SIEMENS

SIMATIC

System components for PRO devices Extension Units

Operating Instructions

05/2024
A5E38523896-AG

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Ⓟ 05/2024 Subject to change

Preface

Validity

These operating instructions apply to the following devices:

Name	MLFB	Description
Extension Unit 12" Hardwired	6AV7674-1LA31-0AA0	Hardwired: All IO signals are connected directly to the plant.
Extension Unit 15" Hardwired	6AV7674-1LA41-0AA0	
Extension Unit 19" Hardwired	6AV7674-1LA51-0AA0	
Extension Unit 22" Hardwired	6AV7674-1LA61-0AA0	
Extension Unit 24" Hardwired	6AV7674-1LA71-0AA0	
Extension Unit 24" Portrait Hardwired	6AV7674-1LA81-0AA0	
Extension Unit 12" PROFINET	6AV7674-1LA32-0AA0	PROFINET: Safety signals are connected directly to the system, all other signals are transmitted via PROFINET.
Extension Unit 15" PROFINET	6AV7674-1LA42-0AA0	
Extension Unit 19" PROFINET	6AV7674-1LA52-0AA0	
Extension Unit 22" PROFINET	6AV7674-1LA62-0AA0	
Extension Unit 24" PROFINET	6AV7674-1LA72-0AA0	
Extension Unit 24" Portrait PROFINET	6AV7674-1LA82-0AA0	
Extension Unit 12" PROFIsafe	6AV7674-1LA33-0AA0	PROFIsafe: All IO signals are transmitted via PROFINET/PROFIsafe.
Extension Unit 15" PROFIsafe	6AV7674-1LA43-0AA0	
Extension Unit 19" PROFIsafe	6AV7674-1LA53-0AA0	
Extension Unit 22" PROFIsafe	6AV7674-1LA63-0AA0	
Extension Unit 24" PROFIsafe	6AV7674-1LA73-0AA0	
Extension Unit 24" Portrait PROFIsafe	6AV7674-1LA83-0AA0	

Conventions

The following terminology is used in this manual:

Generic term	Applies to
Extension Unit	All Extension Units
Extension Unit Hardwired	• Extension Unit 12" Hardwired • Extension Unit 15" Hardwired • Extension Unit 19" Hardwired • Extension Unit 22" Hardwired • Extension Unit 24" Hardwired • Extension Unit 24" Portrait Hardwired
Extension Unit PROFINET	• Extension Unit 12" PROFINET • Extension Unit 15" PROFINET • Extension Unit 19" PROFINET • Extension Unit 22" PROFINET • Extension Unit 24" PROFINET • Extension Unit 24" Portrait PROFINET
Extension Unit PROFIsafe	• Extension Unit 12" PROFIsafe • Extension Unit 15" PROFIsafe • Extension Unit 19" PROFIsafe • Extension Unit 22" PROFIsafe • Extension Unit 24" PROFIsafe • Extension Unit 24" Portrait PROFIsafe
Standard operator controls	Non-fail-safe operator control and display elements, e.g. indicator light, illuminated pushbutton, keyswitch
Safety operator controls	Fail-safe operator controls, e.g. emergency stop button, Pushbutton Safety, Keyswitch Safety
Operator controls	Standard operator controls and safety operator controls
Installation elements	Operator controls and all other elements that can be installed in an Extension Unit.

Figures

This manual contains figures of the described devices. The supplied device might differ in some details from the figures. Within some of the figures, one device is used to represent all devices.

Picture components are marked with black position numbers on a white background ①, ②, ③, ...

Steps in the figures are identified with white process numbers on a black background according to the sequence in which they have to be executed: ❶, ❷, ❸, ...

ID Link for the digital type plate

The ID Link is a unique identifier in accordance with IEC 61406, which you will find in future as a QR code on your product and the product packaging.

You can recognize the ID Link from the frame, which has a black corner at the bottom right. The ID Link takes you to the digital type plate of your product.

Scan the QR code on the product or on the packaging label with a smartphone camera, a bar code scanner or a Read app. Call the relevant link.

In the digital type plate, you will find product data, manuals, Declarations of Conformity, certificates and other helpful information on your product.

Keeping this documentation

NOTICE
Manual belongs to the device This manual belongs to the device and will also be required for recommissioning. Keep all supplied and supplementary documentation for the entire service life of the device. Pass on all of these stored documents to a future owner of the device.

For digitally attached documentation:

1. After you receive your product, download the relevant documentation, at a time no later than the first assembly/commissioning. Use the following options for the download:
   - Technical Support (https://support.industry.siemens.com):
     The documentation is assigned to the product via the article number. The article number can be found on the product and on the packaging label. Products with new, incompatible functions are given a new article number and documentation.
   - ID Link:
     If your product carries an ID Link, you can recognize it as a QR code having a frame with a black corner at the bottom right. The ID Link takes you to the digital type plate of your product. Scan the QR code on the product or on the packaging label with a smartphone camera or a bar code scanner. Call the relevant ID Link.
2. Keep this version of the documentation.

Table of contents

Overview

1

1.1 Product description

The Extension Unit is used to install additional operator controls below a 16:9 SIMATIC PRO device for pedestal (extendable, flange bottom) or for support arm (extendable, round tube).

The example in the figure below shows the Extension Unit 22" with eight operator controls including emergency stop button.

Features

The Extension Units provide high-level industrial functionality:

- Easy and flexible connection options
- Easy installation and connection of operator controls
- Rugged

Device variants

The Extension Unit is supplied without operator controls; the available slots are suitable for installation of operator controls. The Extension Unit is available in the following versions that differ in width and number of slots:

- Extension Unit 12" with 6 slots
- Extension Unit 15" with 8 slots
- Extension Unit 19" with 10 slots
- Extension Unit 22" with 12 slots
- Extension Unit 24" with 12 slots
- Extension Unit 24" Portrait with 6 slots

You can also combine each Extension Unit with any display size.

If additional operator controls are required, a second Extension Unit can be installed under the PRO device.

Note

A maximum of two Extension Units is permitted

A maximum of two Extension Units are permitted below a PRO device for pedestal (extendable, flange bottom) or for support arm (extendable, round tube).

Up to 8 standard operator controls and 2 safety operator controls can be installed and connected in an Extension Unit Hardwired.

All slots can be used by operator controls in an Extension Unit PROFINET and Extension Unit PROFIsafe. Two of these operator controls can be safety operator controls.

1.2 Scope of delivery

The following components are included in the product package:

Extension Unit Hardwired

- 1 Extension Unit
- 1 plug connector, 16-pin for X12 interface
- 1 plug connector, 12-pin for X11 interface
- 1 plug connector, 8-pin for X10 interface
- 1 power supply connector for 24 V DC
- 4 M4x20 screws for mounting the Extension Unit to the SIMATIC PRO device
- Quick Install Guide

Extension Unit PROFINET

- 1 Extension Unit
- 1 plug-in connector, 8-pin for X10 interface
- 1 power supply connector for 24 V DC
- 4 M4x20 screws for mounting the Extension Unit to the SIMATIC PRO device
- Quick Install Guide

Extension Unit PROFIsafe

- 1 Extension Unit
- 1 power supply connector for 24 V DC
- 4 M4x20 screws for mounting the Extension Unit to the SIMATIC PRO device
- Quick Install Guide

The scope of delivery may contain additional documents.

1.3 Design

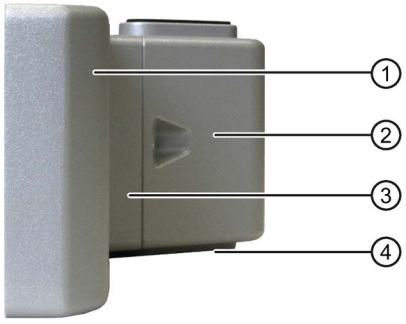
1.3.1 Extension Unit

The figures below show the design of the Extension Units using the Extension Unit 22" as an example.

Front view

① Mechanical interface to the PRO device with seal
② Enclosure
③ Front

Side view



① Enclosure
② Terminal compartment cover
③ Connection compartment
④ Mechanical interface to a stand, to an Extension Unit or for the bottom cover (in case of support arm mounting)

Rear view

① Enclosure
② Rear panel cover
③ Recess for the nameplate

1.3.2 Operator controls and interfaces

The figures below show the position and terminal designations for the slots of the Extension Unit and the position of the cable harness.

Front

Example of an Extension Unit 22" with 7 standard operator controls and one emergency stop button. The other slots are indicated by dotted lines.

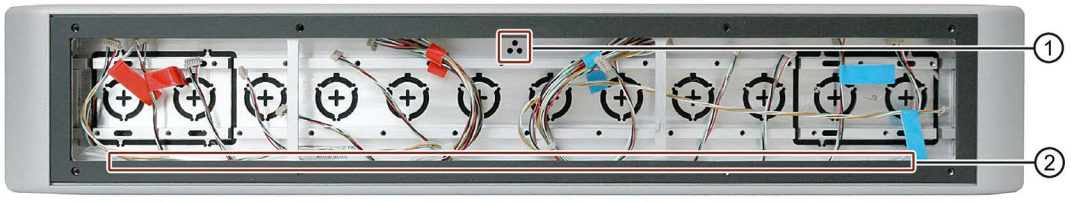
Extension Unit Hardwired	L6	L5	L4	L3	L2	L1	R1	R2	R3	R4	R5	R6
Extension Unit PROFINET Extension Unit PROFIsafe	2	3	4	5	6	7	8	9	10	11	12	13

For the Extension Unit Hardwired, L_x marks the slot positions on the left as counted from the center while R_x marks the slots on the right.

With Extension Unit PROFINET and Extension Unit PROFIsafe, the slots are numbered similar to the display in TIA Portal in ascending order from left to right. The numbering in this and the following figure corresponds to STEP 7 (TIA Portal) as of V15; for V14, the numbering of the slots from 1 to 12 applies.

Rear

The figure below show the enclosure without a rear panel cover using the Extension Unit 22" as an example.



Extension Unit Hardwired	R6	R5	R4	R3	R2	R1	L1	L2	L3	L4	L5	L6
Extension Unit PROFINET Extension Unit PROFIsafe	13	12	11	10	9	8	7	6	5	4	3	2

① Marking for the top of the Extension Unit
② Cable harness

Note that the name or numbering of the slots is reversed when you view the Extension Unit from the rear.

Interfaces of the communication modules

You can find a description of the interfaces of the respective communication module in the connection compartment of the Extension Unit in the section "Interface description (Page 77)".

1.4 Installation elements for the Extension Unit

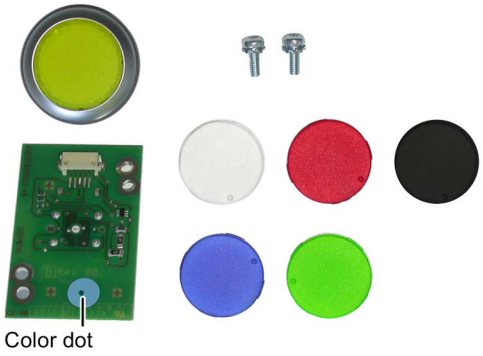
Only use installation components with Siemens approval in the Extension Unit. Ordering information for approved installation elements is available in this section and on the Internet at the following address:

System components for IP65 fully-enclosed devices > Extension Units (https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/10046164)

Operator controls

An operator control is supplied in a kit which contains the following parts:

- Operator control with threaded ring
- Electronic connection module identified by a color dot
- Required fasteners
- Lens assemblies, depending on the type



Example: Operator control kit for an indicator light

The table below shows a selection of operator controls that have been approved for the Extension Unit.

Figure	Name	Description	Color dot	MLFB
	Illuminated pushbutton 1 contact	Standard operator control, 1 NO contact Back-lit button with 6 lens assemblies (red, yellow, green, blue, white, black)	Blue	6AV7674-1MB00-0AA0
	Illuminated pushbutton 2 contacts	Standard operator control, 1 NC contact, 1 NO contact Back-lit button with 6 lens assemblies (red, yellow, green, blue, white, black)	Yellow	6AV7674-1MG00-0AA0
	Indicator light	Standard operator control Indicator light with 6 lens assemblies (red, yellow, green, blue, white, black)	Orange	6AV7674-1MC00-0AA0
	Selector switch	Standard operator control, 2 NO contacts Back-lit switch, 3 positions 2-0-1, latching 2 × 60°	White	6AV7674-1MD00-0AA0

Figure	Name	Description	Color dot	MLFB
	Keyswitch [1]	Standard operator control, 2 NO contacts 3 positions 1-0-2: latching 2 × 90°, 3 removal positions of the key	White	6AV7674-1ME00-0AA0
	Emergency stop mushroom pushbutton	Safety operator control, 2 NC contacts Unlock by turning	Green	6AV7674-1MA00-0AA0
	Pushbutton Safety	Safety operator control, 2 NO contacts Button with 6 lens assemblies (red, yellow, green, blue, white, black)	Red	6AV7674-1MG50-0AA0
	Keyswitch Safety [1]	Safety operator control, 2 NO contacts 2 positions 0-1, latching 1 × 90° (in "V shape") Key can be pulled in position 0.	Red	6AV7674-1ME50-0AA0

[1] The key of the keyswitch is different to the key of the Keyswitch Safety. Both keys can be ordered as spare parts.

Labeling operator controls

The following table shows which articles are available for labeling of operator controls.

Name	Description	MLFB
Insert label	Sheet with insert labels for illuminated pushbuttons, indicator lights and Pushbutton Safety, installation in the operator control behind the lens assembly	6AV7674-1LB30-0AA0
Label holder	Label holder for standard operator controls and safety operator controls except emergency stop button, installation on outside of operator control	6AV7674-1LB20-0AA0

Interface components

Figure	Name	Description	MLFB
	USB port	USB port for installation on the front of the Extension Unit, USB 2.0 Type A cable and plug	6AV7674-1MF00-0AA0

Reader

The figure below shows the reader SIMATIC RF1060R with the optional Card holder for RF1060R.

Reader SIMATIC RF1060R including USB connection cable, article number 6GT2831-6AA50

Optional accessories for the reader:

- Card holder for RF1060R, article number 6GT2890-0CA00

For additional, special system components, see section "Technical support (Page 81)".

1.5 Accessories

An accessory kit with the necessary accessories is included with the Extension Unit.

Note

This section contains a selection of accessories suitable for your device. You can find additional versions of this selection and the complete SIMATIC HMI accessories portfolio in the Industry Mall on the Internet (https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/10144445). Details such as the delivery quantity and technical specifications of accessories can be found in the Industry Mall under the respective article numbers.

You can find an overview of the status and compatibility of the accessories portfolio in the "Cross-list" on the Internet (https://support.industry.siemens.com/cs/ww/en/view/40466415).

HMI I/O components

Name	Suitable for	Article number
Plug-in connector, 8-pin for X10 interface	Extension Unit Hardwired and PROFINET	6AV6881-0HE20-0AA0
Plug-in connector, 12-pin for X11 interface	Extension Unit Hardwired	6AV6671-3XY38-4AX0
Plug-in connector, 16-pin for X12 interface	Extension Unit Hardwired	6AV6671-3XY48-4AX0
Industrial Ethernet RJ45 connector 2x2, 90°	Extension Unit PROFINET and PROFIsafe	6GK1901-1BB20-2A..
Plug for the power supply of the device, 2x2-pin, spring-loaded terminal technology	All Extension Units	6ES7193-4JB00-....

"...." stands for the variant key of the article number.

Safety instructions 2

2.1 Overview

This section contains:

- General safety instructions and application notes, applicable to all Extension Units
- Safety instructions for configuring the Extension Unit PROFINET and Extension Unit PROFIsafe
- Safety instructions for fail-safe operation, for risk analysis of the system and for the safety operator controls, applicable to the Extension Unit PROFIsafe

Depending on the type of your Extension Unit, observe the corresponding safety instructions and additional information.

If the Extension Unit is mounted to a SIMATIC PRO device, the safety instructions and application notes in the SIMATIC PRO operating instructions also apply.

2.2 General safety instructions

The device is designed for operation in industrial areas for operator control and monitoring of plant processes.

⚠ WARNING

Personal injury or material damage due to non-compliance with safety regulations

Failure to exactly comply with the safety regulations and procedures in this document can result in hazards and disable safety functions. This can result in personal injuries or material damage.

Closely follow closely the safety regulations and procedural instructions in each situation.

Observe the safety and accident prevention regulations applicable to your application in addition to the safety instructions given in this document.

NOTICE

Do not modify components inside the Extension Unit

The Extension Unit is designed for the front installation of the built-in elements approved by Siemens.

A modification of the pre-assembled components inside the Extension Unit (e.g. cable harness or communications module) is not permitted.

Safety during configuration and operational safety of the plant

⚠ WARNING

Personal injury or material damage due to improper configuration of the plant

The configuration engineer for plant control must take precautions to ensure that an interrupted program will be correctly integrated again after communication failures, voltage dips or power outages.

A dangerous operating state must not be allowed to occur - not even temporarily - during the entire execution of the control program, even during a troubleshooting.

⚠ WARNING

Programming startup protection in the safety program

At a STOP/RUN transition of an F-CPU, the standard user program starts up as usual. When the safety program starts up, all FDBs are initialized with values from the load memory, same as during a cold restart. As a result, saved error information is lost. The F-system performs an automatic reintegration of the F-I/O. A startup of the safety program with values from the load memory can also be initiated by a handling error or an internal error. If the process does not permit this, a (re)start protection must be programmed in the safety program. The output of process values must be disabled until manually enabled; this must not occur until the process values can be output without posing a hazard and errors have been eliminated.

