

Chapter 2 Assembly and installation guidelines

Overview This chapter contains the information required to assemble and wire a controller consisting of Systems 200V components.

Below follows a description of:

- a general summary of the components
- steps required for the assembly and for wiring
- EMC guidelines for assembling the System 200V

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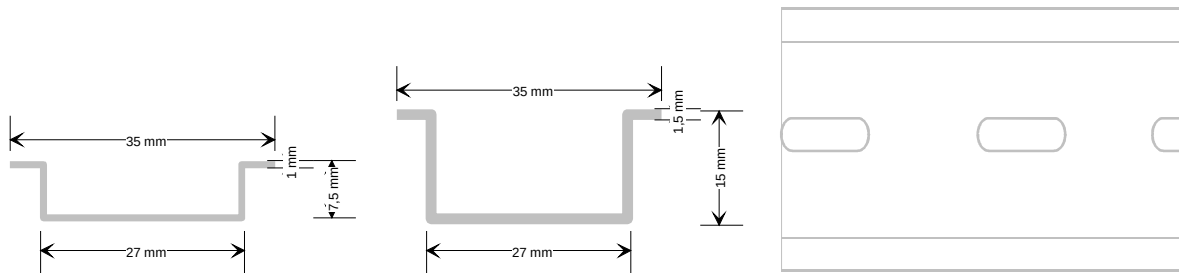
Overview

General

The modules are installed on a carrier rail. A bus connector provides interconnections between the modules. This bus connector links the modules via the backplane bus of the modules and it is placed into the profile rail that carries the modules.

Profile rail

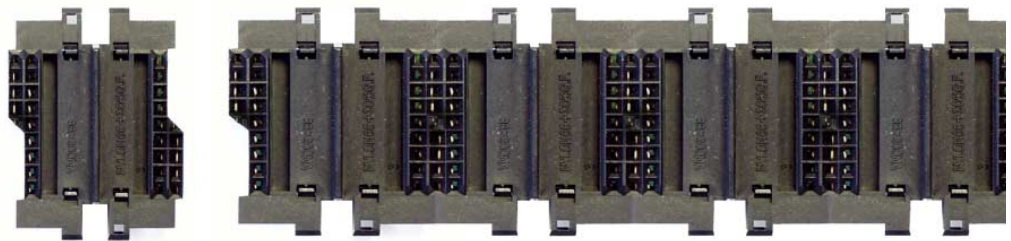
You may use the following standard 35mm profile rail to mount the System 200V modules:



Bus connector

System 200V modules communicate via a backplane bus connector. The backplane bus connector is isolated and available from VIPA in of 1-, 2-, 4- or 8tier width.

The following figure shows a 1tier connector and a 4tier connector bus:

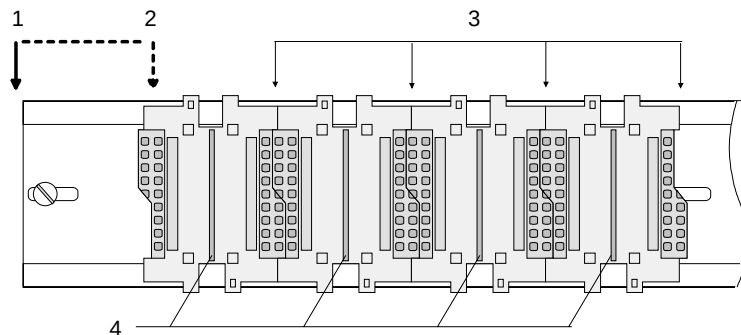


The bus connector is isolated and has to be inserted into the profile rail until it clips in its place and the bus connections protrude from the rail.

Profile rail installation

The following figure shows the installation of a 4tier width bus connector in a profile rail and the plug-in locations for the modules.

The different plug-in locations are defined by guide rails.

