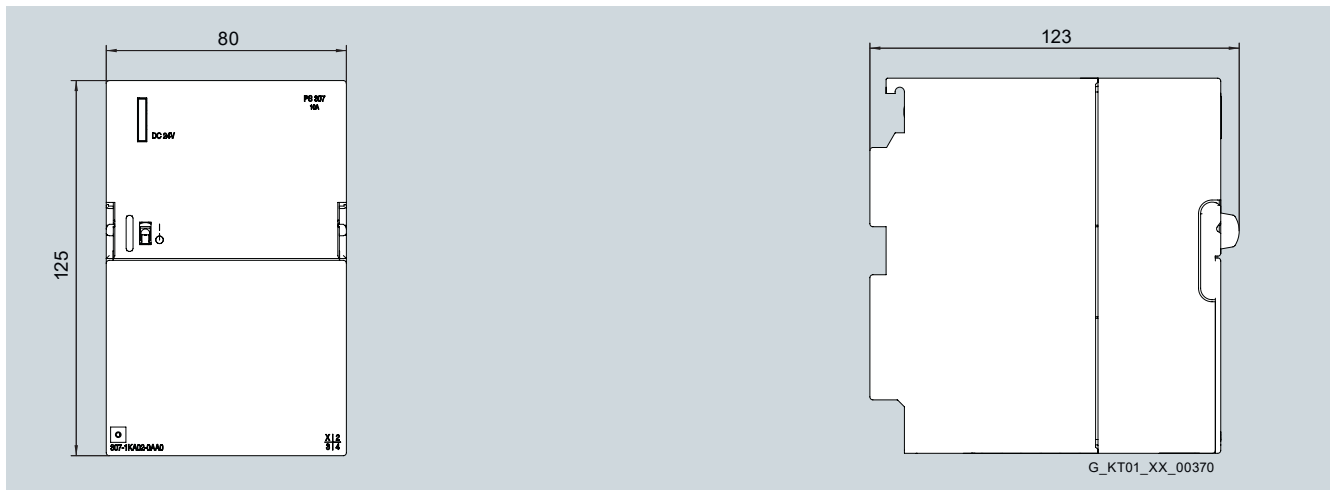
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 334-2AA01, 6EP1 334-2BA01



Dimension drawing 2 with dimensions in mm

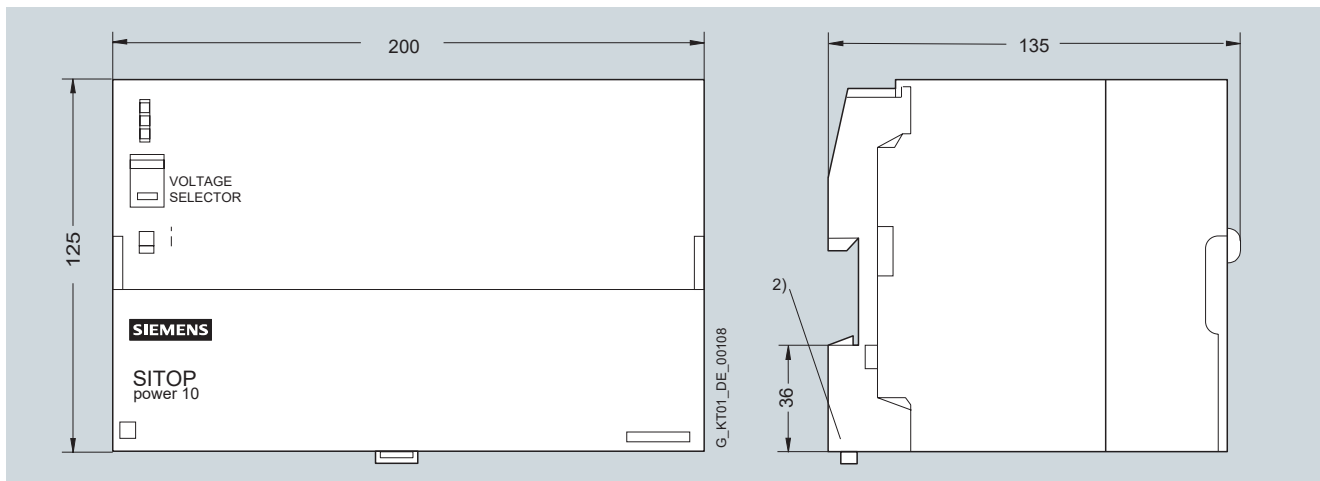
For devices with order number: 6ES7 307-1KA02-0AA0



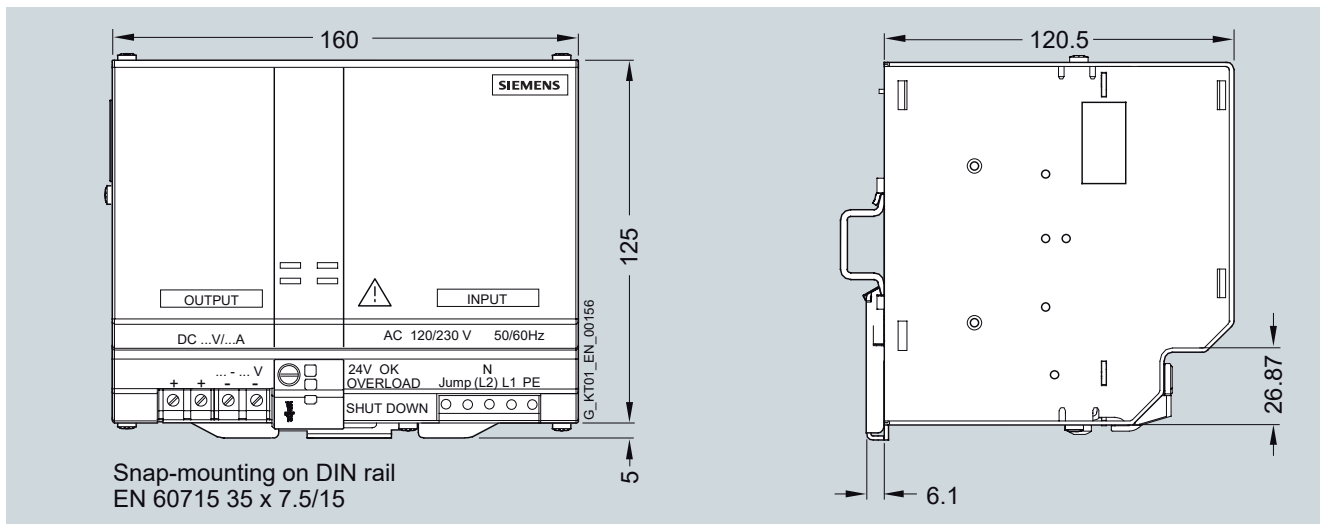
SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

Dimension drawing 1 with dimensions in mm
 For devices with order number: 6EP1 334-1SH01



Dimension drawing 2 with dimensions in mm
 For devices with order numbers: 6EP1 336-3BA00, 6EP1 436-3BA00



