YASKAWA

# VIPA System 300S

## PS | 307-1FB70 | Manual

HB140 | PS | 307-1FB70 | en | 17-50

SPEED7 - PS 307S_Co

www.vipa.com/en/service-support/manuals

VIPA CONTROLS

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307-1FB70_000_PS,1,EN - © 2017

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# 1 General

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## 1.2 About this manual

**Objective and contents**

This manual describes the Co Power Supply for the CPU 317S SPEED7 from VIPA. It contains a description of the construction and usage together with the CPU 317S.

| Product | Order number | as of HW state |
|---|---|---|
| PS 307S_Co | 307-1FB70 | 01 |

**Target audience**

The manual is targeted at users who have a background in automation technology.

**Structure of the manual**

The manual consists of chapters. Every chapter provides a self-contained description of a specific topic.

**Guide to the document**

The following guides are available in the manual:

- An overall table of contents at the beginning of the manual
- References with page numbers

**Availability**

The manual is available in:

- printed form, on paper
- in electronic form as PDF-file (Adobe Acrobat Reader)

**Icons Headings**

Important passages in the text are highlighted by following icons and headings:

**DANGER!**
Immediate or likely danger. Personal injury is possible.

**CAUTION!**
Damages to property is likely if these warnings are not heeded.

*Supplementary information and useful tips.*

## 1.3 Safety information

**Applications conforming with specifications**

The system is constructed and produced for:

- communication and process control
- general control and automation tasks
- industrial applications
- operation within the environmental conditions specified in the technical data
- installation into a cubicle

**DANGER!**
This device is not certified for applications in

– in explosive environments (EX-zone)

**Documentation**

The manual must be available to all personnel in the

- project design department
- installation department
- commissioning
- operation

**CAUTION!**
**The following conditions must be met before using or commissioning the components described in this manual:**

– Hardware modifications to the process control system should only be carried out when the system has been disconnected from power!
– Installation and hardware modifications only by properly trained personnel.
– The national rules and regulations of the respective country must be satisfied (installation, safety, EMC ...)

**Disposal**

**National rules and regulations apply to the disposal of the unit!**

# 2 Assembly and installation guidelines

## 2.1 Safety information for users

**Handling of electrostatic sensitive modules**

VIPA modules make use of highly integrated components in MOS-Technology. These components are extremely sensitive to over-voltages that can occur during electrostatic discharges. The following symbol is attached to modules that can be destroyed by electrostatic discharges.

The Symbol is located on the module, the module rack or on packing material and it indicates the presence of electrostatic sensitive equipment. It is possible that electrostatic sensitive equipment is destroyed by energies and voltages that are far less than the human threshold of perception. These voltages can occur where persons do not discharge themselves before handling electrostatic sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable. Modules that have been damaged by electrostatic discharges can fail after a temperature change, mechanical shock or changes in the electrical load. Only the consequent implementation of protection devices and meticulous attention to the applicable rules and regulations for handling the respective equipment can prevent failures of electrostatic sensitive modules.

**Shipping of modules**

Modules must be shipped in the original packing material.

**Measurements and alterations on electrostatic sensitive modules**

When you are conducting measurements on electrostatic sensitive modules you should take the following precautions:

- Floating instruments must be discharged before use.
- Instruments must be grounded.

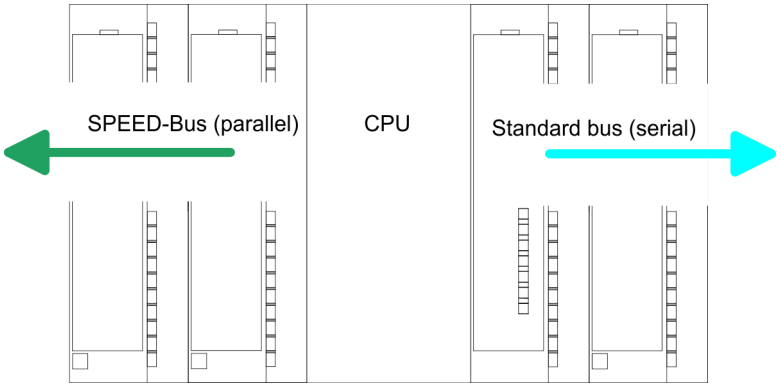
Modifying electrostatic sensitive modules you should only use soldering irons with grounded tips.

