

Edition

11/2023

SYSTEM MANUAL

SIMATIC

ET 200SP

ET 200SP Distributed I/O System

System overview

5.1 What is the SIMATIC ET 200SP distributed I/O system?

SIMATIC ET 200SP

SIMATIC ET 200SP is a scalable and highly flexible distributed I/O system for connecting process signals to a higher-level controller via a fieldbus.

5.1 What is the SIMATIC ET 200SP distributed I/O system?

Customer benefits of the system



Figure 5-1 SIMATIC ET 200SP distributed I/O system - Customer benefits

Area of application

Thanks to its multifunctionality, the SIMATIC ET 200SP distributed I/O system is suitable for a wide range of applications. Its scalable design allows you to tailor your configuration to local requirements. Various CPUs/interface modules are available for connection to PROFINET IO, PROFIBUS DP, EtherNet/IP or Modbus TCP.

SIMATIC ET 200SP with CPU allows intelligent pre-processing to relieve the higher-level controller. The CPU can also be used as standalone device.

By using fail-safe CPUs, you can implement applications for safety engineering. Configuration and programming of your safety program takes place the same way as for standard CPUs.

An extensive range of I/O modules extends the area of application of the ET 200SP system.

SIMATIC ET 200SP is designed with degree of protection IP20 and is intended for installation in a control cabinet.

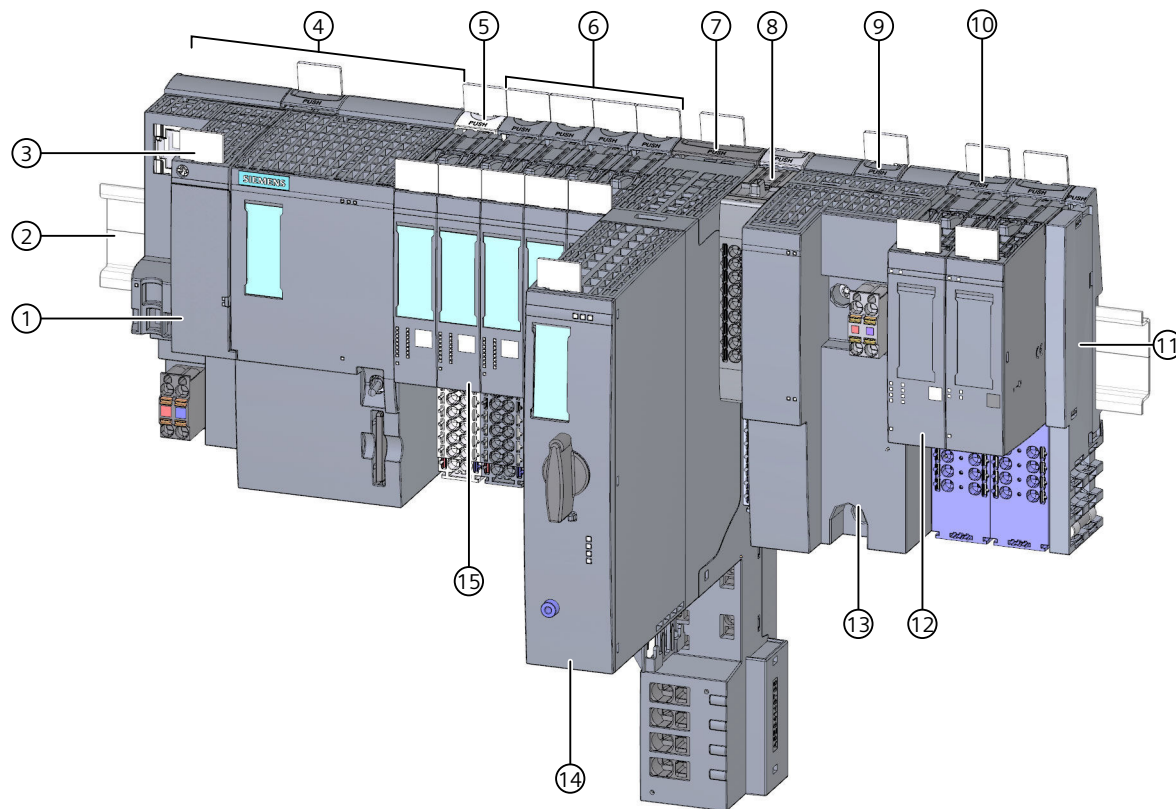
With use of an ET 200SP R1, you increase the availability of the system through redundant interface modules.

Configuration

The SIMATIC ET 200SP distributed I/O system is installed on a mounting rail. It consists of:

- CPU/interface module
- Up to 64 I/O modules, which can be plugged into BaseUnits in any combination
- Up to 31 motor starters
- A server module that completes the configuration of the ET 200SP.