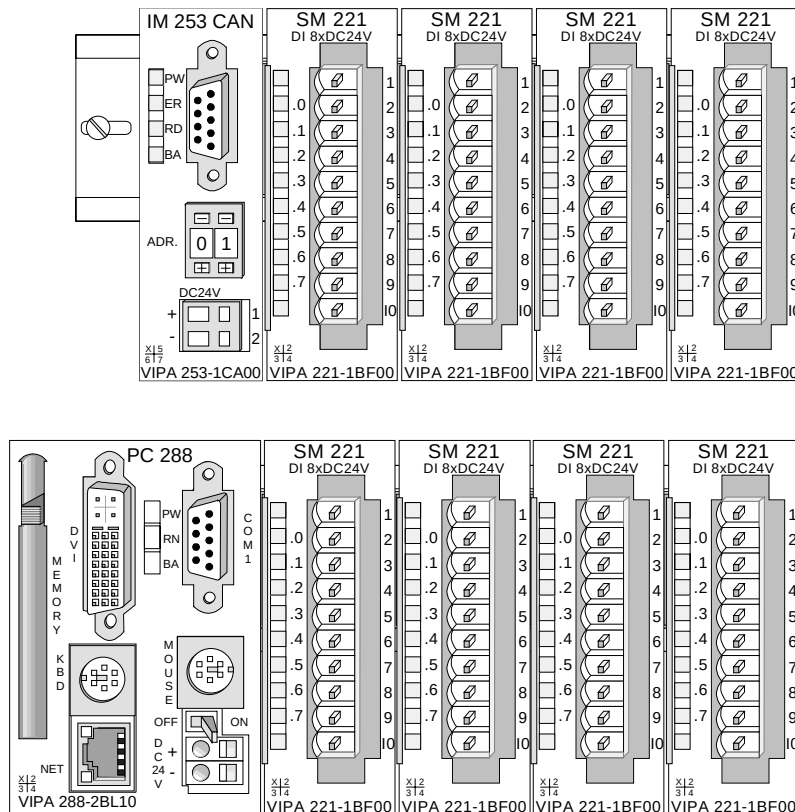


- [1] Header module, like PC, CPU, bus coupler, if double width
- [2] Header module (single width)
- [3] Peripheral module
- [4] Guide rails

Note

A maximum of 32 modules can be connected at the back plane bus.

Take attention that here the **maximum sum current of 3.5A** is not exceeded.



Assembly regarding the current consumption

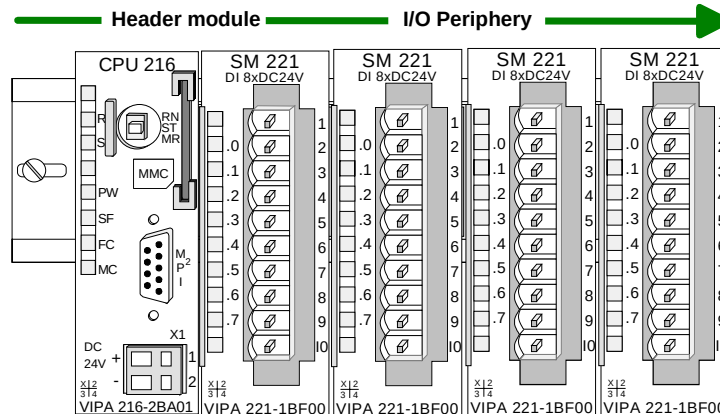
- Use bus connectors as long as possible.
- Sort the modules with a high current consumption right beside the header module. At ftp.vipa.de/manuals/system200v a list of current consumption of every System 200V module can be found.

**Assembly horizontal
respectively vertical**

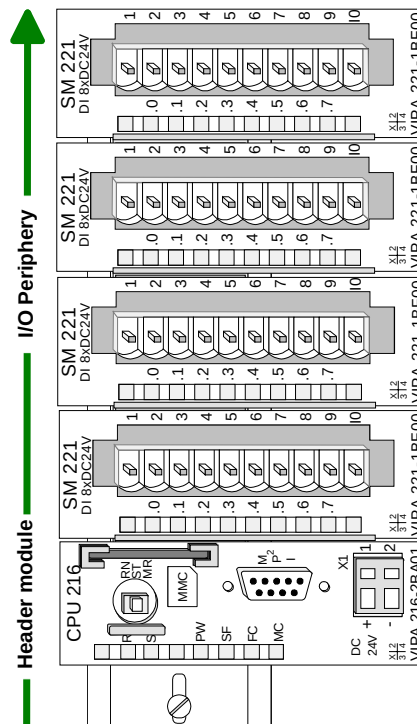
You may install the System 200V as well horizontal as vertical. Please regard the allowed environment temperatures:

- horizontal structure: from 0 to 60°
- vertical structure: from 0 to 40°

The horizontal structure always starts at the left side with a header module (CPU, bus coupler, PC), then you plug-in the peripheral modules beside to the right. You may plug-in maximum 32 peripheral modules.



