General Safety Instructions

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www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

This guide contains general safety instructions applicable to the use of Schneider Electric control equipment controllers from a software and hardware point of view:

- Programmable controllers
- Components of distributed control systems and of remote I/O systems
- Industrial PC and programming and debugging tools
- Human-machine interfaces
- Any product performing the function of control equipment and/or their associated peripherals

This guide does not cover and is not a substitute to all the detailed safety instructions provided in the product manuals, technical specifications, and guides that must be carefully consulted and applied.

This guide is about Schneider Electric automation products and components. As these products are components of a control system, the consistency of the entire automated system, including the consistency of the installation and the application, must be determined by:

- The user or integrator
- The mean of appropriate and complete risk analysis, evaluation, and testing of the products with respect to the relevant specific application or use thereof
- The respect for international standards: for example, IEC 61131-2 and IEC 61010-2-201 completed by IEC 61010-1

Validity Note

This documentation is valid for EcoStruxure™ Control Expert 14.1 or later.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the datasheet.
6	To save or print a datasheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of document	Reference number
Electrical installation guide	EIGED306001EN (English)
Control Panel Technical Guide, How to protect a machine from malfunctions due to electromagnetic disturbance	CPTG003_EN (English), CPTG003_FR (French)

You can download these technical publications and other technical information from our website at *www.schneider-electric.com/en/download*.

Product Related Information

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter, and apply this product. Follow all local and national safety codes and standards. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Chapter 1
General Safety Instructions

What Is in This Chapter?

This chapter contains the following topics:

Standards and Certifications

Directives and National Regulations

The products concerned by this guide comply with the applicable European directives (CE marking).

In addition, products could have been certified for targeted environments by North American agency. For more details on certifications, refer to markings on products and/or check Schneider Electric website at *http://www.schneider-electric.com*.

However, they can only operate correctly in the applications for which they are referenced in the product documentation, and with approved products.

National and local safety codes supersede are complementary to safety recommendations of the product documentation.

Make sure that the installation is carried out in compliance with nationally and locally applicable regulations.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Follow all national and local safety codes and standards.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Use in Ex Area

Ex areas can be named "Hazardous locations", "Hazardous areas", "Explosive atmospheres", and so on. They relate to areas where flammable liquids, vapors, gases, or combustible dusts are likely to occur in quantities sufficient to cause a fire or explosion.

⚠ DANGER

EXPLOSIVE POTENTIAL

- Check the conformity mark on the product if it can be installed and used in hazardous location.
- Read the certificate for any details.
- Read the notice and/or the Instruction Sheet supplied with the products.
- Install the modules in a suitable enclosure as accepted by the local inspection authority having jurisdiction.
- Confirm that the location is free from explosively hazardous gases or dust before connecting or disconnecting equipment, replacing or wiring modules, replacing any fuses, and using the reset button.
- Do not disconnect any USB connectors, RJ45 connectors, SUB-D connectors, terminals, field wiring terminal blocks, and memory cards while circuit is live.
- Securely lock any external interface connected to the modules.
- Confirm that the power supply has been turned OFF before disconnecting, replacing, or wiring modules.
- Make sure that the environment is low pollution level (not exceeding 2) and the operating temperature in protective enclosure never exceeds the specified operating temperature of the product.

Failure to follow these instructions will result in death or serious injury.

Some products are designed to operate in Ex areas. In this case, a specific marking is printed on products:  , Haz. Loc., and so on. For certified products, check Schneider Electric website at *http://www.schneider-electric.com*.

This table gives information on applicative standard texts:

For products certified to be installed in	Refer to
ATEX/IECEx Zone 2 or Zone 22	IEC 600079-14 for installation, selection, and erection.
Class I, Division 2(1), Groups A, B, C & D, and Class I Zone 2 hazardous locations	• Articles 500...502 of the National Electrical Code (NFPA 70) and Appendix J of CSA C22.1 for more information on hazardous locations and approved Division 2 wiring methods. • Articles 505 of the National Electrical Code (NFPA 70) and Section 18 of CSA C22.1 for more information hazardous on locations and approved Zone 2 wiring methods.
(1): Products that can be installed in Class I, Division 2 locations can also be installed in Class I, Zone 2 locations with the same instructions.	