Configuration example



- ① BusAdapter
- ② Mounting rail
- ③ Reference identification label
- ④ CPU/interface module
- ⑤ Light-colored BaseUnit BU..D with infeed of supply voltage
- ⑥ Dark-colored BaseUnits BU..B for conducting the potential group further
- ⑦ BaseUnit for motor starters
- ⑧ Potential distributor module
- ⑨ Ex BaseUnit for Ex power module
- ⑩ Ex BaseUnit for Ex I/O module
- ⑪ Server module (included in the scope of supply of the CPU/interface module)
- ⑫ Ex I/O module
- ⑬ Ex power module
- ⑭ ET 200SP motor starter
- ⑮ I/O module

Figure 5-2 Configuration example of the ET 200SP

5.2 What are fail-safe automation systems and fail-safe modules?

Fail-safe automation systems

Fail-safe automation systems (F-systems) are used in systems with higher safety requirements. F-systems control processes and ensure that they are in a safe state immediately after shutdown. In other words, F-systems control processes in which an immediate shutdown does not endanger persons or the environment.

Safety Integrated

Safety Integrated is the integrated safety concept for automation and drive technology from Siemens.

Proven technologies and systems from automation technology are used for safety systems. Safety Integrated includes the complete safety sequence, ranging from sensor, actuator and fail-safe modules right through to the controller, including safety-related communication via standard fieldbuses. Drives and controllers handle safety tasks in addition to their actual functions.

Fail-safe modules

The key difference between fail-safe modules (F-modules) and standard modules is that they have an internal two-channel design. This means the two integrated processors monitor each other, automatically test the input and output circuits, and switch the fail-safe module to a safe state in the event of a fault.

The F-CPU communicates with a fail-safe module via the safety-related PROFIsafe bus profile.

Fail-safe motor starters

Fail-safe motor starters enable safety-related tripping of motor loads. Fail-safe motor starters are not PROFIsafe nodes. Motor starters operate together with the fail-safe modules of the ET 200SP system.

Area of application of ET 200SP with fail-safe I/O modules

By using the ET 200SP distributed I/O system with fail-safe I/O modules, you are replacing conventional safety engineering configurations. This includes the replacement of switching devices for emergency STOP, protective door monitors, two-hand operation, etc.

5.3 How are SIMATIC Safety F-systems structured with ET 200SP?

SIMATIC Safety F-system with ET 200SP

The figure below shows an example of a configuration for a SIMATIC Safety F-system with ET 200SP distributed I/O system and PROFINET IO. You can configure the PROFINET IO lines with copper cable, fiber-optic cable or WLAN.

Fail-safe I/O modules and non-fail-safe I/O modules can be combined in an ET 200SP configuration.

The fail-safe IO controller (F-CPU) exchanges safety-related and non-safety-related data with fail-safe and non-fail-safe ET 200SP modules.

ET 200SP Fe.g. CPU 1512SP F-1 PN and CM DP

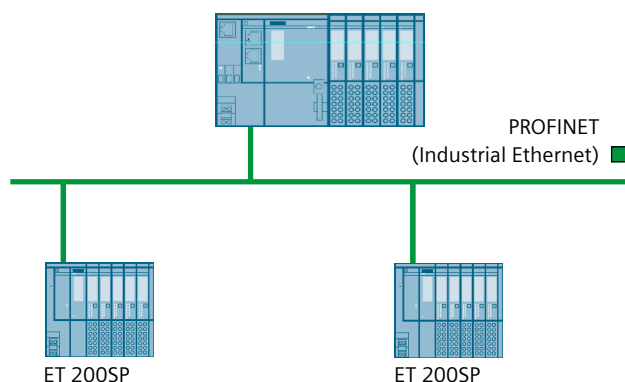


Figure 5-3 Fail-safe SIMATIC Safety automation system (sample configuration)