NOTICE

Safety is the responsibility of the assembler

The safety of any plant or system incorporating the equipment is the responsibility of the assembler of the plant or system.

Note

Observe the Operational Safety and Product Monitoring newsletter.

Plants with safety-related characteristics are subject to special requirements for operational safety on the part of the operator. Vendors are also required to comply with certain measures for monitoring the product. We therefore provide a special newsletter about product development and properties to inform you about important safety aspects for the operation of plants. To ensure that you are always kept up-to-date in this regard and can make changes to your plant, you should subscribe to the appropriate newsletter.

Sign up for the newsletter on safety topics at the following link: Newsletter "Safety Integrated" (https://www.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html)

Safety during commissioning

WARNING

Potential personal injury or material damage due to non-compliance with machine regulations

If it is unclear whether or not the machine operated with the device described in this document meets the provisions of Directive 2006/42/EC, the machine must not be put into operation as there is a risk of personal injury and/or material damage.

Verify before commissioning that the provisions of Directive 2006/42/EC are fulfilled.

Safety when working in and on electrical systems

Work in or on electrical systems may only be carried out by authorized persons. The following safety regulations apply for the prevention of electric shock and electrocution:

1. Switch off the system
2. Secure the system to prevent it switching back on
3. Check the system to ensure it is de-energized
4. Ground and short the system
5. Cover or shield adjacent live parts

Note

These safety steps must always be taken in the above order before any work on electrical systems. Once work on an electrical system is finished, cancel the safety steps starting with the last and finishing with the first.

Label the electrical system in accordance with the applicable safety provisions when work is to be carried out.

Always adhere to the safety provisions applicable in the country of use.

ESD

A device with electronic components is an electrostatic sensitive device. Due to their design, electronic components are sensitive to overvoltage and thus to the discharge of static electricity. Note the applicable regulations for ESD.

Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines, and networks.

In order to protect plants, systems, machines, and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit (https://www.siemens.com/cybersecurity-industry).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under (https://www.siemens.com/cert).

Disclaimer for third-party software updates

This product includes third-party software. Siemens Aktiengesellschaft only provides a warranty for updates/patches of the third-party software if these have been distributed as part of a Siemens Software Update Service contract or officially released by Siemens Aktiengesellschaft. Otherwise, updates/patches are undertaken at your own risk. You can find more information about our Software Update Service offer on the Internet at Software Update Service (https://support.industry.siemens.com/cs/ww/en/view/109759444).

Notes on protecting administrator accounts

A user with administrator privileges has extensive access and manipulation options in the system.

Therefore, ensure there are adequate safeguards for protecting the administrator accounts to prevent unauthorized changes. To do this, use secure passwords and a standard user account for normal operation. Other measures, such as the use of security policies, should be applied as needed.

2.3 Notes about usage

NOTICE
Device approved for indoor use only
The device may be damaged if operated outdoors.
Operate the device indoors only.

Note

The device is intended for operation in an SELV circuit according to IEC/EN 61010-2-201 in a dry environment, which means a dry environment inside the building.

Additional information is available in the section "General technical specifications (Page 72)".

Industrial applications

The device is designed for industrial use. It conforms to the following standards:

- Requirements for interference emissions EN IEC 61000-6-4
- Requirements for interference immunity EN IEC 61000-6-2

Use in mixed-use zone

Under certain circumstances you can use the device in a mixed-use zone. A mixed-use zone is used for housing and commercial operations that do not have a significant impact on residents.

When you use the device in a mixed-use zone, you must ensure that the limits of the generic standard EN 61000-6-3 regarding emission of radio frequency interference are observed.

A suitable measure for achieving these limits for use in a residential area, for example, is the use of filters in power supply lines.

Individual acceptance is required for these measures.

Use in residential areas

Note

Device not intended for use in residential area

The device is not suitable for use in residential areas. Operation of the device in residential areas can affect radio or TV reception.

2.4 Risk assessment of the plant

Note

Risk assessment in an F-system is always required

A risk assessment must be performed for each F-system. The responsibility lies with the operator of the plant.

The following rules apply to the risk assessment of the plant:

- EN ISO 12100:2010, Safety of machinery – General principles for design of machinery – Risk assessment and risk reduction
- ISO 13849-1, Safety of machinery - Safety-related parts of control systems - General principles for design

The results of the risk assessment leads to the Performance Levels a to e according to ISO 13849-1, which indicates how the safety-related system components must be designed if the stop or emergency stop functions are needed locally in a plant segment or globally throughout the plant and which operating mode is to be used for the devices in a safety-related plant area.

In this context, note the following sections:

- Standards on operating safety of the Extension Unit PROFIsafe (Page 66)
- Reaction times and safety characteristics for fail-safe operation (Page 76)

Take the plant configuration as a whole into consideration in the risk assessment and not just the individual areas. Additional information on risk assessment and risk reduction is available at:

"Safety Technology in SIMATIC S7" system manual (https://support.industry.siemens.com/cs/ww/en/view/12490443)

2.5 Important notes on the safety operator controls

Only use safety operator controls with Siemens approval in the Extension Unit Hardwired or the Extension Unit PROFIsafe.

Emergency stop button

⚠ WARNING

Stop functions of Category 0 or 1 according to EN 60204-1

If the emergency stop button is looped as a stop button in the stop circuit of the system, the following applies:

If a category 0 or 1 stop circuit is implemented, the stop function must be effective regardless of the operating mode. A category 0 stop must take precedence. Releasing the emergency stop button must not lead to a dangerous state (see also EN 60204-1, Section 9.2.5.3).

The stop function is not to be used as a replacement for safety equipment.

Pushbutton Safety and Keyswitch Safety

⚠ WARNING

Considering Pushbutton Safety and Keyswitch Safety in the risk analysis and safety configuration

Incorrect wiring, configuration and handling of Pushbutton Safety and Keyswitch Safety can lead to a dangerous state. This can result in personal injury or property damage.

Take the Pushbutton Safety and Keyswitch Safety into consideration according to their function in the hazard analysis and safety configuration of the plant.

Define a suitable proof test interval for the Pushbutton Safety and Keyswitch Safety.

Mounting and connecting the Extension Unit 3

3.1 Preparing the installation

3.1.1 Checking the delivery package

Procedure

1. When accepting a delivery, please check the packaging for visible transport damage.
2. If any transport damage is present at the time of delivery, lodge a complaint at the shipping company in charge. Have the shipper confirm the transport damage immediately.
3. Unpack the device at its installation location.
4. Keep the original packaging in case you have to transport the unit again.

   Note

   Damage to the device during transport and storage

   If a device is transported or stored without packaging, shocks, vibrations, pressure and moisture may impact the unprotected unit. Damaged packaging indicates that ambient conditions have already had a massive impact on the device and it may be damaged.

   This may cause the device, machine or plant to malfunction.

   - Keep the original packaging.
   - Pack the device in the original packaging for transportation and storage.

5. Check the contents of the packaging and any accessories you may have ordered for completeness and damage.

6. Please inform the delivery service immediately if the package contents are incomplete or damaged or do not correspond with your order.

   Do not install a damaged device.

NOTICE
Damage from condensation If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, as is the case in cold weather, for example, moisture can build up on or inside the device (condensation). Moisture causes a short circuit in electrical circuits and damages the device. In order to prevent damage to the device, proceed as follows: • Store the device in a dry place. • Bring the device to room temperature before starting it up. • Do not expose the device to direct heat radiation from a heating device. • If condensation develops, wait until the device is completely dry before switching it on.

7. Please keep the enclosed documentation in a safe place. It belongs to the device. You need the documentation when you commission the device for the first time.
8. Write down the identification data of the device.

3.1.2 Permitted mounting positions

The permissible mounting positions that apply to the Extension Unit are those specified for the PRO device to which the Extension Unit is mounted.

3.1.3 Specifying the operator controls and slots

The description below refers to the front view of the Extension Unit in the standard position, i.e. seal in the mechanical interface of the PRO device on top.

The figure below shows the slots of an Extension Unit 22" as an example.

Extension Unit Hardwired	L6	L5	L4	L3	L2	L1	R1	R2	R3	R4	R5	R6
Extension Unit PROFINET Extension Unit PROFIsafe	2	3	4	5	6	7	8	9	10	11	12	13

With Extension Unit PROFINET and Extension Unit PROFIsafe, the slots are numbered similar to the display in TIA Portal in ascending order from left to right. The numbering in this figure corresponds to STEP 7 (TIA Portal) as of V15; for V14, the numbering of the slots from 1 to 12 applies.

Possible slots for operator controls

The following applies to all Extension Units:

- Each Extension Unit has a specific number of slots for operator controls.
- When an operator control takes up or covers up multiple slots, the total number of slots is reduced.
- A maximum of two safety operator controls and a specific number of standard operator controls can be installed.
- A Pushbutton Safety, Keyswitch Safety or emergency stop button with a yellow ring 40 mm in diameter requires one slot.
- An emergency stop button with a yellow ring 60 mm in diameter covers up the adjacent slots and therefore takes up:
  - Two slots when the emergency stop button is installed in an outer slot.
  - Three slots when the emergency stop button is installed between two slots.
- A reader can be installed all the way on the left or right in the Extension Unit. The reader covers 3 slots.

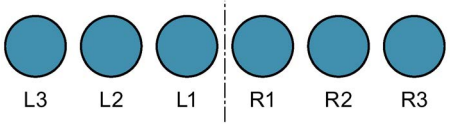
Special feature of the Extension Unit Hardwired

You can connect a maximum of 8 standard operator controls and 2 safety operator controls to the cable harness of the Extension Unit Hardwired.

The figures below show the total number of freely selectable slots and the number of possible standard operator controls for the different Extension Units Hardwired. Safety operator controls have separate plug-in connectors.

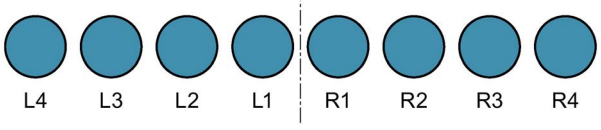
Extension Unit 12" Hardwired and Extension Unit 24" Portrait

Maximum of 6 operator controls:



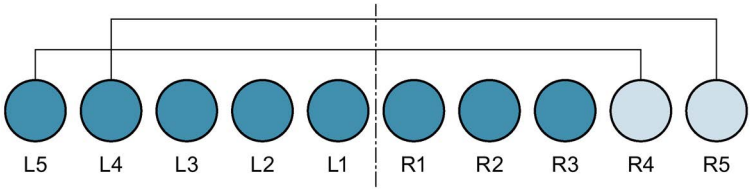
Extension Unit 15" Hardwired

8 slots, maximum of 8 operator controls:



Extension Unit 19" Hardwired

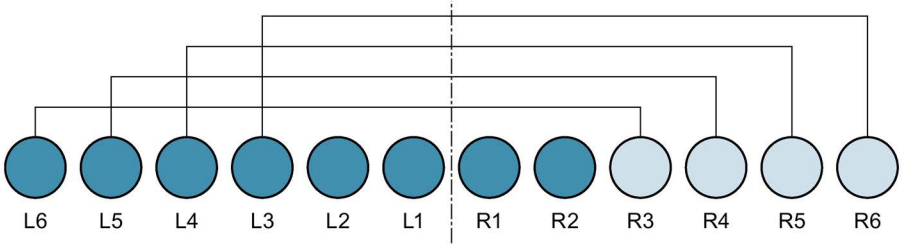
10 slots, maximum of 10 operator controls, maximum of 8 standard operator controls:



Connected slots must only be occupied by one standard operator control, either left (L) or right (R).

Extension Unit 22" Hardwired and Extension Unit 24" Hardwired

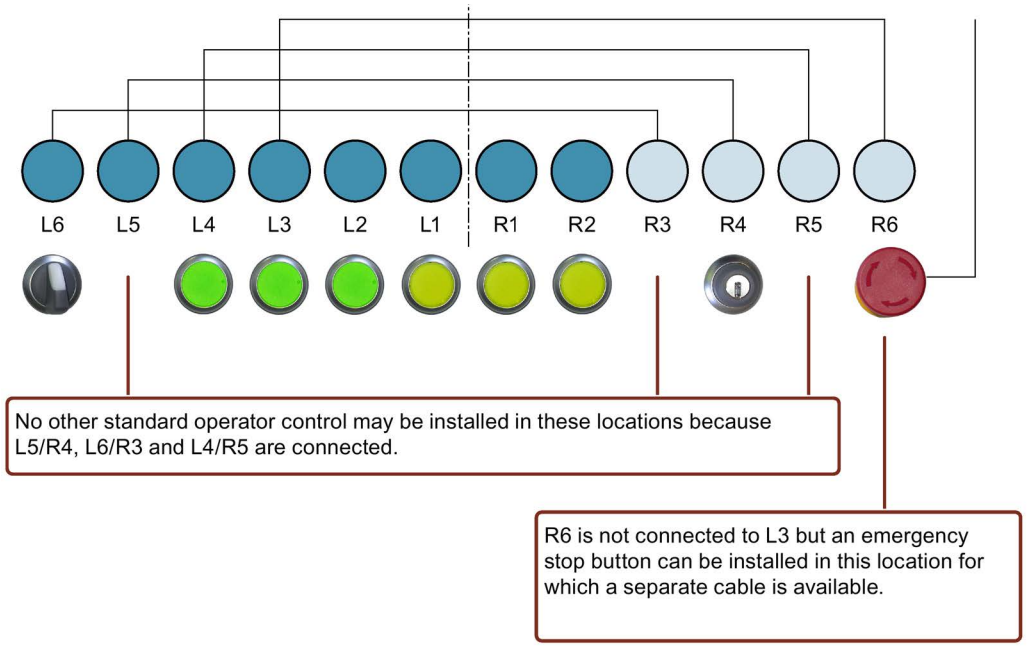
12 slots, maximum of 10 operator controls, maximum of 8 standard operator controls:



Connected slots must only be occupied by one standard operator control, either left (L) or right (R).

Assignment example for an Extension Unit Hardwired

The figure below shows an example of how to install 8 standard operator controls in an Extension Unit Hardwired 22" and use one of the connected slots for the installation of an emergency stop button.



3.2 Important notes for installation

NOTICE
Degree of protection IP65/Type 4X at risk when seals are not seated correctly When there are no seals on the mechanical interfaces of the Extension Unit or if they are damaged, IP65/Type 4X degree of protection is at risk. During installation, especially when assembling the Extension Unit, check the condition and proper seating of the seals. **Damage of the Extension Unit or the PRO device caused by unsuitable screws** Screws made from unsuitable material and screws of an incorrect dimension can damage the Extension Unit or the PRO device. Use only the screws supplied in the accessory kit for the Extension Unit. **Do not exceed torques** When you tighten the screws with an excessive torque, you can damage the threading in the enclosure. Tighten the screws with the specified torques.

Tools required

For installation of the Extension Unit you need:

- A torque screwdriver with T10 insert
- A torque screwdriver with T20 insert

For installation of operator controls you also need:

- A Phillips screwdriver, size 4
- A sharp knife, e.g. a cutter

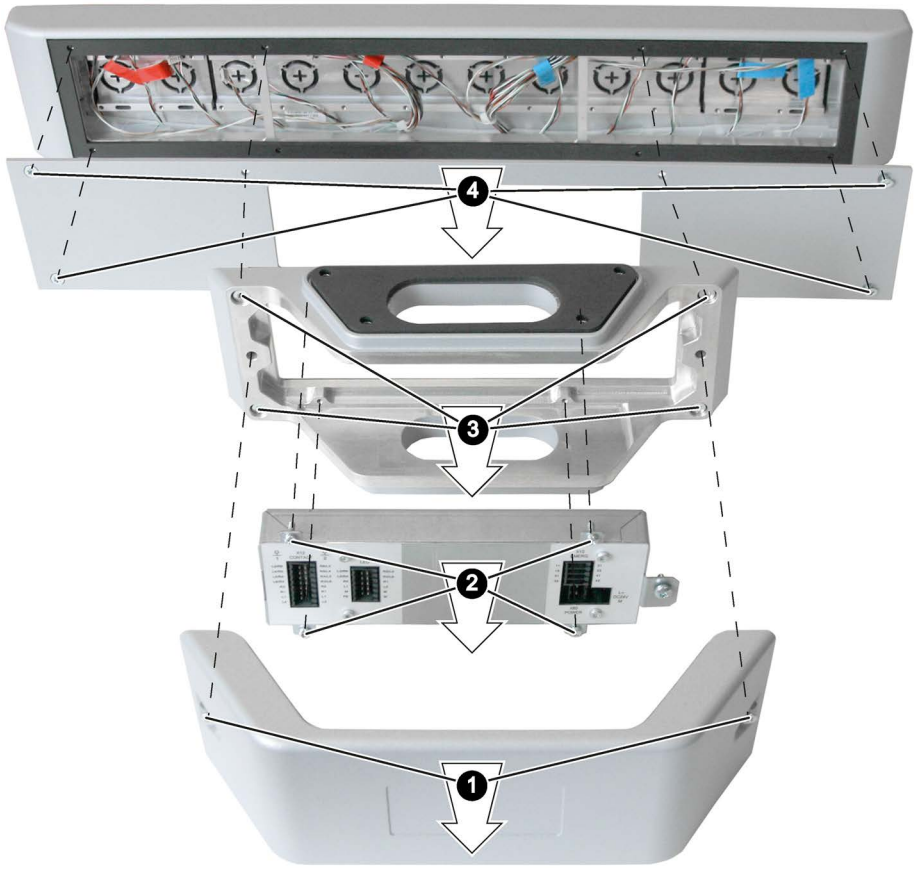
For installation of a reader you also need:

- A slotted screwdriver, size 4
- A sharp knife, e.g. a cutter

3.3 Disassembling the Extension Unit

The Extension Unit must be disassembled for installation of operator controls and for mounting the Extension Unit to a PRO device. The figure below shows an Extension Unit 22" Hardwired as an example.