The vertical structure is turned for 90° against the clock.

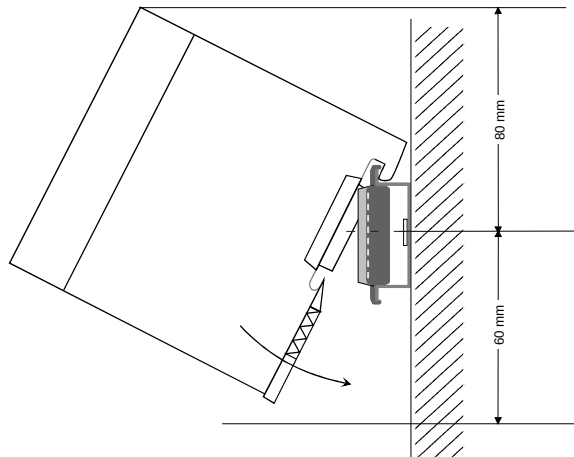


Assembly

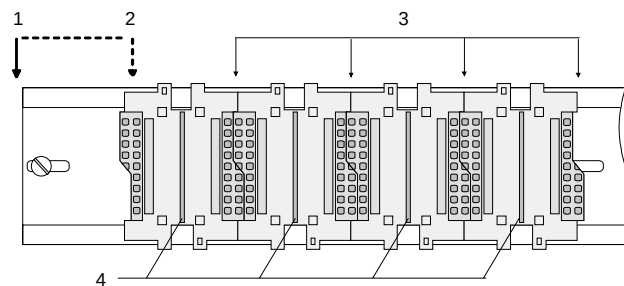


Please follow these rules during the assembly!

- Turn off the power supply before you insert or remove any modules!
- Make sure that a clearance of at least 60mm exists above and 80mm below the middle of the bus rail.



- Every row must be completed from left to right and it has to start with a header module (PC, CPU, and bus coupler).



- [1] Header module, like PC, CPU, bus coupler, if double width
- [2] Header module (single width)
- [3] Peripheral module
- [4] Guide rails

- Modules are to install adjacent to each other. Gaps are not permitted between the modules since this would interrupt the backplane bus.
- A module is only installed properly and connected electrically when it has clicked into place with an audible click.
- Plug-in locations after the last module may remain unoccupied.

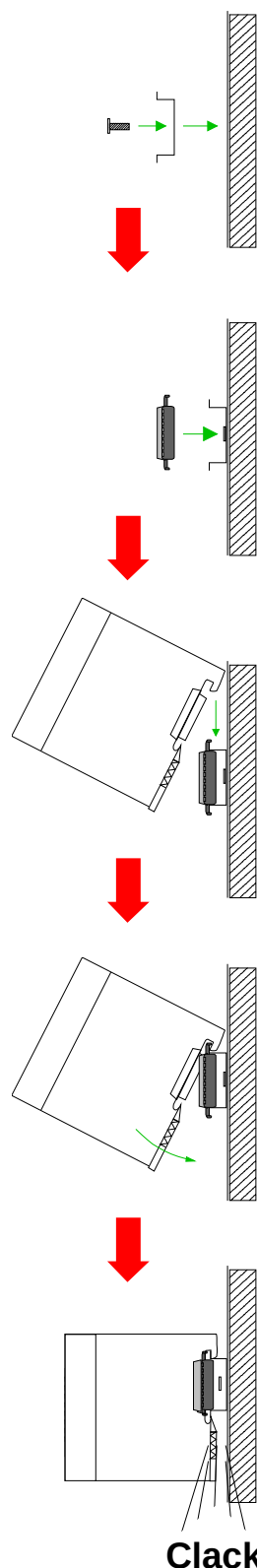


Note!

A maximum of 32 modules can be connected at the back plane bus. Take attention that here the maximum **sum current** of **3.5A** is not exceeded.

Assembly procedure

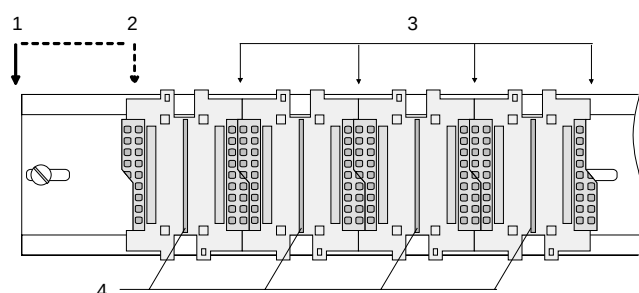
The following sequence represents the assembly procedure as viewed from the side.