**CAUTION!**
Personnel and instruments should be grounded when working on electrostatic sensitive modules.

## 2.2 Overview

**General**

While the standard peripheral modules are plugged-in at the right side of the CPU, the SPEED-Bus peripheral modules are connected via a SPEED-Bus bus connector at the left side of the CPU. VIPA delivers profile rails with integrated SPEED-Bus for 2, 6 or 10 SPEED-Bus peripheral modules with different lengths.




**Serial Standard bus**

The single modules are directly installed on a profile rail and connected via the backplane bus coupler. Before installing the modules you have to clip the backplane bus coupler to the module from the backside. The backplane bus couplers are included in the delivery of the peripheral modules.

**Parallel SPEED-Bus**

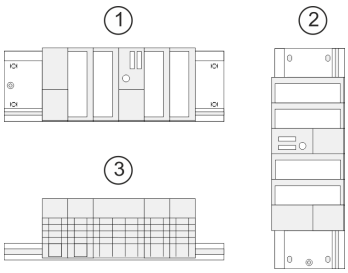
With SPEED-Bus the bus connection happens via a SPEED-Bus rail integrated in the profile rail at the left side of the CPU. Due to the parallel SPEED-Bus not all slots must be occupied in sequence.

***SLOT 1 for additional power supply***

At slot (SLOT 1 DCDC) you may plug either a SPEED-Bus module or an additional power supply.

**Assembly possibilities**

You may assemble the System 300 horizontally, vertically or lying.



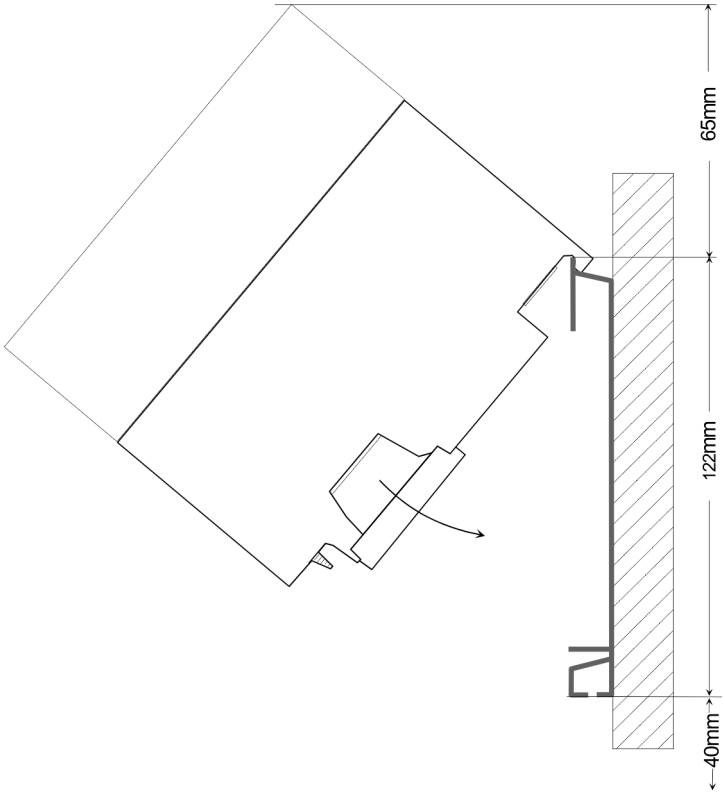

Please regard the allowed environment temperatures:

- horizontal assembly: from 0 to 60°C
- vertical assembly: from 0 to 40°C
- lying assembly: from 0 to 40°C