Procedure



1. Loosen the 2 screws of the terminal compartment cover with a T20 screwdriver and remove the terminal compartment cover.
2. Loosen the 4 screws of the communication module with a T10 screwdriver and carefully put down the communication module.
3. Loosen the four screws of the connection compartment with a T20 screwdriver and carefully put down the connection compartment. The screws also fasten the rear panel cover.
4. Loosen the 4 remaining screws of the rear panel cover with a T20 screwdriver and remove the rear panel cover from the front.

3.4 Installing operator controls

NOTICE
Use only approved operator controls Operator controls that are not approved can damage the Extension Unit and the PRO device. Only install operator controls with Siemens approval in the Extension Unit, see section "Installation elements for the Extension Unit (Page 13)".

Procedure

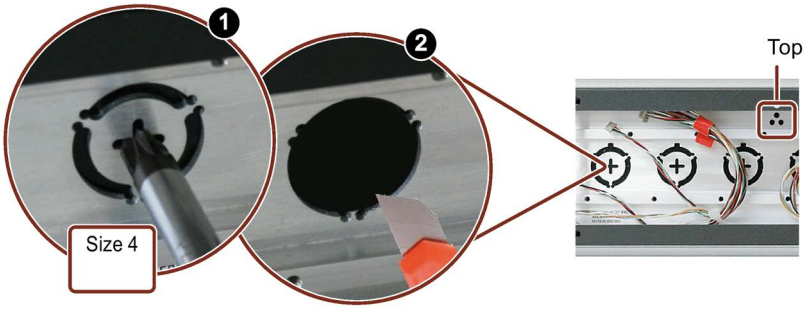
Note

Place the Extension Unit on a soft surface to avoid scratching the front.

The following description is based on the standard position of the Extension Unit, which means as views from the inside with the cable harness below, the marking (∴) above.

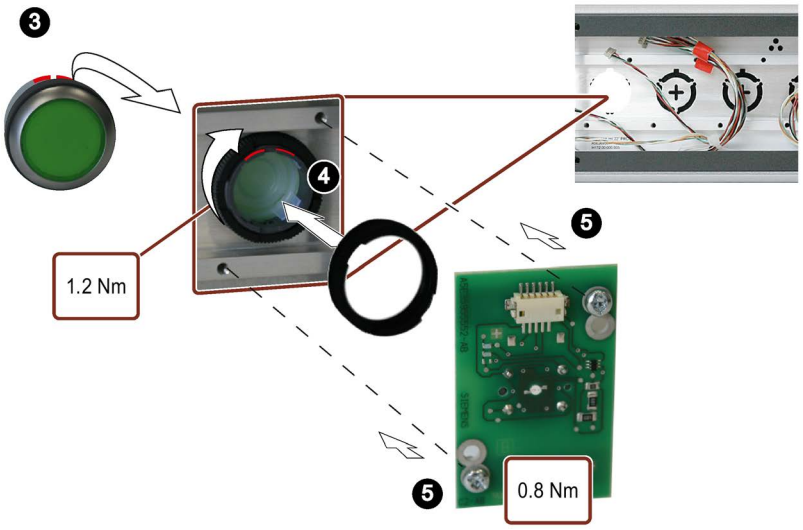
The following description shows the installation of an operator control using the example of an illuminated pushbutton. A safety operator control is installed in the same way.

1. Remove the plate at the required mounting position with a size 4 Phillips screwdriver.

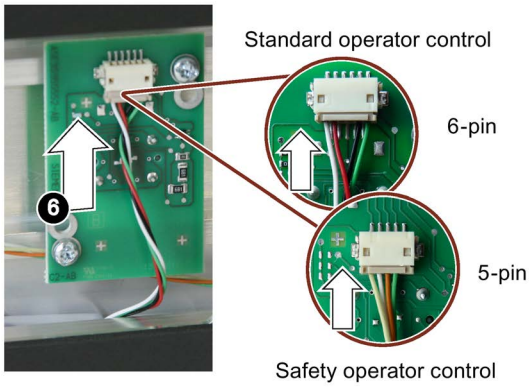


2. Cut out the foil at the required mounting position with a sharp knife. Notice! Only cut within the cutout. To ensure a tight fit, the foil cutout can be smaller but not larger than the cutout for the operator control.

3. Insert the operator control at the mounting position from the front of the Extension Unit, the nipple for anti-twist protection must point up.



4. Fasten the operator control from the inside with the supplied nut, torque = 1.2 Nm.
5. Insert the connection module of the operator control into the Extension Unit so that the plug-in connector is at the top. Fasten the connection module onto the enclosure of the Extension Unit at the marked locations, torque 0.8 Nm.
6. Connect the corresponding connector of the cable harness to the connector of the connection module:



Connector types:

- Standard operator controls: 6-pin connector, white/red/black/green (from left to right as seen from inside of Extension Unit).
- Safety operator controls: 5-pin connector, yellow/white, brown, green (from left to right as viewed from inside of Extension Unit).
  The safety operator control connection "left" as viewed from front view of the Extension Unit from the outside is marked with blue adhesive tape; the safety operator control connection "right" as viewed from the front view of the Extension Unit from the outside is marked with red adhesive tape.

Note

Extension Unit PROFIsafe with one safety operator control

If you are only installing one safety operator control in an Extension Unit PROFIsafe, use the 5-pin connector "right" identified with the red tape for this safety operator control.

Repeat steps 1 to 6 for all operator controls you want to install.

3.5 Installing interface components

The interface components are installed in the same way as the operator controls.

If you are dealing with an interface component without a connection module, the last steps for installing and connecting the connection module are omitted.

Tighten the threaded ring of the interface component with a torque of 1.2 Nm.

3.6 Installing the reader

NOTICE

Use only approved readers.

Readers that are not approved may damage the Extension Unit and the PRO device. Only install readers with Siemens approval in the Extension Unit, see section "Installation elements for the Extension Unit (Page 13)".

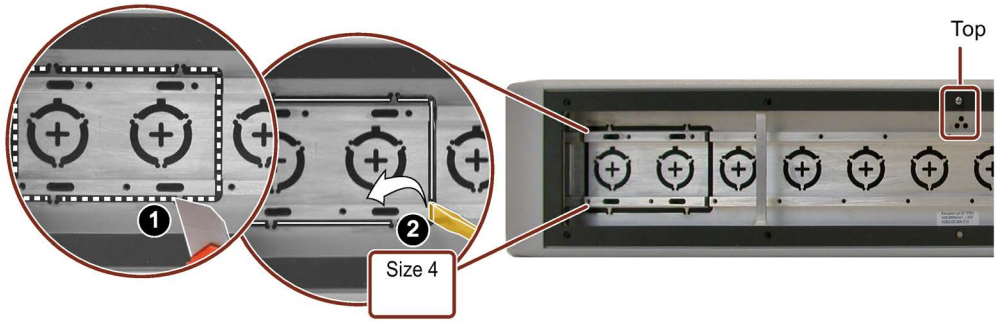
Procedure

Note

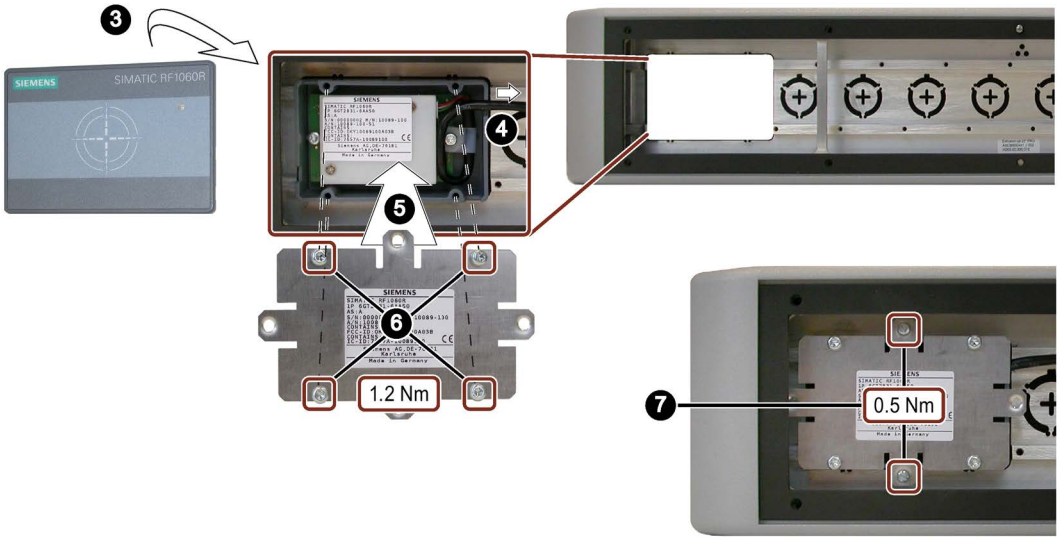
Place the Extension Unit on a soft surface to avoid scratching the front.

The following description is based on the standard position of the Extension Unit, which means as viewed from the inside with the cable harness below, the marking (⁘) above.

1. Cut out the foil on the inside of the Extension Unit along all cutouts required for the reader with a sharp knife. Notice! Only cut within the cutouts.



2. Insert a screwdriver size 4 as shown in a gap of the screw bar and carefully lift out the metal plate. If the metal plate does not release completely, use the screwdriver and insert it into a different gap of the screw bar.
3. Insert the reader from the front into the Extension Unit. Take care that the reader is not upside down.



4. Guide the USB cable of the reader through one of the cutouts to the outside of the reader housing.
5. Place the cover on the reader. Make sure that you do not pinch the USB cable.
6. Fasten the cover of the reader with the 4 supplied tapping screws M3x10, torque 1.2 Nm.
7. Secure the reader - as shown in the figure above - with two of the supplied set screws M4x20 in the Extension Unit. Use a slotted size 2 screwdriver, torque 0.5 Nm. It may happen that the two threaded shackles on the cover of the reader bend slightly when they are screwed in. This does not damage the reader.

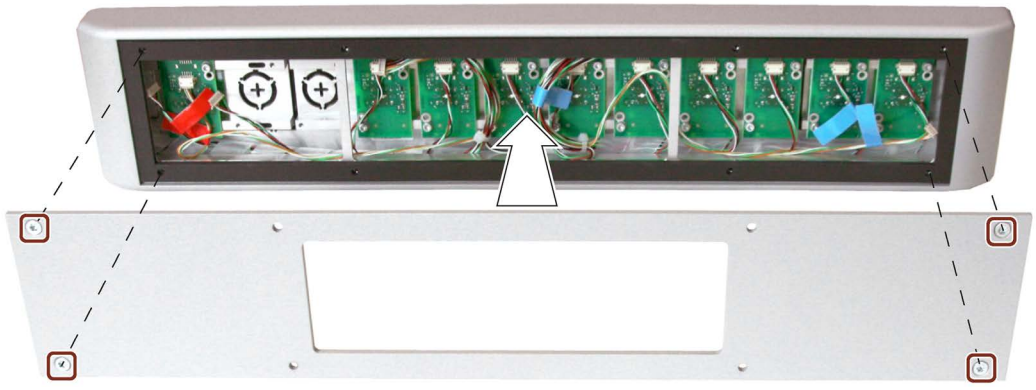
To install the optional card holder for RF1060R, insert the card holder into the retainers on the reader until they snap into place.

3.7 Closing the rear panel cover

Procedure

When all operator controls are installed, fasten the rear panel cover to the enclosure of the Extension Unit as shown in the figure below.

NOTICE
Do not pinch the cables, connectors X15 and X17 visible in cutout When fastening the rear panel cover, make sure that you do not pinch the cables of the cable harness and that the connectors X15 and X17 remain visible in the cutout of the rear panel cover so that they are easily accessible.



Tighten the 4 marked screws with a torque of 1.5 Nm.

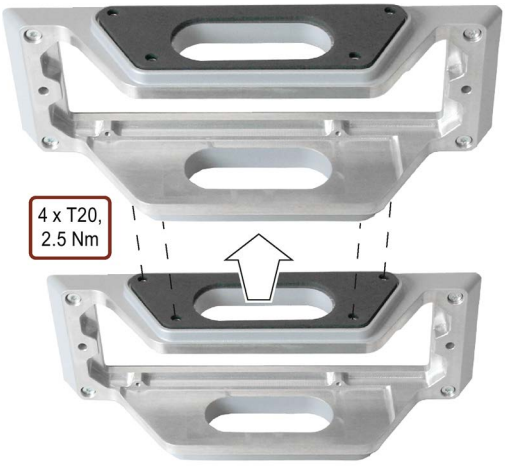
3.8 Mounting the Extension Unit

Requirement

- A SIMATIC PRO device for pedestal (extendable, flange bottom) or for support arm (extendable, round tube)
- Stand mounting: The base adapter is mounted on the stand.
- Support arm mounting: The bottom cover was removed from the PRO device.

Preparations

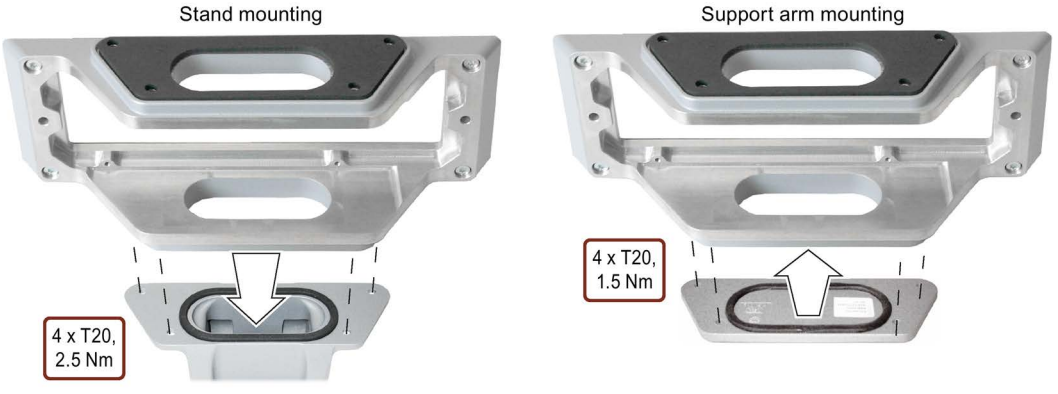
Installation of two Extension Units: Fasten the connection compartment of the bottom Extension Unit with four T20 screws to the mechanical interface of the top Extension Unit with a torque of 2.5 Nm. Proceed as described to install an individual Extension Unit.



Rear panel

Stand mounting: Fasten the connection compartment to the mechanical interface of the stand with 4 T20 screws and a torque of 2.5 Nm.

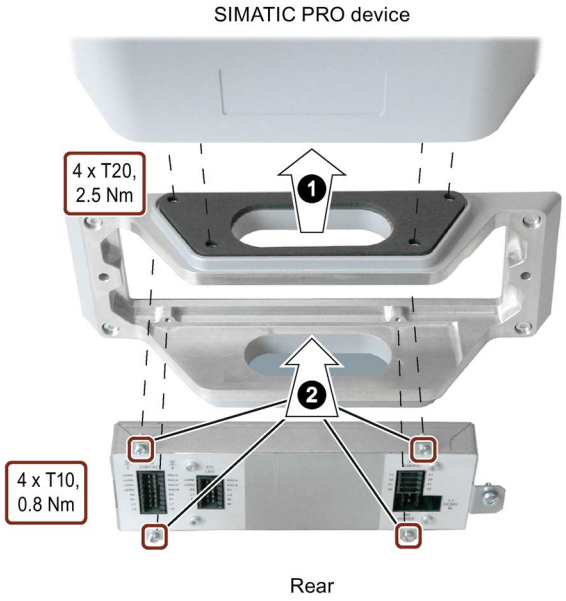
Support arm mounting: Attach the bottom cover of the PRO device to the bottom of the connection compartment with 4 T20 screws and a torque of 1.5 Nm.



Rear

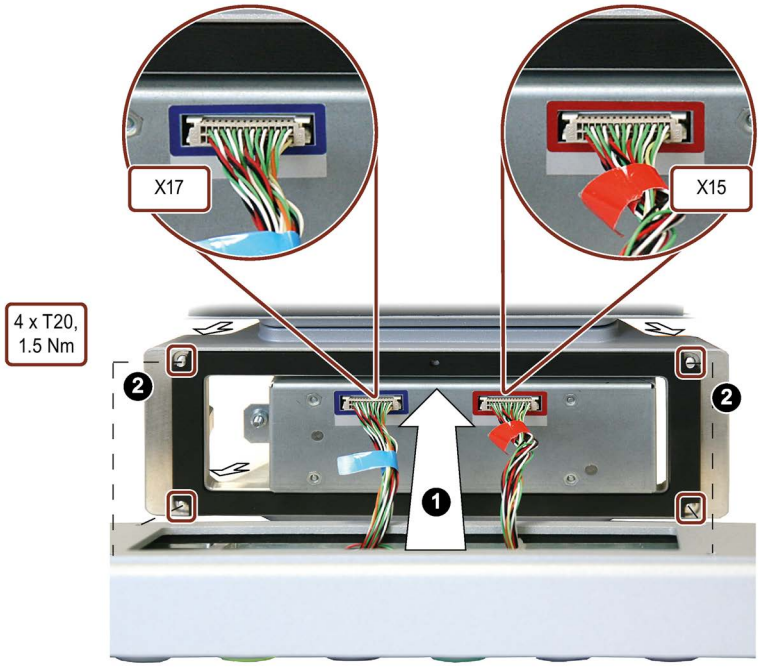
Fastening the Extension Unit to the PRO device

The figure below shows an Extension Unit Hardwired as an example.