- Install the profile rail. Make sure that a clearance of at least 60mm exists above and 80mm below the middle of the bus rail.

- Press the bus connector into the rail until it clips securely into place and the bus-connectors protrude from the profile rail. This provides the basis for the installation of your modules.

- Start at the outer left location with the installation of your header module like CPU, PC or bus coupler and install the peripheral modules to the right of this.



- [1] Header module like PC, CPU, bus coupler
- [2] Header module when this is a double width or a peripheral module
- [3] Peripheral module
- [4] Guide rails

- Insert the module that you are installing into the profile rail at an angle of 45 degrees from the top and rotate the module into place until it clicks into the profile rail with an audible click. The proper connection to the backplane bus can only be guaranteed when the module has properly clicked into place.

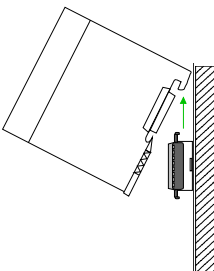
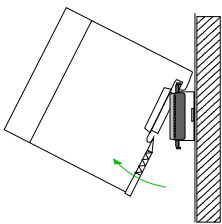
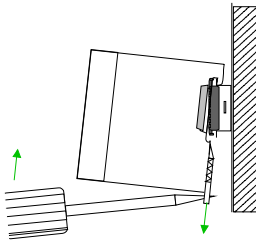
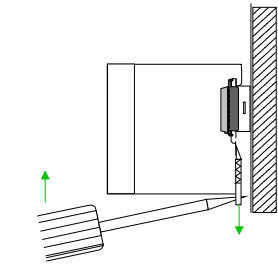
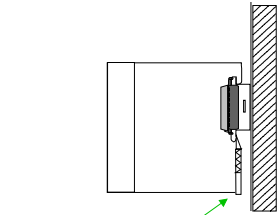
**Attention!**

Power must be turned off before modules are installed or removed!

Removal procedure

The following sequence shows the steps required for the removal of modules in a side view.

- The enclosure of the module has a spring-loaded clip at the bottom by which the module can be removed from the rail.
- Insert a screwdriver into the slot as shown.



- The clip is unlocked by pressing the screwdriver in an upward direction.

- Withdraw the module with a slight rotation to the top.

**Attention!**

Power must be turned off before modules are installed or removed!

Please remember that the backplane bus is interrupted at the point where the module was removed!

Wiring

Outline

Most peripheral modules are equipped with a 10pole or an 18pole connector. This connector provides the electrical interface for the signaling and supply lines of the modules.

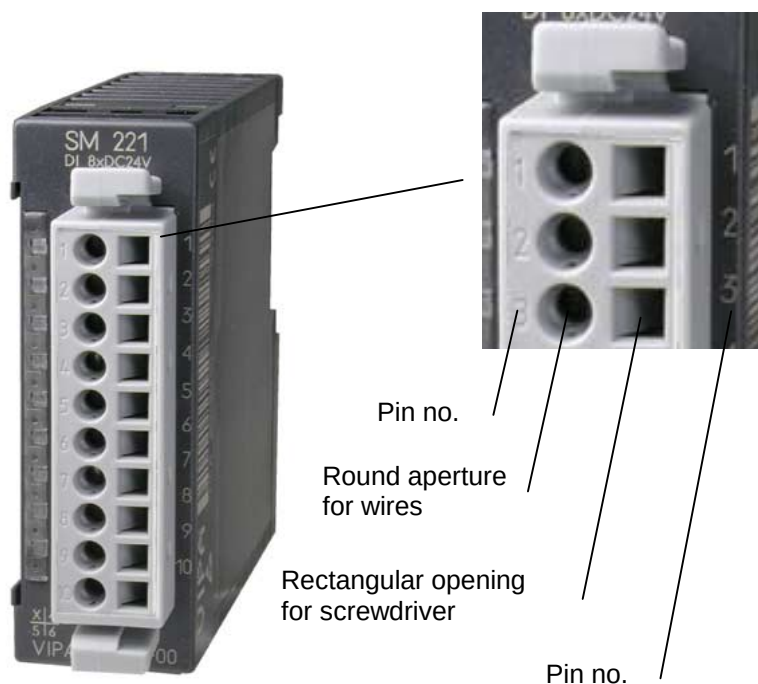
The modules carry spring-clip connectors for the interconnections and wiring.