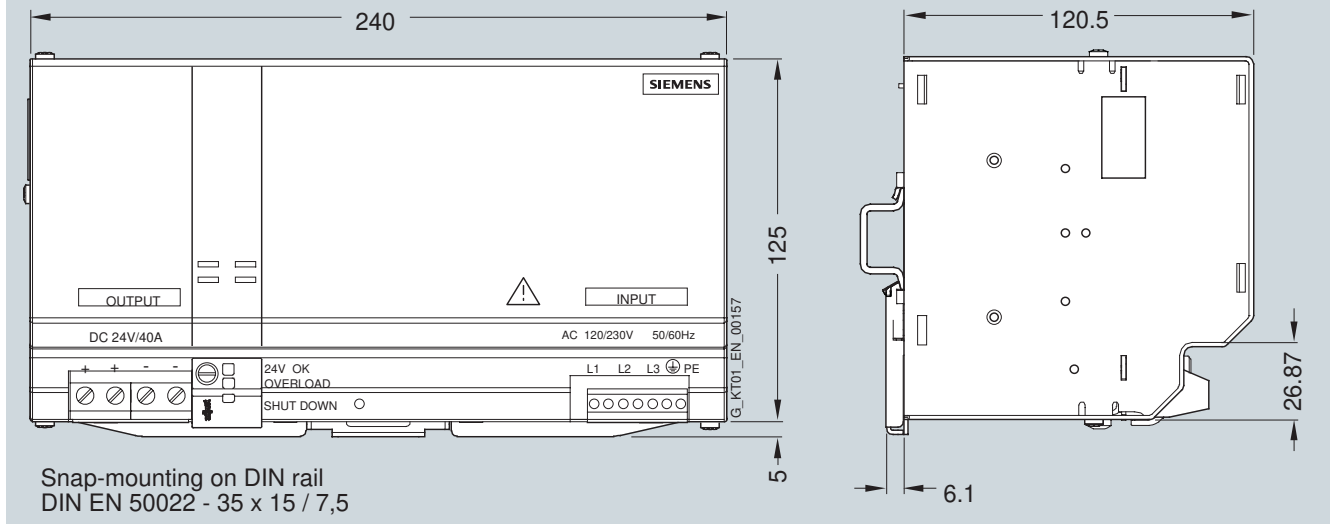
Dimension drawings

SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

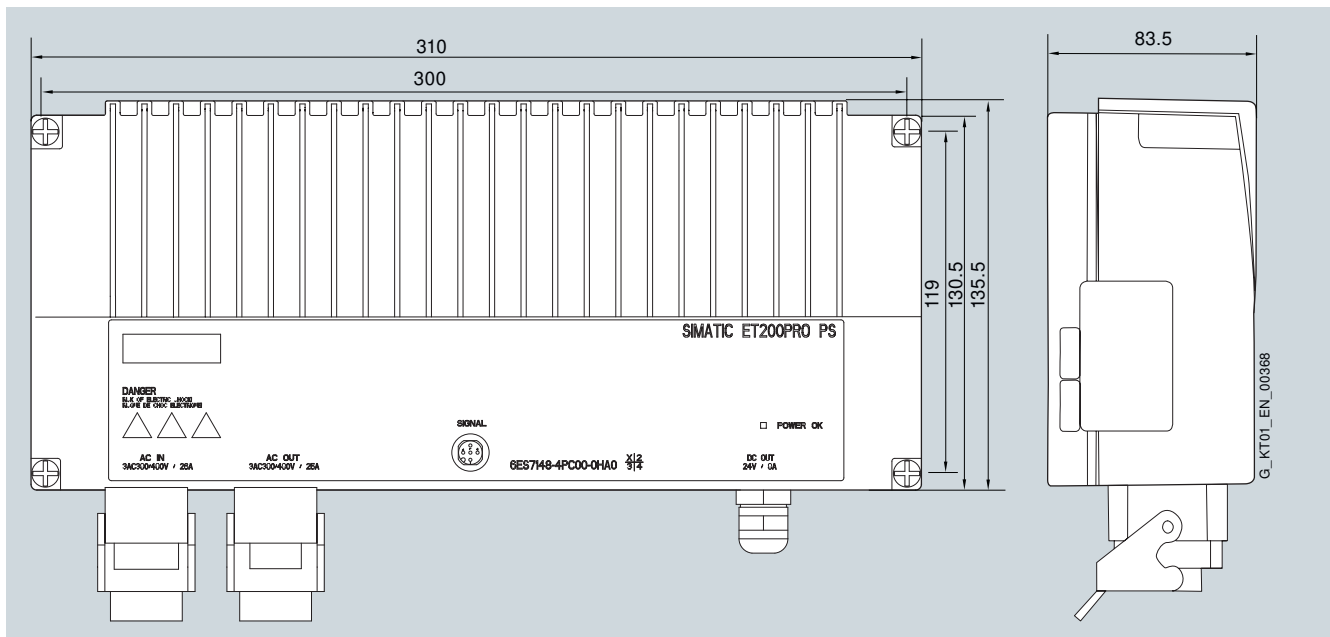
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 337-3BA00, 6EP1 437-3BA00



Dimension drawing 2 with dimensions in mm

For devices with order number: 6ES7 148-4PC00-0HA0, 6EP1 433-2CA00

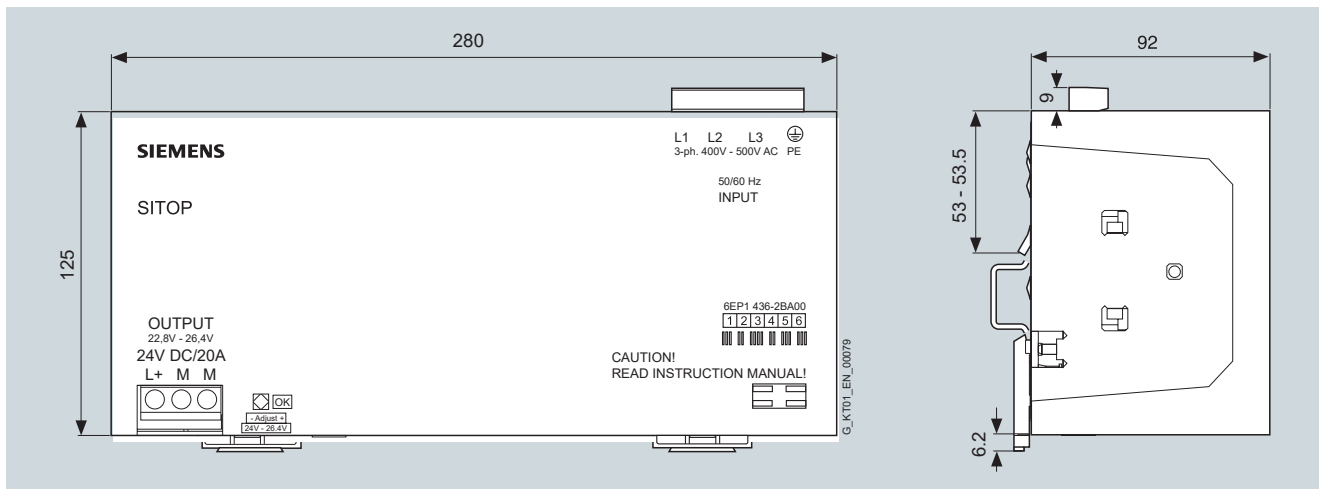


SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

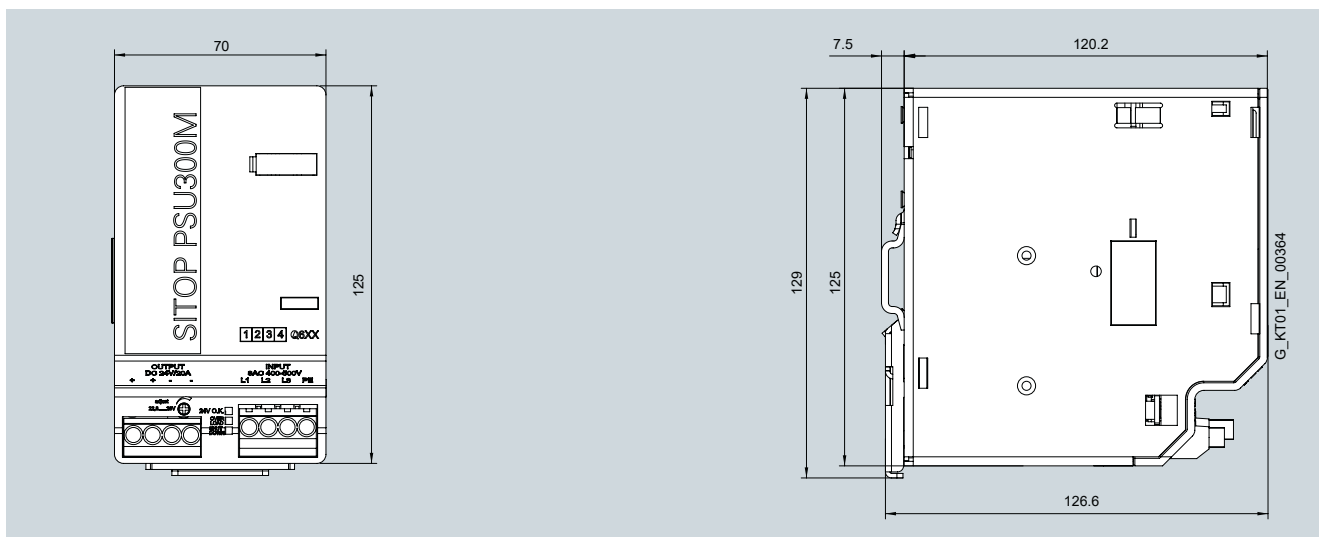
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 434-2BA00, 6EP1 436-2BA00