1. Fasten the connection compartment onto the PRO device as shown below with a torque of 2.5 Nm using the 4 screws and the angled T20 screwdriver included in the product package.
2. Fasten the communication module to the connection compartment with 4 T10 screws and a torque of 0.8 Nm.

Mounting and connecting front with operator controls



Front

1. Attach the front of the Extension Unit to the connection compartment as shown and connect the 30-pin connector of the cable harness to the interfaces X15 and X17 of the communication module. The cable harnesses of the connectors are marked with colored adhesive tape as follows:
   - Blue adhesive tape = connector X17
   - Red adhesive tape = connector X15
2. Fasten the front from the rear with the connection compartment with 4 T20 screws and a torque of 1.5 Nm.

3.9 Extension Unit PROFIsafe - Setting the PROFIsafe address

The PROFIsafe address on the PROFIsafe device must be set and configured in the engineering system for PROFIsafe communication with a PROFIsafe device in a system.

Note

The PROFIsafe address of a PROFIsafe device must be unique throughout the network and station. You can assign a maximum of 1022 PROFIsafe addresses in a single system.

The configured PROFIsafe address must match the PROFIsafe address that is set on the PROFIsafe device.

This section describes how to set the PROFIsafe address in an Extension Unit PROFIsafe.

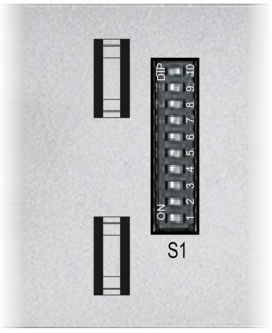
Requirement

- The Extension Unit PROFIsafe is mounted.
- The connection compartment of the Extension Unit PROFIsafe is open.
- A PROFIsafe address has been specified for the Extension Unit PROFIsafe.

Procedure

1. De-energize the Extension Unit PROFIsafe.
2. Set the PROFIsafe address with the DIP switch on the back of the communication module of the Extension Unit PROFIsafe.

   The PROFIsafe address is set in binary form with the DIP switch and entered as numerical value in the engineering system.



Example

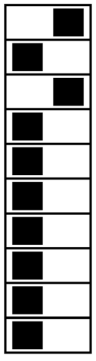
The PROFIsafe address "383" has been specified for the Extension Unit PROFIsafe.

Corresponding setting on the DIP switch (9...0): 0101111111

Setting of the switch bits:

- 1 = switch setting "ON"
- 0 = switch setting "OFF".

Set the DIP switch on the back of the communication module as follows:



Switches	Bit number	Valence	Address
10	9	512	0
9	8	256	256
8	7	128	0
7	6	64	64
6	5	32	32
5	4	16	16
4	3	8	8
3	2	4	4
2	1	2	2
1	0	1	1
			383

The illustrated switch settings correspond with the binary address 383.

See also

Extension Unit PROFIsafe - Safety configuration (Page 53)

3.10 Connecting the Extension Unit

3.10.1 Connection information

Connecting cables

Use only shielded standard cables as data connecting cables, order information is available in the Industry Mall (https://mall.industry.siemens.com).

Note

Separate SELV/PELV circuits from other electric circuits or insulate the cables

The wiring of SELV/PELV circuits must either be separated from the wiring of other non-SELV/PELV electric circuits, or the insulation of all conductors must be rated for the higher voltage. Alternatively, a grounded shielding or additional insulation must be installed around the wiring for SELV/PELV circuits or the other electric circuits, based on IEC 60364-4-41.

Note on the use of the Extension Unit within the scope of UL508

Note

Use copper cables at the connectors with terminal connections

Use copper (Cu) cables for all supply lines that are connected to the device with terminals, for example, 24 V DC power supply cables to the 24 V DC power supply connector.

Utiliser des câbles en cuivre et des connexions par borne

Utilisez des câbles en cuivre (Cu) pour tous les câbles d'alimentation qui sont raccordés à l'appareil par des bornes, par exemple des câbles d'alimentation 24 V CC avec un connecteur d'alimentation 24 V CC.

Connecting the cables

NOTICE
Observe the local installation regulations Observe the local regulations and the local installation conditions, such as protective wiring for power supply cables, when connecting the cables.

NOTICE
Thermal stability and insulation of the cables
Use cables with a maximum permitted operating temperature that is at least 20 °C higher than the maximum ambient temperature.
The insulation of the cables must be suitable for the operating voltage.

- When connecting the cables, make sure that you do not bend the contact pins.
- Secure each cable connector with a cable tie.
- Provide adequate strain relief for all cables.
- The pin assignment of the ports is described in the technical specifications.

3.10.2 Connecting the functional grounding

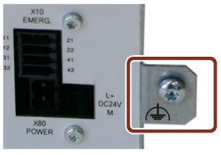
Requirement

- The Extension Unit is mounted.
- 1 cable for functional grounding, cross section 2.5 to 4 mm^2, with cable lug for M4 is threaded through the pedestal or support arm to the connection compartment.
- 1 T20 screwdriver

Procedure

The figure below shows the communication module of an Extension Unit Hardwired or Extension Unit PROFINET as an example.

1. Clamp the cable lug onto the cable for functional grounding.
2. Connect the cable lug to the marked screw.
   Tighten the screw with a torque of 1.5 Nm.



3. Connect the cable for functional grounding to the corresponding connector of the control cabinet from which the Extension Unit is supplied with power.

3.10.3 Connecting the power supply

The operator controls are supplied by the 24 V DC power supply of the Extension Unit.

NOTICE
Safe electrical separation For the 24 V DC supply, only use power supply units with safe electrical isolation in line with IEC 61010-2-201, e.g. according to the SELV/PELV standard. The supply voltage must be within the specified voltage range, see section "General technical specifications (Page 72)". Incorrect voltage may cause malfunctions. The following applies for a non-isolated system design: Connect the GND 24 V connection from the 24 V power supply output to equipotential bonding for uniform reference potential. You should always select a central point of termination.

Requirement

- The Extension Unit is mounted.
- 2 power supply cables, cross section 0.25 to 2.5 mm^2, threaded though the stand or support arm to the connection compartment.
- 1 power supply connector from the accessory kit of the Extension Unit

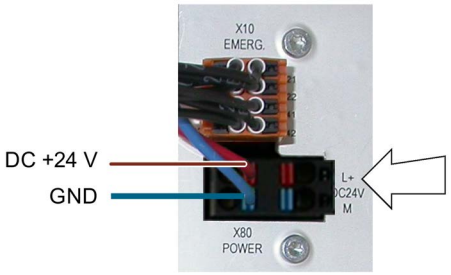
Connecting the power supply connector

1. Switch off the power supply.
2. Connect the cables of the power supply to the power supply connector. Please note the polarity, see figure below.

   Note

   Connect the cables only when the power supply connector is removed.

3. Plug the power supply connector into the "X80 POWER" socket as shown below. The figure below shows the communication module of an Extension Unit Hardwired or Extension Unit PROFINET as an example.



3.10.4 Connecting the data cables

Requirement

- The Extension Unit is mounted.
- Depending on the type of the Extension Unit, the following connection cables are threaded though the stand or support arm to the connection compartment:

Extension Unit Hardwired	**Extension Unit PROFINET**	**Extension Unit PROFIsafe**
Cables for the digital inputs/outputs of the operator controls, cross section 0.14 mm to 1.5 mm^2		
Connecting cables for the safety operator controls, cross-section 0.14 mm to 1.5 mm^2		
	PROFINET cable	

- Depending on the type of Extension Unit, the following plug-in connectors are available:

Extension Unit Hardwired	**Extension Unit PROFINET**	**Extension Unit PROFIsafe**
Plug-in connector, 12-pin for X11* interface Plug-in connector, 16-pin for X12* interface		
Plug-in connector, 8-pin for X10* interface		
	Angled PROFINET connector	

* included in the accessory kit of the respective Extension Unit

Procedure

1. Connect the connection cables with the corresponding plug-in connectors.

   Extension Unit Hardwired
   - Contacts of the standard operator controls: X12 connector
   - LEDs of the standard operator controls: X11 connector
   - Contacts of the safety operator controls: X10 connector

   Extension Unit PROFINET
   - Contacts of the safety operator controls: X10 connector
   - PROFINET cable: Angled PROFINET connector

   Extension Unit PROFIsafe
   - PROFINET cable: Angled PROFINET connector

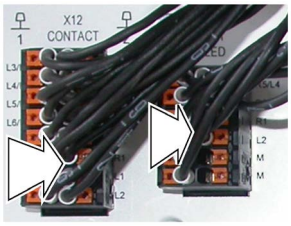
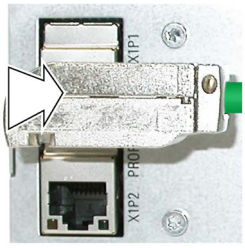
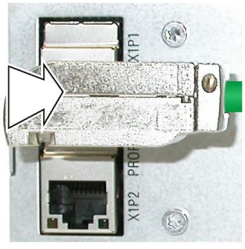
   Note

   Angled PROFINET connector required for Extension Unit PROFINET and PROFIsafe

   The connection compartment of the Extension Unit can only be closed properly when you use an angled PROFINET connector.

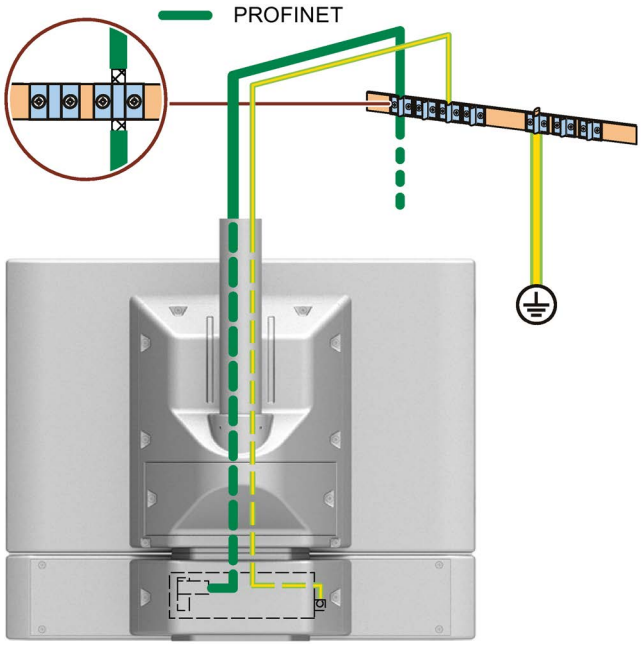
   You can find details on wiring the connectors X10, X11 and X12 in the section "Digital inputs/outputs (Page 78)".

2. Connect the respective connector to the corresponding interface.

Extension Unit	Communication module "left"	Communication module "right"
Extension Unit Hardwired	X12 and X11 	X10 
Extension Unit PROFINET	X1 	X10 
Extension Unit PROFIsafe	X1 	

Applying cable shields to reference potential

The following applies to the Extension Unit PROFINET and the Extension Unit PROFIsafe: Clamp the shield of the PROFINET cable from the Extension Unit flush at the rail for the functional grounding using suitable cable clamps as seen in the figure below.



The rail for functional grounding should be installed close to the Extension Unit or the device. Route the functional grounding cable and the data cables in parallel and with minimum clearance in between.

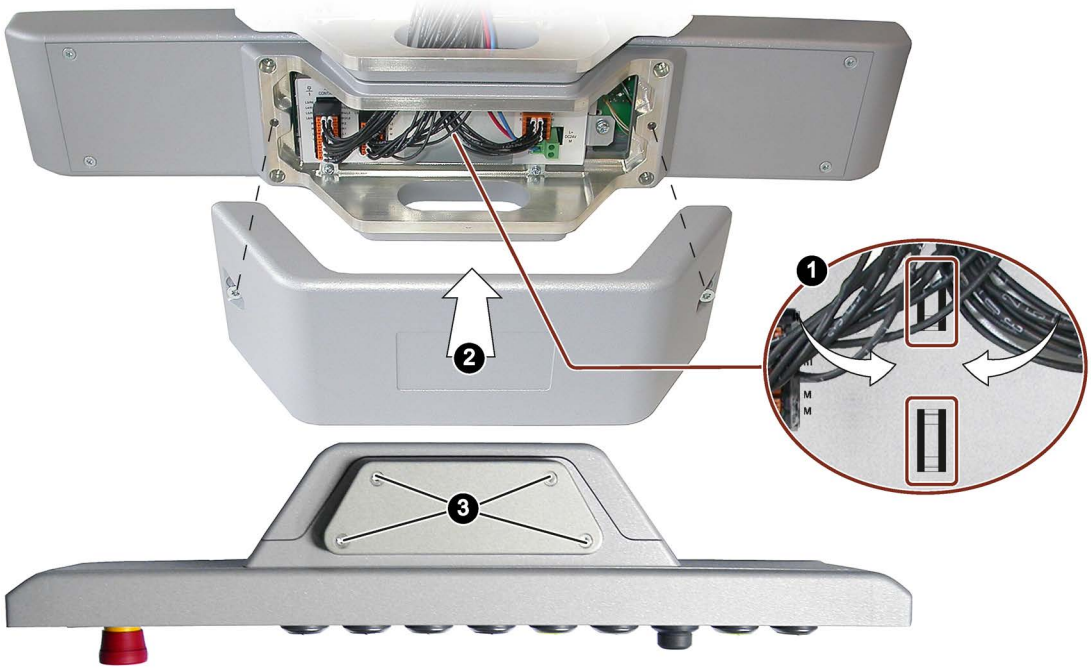
3.11 Securing cables and closing the Extension Unit

Requirement

- The Extension Unit is mounted.
- Functional ground, power supply and all data cables are connected to the communication module of the Extension Unit.

Procedure

The figure below shows an Extension Unit Hardwired as an example. The cables are secured and the Extension Unit PROFINET and PROFIsafe are closed in the same way.



1. Use cable ties to secure the connected cables to the selected fasteners of the communication module for strain relief.
2. Fasten the connection compartment cover back onto the connection compartment with a T20 screwdriver and a torque of 1.5 Nm.
3. When you have mounted the Extension Unit to a PRO device for support arm (extendable, round tube) and no additional Extension Unit is mounted to the bottom of the Extension Unit, fasten the cover included in the PRO device product package with four T20 screws from below to the Extension Unit, torque 1.5 Nm.

3.12 Removing Extension Unit

This section describes how to remove the Extension Unit properly, if necessary.

The Extension Unit is generally removed in the reverse order for mounting and connecting.

Procedure

Proceed as follows:

1. Switch off the power supply of the Extension Unit.
2. Open the Extension Unit. Loosen the 2 screws of the terminal compartment cover and remove the terminal compartment cover.
3. Remove all cable ties that were installed for tension relief of the connecting cables in the connection compartment of the Extension Unit.
4. Remove all plug-in connectors and the equipotential-bonding cable from the communication module of the Extension Unit.
5. Unscrew the four T10 screws of the communication module and carefully remove the communication module from the connection compartment.
6. Remove the plugs of the connecting cables from interfaces X15 and X17 of the communication module.
7. Unscrew the four T20 screws that connect the connection compartment to the PRO device, another Extension Unit or a supporting foot and remove the Extension Unit.
8. Reconnect the plugs of the connecting cables X15 and X17 with the communication module.
9. Fasten the communication module using the four T10 screws in the connection compartment, torque 0.8 Nm.
10. Close the Extension Unit. Fasten the terminal compartment cover to the two T20 screws, torque 1.5 Nm.

See also

Mounting the Extension Unit (Page 34)

Securing cables and closing the Extension Unit (Page 44)

Connecting the Extension Unit (Page 38)

Configuring Extension Unit PROFINET and PROFIsafe

4

4.1 Software requirements

You configure the Extension Unit PROFINET and the Extension Unit PROFIsafe with the STEP 7 (TIA Portal) software. The configuration possibilities and the need to install a Hardware Support Package in addition depend on the TIA Portal version. These dependencies are described in the following paragraphs of this section.

TIA Portal version

TIA Portal V14 or V15

If you are using TIA Portal V14 or V15, you need the STEP 7 (TIA Portal) V14 or V15 software with a Hardware Support Package to configure the Extension Unit PROFINET and the Extension Unit PROFIsafe:

- HSP_V<TIA version>_0209_001_SysComp_ExtUnit_1.0.isp<TIA version> for configuring the Extension Unit PROFINET
- HSP_V<TIA version>_0210_001_SysComp_ExtUnitPS_1.0.isp<TIA version> for configuring the Extension Unit PROFIsafe

Hardware Support Packages can be found on the Internet at the following address: Support Packages for the hardware catalog in the TIA Portal (https://support.industry.siemens.com/cs/ww/en/view/72341852).