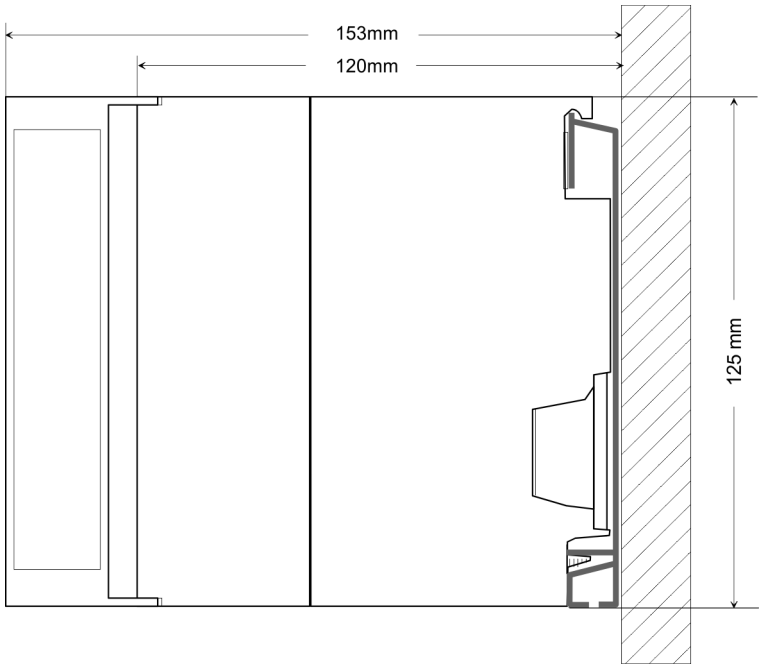
## 2.3 Installation dimensions

**Dimensions Basic enclosure** 1tier width (WxHxD) in mm: 40 x 125 x 120

**Dimensions**




**Installation dimensions**



## 2.4 Assembly SPEED-Bus

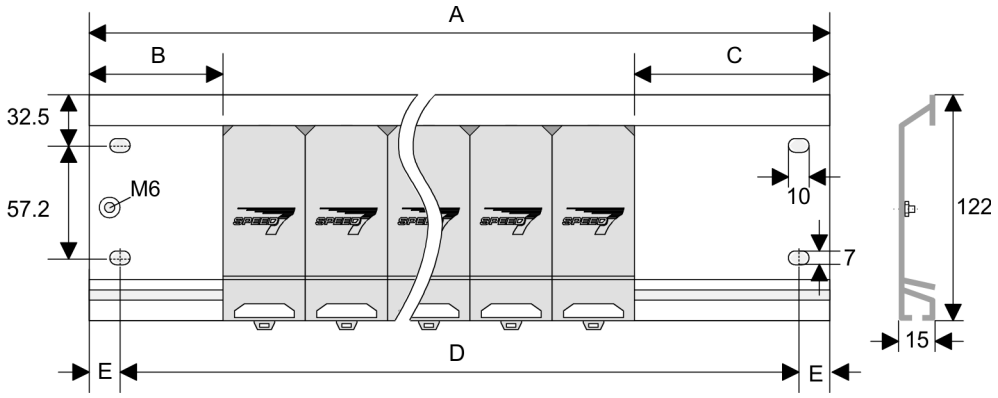
**Pre-manufactured SPEED-Bus profile rail**

For the deployment of SPEED-Bus modules, a pre-manufactured SPEED-Bus rail is required. This is available mounted on a profile rail with 2, 6 or 10 extension slots.

***Dimensions***

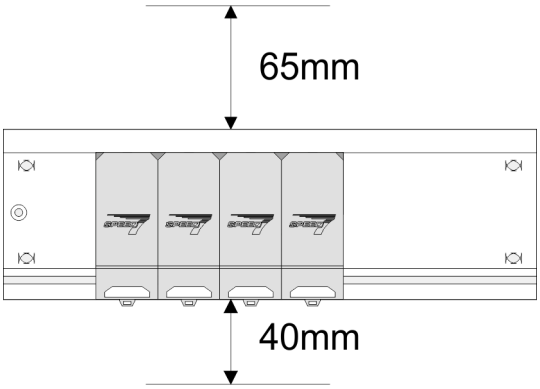
| Order number | Number of modules SPEED-Bus/Standard bus | A | B | C | D | E |
|---|---|---|---|---|---|---|
| 391-1AF10 | 2/6 | 530 | 100 | 268 | 510 | 10 |
| 391-1AF30 | 6/2 | 530 | 100 | 105 | 510 | 10 |
| 391-1AF50 | 10/0 | 530 | 20 | 20 | 510 | 10 |
| 391-1AJ10 | 2/15 | 830 | 22 | 645 | 800 | 15 |
| 391-1AJ30 | 6/11 | 830 | 22 | 480 | 800 | 15 |
| 391-1AJ50 | 10/7 | 830 | 22 | 320 | 800 | 15 |