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 436-3BA10



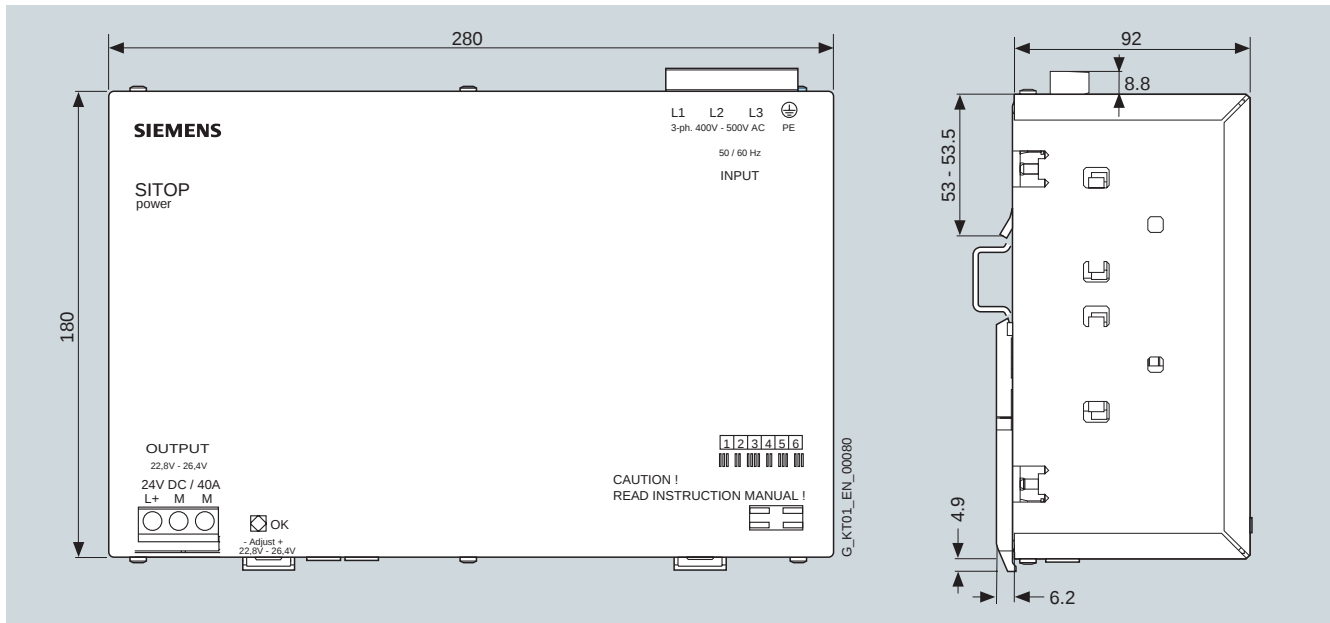
Dimension drawings

SITOP 24 V 1-phase, 2-phase, 3-phase

Dimension drawings

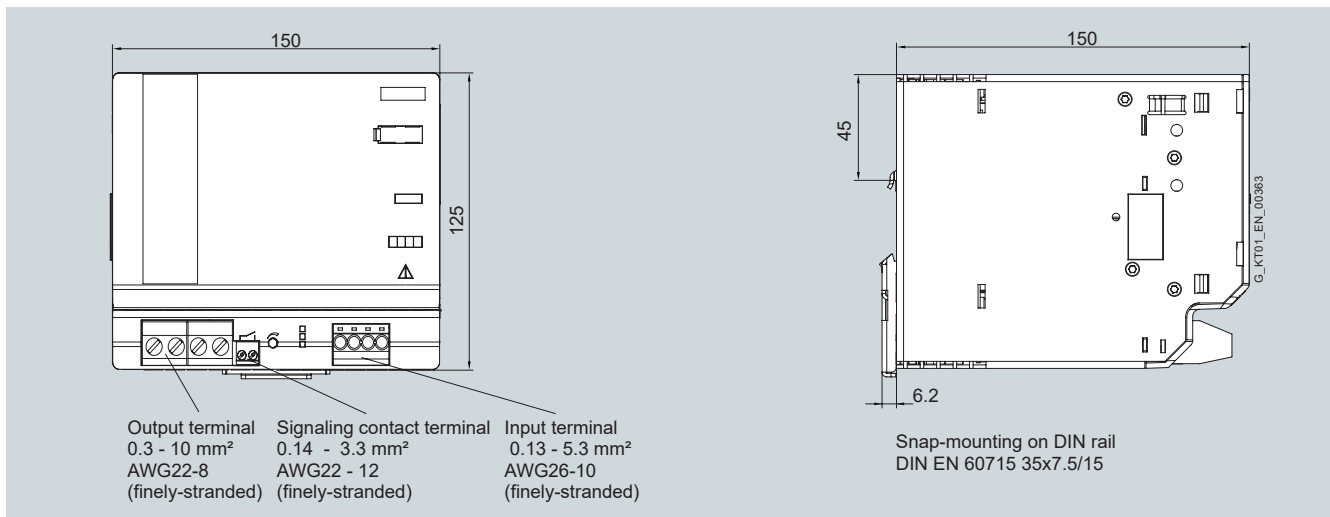
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 437-2BA00, 6EP1 437-2BA10



Dimension drawing 1 with dimensions in mm

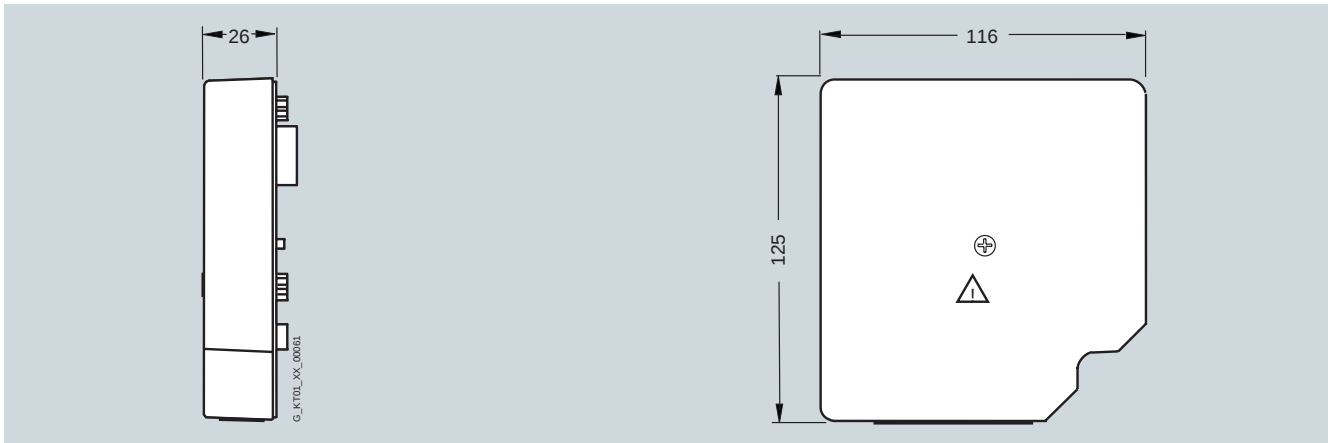
For devices with order number: 6EP1 437-3BA10



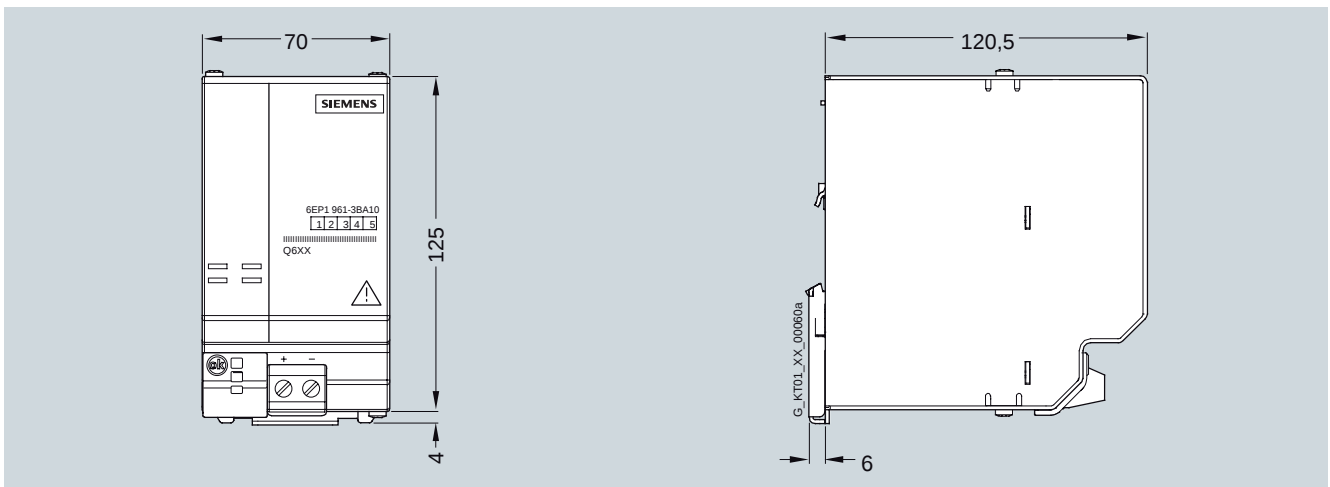
Expansion modules

Dimension drawings

Dimension drawing 1 with dimensions in mm
For devices with order number: 6EP1 961-3BA10