You can find a description of the installation of a Hardware Support Package in the information system of TIA Portal.

The SIMATIC STEP 7 Safety optional package is required for installation of the Hardware Support Package for the Extension Unit PROFIsafe.

TIA Portal V15.1

If you are using TIA Portal V15.1 or higher, you do not need a Hardware Support Package to configure the Extension Unit PROFINET and the Extension Unit PROFIsafe.

Configuration options

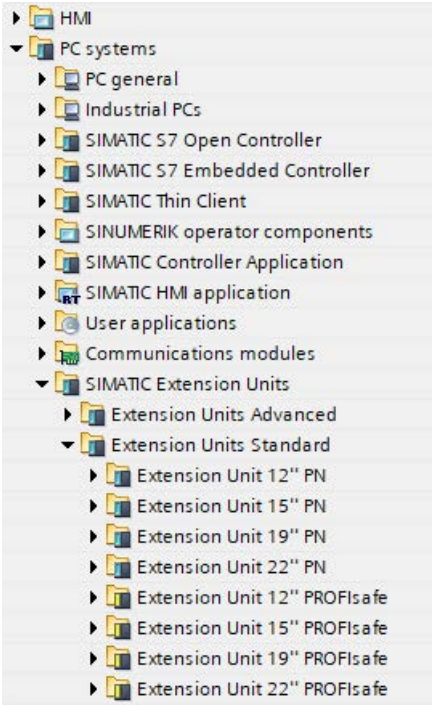
With TIA Portal V14, V15 and V15.1, you can configure the Extension Units, all standard operator controls and the emergency stop button.

As of TIA Portal V16, you can also configure the Pushbutton Safety and Keyswitch Safety.

4.2 Overview

The following sections describe the configuration of the Extension Units and the operator controls. The figures in the following sections correspond to STEP 7 (TIA Portal) V16 and might deviate from the display on your configuration PC in some details. Configuration with other TIA Portal versions is performed in the same way.

If the required software is installed, you can find the corresponding Extension Units in the catalog tree under:
"Devices & Networks > PC systems > SIMATIC Extension Units > Extension Units Standard":



If you are using STEP 7 (TIA Portal) V14 or V15 with HSP, you will find the Extension Units in the catalog tree under "Devices & Networks > PC systems > System Components for IP65 fully enclosed devices".

From the catalog tree, you can place the required Extension Unit in the "Devices & Networks" editor and network it with a controller.

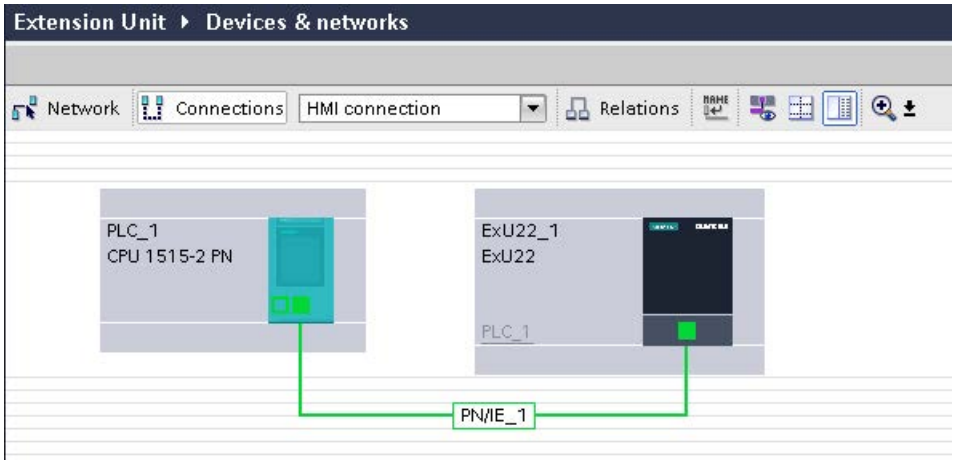
Note

Configuring Extension Units 24"

The Extension Units 24" are not in the catalog tree, but have the same number of slots as an Extension Unit 22" or an Extension Unit 12".

- If you are using an Extension Unit 24" PROFINET or PROFIsafe, configure the corresponding Extension Unit 22".
- If you are using an Extension Unit 24" Portrait PROFINET or PROFIsafe, configure the corresponding Extension Unit 12".

The figure below shows the Network view of an Extension Unit 22" PROFINET that is connected to a CPU 1515-2 PN.



Note

Configuring Extension Unit PROFIsafe in combination with F-CPU

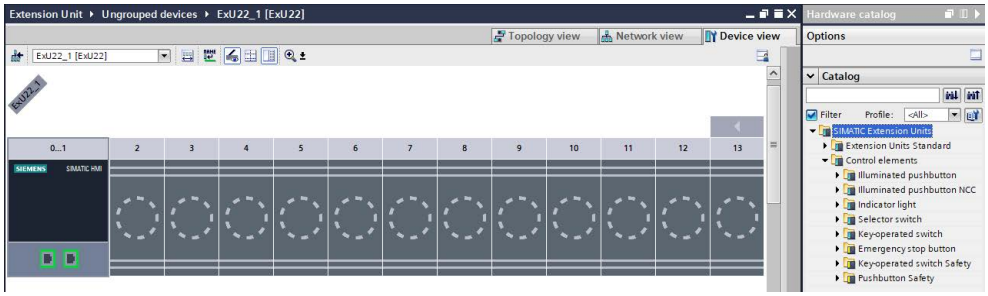
An Extension Unit PROFIsafe must only be configured in combination with an F-CPU and networked accordingly.

PROFINET device name

The PROFINET device name under "PROFINET interface [Xn] > Ethernet interfaces" must match the physical device name of the Extension Unit that is assigned online. You can find more information in the "PROFINET" system manual on the Internet (https://support.industry.siemens.com/cs/us/en/view/19292127).

You can also set up a ring topology with the Extension Unit PROFINET and the Extension Unit PROFIsafe, for example, to increase availability. The respective Extension Unit is entered as MRP client.

The slots for operator controls are displayed in the Device view of the Extension Unit. The operator controls for Extension Units are displayed in the catalog tree of the Device view.



4.3 Configuring standard operator controls

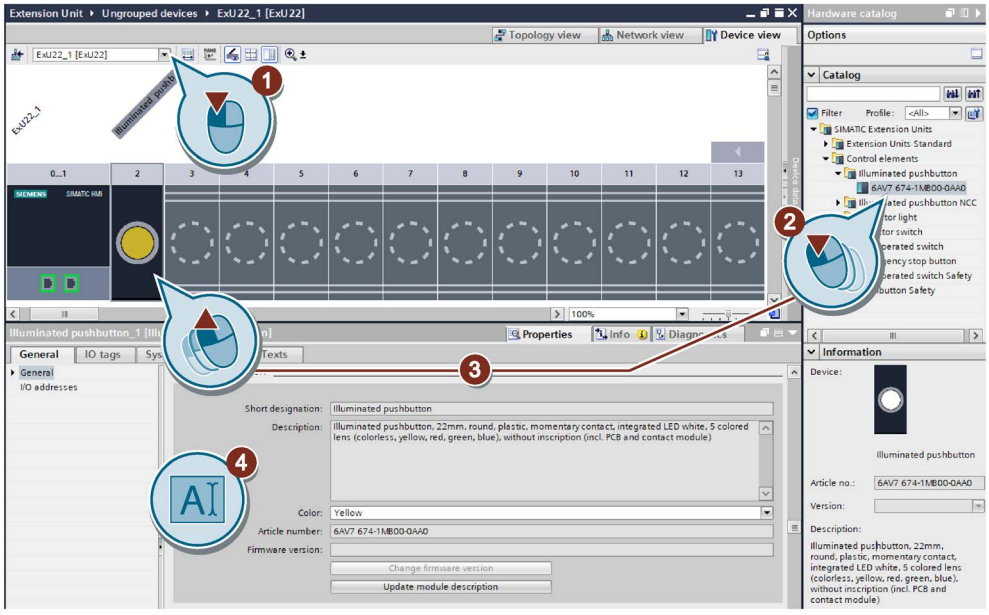
The following procedure describes the configuration of a standard operator control using an illuminated pushbutton as an example. The other standard operator controls are configured in the same way.

Requirement

- The necessary software is installed.
- You have opened a project with Extension Unit.
- The Device view is open.

Procedure

1. Select the required Extension Unit in the Device view.
2. Select the required operator control in the catalog tree.
3. Drag the required operator control to the preferred mounting position. The mounting position must match the physical mounting position of the operator control.



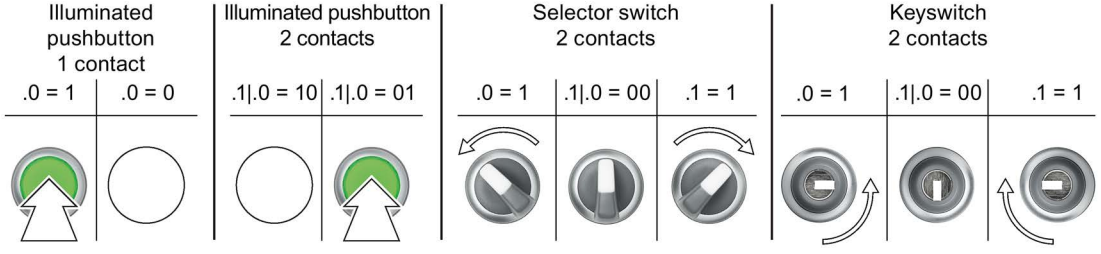
4. Assign the parameters of the operator control in the property window.

Properties of the standard operator controls

Operator control	Input (contact)	Output (LED)
Indicator light [1]	-	1 bit • "0": LED off • "1": LED on
Illuminated pushbutton [1] 1 NC contact	1 bit (7.0) • "0": Pushbutton is not pressed • "1": Pushbutton is pressed	1 bit • "0": LED off • "1": LED on
Illuminated pushbutton [1] 1 NC contact, 1 NO contact	2 bits (7.1|7.0) • "10": Pushbutton is not pressed • "01": Pushbutton is pressed	1 bit • "0": LED off • "1": LED on
Selector switch	2 bits (7.1|7.0) [2] • "00": Position "Center" • "01": Position "Right" • "10": Position "Left"	1 bit • "0": LED off • "1": LED on
Keyswitch	2 bits (7.1|7.0) [2] • "00": Position "Center" • "10": Position "Right" • "01": Position "Left"	-

[1] The color of the lens assembly for representation in the device view (TIA Portal) can be configured.
[2] The positions "Center", "Right" and "Left" refer to the front view of the operator control or the Extension Unit.

The figure below shows the correlation between switch settings and the associated input bits.



Note

PROFINET IO, behavior of the digital output/operator control LEDs during operation

In the following cases, the digital outputs of the Extension Unit PROFINET are set to "0". This means the operator controls with LEDs **do not** light up:

- After the device is switched on
- When the PROFINET IO connection is disrupted
- When the Extension Unit recognizes an IOPS=Bad in the cyclical output data for the controller (IOPS=**I**nput/Output **O**bject **P**rovider **S**tatus)

Safety operator controls

Safety operator controls are not configured with the Extension Unit PROFINET. They are hardwired instead using the X10 interface.

Note

Configure safety operator controls only for Extension Unit PROFIsafe

When you place a safety control element in a slot of the Extension Unit PROFINET, an error message is displayed when compiling the project as part of the consistency check informing you that the project cannot be compiled.

Place safety operator controls in the configuration only in a slot of an Extension Unit PROFIsafe.

This next section describes how to configure safety operator controls for an Extension Unit PROFIsafe.

4.4 Extension Unit PROFIsafe - Configuring safety operator controls

The following procedure describes the configuration of the safety operator controls for an Extension Unit PROFIsafe.

You can configure a maximum of two safety operator controls for an Extension Unit PROFIsafe.

The parameters of the safety function are assigned with the parameter assignment of the F-module of the Extension Unit PROFIsafe. The F-module has an input address with 5 bytes and an output address of 4 bytes.

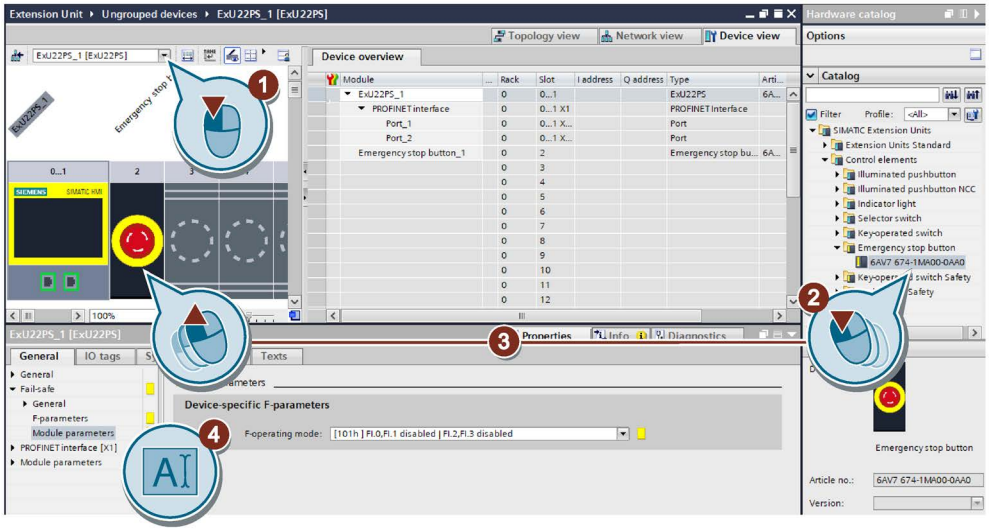
Requirement

- The necessary software is installed.
- You have opened a project with Extension Unit PROFIsafe.
- The Device view is open.

Procedure

The following procedure describes the configuration of the safety operator controls using the example of an emergency stop button. The other safety operator controls are configured in the same way.

1. Select the required Extension Unit PROFIsafe in the Device view.
2. Select an emergency stop button in the catalog tree.
3. Drag the emergency stop button to the required mounting position. The mounting position must match the physical mounting position of the emergency stop button.



4. Configure slot 0 of the Extension Unit PROFIsafe for fail-safe operation as described in the section below.

Note

Address of the safety operator controls

The safety operator controls do not have their own address. The information on the status of the safety operator controls is available in the first byte of the start address of the safety module in slot 0.

The bits of the start address are set or not set depending on the number of safety operator controls, their color-coded connection (red "right"/blue "left") and the selected operating mode, see section "Operating modes of the Extension Unit PROFIsafe (Page 75)".

4.5 Extension Unit PROFIsafe - Safety configuration

This section describes how to configure the PROFIsafe address and safety functions of an Extension Unit PROFIsafe in conjunction with an F-CPU in STEP 7 (TIA Portal).

Note

Configuring Extension Unit PROFIsafe in combination with F-CPU

An Extension Unit PROFIsafe must only be configured in combination with an F-CPU.

The PROFIsafe address on the PROFIsafe device must be set and configured in the engineering system, among other things, for PROFIsafe communication with a PROFIsafe device in a system.

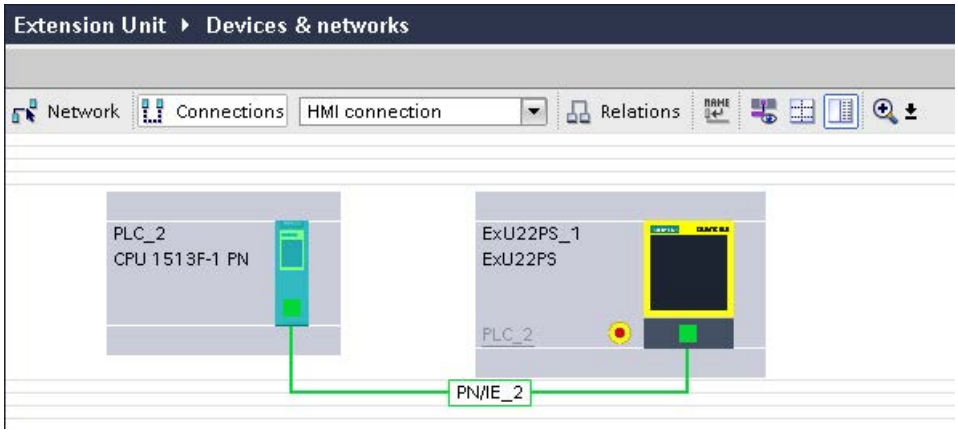
Note

The PROFIsafe address of a PROFIsafe device must be unique throughout the network and station. You can assign a maximum of 1022 PROFIsafe addresses in a single system.

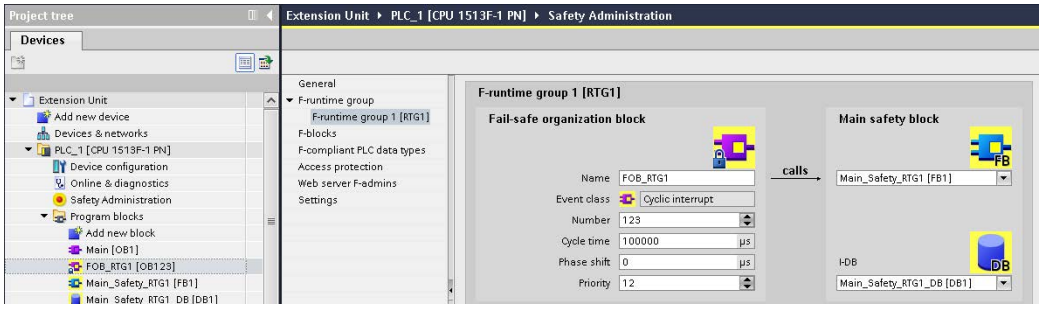
The configured PROFIsafe address must match the PROFIsafe address that is set on the PROFIsafe device.