Measures in mm

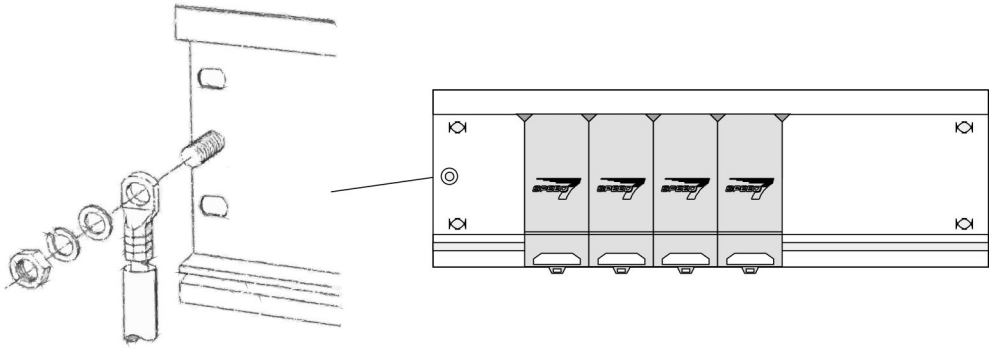


### Installation of the profile rail

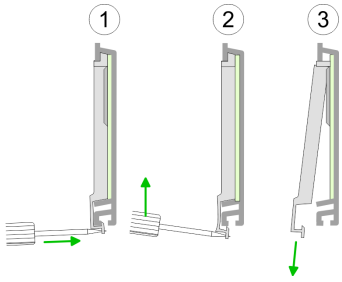
1. Bolt the profile rail with the background (screw size: M6), so that you still have minimum 65mm space above and 40mm below the profile rail. Please look for a low-impedance connection between profile rail and background.




2. Connect the profile rail with the protected earth conductor. The minimum cross-section of the cable to the protected earth conductor has to be 10mm$^2$.

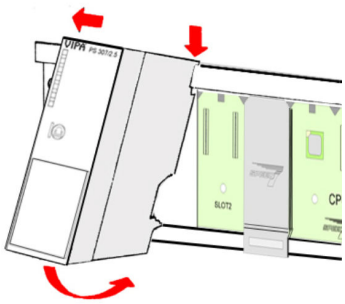


### Installation SPEED-Bus module

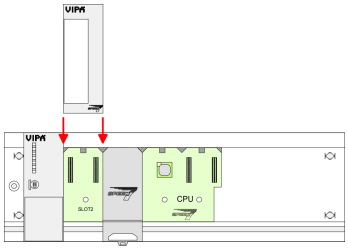



1. Dismantle the according protection flaps of the SPEED-Bus slot with a screw driver (open and pull down).

   For the SPEED-Bus is a parallel bus, not every SPEED-Bus slot must be used in series. Leave the protection flap installed at an unused SPEED-Bus slot.

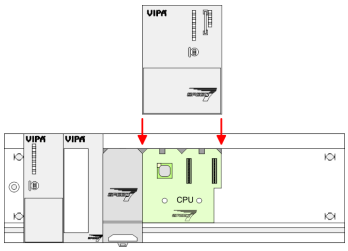


2. At deployment of a DC 24V power supply, install it at the shown position at the profile rail at the left side of the SPEED-Bus and push it to the left to the isolation bolt of the profile rail.
3. Fix the power supply by screwing.

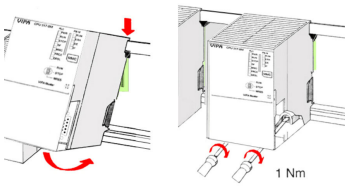


4. To connect the SPEED-Bus modules, plug it between the triangular positioning helps to a slot marked with "SLOT ..." and pull it down.
5. Only the "SLOT1 DCDC" allows you to plug-in either a SPEED-Bus module or an additional power supply.
6. Fix the CPU by screwing.