Fail-safe ET 200SP I/O modules

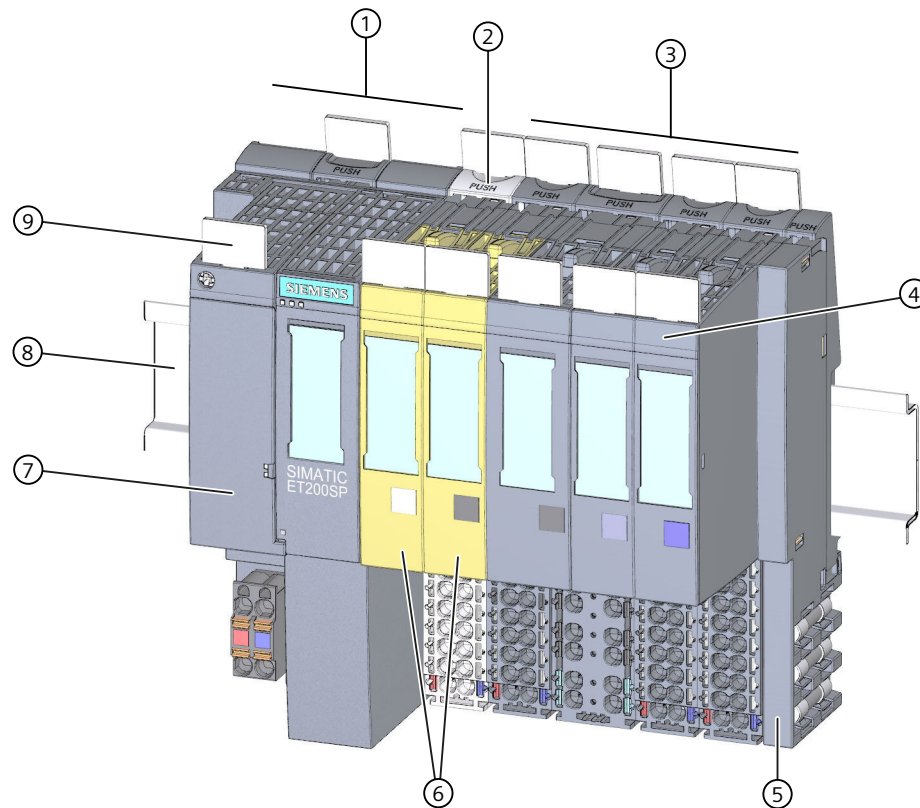
The following fail-safe I/O modules are available for the ET 200SP distributed I/O system:

- Fail-safe power modules are used to supply the potential group load voltage and for the safety-related tripping of the load voltage for non-fail-safe output modules.
- Fail-safe digital input modules detect the signal states of safety-related sensors and send the relevant safety frames to the F-CPU.
- Fail-safe digital output modules are suitable for safety-related shutdown procedures with short circuit and cross-circuit protection up to the actuator.

ET 200SP fail-safe motor starters

Fail-safe motor starters are suitable for safety-related tripping of motor loads.

Example of a configuration with fail-safe I/O modules



- ① Interface module
- ② Light-colored BaseUnit BU..D with infeed of supply voltage
- ③ Dark-colored BaseUnits BU..B for conducting the potential group further
- ④ I/O module
- ⑤ Server module (ships with the interface module)
- ⑥ Fail-safe I/O modules
- ⑦ BusAdapter
- ⑧ Mounting rail
- ⑨ Reference identification label

Figure 5-4 Example of a configuration of the ET 200SP with fail-safe I/O modules

Hardware and software requirements

Fail-safe modules ET 200SP are supported by IM155-6PN ST interface modules as of firmware V1.1.1, IM155-6PN HF as of firmware V2.0, IM155-6PN HS as of firmware V4.0 and IM155-6DP HF as of firmware V1.0.

You require the STEP 7 Safety Advanced option package, V12 or higher including HSP 54, for configuration and programming of the ET 200SP fail-safe modules with the SIMATIC Safety fail-safe system.

You require the F-Configuration Pack V5.5 SP10 or later for configuring and programming the ET 200SP failsafe modules with the Distributed Safety failsafe system.

You require the F-Configuration Pack V5.5 SP12 or later for configuring and programming the ET 200SP failsafe modules with the F/FH Systems failsafe system.

ET 200SP fail-safe motor starters are supported by interface modules IM155-6PN BA, firmware V3.2 or higher, IM155-6PN ST, firmware V3.1 or higher, IM155-6PN HF, firmware V3.1 or higher and IM155-6DP HF firmware V3.0 or higher.

You require SIMATIC Step 7 V14 or higher for configuration and programming of ET 200SP fail-safe motor starters. The F-Configuration Pack is not needed for configuration and programming of the ET 200SP fail-safe motor starter.

NOTE

Configuration of ET 200SP motor starters, SIMATIC Step 7 V13 or higher, is possible with a GSD file (GSDML).

Use in safety mode only

Safety mode is the F-I/O operating mode that allows safety-related communication using safety frames.

Safety mode of motor starters is characterized by the fail-safe digital input (F-DI) and availability of the 24 V power supply.

You can only use the ET 200SP fail-safe I/O modules in safety mode. They cannot be used in non-fail-safe mode.

Achievable safety classes

The fail-safe modules are equipped with integrated safety functions for safety mode.

You can achieve the safety classes of the table below:

- With the appropriate parameter assignment of the safety functions in STEP 7
- With a specific combination of fail-safe and non-fail-safe I/O modules
- With a special arrangement and wiring of the sensors and actuators

Table 5-1 Safety classes that can be achieved with ET 200SP in safety mode

Safety class in safety mode		
According to IEC 61508	According to ISO 13849-1	
SIL2	Category 3	(PL) Performance Level d
SIL3	Category 3	(PL) Performance Level e
SIL3	Category 4	(PL) Performance Level e

More information

You will find the use cases and wiring for the relevant safety class in the manuals of the fail-safe I/Os and the fail-safe motor starters.