Requirement

- The PROFIsafe address on the communication module of the Extension Unit is set, see section "Extension Unit PROFIsafe - Setting the PROFIsafe address (Page 36)".
- The necessary software is installed.
- You have opened a project with Extension Unit PROFIsafe and F-CPU.
- The Extension Unit PROFIsafe and the F-CPU are networked over the PROFINET interfaces.

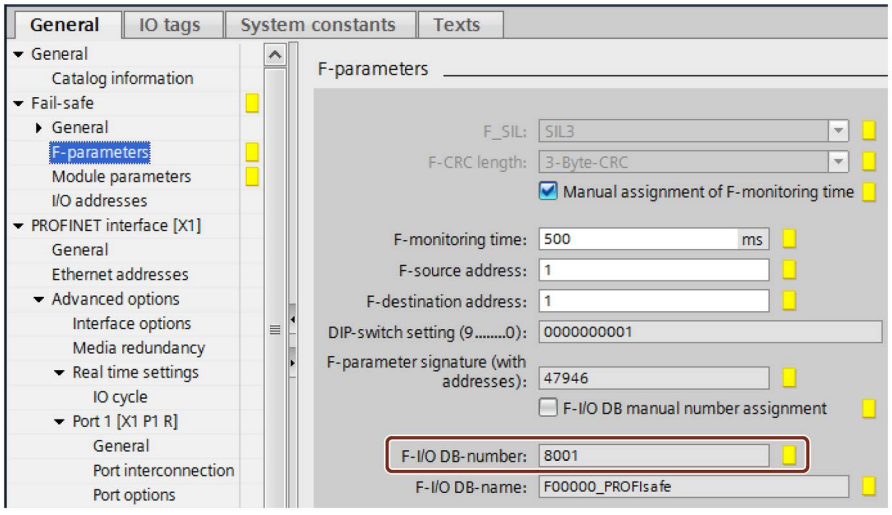


- An F-runtime group exists. To check, select the "Program blocks" entry under the PLC in the device view.



- The input address of the Extension Unit PROFIsafe is evaluated at least once in the F-runtime group.

  The number of the F-I/O DB is located below the F-parameters of the Extension Unit PROFIsafe in the "F-I/O DB number" box, see figure below.

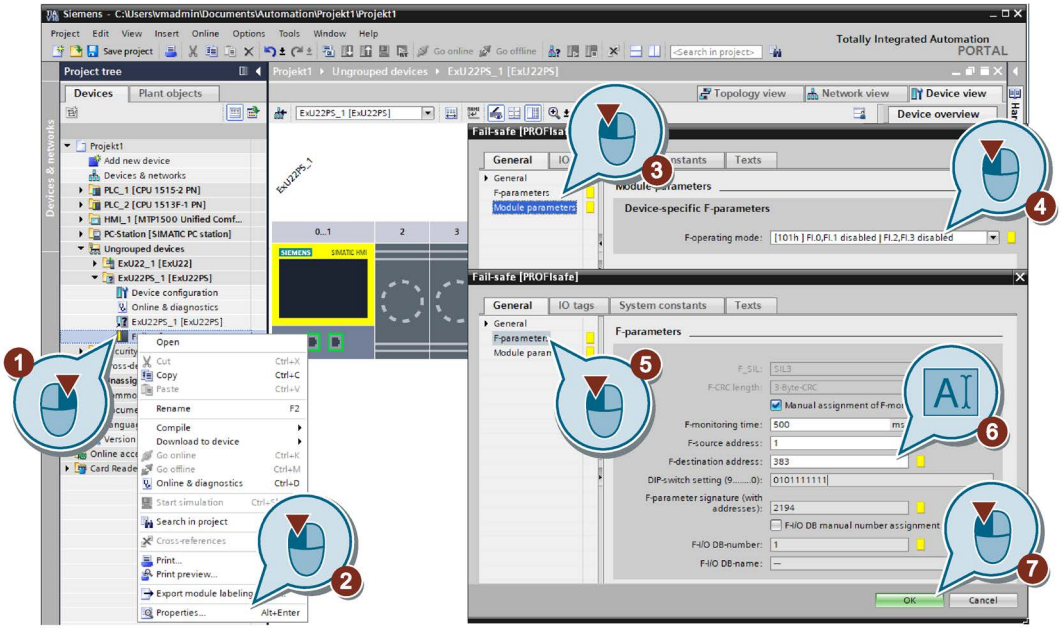


- The Device view is open.

Procedure

1. Select the entry "Fail-safe" for the required Extension Unit.
2. Use the right mouse button to open the properties.

   Alternatively: Double-click the safety module in slot 0 of the Extension Unit PROFIsafe with the yellow frame.



3. In the Fail-safe properties, select the entry "Module parameters".
4. Select the operating mode according to the plant specification. The default setting is "101h", i.e. all safety operator controls are passivated.

   The first input address ("+0") contains the information on the status of the safety operator controls, see section "Operating modes of the Extension Unit PROFIsafe (Page 75)".
5. In the fail-safe properties, select the entry "F-parameters".
6. Enter the PROFIsafe address in the "F-destination address" entry field. For example, the value "383" is input in the previous figure.
7. Save your settings with "OK".

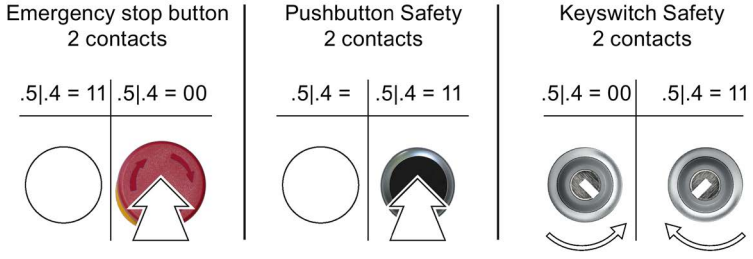
Properties of the safety operator controls

The following table shows the properties of the safety operator controls based on the example of the setting "8484h" for the operating mode, i.e. operating mode "1oo1" with a safety operator control. The safety operator control is located at the connection of the cable harness marked with red adhesive tape.

Operator control	Input (contact)	Output (LED)
Emergency stop button 2 NC contacts	2 bits (.5|.4) • "00": Pushbutton is pressed • "11": Pushbutton is not pressed	-
Pushbutton Safety 2 NO contacts	2 bits (.5|.4) • "00": Pushbutton is not pressed • "11": Pushbutton is pressed	-
Keyswitch Safety 2 NO contacts	2 bits (.5|.4) • "00": Position "Right" * • "11": Position "Left" *	-

* The positions "Right" and "Left" refer to the front view of the operator control or the Extension Unit.

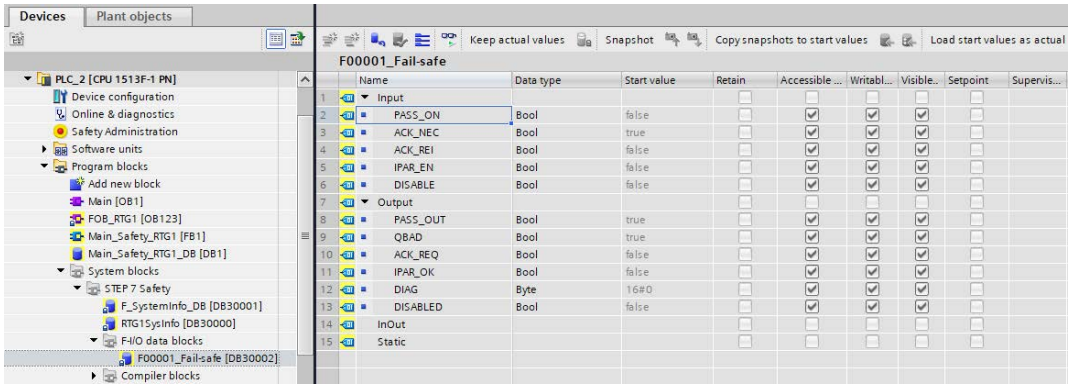
The figure below shows the correlation between switch settings and the associated input bits.



Additional information

Reading out status of the F-runtime group

The status of the F-runtime group can be read out, for example, by means of the F-I/O DB.



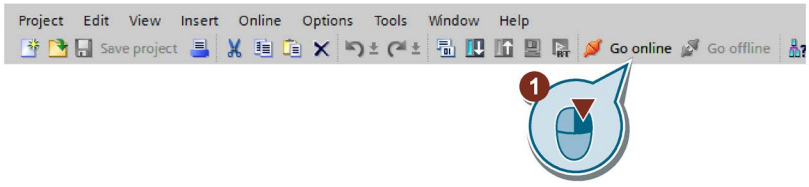
The following outputs are of major importance for commissioning:

QBAD	An error has occurred in the device; the device outputs substitute values.
ACK_REQ	The device can be activated again, for example, with ACK_REI or globally with the instruction "ACK_GL" from the library "Basic instructions > Safety functions"

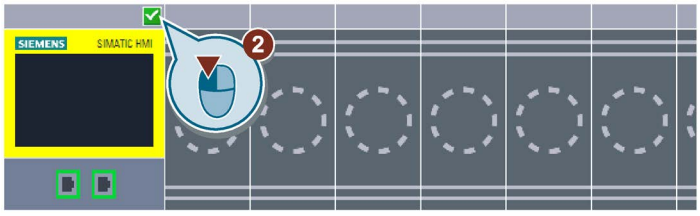
Reading out diagnostic information of the safety module

Follow these steps to display the diagnostic information of an Extension Unit PROFIsafe that is connected to a PLC.

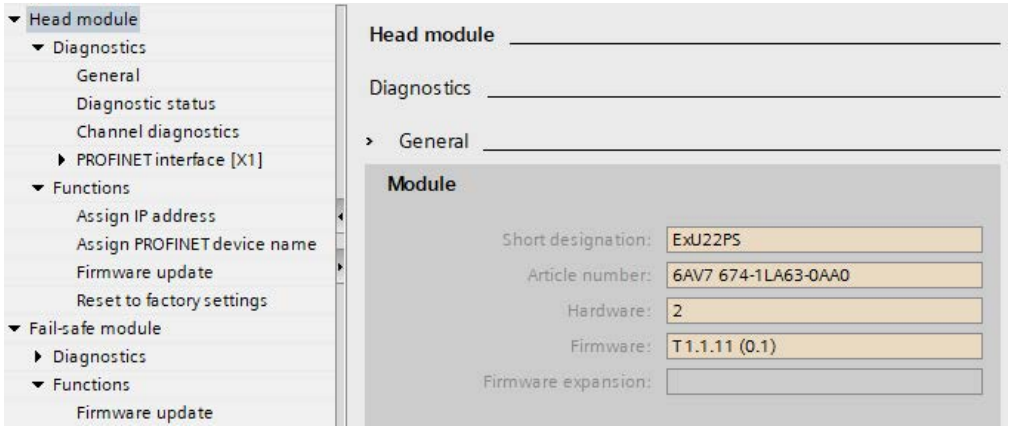
1. Press the "Go online" button.



2. Select slot 0 of the Extension Unit PROFIsafe in the device view and click on the green check mark in the top right-hand corner of the safety module.



The diagnostics window opens.



In the Diagnostics window you have access to the advanced functions "Firmware update" and "Reset to factory settings", among other things.

See also

"SIMATIC Safety - Configuring and Programming" programming and operating manual (https://support.industry.siemens.com/cs/ww/en/view/54110126)

4.6 Example for evaluating safety operator controls

The following example shows how you can perform the following configuration steps in TIA Portal from V15 depending on the wiring of two safety operator controls:

- Define the SIL and set the associated operating mode
- Define the start address of the safety operator controls
- Read the bits of the safety operator controls

Position and wiring of the safety operator controls

In the example, two safety operator controls were installed into one Extension Unit 22" PROFIsafe:

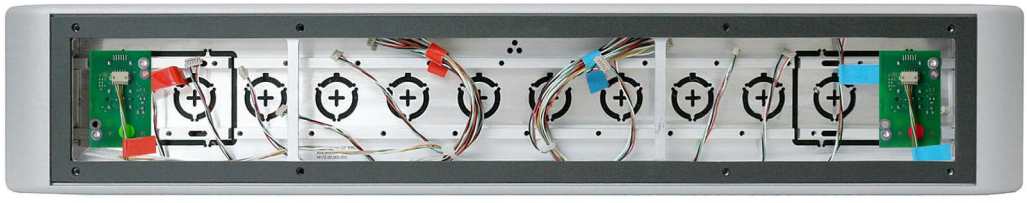
- A safety pushbutton in slot 1 corresponds to "Rack" position 2 in STEP 7 (TIA Portal)
- An emergency stop button in slot 12 corresponds to "Rack" position 13 in STEP 7 (TIA Portal)

The following figure shows the front view of the Extension Unit and the numbers of the "Rack" positions in STEP 7 (TIA Portal) for both safety operator controls.

Within the Extension Unit, the safety operator controls were connected to the cable harness as follows:

- Emergency stop button on the 5-pin plug, the connecting cables of which are marked with red adhesive tape
- Safety pushbutton on the 5-pin plug, the connecting cables of which are marked with blue adhesive tape

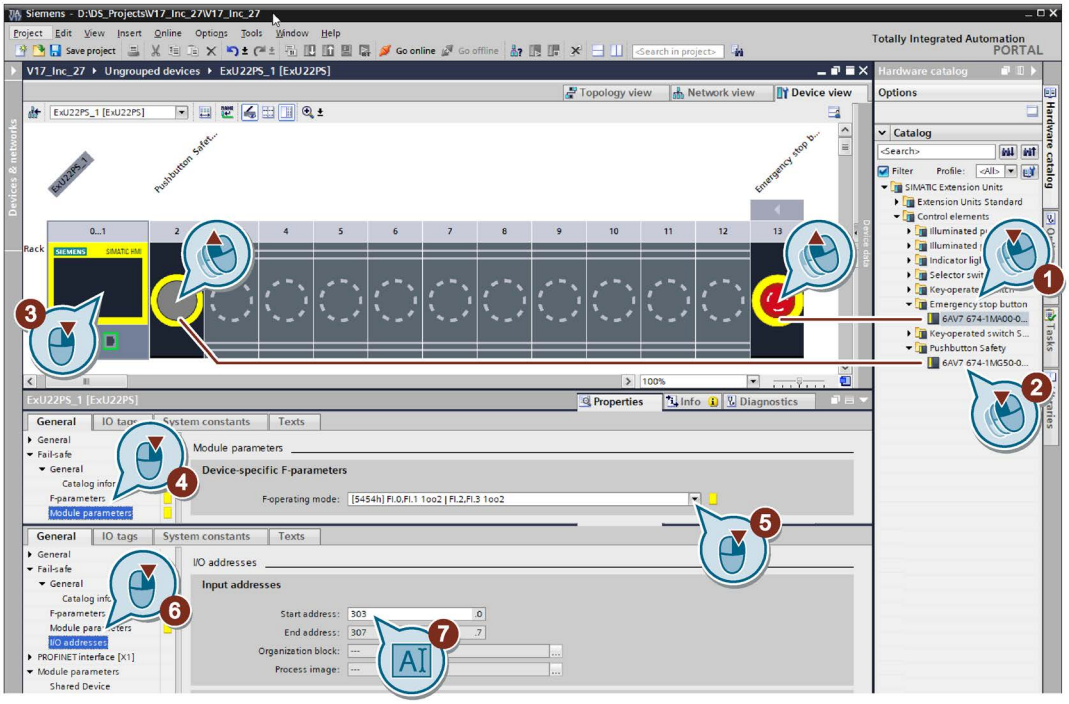
The following figure shows the rear view of the 22" Extension Unit with the rear cover open and the numbers of the" Rack" positions in STEP 7 (TIA Portal) for both safety operator controls.



Configuring the operating mode and start address of the safety operator controls

The following procedure describes the exemplary configuration of the operating mode and start address of the safety operator controls to match their wiring.

For the example, the operating mode "1oo2" was defined for both safety operator controls, i.e. Safety Integrity Level "2 x SIL3".



1. In the device view of the Extension Unit 22" PROFIsafe, drag the emergency stop button from the catalog tree to "Rack" position 13.
2. Drag the Safety pushbutton from the catalog tree to "Rack" position 2.
3. Click on the yellow-framed safety module in slot 0 of the Extension Unit 22" PROFIsafe.
4. Under "Properties" in the "General" tab, click on "Fail-safe" > "Module parameters".
5. Under "F mode" select the entry "5454h".
6. Enter a start address under "I/O addresses". In the example, the start address "303" was selected.

Read the bits of the safety operator controls

The bits of the start address contain the information on the status of the safety operator controls.

You can find detailed information on evaluating the bits in the evaluation table in section "Operating modes of the Extension Unit PROFIsafe (Page 75)".