### *Installation CPU without Standard-Bus-Modules*

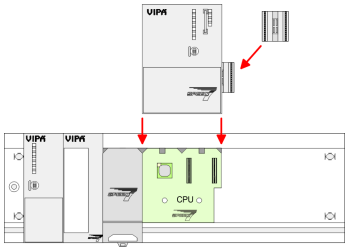


1. To deploy the SPEED7-CPU exclusively at the SPEED-Bus, plug it between the triangular positioning helps to the slot marked with "CPU SPEED7" and pull it down.

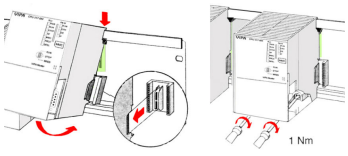



2. Fix the CPU by screwing.

### *Installation CPU with Standard-Bus-Modules*

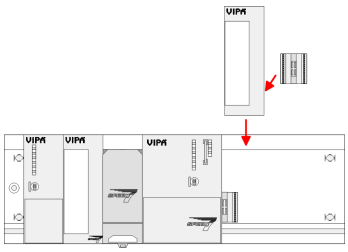


1. If also standard modules shall be plugged, take a bus coupler and click it at the CPU from behind like shown in the picture. Plug the CPU between the triangular positioning helps to the slot marked with "CPU SPEED7" and pull it down.




2. Plug the CPU between the triangular positioning helps to the plug-in location marked with "CPU SPEED7" and pull it down. Fix the CPU by screwing.

### Installation Standard-Bus-Modules



Repeat this procedure with the peripheral modules, by clicking a backplane bus coupler, stick the module right from the modules you've already fixed, click it downwards and connect it with the backplane bus coupler of the last module and bolt it.

**CAUTION!**

– The power supplies must be released before installation and repair tasks, i.e. before handling with the power supply or with the cabling you must disconnect current/voltage (pull plug, at fixed connection switch off the concerning fuse)!
– Installation and modifications only by properly trained personnel!

## 2.5 Cabling

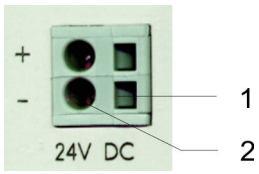
**Overview**

The Co Power Supply is exclusively delivered with CageClamp contacts. Here the DC 24V power supply may be connected.

**CAUTION!**

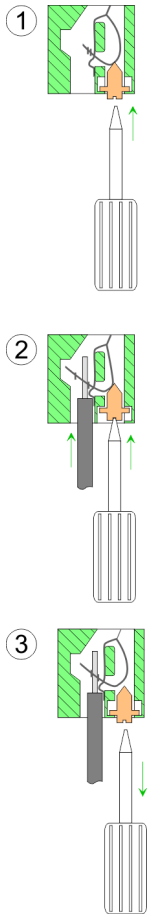
– The power supplies must be released before installation and repair tasks, i.e. before handling with the power supply or with the cabling you must disconnect current/voltage (pull plug, at fixed connection switch off the concerning fuse)!
– Installation and modifications only by properly trained personnel!

**CageClamp technology (gray)**




For the cabling of power supply of a CPU, a green plug with CageClamp technology is deployed. The connection clamp is realized as plug that may be clipped off carefully if it is still cabled.

1 Rectangular opening for screwdriver
2 Round opening for wires




The picture on the left side shows the cabling step by step from top view. Here wires with a cross-section of 0.08mm$^2$ to 2.5mm$^2$ may be connected. You can use flexible wires without end case as well as stiff wires.

**1.** For cabling you push the locking vertical to the inside with a suiting screwdriver and hold the screwdriver in this position.

**2.** To open the contact spring you have to push the screwdriver in the opposite direction and hold it.

Insert the de-isolated wire into the round opening. You may use wires with a cross-section from 0.08mm$^2$ to 2.5mm$^2$

**3.** By removing the screwdriver the wire is connected safely with the plug connector via a spring.

## 2.6 Installation guidelines

**General**

The installation guidelines contain information about the interference free deployment of a PLC system. There is the description of the ways, interference may occur in your PLC, how you can make sure the electromagnetic compatibility (EMC), and how you manage the isolation.

**What does EMC mean?**

Electromagnetic compatibility (EMC) means the ability of an electrical device, to function error free in an electromagnetic environment without being interfered respectively without interfering the environment.

The components of VIPA are developed for the deployment in industrial environments and meets high demands on the EMC. Nevertheless you should project an EMC planning before installing the components and take conceivable interference causes into account.