The spring-clip connector technology simplifies the wiring requirements for signaling and power cables.

In contrast to screw terminal connections, spring-clip wiring is vibration proof. The assignment of the terminals is contained in the description of the respective modules.

You may connect conductors with a diameter from 0.08mm^2 up to 2.5mm^2 (max. 1.5mm^2 for 18pole connectors).

The following figure shows a module with a 10pole connector.

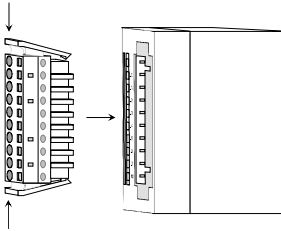


Note!

The spring-clip is destroyed if you insert the screwdriver into the opening for the hook-up wire!

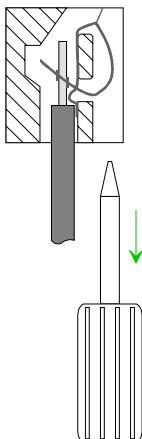
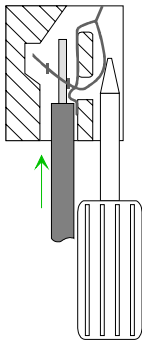
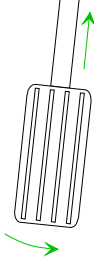
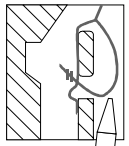
Make sure that you only insert the screwdriver into the square hole of the connector!

Wiring procedure



- Install the connector on the module until it locks with an audible click. For this purpose you press the two clips together as shown. The connector is now in a permanent position and can easily be wired.

The following section shows the wiring procedure from above.



- Insert a screwdriver at an angle into the square opening as shown.
- Press and hold the screwdriver in the opposite direction to open the contact spring.

- Insert the stripped end of the hook-up wire into the round opening. You can use wires with a diameter of 0.08mm^2 to 2.5mm^2 (1.5mm^2 for 18pole connectors).

- When you remove the screwdriver, the wire is clipped securely.



Wire the power supply connections first followed by the signal cables (inputs and outputs).

Assembly dimensions

Overview

Here follow all the important dimensions of the System 200V.

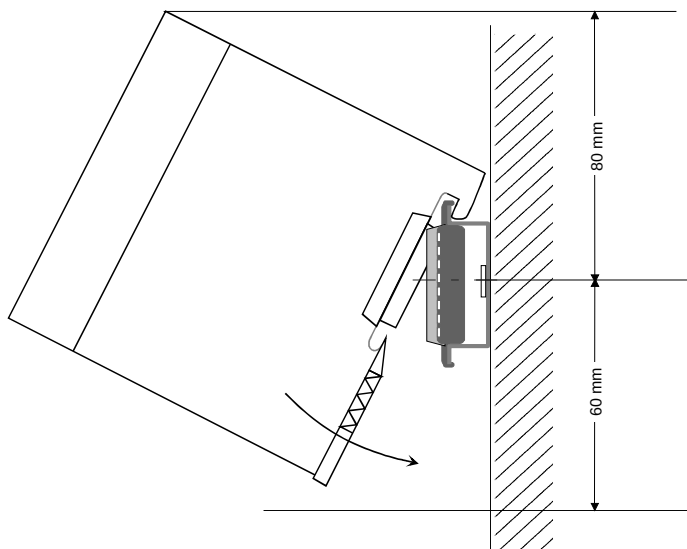
Dimensions

Basic enclosure

1tier width (HxWxD) in mm: 76 x 25.4 x 74

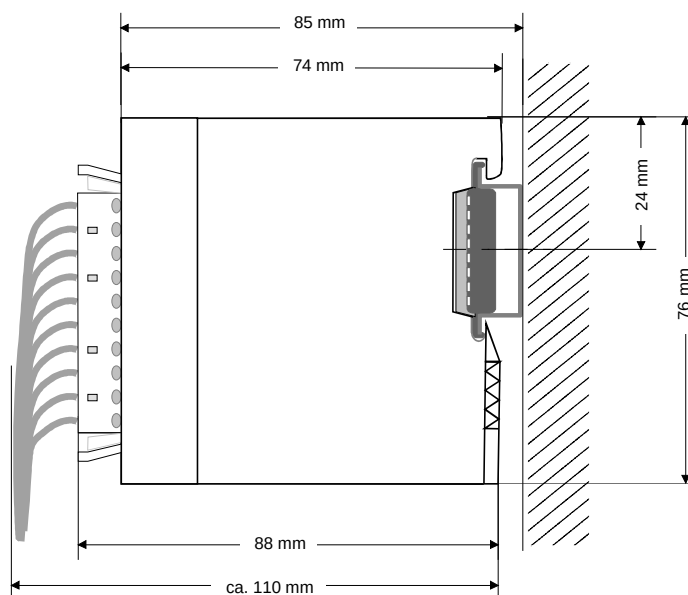
2tier width (HxWxD) in mm: 76 x 50.8 x 74