For the fail-safe mode "5454h" and start address "303" selected in the example, the following switching states result from the evaluation table with the emergency stop button on the connection marked blue and the emergency stop button on the connection marked red:

303.7	303.6	303.5	303.4	303.3	303.2	303.1	303.0	Pushbutton Safety	Emergency stop button
						0	0	Not pressed	Pressed
						0	1	Not pressed	Not pressed
						1	0	Pressed	Pressed
						1	1	Pressed	Not pressed

If, instead of "2 x SIL3", you want to use another Safety Integrity Level, such as "2 x SIL2", then select the value "9898" under "F mode" in the project. For this F mode and start address "303" the following switching states result from the evaluation table:

303.7	303.6	303.5	303.4	303.3	303.2	303.1	303.0	Pushbutton Safety	Emergency stop button
0	0	0	0					Not pressed	Pressed
0	0	1	1					Not pressed	Not pressed
1	1	0	0					Pressed	Pressed
1	1	1	1					Pressed	Not pressed

Device maintenance and repair 5

5.1 General information on maintenance and servicing

Observe the following when servicing and repairing protective equipment e.g. such as ground circuits or overvoltage protection components:

- Observe the maintenance and replacement intervals.
- Replace system components, including external cables, fuses and batteries only with equivalent components approved by the respective manufacturer.

5.2 Cleaning the device

The device is designed for low-maintenance operation. However, it is still necessary to clean the device regularly.

Clean the entire device thoroughly:

- Before commissioning
- As required, depending on the degree of contamination
- At regular intervals (according to an internal cleaning plan)

⚠ CAUTION
Unwanted reactions when cleaning the device
You risk unintentional actuation of operator controls if you clean the device while it is switched on.
You may possibly trigger unwanted actions of the device or controller. that are liable to cause personal injury or damage to the machinery.
Before you start cleaning, switch off the power supply of the Extension Unit and the power supply of the devices that are controlled by the operator controls of the Extension Unit.

Also see the cleaning information in the operating instructions of the PRO device to which the Extension Unit is connected.

Cleaning agents

NOTICE
Damage to the device due to impermissible cleaning agents
Impermissible and unsuitable cleaning agents can cause damage the device.
Use dish soap or foaming screen cleaner only as cleaning agents.
Do not use aggressive solvents or scouring powder.

Observe the information on chemical resistance (https://support.industry.siemens.com/cs/ww/en/view/39718396).

Procedure

1. Switch off the device.
2. Dampen the cleaning cloth.
3. Spray the cleaning agent on the cloth and not directly on the device.
4. Clean the device with the cleaning cloth.

5.3 Spare parts and repairs

Repairs

Contact your Siemens representative (https://www.siemens.com/aspa). Filter by expertise, product and region.

Your contact person will let you know if a product can be repaired and how to return it.

Contact your representative before returning a product, including when you would like to request prioritized handling of your repair, a cost estimate, a repair report or an examination report.

The representative can also provide information about spare parts, if available.

Spare parts

You can find spare parts and accessories for your device in the following sections:

- "Installation elements for the Extension Unit (Page 13)"
- "Accessories (Page 15)"

5.4 Recycling and disposal

The devices described in these operating instructions can be recycled thanks to their low level of pollutants.

Contact a certified disposal service company for electronic scrap for environmentally sustainable recycling and disposal of your old devices and dispose of the device according to the relevant regulations in your country.

Technical specifications

6

6.1 Markings and approvals

Certifications and approvals for the Extension Unit and its installation elements can be found on the Internet at the following address:
Extension Units certificates (https://support.industry.siemens.com/cs/ww/en/ps/24490/cert).

Approvals

Note

The following overview shows possible approvals.

For the device itself, only the approvals shown on the rear of the device apply.

CE approval

The device meets the general and safety-related requirements of the following EU directives and conforms to the harmonized European standards for programmable logic controllers published in the official gazettes of the European Union:

- 2014/30/EU "Electromagnetic Compatibility Directive" (EMC Directive)
- 2011/65/EU "Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment" (RoHS Directive)

EU Declaration of Conformity

The EU Declarations of Conformity are available to the relevant authorities at the following address:

Siemens Aktiengesellschaft
Digital Industries
Factory Automation
DI FA TI COS
Postfach 1963
D-92209 Amberg

You can download information on the EC Declaration of Conformity at the following address, keyword "Declaration of Conformity":
Extension Units certificates (https://support.industry.siemens.com/cs/ww/en/ps/24490/cert).

UKCA marking

The devices fulfil the general and safety-related requirements of the following regulations and related amendments and comply with the designated British Standards (BS) published in the official consolidated list of the British Government.

- Electromagnetic Compatibility Regulations 2016 (EMC)
- Regulations on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2012 (RoHS)

UK Declarations of Conformity

The UK Declarations of Conformity are available to the relevant authorities at the following address:

Siemens plc
Princess Road
Manchester
M20 2UR
United Kingdom

You can download information on the EC Declaration of Conformity, here under the keyword "Declaration of Conformity":

Extension Units certificates (https://support.industry.siemens.com/cs/ww/en/ps/24490/cert)

UL approval

Note

The UL approval applies when only operator controls with Siemens approval are installed, see section "Installation elements for the Extension Unit (Page 13)".

Underwriters Laboratories Inc. to

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)

RCM Australia/New Zealand

This product meets the requirements of EN 61000-6-4 Generic standards – Emission standard for industrial environments.

EAC (Eurasian Conformity)

The EAC (Eurasian Conformity) marking confirms the conformity with the technical regulations (TR) of the Eurasian Economic Union.

Korea Certificate

This product conforms to Limit Class A for emission of radio interference. This device is not intended to be used in residential areas.

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

WEEE label (European Union)

Disposal instructions, observe the local regulations and the section "Recycling and disposal (Page 63)".

6.2 Standards and requirements

IEC 61010-2-201/IEC 61131-2

The devices meet the requirements and criteria of the IEC 61010-2-201 or IEC 61131-2 standard.

- IEC 61010-2-201, Safety regulations for electrical equipment for measurement, control, and laboratory use: Particular requirements for control equipment
- IEC 61131-2, Programmable controllers: Equipment requirements and testing

6.3 Standards on operating safety of the Extension Unit PROFIsafe

The information in this section applies exclusively to the Extension Unit PROFIsafe.

Plant-related standards

The Extension Unit PROFIsafe meets the following standards for use in a plant:

Standard	Title
EN 12417:2001+A2:2009	Machine Tools - Safety - Machining Centres
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007 +A1:2011	Electromagnetic compatibility (EMC) – Part 6-4: Generic standard - Emission standard for industrial environments
EN 61131-2:2007	The device meets the requirements and criteria of IEC 61131-2, Programmable Logic Controllers, Part 2: Equipment requirements and testing

TÜV

The German Technical Inspectorate (TÜV) confirms that the Extension Unit PROFIsafe satisfies the requirements of the following standards with regard to its safety functions.

Standard	Title
IEC 60204-1:2016	Safety of machinery – Electrical equipment of machines – Part 1: General Requirements
IEC 62061:2005 +A2:2015	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
IEC 61508-1 to 4:2010	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems, Part 1 to Part 4
ISO 13850:2015	Safety of machinery - EMERGENCY STOP - Principles for design
EN ISO 13849-1:2015	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design

6.4 Electromagnetic compatibility

The device fulfills, amongst others, the requirements of the EMC directive applicable to the European domestic market.

Installing the device according to EMC directive

EMC-compliant mounting of the device and the use of interference-proof cables provide the basis for interference-free operation.

Observed the following manuals in addition to these operating instructions:

- Designing interference-free controllers (https://support.industry.siemens.com/cs/ww/en/view/59193566)
- Industrial Ethernet / PROFINET - Passive network components (https://support.industry.siemens.com/cs/ww/en/view/84922825)

Pulse-shaped disturbance

The following table shows the electromagnetic compatibility of modules with regard to pulse-shaped interference. The precondition for electromagnetic compatibility is that the device meets the specifications and guidelines for electrical installation.

Pulse-shaped interference	Tested with	Test level equivalence
Electrostatic discharge according to IEC 61000-4-2	Air discharge: 8 kV	3
	Contact discharge: 6 kV	
Bursts (high-speed transient interferences) according to IEC 61000-4-4	2 kV supply cable 1 kV signal line, < 30 m	3
	2 kV signal line, > 30 m	4
High-energy single pulse (surge) according to IEC 61000-4-5 Coupling process: 42 Ω, 0.5 µF	Asymmetrical coupling (line to ground):	
	• 1 kV supply cable, DC voltage	2
	• 2 kV signal cable/data cable, > 30 m	3
	Symmetrical coupling (line to line):	
	• 0.5 kV power cable, DC voltage	2
	• 1 kV signal line, > 30 m	3

NOTICE

Lightning protector required

The SIMATIC Extension Units have been tested for high-energy single pulse (surge) in accordance with IEC 61000-4-5.

An external protective circuit is required for operation with 24 V DC, see section 7 "Lightning protection and overvoltage protection" in the Function Manual "Designing interference-free controllers".

The following lightning protector was used during the testing of the SIMATIC Extension Units: Dehn BVT AVD 24 (Article No. 918 422)

Sinusoidal interference

The following table shows the EMC behavior of the modules with respect to sinusoidal interference. This requires the device to meet the specifications and directives for electrical installation.

Sinusoidal interference	Test values
HF radiation (electromagnetic fields) according to IEC 61000-4-3	80% amplitude modulation at 1 kHz • Up to 10 V/m in the 80 MHz to 1 GHz range • Up to 3 V/m in the 1.4 GHz to 6 GHz range
RF power applied to lines and line shields according IEC 61000-4-6	Test voltage 10 V, with 80% amplitude modulation of 1 kHz in the 150 kHz to 80 MHz range
Magnetic field strength according to IEC 61000-4-8	50/60 Hz; 100 A/m rms

Emission of radio interference

The following table shows the interference emission from electromagnetic fields according to EN/IEC 61000-6-4, measured at the following distance.

Radiated emission (emitted interference)

Frequency range	Measuring distance	Interference emission
30 ... 230 MHz	10 m	< 40 dB (µV/m) quasi-peak
230 ... 1000 MHz	10 m	< 47 dB (µV/m) quasi-peak
1 ... 3 GHz	3 m	< 76 dB peak and < 56 dB average
3 ... 6 GHz	3 m	< 80 dB peak and < 60 dB average

Emission of radio interference voltages

Frequency range	Interference emission
0.150 ... 0.5 MHz	< 89 dB quasi-peak and < 76 dB average
0.5 ... 30 MHz	< 83 dB quasi-peak and < 70 dB average

See also

EMC information in section "Notes about usage (Page 20)".

6.5 Mechanical environmental conditions

6.5.1 Transport and storage conditions

The following information applies to all versions of the Extension Units.

Type of condition	Permitted range
Free-fall in product packaging	≤ 0.3 m

The following information applies to all versions of the Extension Units in connection with a SIMATIC PRO device.

Type of condition	Permitted range
Vibration according to IEC 60068-2-6	5 .. 8.4 Hz, deflection 3.5 mm 8.4 ... 500 Hz, acceleration 1 g
Shock according to IEC 60068-2-27	Half-sine; peak value 25 g, duration 6 ms, 6000 shocks (1000 shocks per axis, in both directions in each case)

6.5.2 Operating Conditions

The following information applies to all versions of the Extension Units in connection with a SIMATIC PRO device.

Type of condition	Permitted range
Vibration to IEC 60068-2-6	10 ... 58 Hz, deflection 0.0375 mm 58 ... 200 Hz, acceleration 0.5 g
Shock to IEC 60068-2-27	Half-sine; peak value 15 g, duration 11 ms, 18 shocks (3 shocks per axis, in both directions in each case)

6.6 Climatic ambient conditions

6.6.1 Transport and storage conditions

The following information applies to all versions of the Extension Units.

Type of condition	Permitted range
Temperature	-20 ... 60 °C
Atmospheric pressure	1140 ... 660 hPa, corresponds to an elevation of -1000 to 3500 m
Relative humidity	10 to 90 %, no condensation inside the enclosure
Pollutant concentration	According to ANSI/ISA-71.04-2013 severity level G3

6.6.2 Operating Conditions

The following information applies to all versions of the Extension Units.

Type of condition	Permitted range
Temperature	0 ... 50 °C
Atmospheric pressure, operation elevation	1140 ... 795 hPa, corresponds to an elevation of -1000 to 2000 m
Relative humidity	From 10 ... 90%, no condensation inside the enclosure
Pollutant concentration	According to ANSI/ISA-71.04-2013 severity level G3

Observe the Notes on use (Page 20) and section "Permitted mounting positions (Page 24)".

Note

The system components connected to the device, the power supply for example, must also be suited to the respective operating conditions.

6.7 Information on insulation tests, protection class and degree of protection

Insulation test

The insulation strength is verified in the type test with the following test voltages according to IEC 61010-2-201 and IEC 61131-2:

Circuit	Insulation tested with (type test)
Rated voltage U_e 24 V	707 V DC to other circuits / to ground
Ethernet connector*	2250 V DC

* Only for Extension Unit PROFINET and Extension Unit PROFIsafe

Degree of pollution and overvoltage category

The device meets the following requirements according to IEC 61010-2-201.

Degree of pollution	3 (fully-enclosed)
Overvoltage category	II

Protection class

Protection class III according to IEC 61131-2.

Protection against foreign objects and water

The device meets the requirements according to IEC 60529 and UL50E.

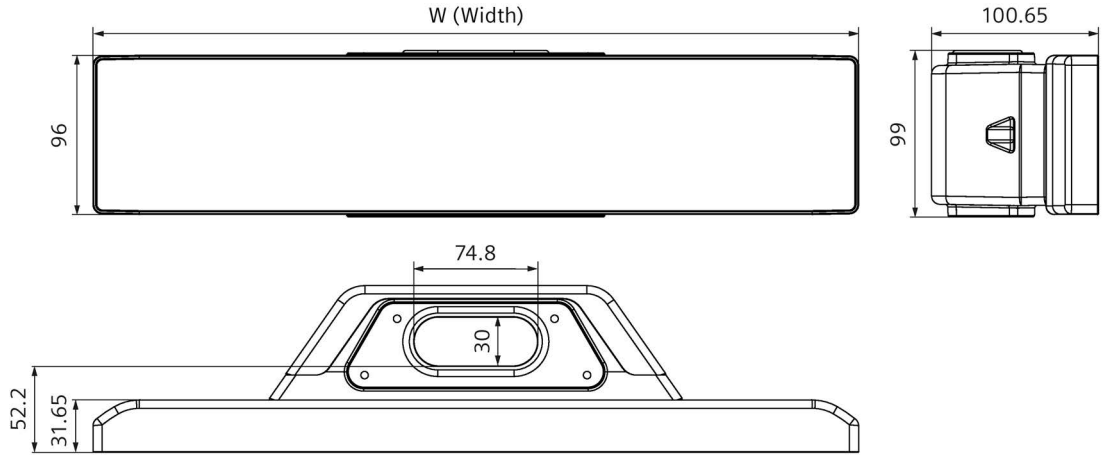
Device side	Degree of protection
Fully-enclosed	• IP65 according to IEC 60529 • Type 4X (indoor use only) according to UL50E

The degrees of protection can only be ensured if the seals are completely in contact with all mechanical interfaces and the connection compartment and the associated covers are closed.

6.8 Dimension drawings

The figure below shows the dimension drawings of the Extension Units that only differ in their width (W).

Extension Unit					
12"	**15"**	**19"**	**22"**	**24"**	**24" Portrait**
W = 313 mm	W = 396 mm	W = 462 mm	W = 527 mm	W = 583 mm	W = 361 mm



All dimensions in mm

6.9 Technical specifications

6.9.1 General technical specifications

Weight and dimensions

The following information applies to all versions of the Extension Units.

	Extension Unit	
Weight	• 12" approx. 1.9 kg • 15" approx. 2.1 kg • 19" approx. 2.3 kg	• 22" approx. 2.5 kg • 24" approx. 2.6 kg • 24" Portrait approx. 2.1 kg
Dimensions (W × H × D)	• 12": 313 × 99 × 100.65 mm • 15": 396 × 99 × 100.65 mm • 19": 462 × 99 × 100.65 mm	• 22": 527 × 99 × 100.65 mm • 24": 583 × 99 × 100.65 mm • 24" Portrait: 361 × 99 × 100.65 mm

Power supply

	Extension Unit Hardwired	Extension Unit PROFINET, Extension Unit PROFIsafe
Supply voltage (V_N)	24 V DC	
permitted range, low limit (DC)	19.2 V	
permitted range, high limit (DC)	28.8 V	
maximum permitted transients	35 V (500 ms)	
Minimum time between two transients	50 s	
Fuse, internal	7 A	4 A
Input current: Current consumption (no load)	24 V / 10 mA	24 V / 150 mA
Power consumption (without load) [1]	0.24 W [2]	3.6 W [3]
Inrush current I^2t	0.5 A^2s	
Electrical isolation between power supply and internal electronics	No	

[1] The power loss generally corresponds to the specified value for power consumption.
[2] For Extension Unit Hardwired, additional 0.4 W per operator control
[3] For Extension Unit PROFINET and Extension Unit PROFIsafe, additional 0.1 W per operator control with LED

Interfaces

	Extension Unit Hardwired	Extension Unit PROFINET	Extension Unit PROFIsafe
X80 POWER, power supply	Yes	Yes	Yes
X10 EMERG, connection for safety operator controls (output)	Yes	Yes	No
X11 LED, connection for LEDs of the operator controls (input)	Yes	No	No
X12 CONTACT, connection for contacts of the operator controls (output)	Yes	No	No
X1 PROFINET (LAN), 2 x RJ45 10/100Mbps *	No	Yes	Yes

* With integrated switch (one IP address only)

Inputs and outputs for standard operator controls

Extension Unit Hardwired

Switching capacity of the outputs		DQ 8x24VDC 0.5 A
Electrical isolation between different circuits		No
Number of standard operator controls, maximum		8
per operator control	Number of inputs (LED)	0 ... 1
	Number of outputs (contacts)	1 ... 2 NC or NO contacts
Cable length (shielded or unshielded cable)		Maximum 30 m
Inputs		
Rated voltage		24 V DC
Switching threshold		• for "0" signal: 5 V DC • for "1" signal: 15 V DC
Input current		• for "1" signal: 14 mA; typically with 24 V
Outputs		
Switching capacity	with resistive load (max. 1 of 2 active)	0.5 A
	with lamp load, max.	5 W DC
	Short-circuit protection	Yes
Output delay with resistive load		• 0 after "1", max. 3 ms • 1 after "0", max. 3 ms

Extension Unit PROFINET, Extension Unit PROFIsafe

Switching capacity of the outputs		According to PROFINET/PROFIsafe specification
Electrical isolation between different circuits		No
Number of standard operator controls, maximum		12
per operator control	Number of inputs (LED)	0 ... 1
	Number of outputs (contacts)	1 ... 2 NC or NO contacts
Cable length		According to PROFINET/PROFIsafe specification

Inputs for safety operator controls

The following information applies to all versions of the Extension Units.