**Possible interference causes**

Electromagnetic interferences may interfere your control via different ways:

- Electromagnetic fields (RF coupling)
- Magnetic fields with power frequency
- Bus system
- Power supply
- Protected earth conductor

Depending on the spreading medium (lead bound or lead free) and the distance to the interference cause, interferences to your control occur by means of different coupling mechanisms.

There are:

- galvanic coupling
- capacitive coupling
- inductive coupling
- radiant coupling

**Basic rules for EMC**

In the most times it is enough to take care of some elementary rules to guarantee the EMC. Please regard the following basic rules when installing your PLC.

- Take care of a correct area-wide grounding of the inactive metal parts when installing your components.
  - Install a central connection between the ground and the protected earth conductor system.
  - Connect all inactive metal extensive and impedance-low.
  - Please try not to use aluminium parts. Aluminium is easily oxidizing and is therefore less suitable for grounding.
- When cabling, take care of the correct line routing.
  - Organize your cabling in line groups (high voltage, current supply, signal and data lines).
  - Always lay your high voltage lines and signal respectively data lines in separate channels or bundles.
  - Route the signal and data lines as near as possible beside ground areas (e.g. suspension bars, metal rails, tin cabinet).

- Proof the correct fixing of the lead isolation.
  - Data lines must be laid isolated.
  - Analog lines must be laid isolated. When transmitting signals with small amplitudes the one sided laying of the isolation may be favourable.
  - Lay the line isolation extensively on an isolation/protected earth conductor rail directly after the cabinet entry and fix the isolation with cable clamps.
  - Make sure that the isolation/protected earth conductor rail is connected impedance-low with the cabinet.
  - Use metallic or metallised plug cases for isolated data lines.
- In special use cases you should appoint special EMC actions.
  - Consider to wire all inductivities with erase links.
  - Please consider luminescent lamps can influence signal lines.
- Create a homogeneous reference potential and ground all electrical operating supplies when possible.
  - Please take care for the targeted employment of the grounding actions. The grounding of the PLC serves for protection and functionality activity.
  - Connect installation parts and cabinets with your PLC in star topology with the isolation/protected earth conductor system. So you avoid ground loops.
  - If there are potential differences between installation parts and cabinets, lay sufficiently dimensioned potential compensation lines.

**Isolation of conductors**

Electrical, magnetically and electromagnetic interference fields are weakened by means of an isolation, one talks of absorption. Via the isolation rail, that is connected conductive with the rack, interference currents are shunt via cable isolation to the ground. Here you have to make sure, that the connection to the protected earth conductor is impedance-low, because otherwise the interference currents may appear as interference cause.

When isolating cables you have to regard the following:

- If possible, use only cables with isolation tangle.
- The hiding power of the isolation should be higher than 80%.
- Normally you should always lay the isolation of cables on both sides. Only by means of the both-sided connection of the isolation you achieve high quality interference suppression in the higher frequency area. Only as exception you may also lay the isolation one-sided. Then you only achieve the absorption of the lower frequencies. A one-sided isolation connection may be convenient, if:
  - the conduction of a potential compensating line is not possible.
  - analog signals (some mV respectively µA) are transferred.
  - foil isolations (static isolations) are used.
- With data lines always use metallic or metallised plugs for serial couplings. Fix the isolation of the data line at the plug rack. Do not lay the isolation on the PIN 1 of the plug bar!
- At stationary operation it is convenient to strip the insulated cable interruption free and lay it on the isolation/protected earth conductor line.
- To fix the isolation tangles use cable clamps out of metal. The clamps must clasp the isolation extensively and have well contact.
- Lay the isolation on an isolation rail directly after the entry of the cable in the cabinet. Lead the isolation further on to your PLC and don't lay it on there again!

**CAUTION!**
**Please regard at installation!**
At potential differences between the grounding points, there may be a compensation current via the isolation connected at both sides.