Dimension drawing 2 with dimensions in mm
For devices with order number: 6EP1 961-3BA01

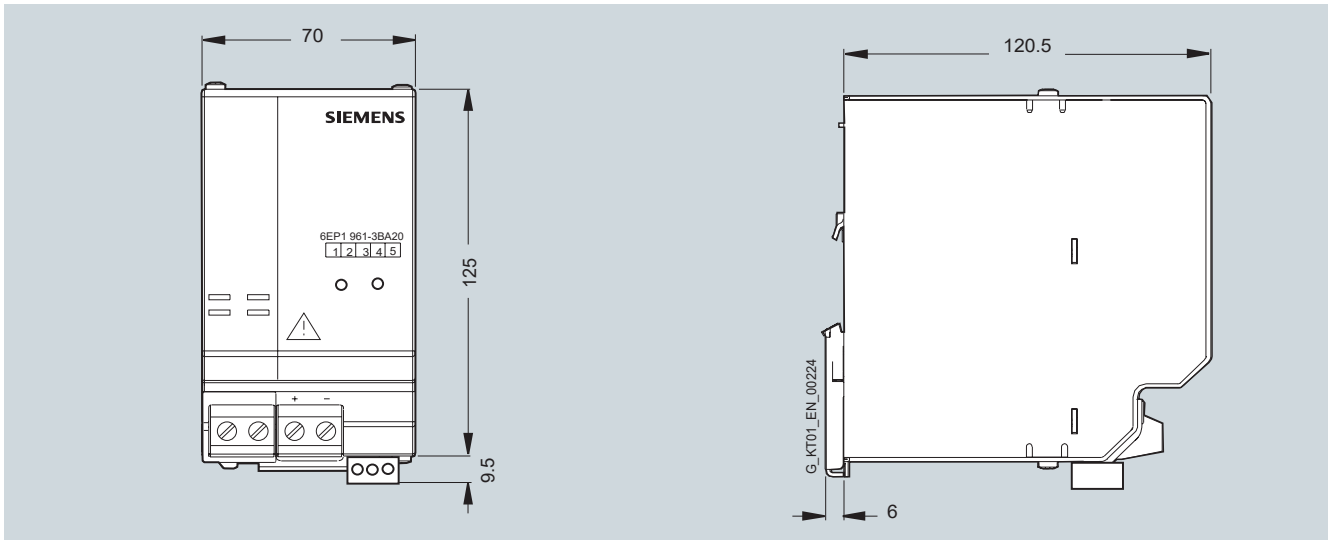


Dimension drawings

Expansion modules

Dimension drawings

Dimension drawing 1 with dimensions in mm
For devices with order number: 6EP1 961-3BA20



Dimension drawing 2 with dimensions in mm
For devices with order number: 6EP1 961-2BA00

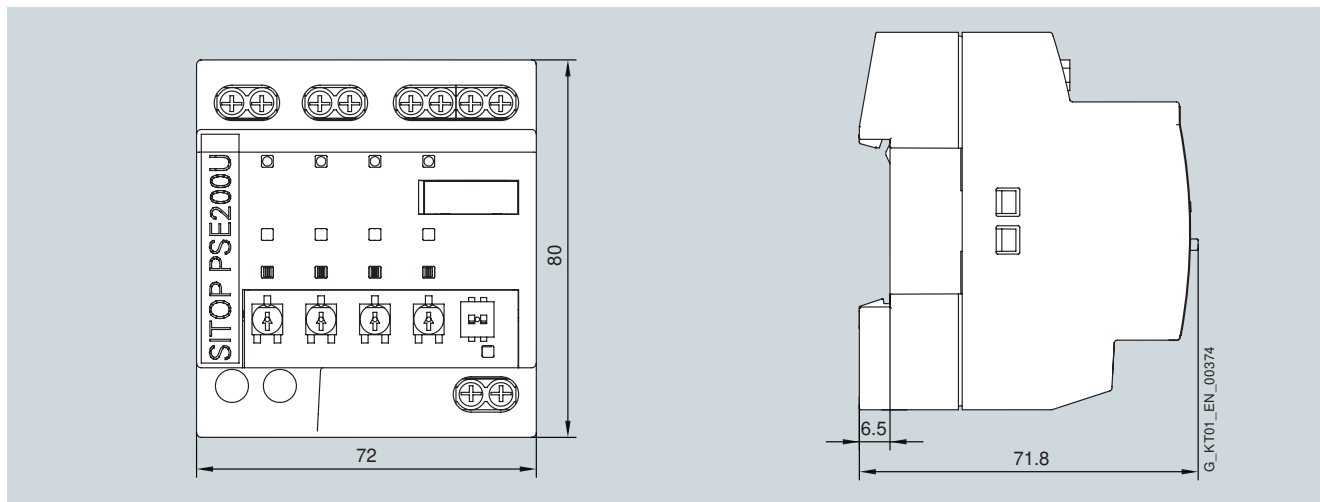


Expansion modules

Dimension drawings

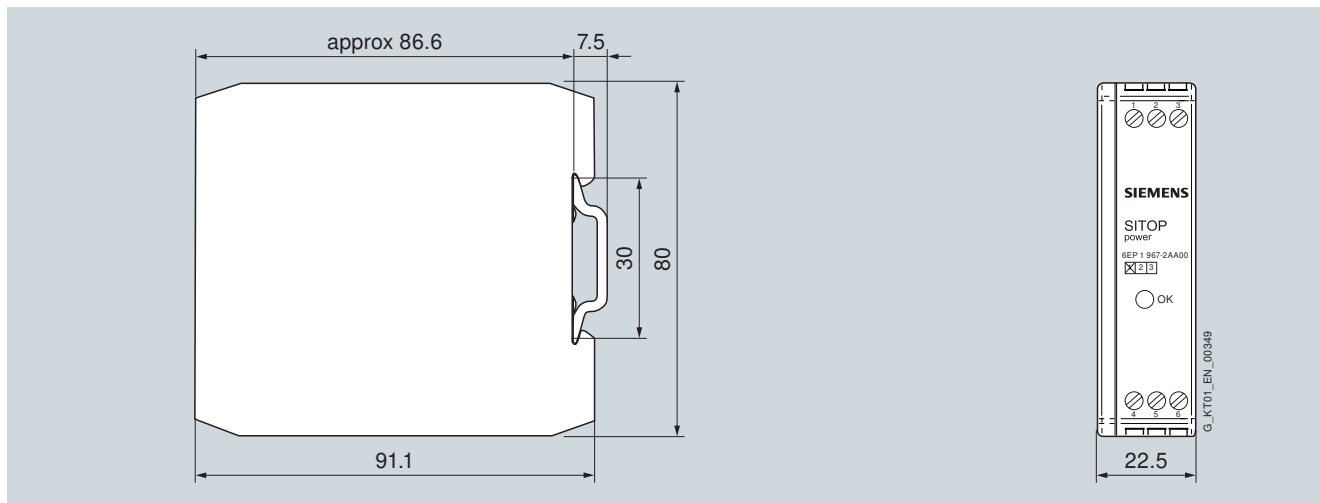
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 961-2BA10, 6EP1 961-2BA20



Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1 967-2AA00

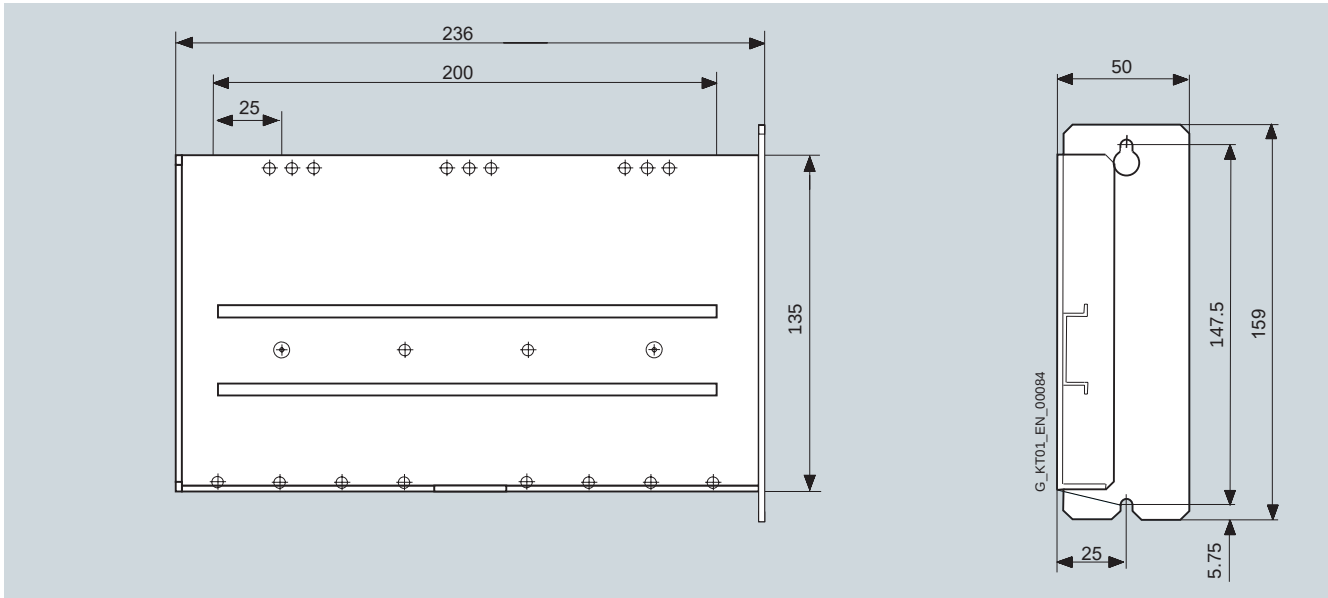


Dimension drawings

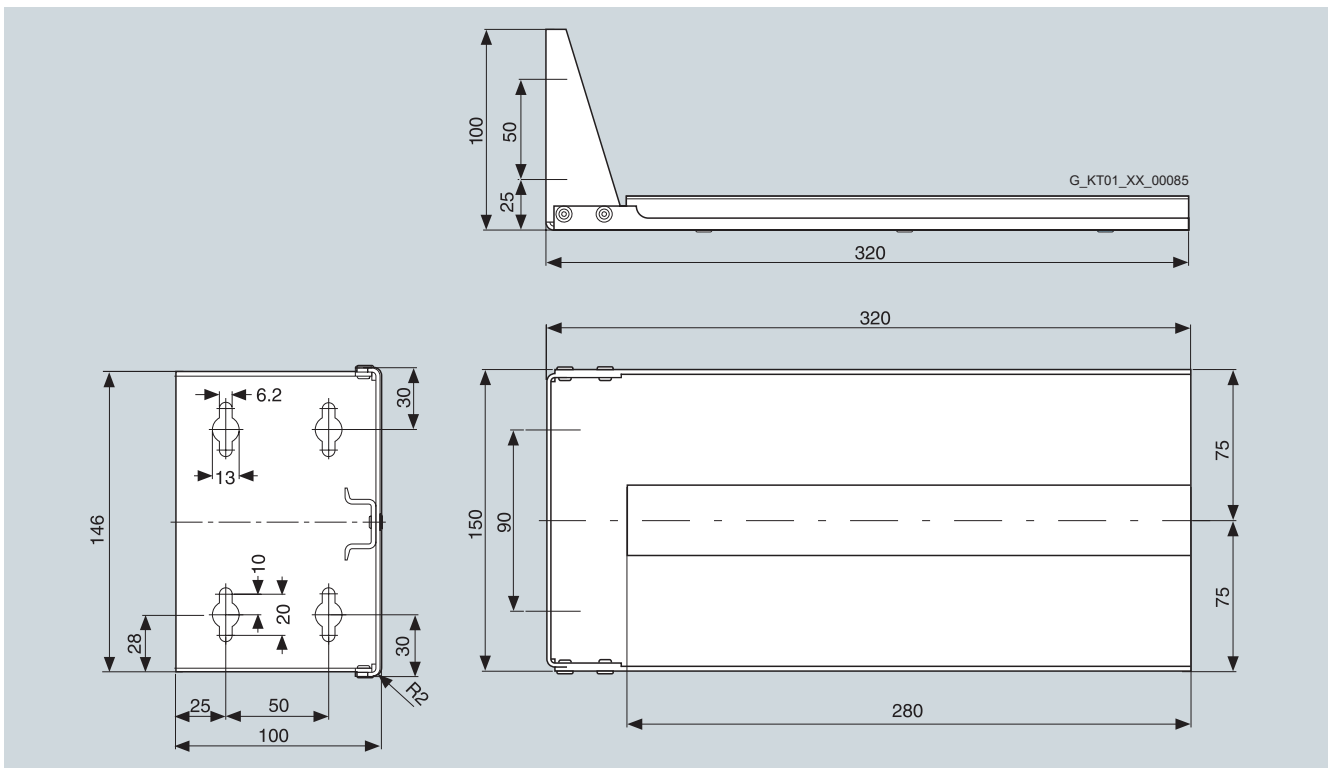
Expansion modules Mounting bracket

Dimension drawings

Dimension drawing 1 with dimensions in mm
For devices with order number: 6EP1 971-1AA01



Dimension drawing 2 with dimensions in mm
For devices with order number: 6EP1 971-2BA00

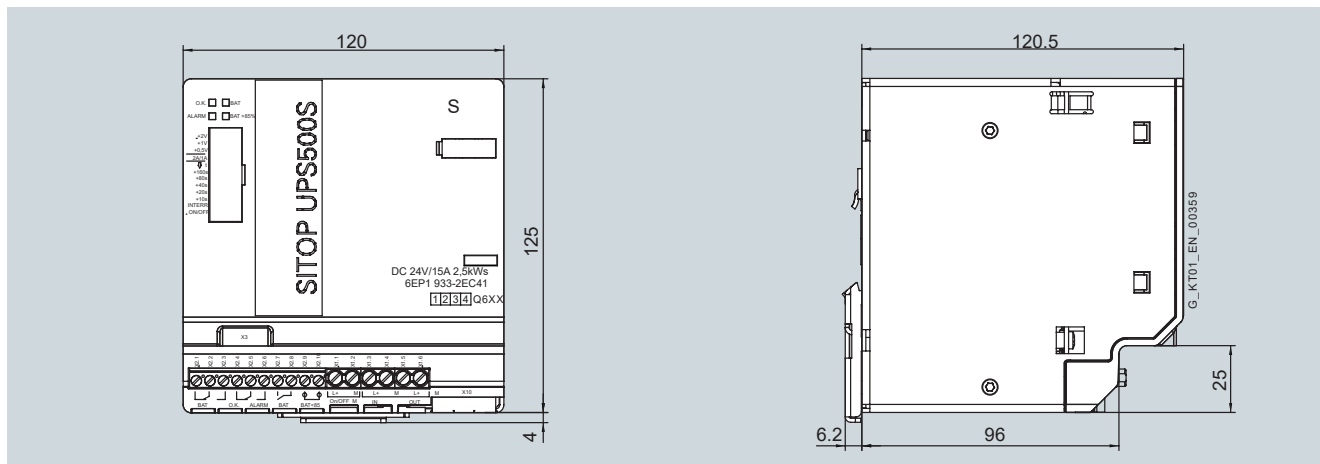


Uninterruptible power supplies

Dimension drawings

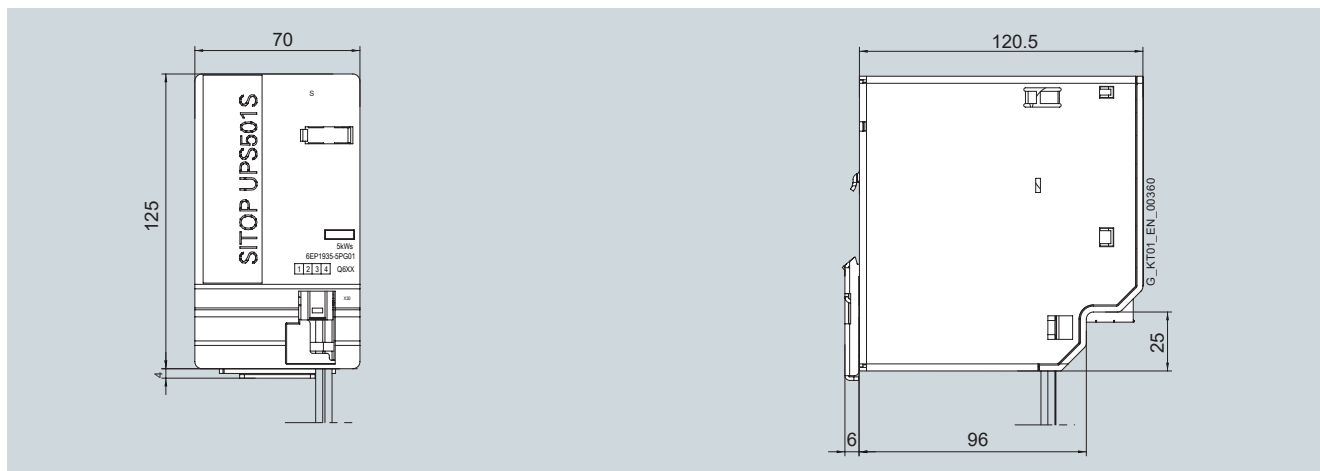
Dimension drawing 1 with dimensions in mm