Installation dimensions

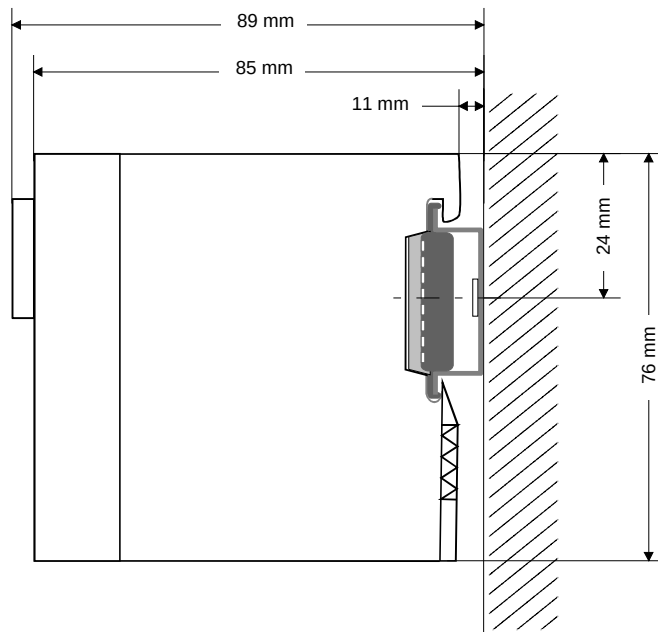
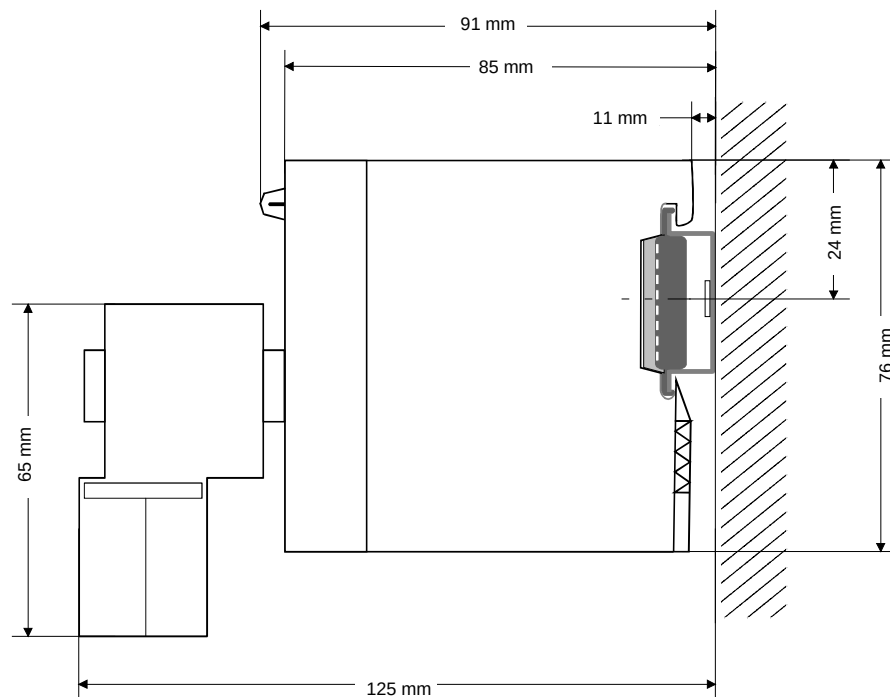


Installed and wired dimensions

In- / Output modules



Function modules

CPUs here with
EasyConn from
VIPA

Installation guidelines

General

The installation guidelines contain information on the proper assembly of System 200V. Here we describe possible ways of interference that may disturb the controlling system and how you have to approach shielding and screening issues to ensure the electromagnetic compatibility (EMC).