Remedy: Potential compensation line

## 2.7 General data

| Conformity and approval | | |
|---|---|---|
| Conformity | | |
| CE | 2014/35/EU | Low-voltage directive |
| | 2014/30/EU | EMC directive |
| Approval | | |
| UL | | Refer to Technical data |
| others | | |
| RoHS | 2011/65/EU | Restriction of the use of certain hazardous substances in electrical and electronic equipment |

| Protection of persons and device protection | | |
|---|---|---|
| Type of protection | - | IP20 |
| Electrical isolation | | |
| to the field bus | - | electrically isolated |
| to the process level | - | electrically isolated |
| Insulation resistance | | - |
| Insulation voltage to reference earth | | |
| Inputs / outputs | - | AC / DC 50V, test voltage AC 500V |
| Protective measures | - | against short circuit |

| Environmental conditions to EN 61131-2 | | |
|---|---|---|
| Climatic | | |
| Storage / transport | EN 60068-2-14 | -25…+70°C |
| Operation | | |
| Horizontal installation hanging | EN 61131-2 | 0…+60°C |
| Horizontal installation lying | EN 61131-2 | 0…+55°C |
| Vertical installation | EN 61131-2 | 0…+50°C |
| Air humidity | EN 60068-2-30 | RH1 (without condensation, rel. humidity 10…95%) |
| Pollution | EN 61131-2 | Degree of pollution 2 |
| Installation altitude max. | - | 2000m |
| Mechanical | | |
| Oscillation | EN 60068-2-6 | 1g, 9Hz ... 150Hz |
| Shock | EN 60068-2-27 | 15g, 11ms |

| Mounting conditions | | |
|---|---|---|
| Mounting place | - | In the control cabinet |
| Mounting position | - | Horizontal and vertical |

| EMC | Standard | | Comment |
|---|---|---|---|
| Emitted interference | EN 61000-6-4 | | Class A (Industrial area) |
| Noise immunity zone B | EN 61000-6-2 | | Industrial area |
| | | EN 61000-4-2 | ESD<br>8kV at air discharge (degree of severity 3),<br>4kV at contact discharge (degree of severity 2) |
| | | EN 61000-4-3 | HF field immunity (casing)<br>80MHz … 1000MHz, 10V/m, 80% AM (1kHz)<br>1.4GHz ... 2.0GHz, 3V/m, 80% AM (1kHz)<br>2GHz ... 2.7GHz, 1V/m, 80% AM (1kHz) |
| | | EN 61000-4-6 | HF conducted<br>150kHz … 80MHz, 10V, 80% AM (1kHz) |
| | | EN 61000-4-4 | Burst, degree of severity 3 |
| | | EN 61000-4-5 | Surge, degree of severity 3 * |

*) Due to the high-energetic single pulses with Surge an appropriate external protective circuit with lightning protection elements like conductors for lightning and overvoltage is necessary.

# 3 Hardware description

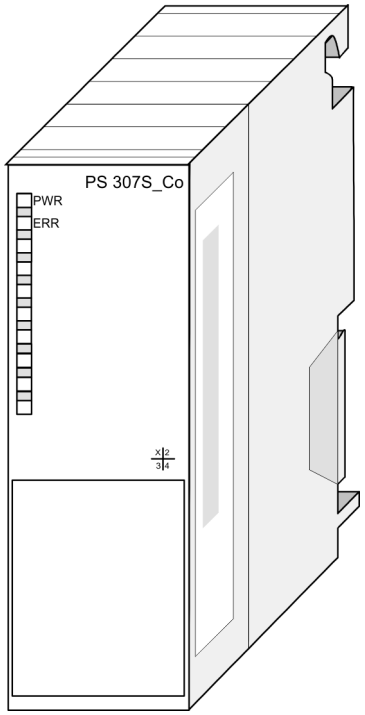
## 3.1 Properties

**Co Power Supply exclusive for CPU 317S**

The SPEED7 CPU 317S has an integrated power supply, which is to be powered by DC 24V. The CPU and the connected modules at the standard and SPEED-Bus are powered by this power supply. The total value of the current for the backplane bus may be increased with 5.5A by means of the Co Power Supply PS 307S_Co. The Co Power Supply is to be plugged directly at the SPEED-Bus left beside the CPU labeled with "Slot1 DCDC". The Co Power Supply may only be operated together with the CPU 317S. As soon as the CPU 317S is power supplied, the Co Power Supply starts automatically.