Number of safety operator controls, maximum		2
per emergency stop button	Number of inputs (LED)	0
	Number of outputs (contacts)	2 NC contacts
Per Pushbutton Safety	Number of inputs (LED)	0
	Number of outputs (contacts)	2 NO contacts
Per Keyswitch Safety	Number of inputs (LED)	0
	Number of outputs (contacts)	2 NO contacts
Cable length (shielded or unshielded cable)		Maximum 30 m
Rated voltage		24 V DC

Emergency stop button

The following information applies to all Extension Units when using the emergency stop mushroom pushbutton, article number 6AV7674-1MA00-0AA0.

Contacts	2 NC contacts, gold-plated
Operations	50000
B10 value	61000

For Extension Unit Hardwired and Extension Unit PROFINET: Connection of the emergency stop button to 24 V DC safety monitoring, e.g. Siemens 3SK1 series, or fail-safe digital inputs required

Pushbutton Safety

The following information applies to all Extension Units when using the Pushbutton Safety, article number 6AV7674-1MG50-0AA0.

Contacts	2 NO contacts, gold-plated
Operations	1000000
B10 value	650000

Keyswitch Safety

The following information applies to all Extension Units when using the Keyswitch Safety, article number 6AV7674-1ME50-0AA0.

Contacts	2 NO contacts, gold-plated
Operations	50000
B10 value	61000

See also

Installation elements for the Extension Unit (Page 13)

6.9.2 Operating modes of the Extension Unit PROFIsafe

The following table shows the assignment between safety operator controls and the bits of the input address depending on the set operating mode. For the bits of the input address, the following applies depending on the safety operator control:

- Emergency stop button: The bits are set in the "not pressed" position.
- Pushbutton Safety: The bits are set in the "pressed" position.
- Keyswitch Safety: The bits are set in the "left" position.

Number of Safety operator controls	Encoder Evaluation value		Input (Contact) Bit								Operating mode	Safety Integrity Level
	Hex.	Dec.	.7	.6	.5	.4	.3	.2	.1	.0		
0	0101	257									-	-
1	D3D3	54227								Red	1oo2	SIL3
	8484	33924			Red	Red					1oo1	SIL2
2	5454	21588							Blue	Red	1oo2	2 x SIL3
	9898	39064	Blue	Blue	Red	Red					1oo1	2 x SIL2
2	4A4A	19018								Red	1oo2	SIL3
			Blue	Blue							1oo1	SIL2

Red Connection marked with red adhesive tape

Blue Connection marked with blue adhesive tape

In the operating mode "0101 Hex." ("257 Dec."), all safety operator controls are passivated, all input bits are set to "0".

6.9.3 Reaction times and safety characteristics for fail-safe operation

The following table shows the safety parameters of the safety operator controls.

	Configured operating mode	
In accordance with IEC 61508	**1oo1**	**1oo2**
Safety Integrity Level	SIL2	SIL3
Mode of operation	high and low demand mode	high and low demand mode
Meantime to Restoration (MTTR)	100 h	100 h
Probability of a dangerous failure per hour (PFH)	$< 6.5 \times 10^{-10}$ 1/h	$< 3.5 \times 10^{-10}$ 1/h
Probability of a dangerous failure on demand (PFD)	$< 5.5 \times 10^{-5}$	$< 3 \times 10^{-5}$
Diagnostic test interval	15 ms	15 ms
Proof Test Interval	1 x per year *	1 x per month *
Lifetime	20 y	20 y
In accordance with IEC 13849-1		
Meantime to Failure (MTTFd)	high	high
Meantime to Restoration (MTTR)	100 h	100 h
Diagnostic Coverage (DCavg)	high	high
Performance level	d	e
Category	3	4

* The specified values do not apply to the emergency stop button.
Suitable values must be defined for the other safety operator controls depending on their function.

All values are based on the SN 29500 and an ambient temperature of 60 °C.

Note

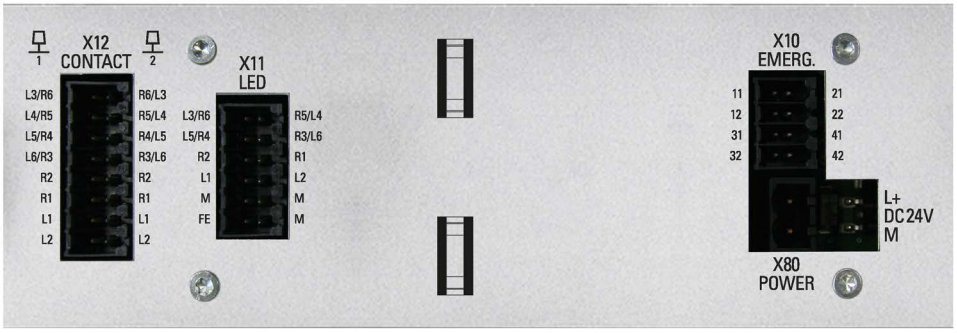
Reaction times

Use the following table for calculation of the total reaction time: S7Safety_RTTplus.xlsm (https://support.industry.siemens.com/cs/ww/en/view/93839056)

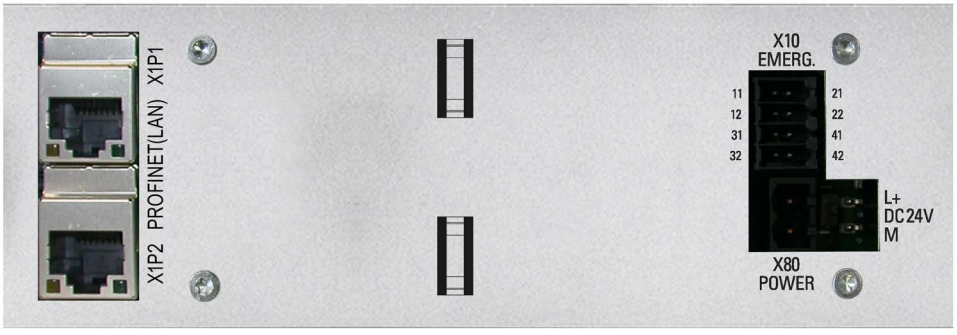
6.10 Interface description

The figures below show the external interfaces of the various communication modules in the connection compartment of the Extension Units:

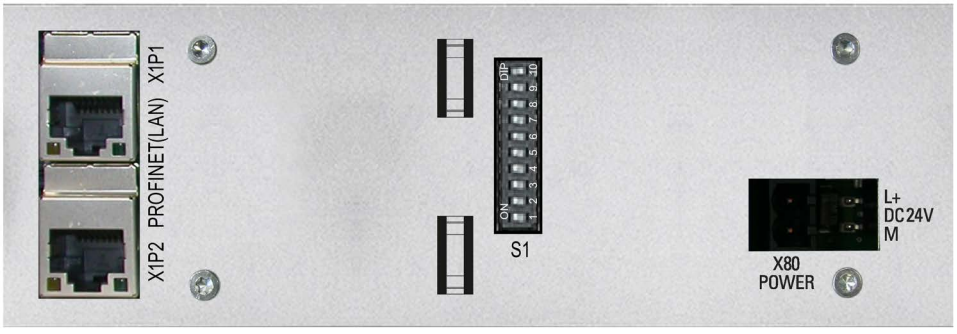
- External interfaces on the communication module of the Extension Unit Hardwired:



- External interfaces on the communication module of the Extension Unit PROFINET:



- External interfaces on the communication module of the Extension Unit PROFIsafe:

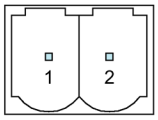


The following sections describe:

- The pin assignment of the interface **X80 POWER**
- The pin assignment and the switching states of the digital inputs/outputs at the following interfaces:
  - **X12 CONTACT** and **X11 LED** of the Extension Unit Hardwired
  - **X10 EMERG.** of the Extension Unit Hardwired and PROFINET
- The pin assignment of the **X1 PROFINET (LAN)** interface of the Extension Unit PROFINET and PROFIsafe

6.10.1 24 V DC power supply

Plug connector, 2-pin



Pin	Assignment
1	+24 VDC (L+)
2	GND (M)

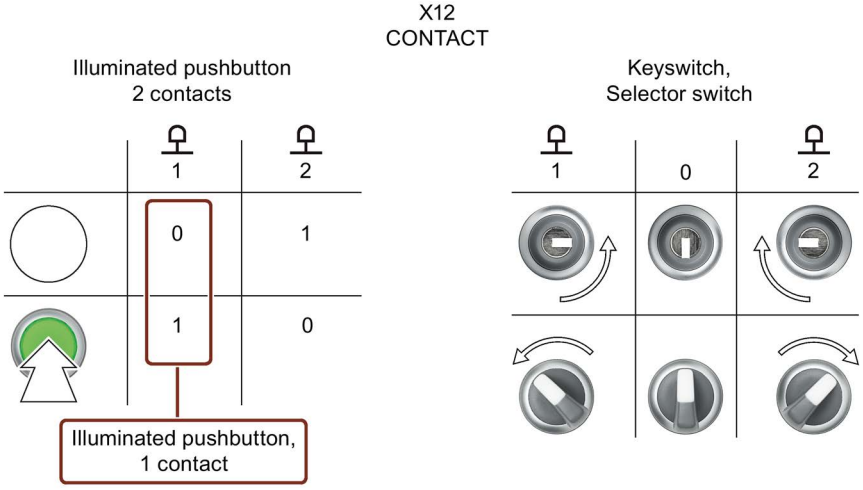
6.10.2 Digital inputs/outputs

Contacts of the standard operator controls (X12)

Pin left	connected to slot position	Pin right	connected to slot position
1	L3 | R6	1	R6 | L3
2	L4 | R5	2	R5 | L4
3	L5 | R4	3	R4 | L5
4	L6 | R3	4	R3 | L6
5	R2	5	R2
6	R1	6	R1
7	L1	7	L1
8	L2	8	L2

The figures below show the contacts that can be switched depending on the switch position of the operator control and based on the type of a standard operator control.

Contact 1 of the operator control is assigned to the "Left pin" column and contact 2 of the operator control is assigned to the "Right pin" column of the table above.



LEDs of the standard operator controls (X11)

When you are using operator controls with LED, wire the connection for the LED according to the mounting position of the operator control with X11.

Pin left	connected to slot position	Pin right	connected to slot position
1	L3 | R6	1	R5 | L4
2	L5 | R4	2	R3 | L6
3	R2	3	R1
4	L1	4	L2
5	M [1]	5	M [1]
6	FE [2]	6	M

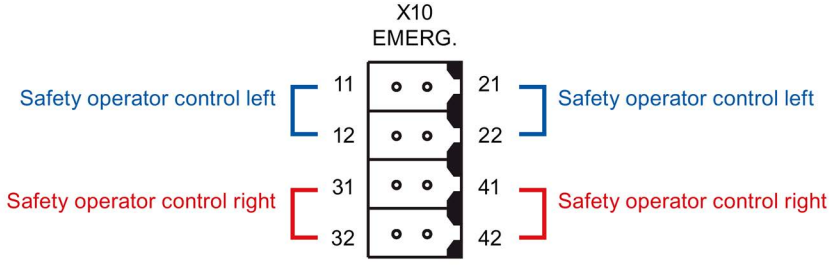
[1] Connect the ground terminals marked M to the ground of the digital output module connected to the Extension Unit.

[2] You can also connect the shield of a shielded cable here.

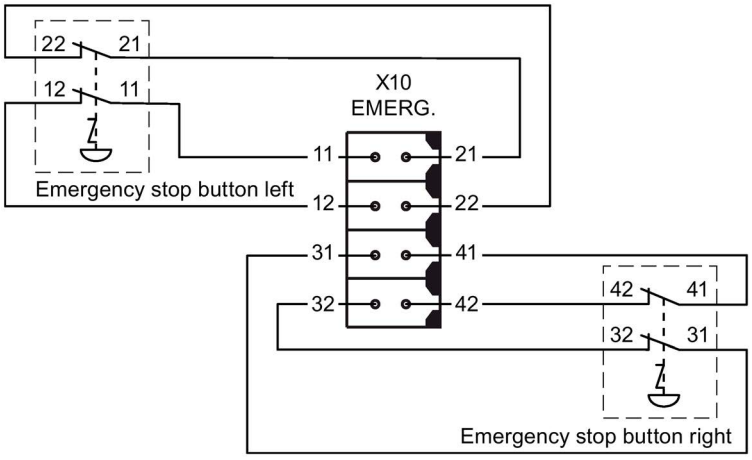
Outputs of the safety operator controls (X10)

Pin left	Terminal	Pin right	Terminal
11	L11	21	L21
12	L12	22	L22
31	R31	41	R41
32	R32	42	R42

The figure below shows the contacts of the safety operator controls left/right in relation to the front view of the Extension Unit.



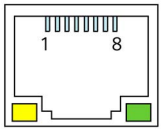
Internal wiring in the Extension Unit using the example of an emergency stop button:



6.10.3 PROFINET (LAN)

Name of interface on the device: PROFINET (LAN) X1

RJ45 socket



Pin	Assignment
1	Tx+
2	Tx–
3	Rx+
4	n. c.
5	n. c.
6	Rx–
7	n. c.
8	n. c.

Meaning of LEDs

There is no connection if both LEDs are off.

The green "Link" LED lights up as soon as there is a physical connection.

The yellow "Activity" LED lights up during the data transfer.

Technical support

A

A.1 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support (https://support.industry.siemens.com)
- Support request form (https://www.siemens.com/supportrequest)
- After Sales Information System SIMATIC IPC/PG (https://www.siemens.com/asis)
- SIMATIC Documentation Collection (https://www.siemens.com/simatic-tech-doku-portal)
- Your local representative (https://www.automation.siemens.com/aspa_app)
- Training center (https://siemens.com/sitrain)
- Industry Mall (https://mall.industry.siemens.com)

When contacting your local representative or Technical Support, please have the following information at hand:

- MLFB of the device
- BIOS version for industrial PC or image version of the device
- Other installed hardware
- Other installed software

Current documentation

Always use the current documentation available for your product. You can find the latest edition of this manual and other important documents by entering the article number of your device on the Internet (https://support.industry.siemens.com). If necessary, filter the comments for the entry type "Manual".

Tools & downloads

Please check regularly if updates and hotfixes are available for download to your device. The download area is available on the Internet at the following link:

After Sales Information System SIMATIC IPC/PG (https://www.siemens.com/asis)

See also

TIA Selection Tool (https://www.siemens.com/tia-selection-tool)

A.2 Application example

You can find additional information on installing and configuring Extension Units in the following document:

Getting Started Extension Unit
(https://support.industry.siemens.com/cs/ww/en/view/109753218)

A.3 Information about the manufacturer

The manufacturer of the Extension Units described in this document is Siemens Aktiengesellschaft.

The manufacturer address is:

Siemens Aktiengesellschaft
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

Markings and symbols

B

B.1 Safety-relevant symbols

The following table describes symbols that can be added to your SIMATIC device, to its packaging or to an enclosed document in addition to the symbols described in the manuals.

Symbol	Meaning	Reference
	General danger sign Caution / Attention You must following the operating instructions. The operating instructions contain information on the type of the potential hazard and enable you to identify risks and implement countermeasures.	ISO 7000 No. 0434B, DIN ISO 7000 No. 0434B
	Attention, only relevant for modules with Ex approval	
	Follow the instructions	ISO 7010 M002
	May be installed by qualified electricians only	IEC 60417 No. 6182
	Mechanical load for HMI devices	
	Connection cables must be designed for the ambient temperature	
	EMC-compliant installation	
	No mounting or pulling & plugging under voltage	
	Dangerous electrical voltage for 230V modules	ANSI Z535.2
	Protection class III, supply only with protective low voltage (SELV/PELV)	IEC 60417-1-5180 "Class III equipment"

Symbol	Meaning	Reference
	Only for industrial applications and indoor areas (control cabinet)	
	Device is to be integrated or installed in a control cabinet	
	Integrate or install devices approved for Ex Zone 2 in a control cabinet with at least IP54	
	Integrate or install devices approved for Ex Zone 22 in a control cabinet with at least IP6x	