For devices with order numbers: 6EP1 933-2EC41, 6EP1 933-2EC51



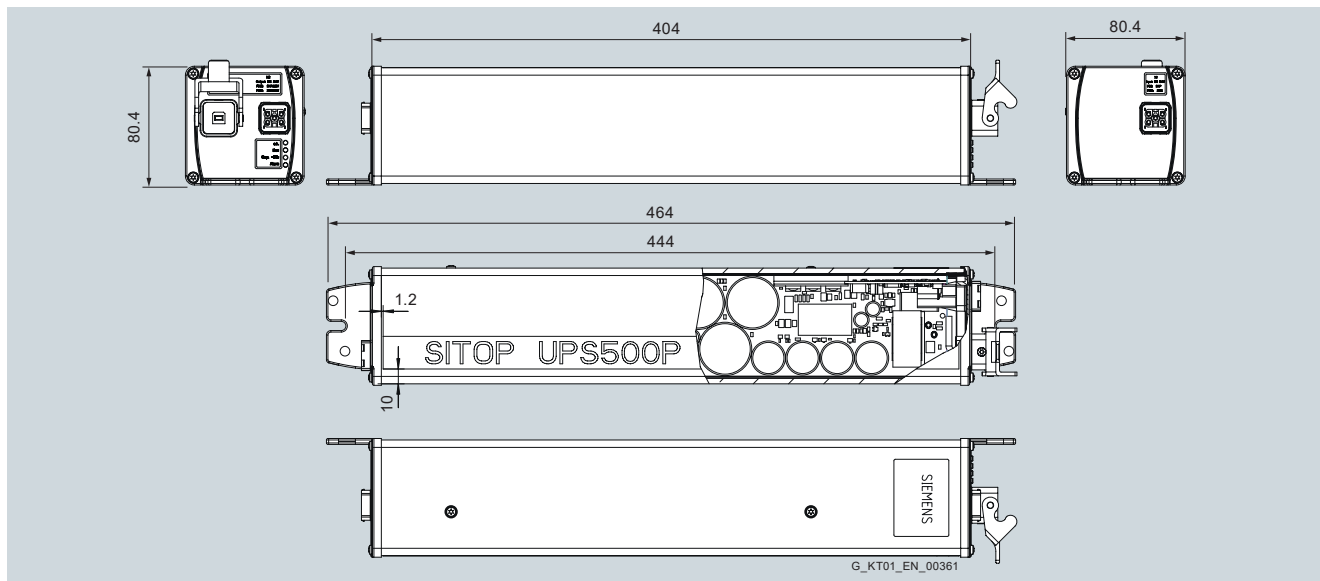
Dimension drawing 2 with dimensions in mm

For devices with order number: 6EP1935-5PG01



Dimension drawing 3 with dimensions in mm

For devices with order numbers: 6EP1 933-2NC01, 6EP1 933-2NC11



Dimension drawings

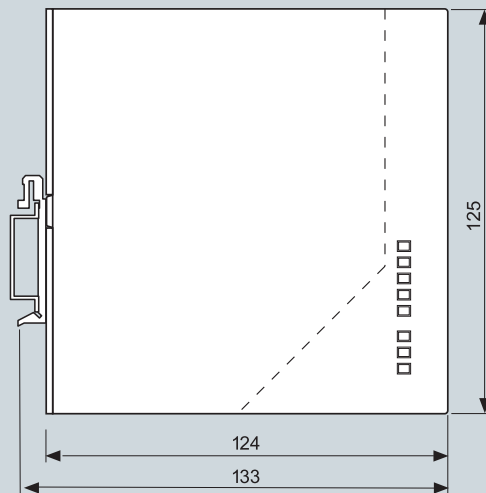
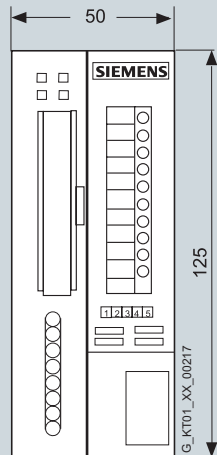
Uninterruptible power supplies

Dimension drawings

Dimension drawing 1 with dimensions in mm

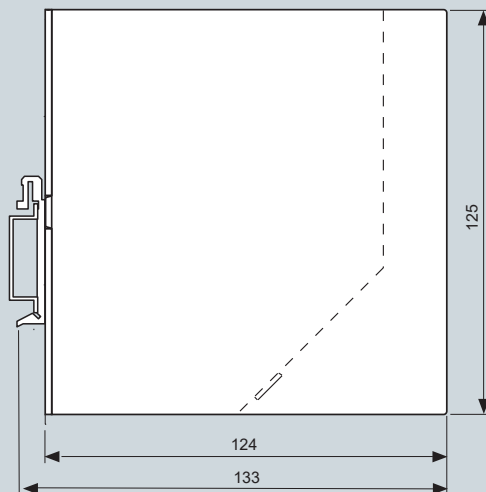
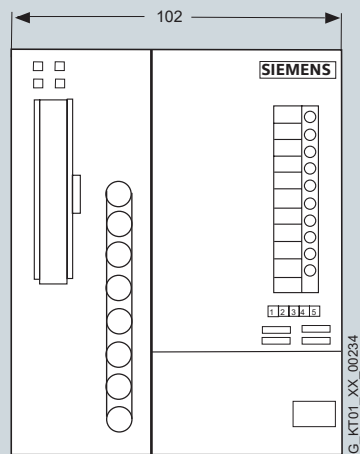
For devices with order numbers: 6EP1 931-2DC21, 6EP1 931-2DC31, 6EP1 931-2DC42

For devices with order numbers: 6EP1 931-2EC21, 6EP1 931-2EC31, 6EP1 931-2EC42



Dimension drawing 2 with dimensions in mm

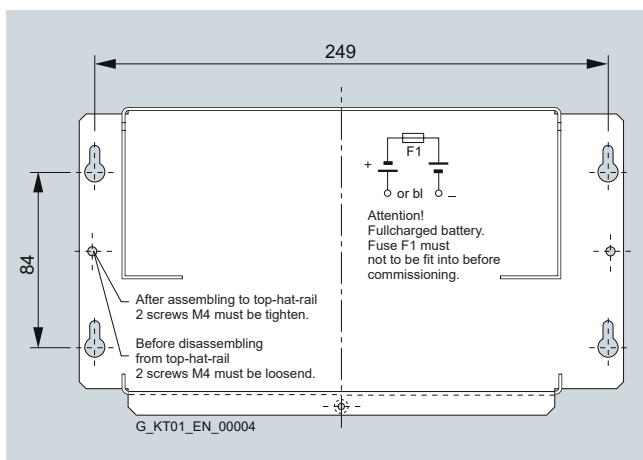
For devices with order numbers: 6EP1 931-2FC21, 6EP1 931-2FC42



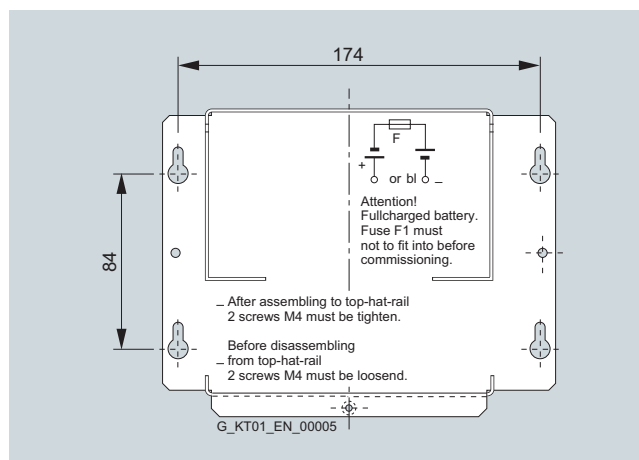
Battery modules

Dimension drawings

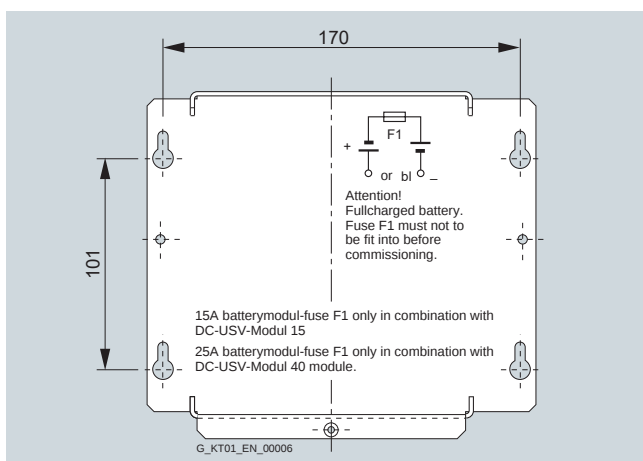
Dimension drawing 1 with dimensions in mm
 For devices with order number: 6EP1 935-6MD31