What is EMC?

The term "electromagnetic compatibility" (EMC) refers to the ability of an electrical device to operate properly in an electromagnetic environment without interference from the environment or without the device causing illegal interference to the environment.

All System 200V components were developed for applications in harsh industrial environments and they comply with EMC requirements to a large degree. In spite of this you should implement an EMC strategy before installing any components which should include any possible source of interference.

Possible sources for disturbances

Electromagnetic interference can enter your system in many different ways:

- Fields
- I/O signal lines
- Bus system
- Power supply
- Protective conductor

Interference is coupled into your system in different ways, depending in the propagation medium (conducted or not) and the distance to the source of the interference.

We differentiate between:

- galvanic coupling
- capacitive coupling
- inductive coupling
- radiated power coupling

The most important rules for ensuring EMC

In many cases, adherence to a set of very elementary rules is sufficient to ensure EMC. For this reason we wish to advise you to heed the following rules when you are installing your controllers.

- During the installation of your components you have to ensure that any inactive metal components are grounded via a proper large-surface earth.
 - Install a central connection between the chassis ground and the earthing/protection system.
 - Interconnect any inactive metal components via low-impedance conductors with a large cross-sectional area.
 - Avoid aluminum components. Aluminum oxidizes easily and is therefore not suitable for grounding purposes.
- Ensure that wiring is routed properly during installation.
 - Divide the cabling into different types of cable. (Heavy current, power supply, signal and data lines).
 - Install heavy current lines and signal or data lines in separate channeling or cabling trusses.
 - Install signaling and data lines as close as possible to any metallic ground surfaces (e.g. frames, metal rails, sheet metal).
- Ensure that the screening of lines is grounded properly.
 - Data lines must be screened.
 - Analog lines must be screened. Where low-amplitude signals are transferred, it may be advisable to connect the screen on one side of the cable only.
 - Attach the screening of cables to the ground rail by means of large surface connectors located as close as possible to the point of entry. Clamp cables mechanically by means of cable clamps.
 - Ensure that the ground rail has a low-impedance connection to the cabinet/cubicle.
 - Use only metallic or metallized covers for the plugs of screened data lines.
- In critical cases you should implement special EMC measures.
 - Connect snubber networks to all inductive loads that are controlled by System 200V modules.
 - Use incandescent lamps for illumination purposes inside cabinets or cubicles, do not use fluorescent lamps.
- Create a single reference potential and ensure that all electrical equipment is grounded wherever possible.
 - Ensure that earthing measures are implemented effectively. The controllers are earthed to provide protection and for functional reasons.
 - Provide a star-shaped connection between the plant, cabinets/cubicles of the System 200V and the earthing/protection system. In this way you avoid ground loops.
 - Where potential differences exist you must install sufficiently large equipotential bonding conductors between the different parts of the plant.

Screening of cables

The screening of cables reduces the influence of electrical, magnetic or electromagnetic fields; we talk of attenuation.

The earthing rail that is connected conductively to the cabinet diverts interfering currents from screen conductors to ground. It is essential that the connection to the protective conductor is of low-impedance as the interfering currents could otherwise become a source of trouble in themselves.

The following should be noted when cables are screened:

- Use cables with braided screens wherever possible.
- The coverage of the screen should exceed 80%.
- Screens should always be grounded at both ends of cables. High frequency interference can only be suppressed by grounding cables on both ends.

Grounding at one end may become necessary under exceptional circumstances. However, this only provides attenuation to low frequency interference. One-sided earthing may be of advantage where:

- it is not possible to install equipotential bonding conductors.
- analog signals (in the mV or μ A range) are transferred.
- foil-type shields (static shields) are used.
- Always use metallic or metallized covers for the plugs on data lines for serial links. Connect the screen of the data line to the cover. Do **not** connect the screen to PIN 1 of the plug!
- In a stationary environment it is recommended that the insulation is stripped from the screened cable interruption-free and to attach the screen to the screening/protective ground rail.
- Connect screening braids by means of metallic cable clamps. These clamps need a good electrical and large surface contact with the screen.
- Attach the screen of a cable to the grounding rail directly where the cable enters the cabinet/cubicle. Continue the screen right up to the System 200V module but do **not** connect the screen to ground at this point!



Please heed the following when you assemble the system!

Where potential differences exist between earthing connections it is possible that an equalizing current could be established where the screen of a cable is connected at both ends.

Remedy: install equipotential bonding conductors