**307-1FB70**

- Operates exclusive together with the CPU 317S
- Output current 5.5A - extends the maximum total value at the backplane bus (Standard bus + SPEED-Bus)
- Automatic start-up with the power supply of the CPU 317S
- Defined power-down at failure of one of the power supplies
- Protection against short circuits and overloads
- Protection against overheat
- Efficiency typ. 90% at $I_{Nom}$

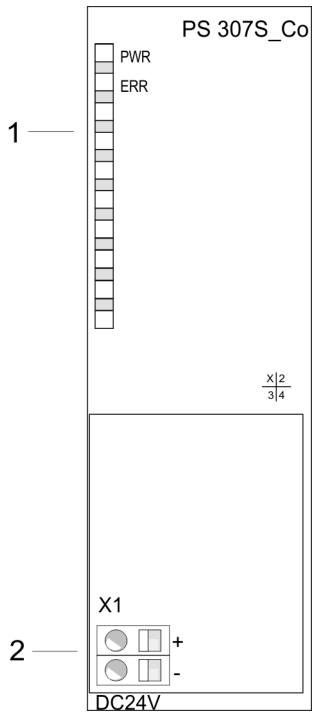



**Order data**

| Order number | Description |
|---|---|
| 307-1FB70 | Co Power Supply DC 24V |

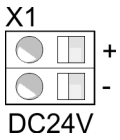
## 3.2 Structure

**PS 307S_Co**




1 LEDs status display
**The following component is beneath a flap:**
2 Connector for DC 24V Power supply

**DC 24V input**




The Co Power Supply is to be provided with DC 24V by means of this connector. The connector is to be found beneath the front flap.

**LEDs**

The Co Power Supply has got one row of LEDs at the front side. The following table shows you the usage and the according colors.

| Label | Color | Description |
|---|---|---|
| PWR | green | activated power supply by front side |
| ERR | red | Error / Co Power Supply inactive<br>Lights permanently if missing power supply of the CPU 317S, if wrong slot respectively if not mounted at SPEED-Bus. |

**Operation**

- As soon as the DC 24V input voltage is present at CPU 317S and Co Power Supply, the output voltage to the backplane bus is issued.
- Here the output current at the backplane bus (standard bus + SPEED-Bus) is increased by 5.5A.
- If the input voltage is missing at one power supply the other power supply remains inactive. If one of the power supplies is missing during operation a power-down is generated and the system is defined powered down. Here both power supplies are powered-off. After one second there is a restart executed.

**CAUTION!**
The Co Power Supply may only be (de-)connected at off-circuit conditions.

## 3.3 Technical data

| **Order no.** | **307-1FB70** |
|---|---|
| Type | PS 307S - SPEED-Bus |
| SPEED-Bus | - |
| **Technical data power supply** | |
| Input voltage (rated value) | DC 24 V |
| Input voltage (permitted range) | DC 20.4...28.8 V |
| Mains frequency (rated value) | - |
| Mains frequency (permitted range) | - |
| Input current (at 120 V) | - |
| Input current (at 230 V) | - |
| Inrush current (at 25 °C) | 5 A |
| $I^2t$ | 0.5 $A^2s$ |
| Power consumption typ. | 36 W |
| Output voltage (rated value) | 5.2 V |
| Output current (rated value) | 5.5 A |
| Power supply parallel switchable | - |
| Protect type | short circuit (electr.), overload, over temperature (IP20) |
| Ripple of output voltage (max.), BW=20 MHz | 150 mV |
| Efficiency typ. | 90 % |
| Power loss typ. | 6 W |
| **Status information, alarms, diagnostics** | |
| Status display | yes |
| Interrupts | no |
| Process alarm | no |
| Diagnostic interrupt | no |
| Diagnostic functions | no |

| Order no. | 307-1FB70 |
|---|---|
| Diagnostics information read-out | none |
| Supply voltage display | green LED |
| Group error display | red LED |
| Channel error display | none |
| **Housing** | |
| Material | PPE / PA 6.6 |
| Mounting | DIN rail SPEED-Bus |
| Mechanical data | |
| Dimensions (WxHxD) | 40 x 125 x 120 mm |
| Weight | 210 g |
| **Environmental conditions** | |
| Operating temperature | 0 °C to 60 °C |
| Storage temperature | -25 °C to 70 °C |
| **Certifications** | |
| UL certification | yes |
| KC certification | yes |