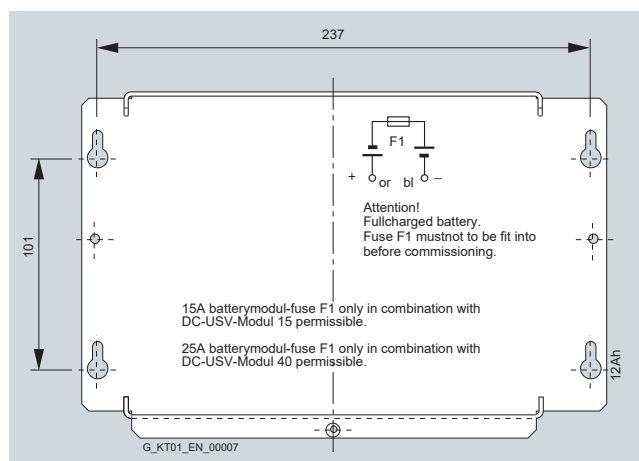
Dimension drawing 2 with dimensions in mm
 For devices with order number: 6EP1 935-6MD11



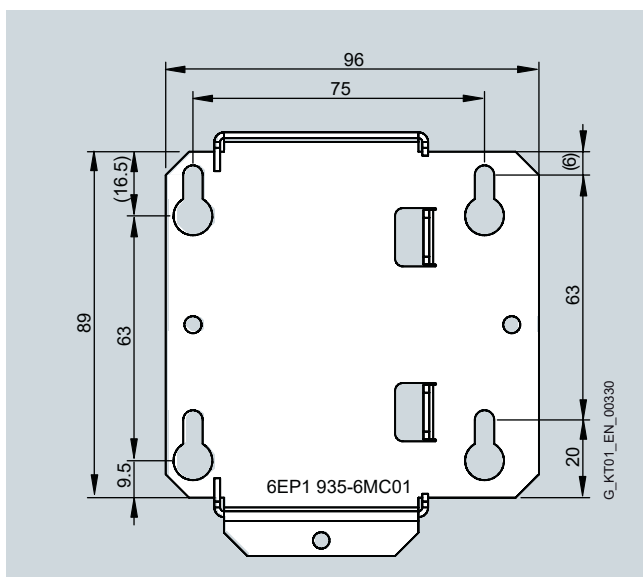
Dimension drawing 3 with dimensions in mm
 For devices with order number: 6EP1 935-6ME21



Dimension drawing 4 with dimensions in mm
 For devices with order number: 6EP1 935-6MF01



Dimension drawing 5 with dimensions in mm
 For devices with order number: 6EP1 935-6MC01

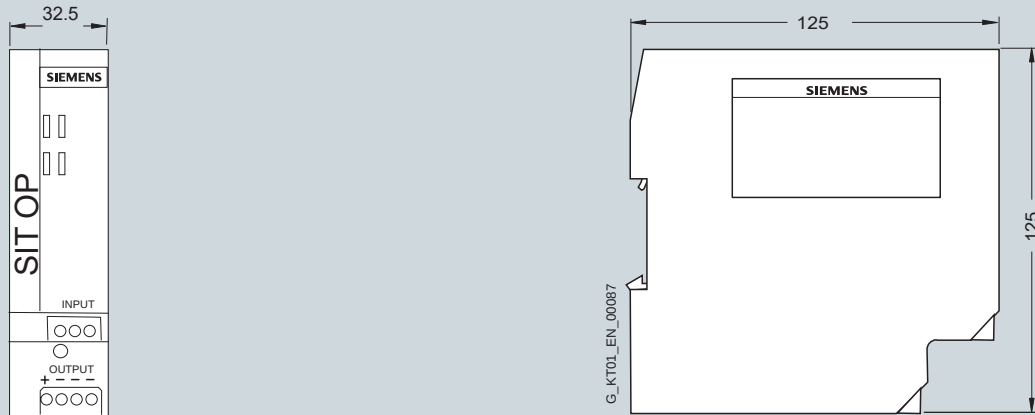


Dimension drawings

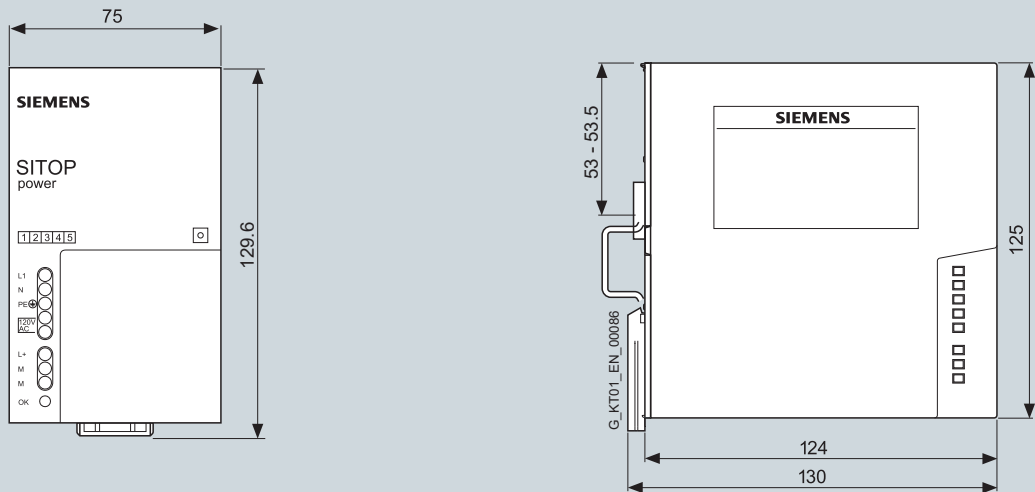
Alternative voltages

Dimension drawings

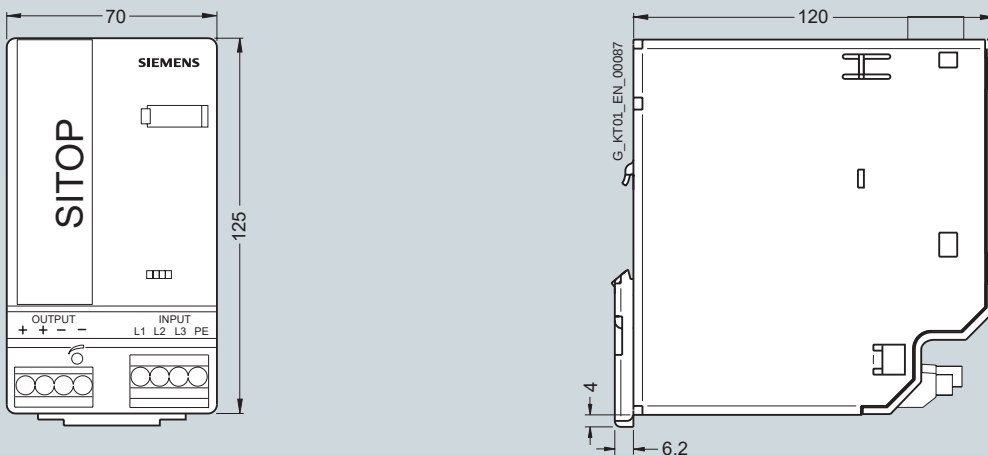
Dimension drawing 1 with dimensions in mm
For devices with order number: 6EP1 621-2BA00



Dimension drawing 2 with dimensions in mm
For devices with order numbers: 6EP1 353-2BA00, 6EP1 353-0AA00



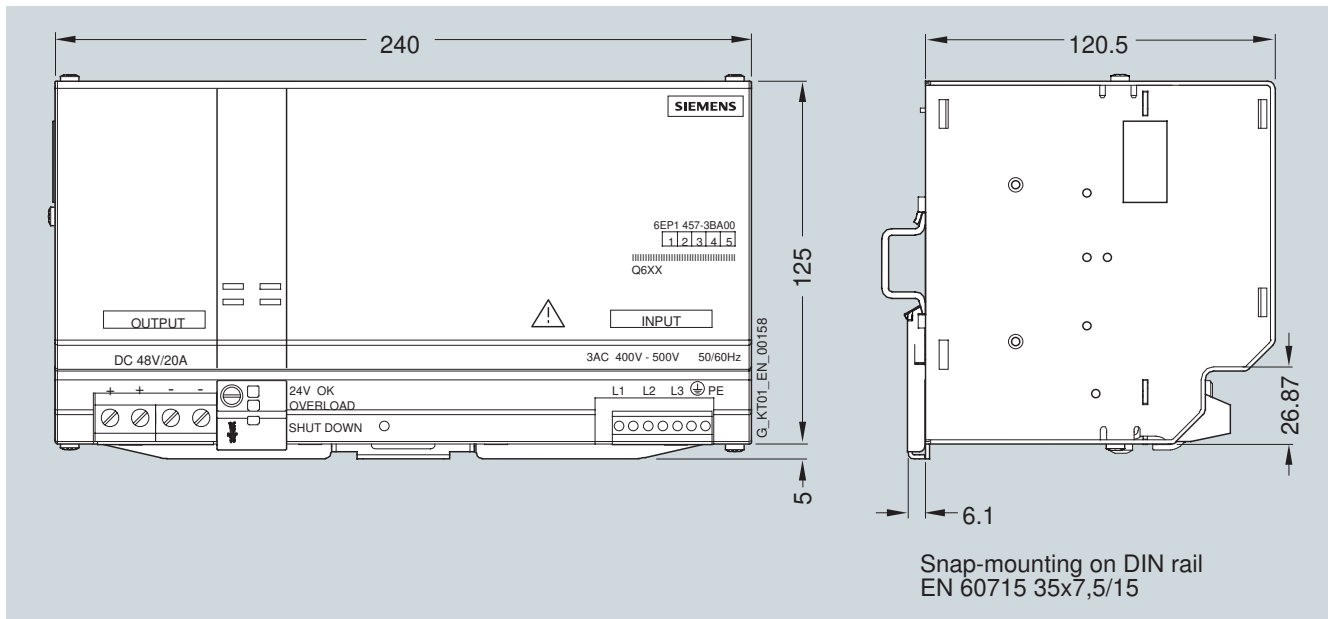
Dimension drawing 3 with dimensions in mm
For devices with order number: 6EP1 456-2BA00



Alternative voltages

Dimension drawings

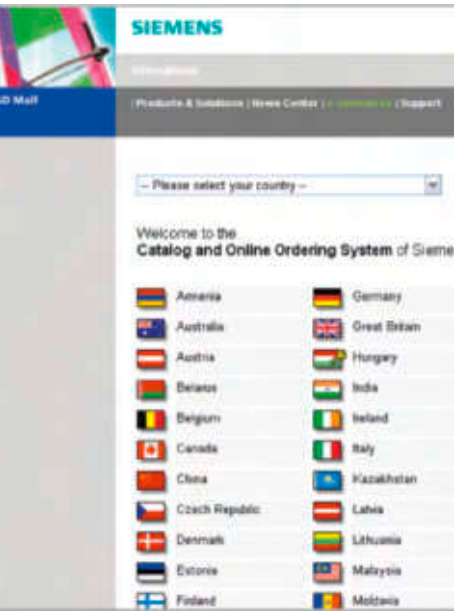
Dimension drawing 1 with dimensions in mm
 For devices with order number: 6EP1 457-3BA00



Dimension drawings

Notes

Appendix



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Appendix

Indexes

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Appendix

Siemens Contacts Worldwide



At

<http://www.siemens.com/automation/partner>

you can find details of Siemens contact partners worldwide responsible for particular technologies.

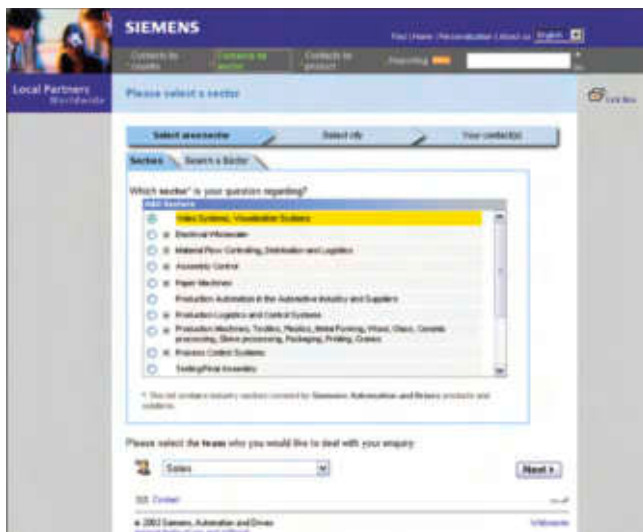
You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training,
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.



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A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

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Under the address

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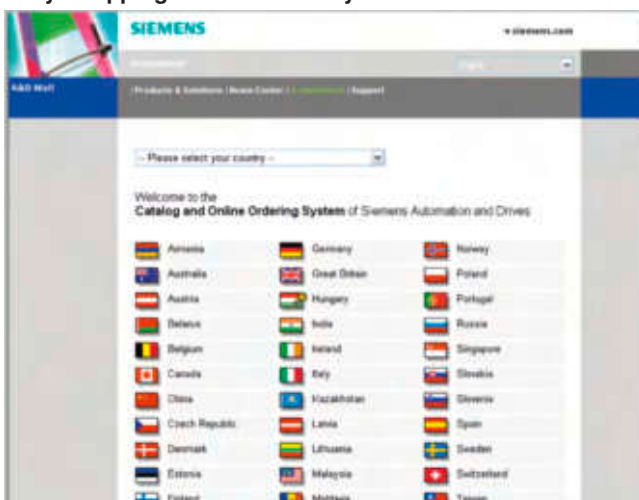
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Information on the Offline Mall CA 01 can be found in the Internet under

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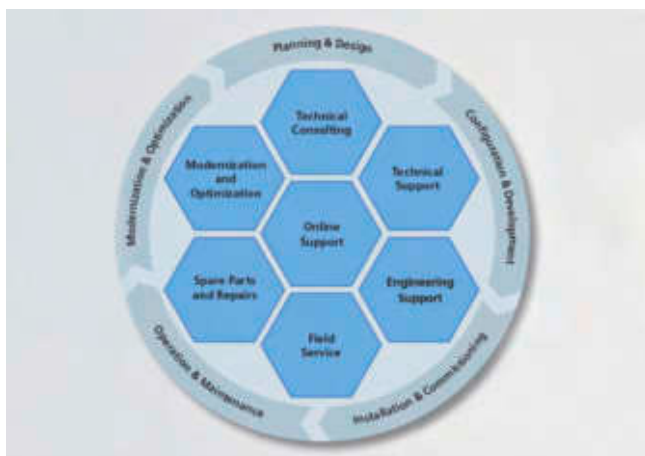
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Appendix

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<http://www.siemens.com/automation/support-request>

Technical Consulting



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Engineering Support



Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project.

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After startup or during the operating phase, additional potential for increasing the productivity or for reducing costs often arises. For this purpose, we offer you high-quality services in optimization and upgrading.

You find contact details in the Internet under:
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Order no. **6ZB5310-0EP30-0BA2**

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Small card – great support

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Automation Value Card order numbers

Credits	Order no.
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500	6ES7 997-0BB00-0XA0
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Service & Support à la Card: Examples

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"Priority"	Priority processing for urgent cases
"24 h"	Availability round the clock
"Extended"	Technical consulting for complex questions
"Mature Products"	Consulting service for products that are not available any more

Support Tools in the Support Shop

	Tools that can be used directly for configuration, analysis and testing
--	---

Appendix

Notes



Notes



Conditions of sale and delivery

Export regulations

Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusively for orders placed with Siemens AG.

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The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

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Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

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Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

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- 6ZB5310-OKR30-0BA1
(for customers based in Germany)
- 6ZB5310-OKS53-0BA1
(for customers based outside Germany)

or download them from the Internet

<http://www.siemens.com/automation/mail>

(Germany: Industry Mall Online-Help System)

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The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the <u>German Export List</u> Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "<u>AL" not equal to "N"</u> are subject to a European or German export authorization when being exported out of the EU.
ECCN	<u>Export Control Classification Number</u> Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "<u>ECCN" not equal to "N"</u> are subject to a US re-export authorization.

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Industry Automation, Drive Technologies and Electrical Installation Technology

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

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SINAMICS G130 Drive Converter Chassis Units,	D 11		
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SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1		
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