NOTE: You have to refer to edicts, by-laws, laws, directives, circulars, standards, regulations, and any other document related to the installation location of the device.

Personnel Information

Overview

The product manuals and the products are intended for use by persons technically qualified to install, use, and service the Schneider Electric products.

Operation by unqualified persons or failure to follow the safety instructions provided in the product manuals and/or those affixed to the devices, can result in irremediable harm or damage to persons and equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Authorize only persons with expertise in the design and programming of control systems to program, install, and operate the products.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Qualified Persons

Only qualified persons should be authorized to install, use, and service products.

Products must be used by persons who have received training and have been informed of the major risks involved in working in an industrial environment.

In particular, the following personnel are deemed to be qualified for:

- Equipment operation
- Equipment preventive and corrective maintenance

Equipment Operators

Personnel who operate the machines and/or processes via a human machine interface connected to the PLC.

Operators cannot modify the PLC configuration (hardware or software) or its application program.

Equipment Maintenance Personnel

Personnel who modify the PLC hardware configuration and/or its application program and install the software updates supplied by the manufacturer.

These persons must:

- Be trained in PLC programming and operation.
- Have the experience and technical knowledge required to be aware of:
  - The risks, electrical hazards in particular, involved in their job.
  - The ways of reducing these risks for themselves, third-parties, and the equipment being used.

Product Selection

Automation Equipment Characteristics

Automation equipment and related software are used to control various industrial processes. The type or model of automation equipment suitable for each application varies depending on these factors:

- The control function required
- The degree of protection required
- The production methods
- Some unusual conditions
- Government regulations

Detailed information about the electrical, mechanical, and thermal specifications of Schneider Electric devices is available in the associated technical documentation such as installation manuals or service instructions.

⚠ WARNING

UNEXPECTED SYSTEM BEHAVIOR

Select and use only software and hardware products approved by Schneider Electric for use in the intended application and operating environment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Automation Equipment Applications

Take into account norms and standards applicable to each application domain.

In particular, machinery that lacks of protective equipment should not be used in automation systems without special considerations.

⚠ WARNING

UNEXPECTED SYSTEM BEHAVIOR

Do not use only software and related automation equipment on equipment that does not have point-of-operation protection.

Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

System Design

Overview

The safety of a system must be analyzed during the design phase:

- Perform safety analysis for the application and equipment.
- Design and plan for appropriate tests of the application.
- Take into account compliance to all applicable safety standards and application domain best practices.

As a general approach, the system must be designed to ensure that if a component fails, the other components and the system step into a predictive and acceptable state. For instance, technologies and operating modes of sensors and actuators must be selected in order that if a sensor fails, the actuators fallback in a safe state.

Protection Devices

In complement to system programming and interlocks, the system designer must use devices external to the PLC to provide protection against unsignaled active internal PLC faults detected, which are deemed dangerous in the application.

Fault remediation may require various technological solutions such as mechanical, electromagnetic, pneumatic, hydraulic solutions: for example, direct wiring of the limit switch and emergency stop detectors on movement control contactor coils.

Ensure that emergency stop devices remain effective in any equipment operation mode, even when abnormal: for example, in the event of a cut wire. In particular, resetting these devices should not result in uncontrolled or undefined restarts.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and over travel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link.
- Each implementation must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Examples in Product Manuals

The product manuals may contain information and examples relative to the design and operation of industrial applications and processes.

All the examples provided in the product manuals are given for information only and have to be studied and adapted to a given industrial application.

⚠ WARNING

UNEXPECTED EQUIPMENT BEHAVIOR - INAPPROPRIATE EXAMPLE USE

Before intending to use the examples of applications or programs provided in the product manuals, adapt them to the specific functions and safety requirements of the industrial application concerned.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Project Examples

The examples of projects provided with the products are for information only and does not match any specific installation.

⚠ WARNING

UNEXPECTED EQUIPMENT BEHAVIOR - MISAPPLICATION OF PROJECT

To adapt a demonstration project to a given industrial application:

- Conduct a safety analysis for the application and equipment installed.
- Verify that all equipment is appropriate for the equipment in the installation.
- Supply appropriate parameters, particularly for limits.
- Check that all sensors and actuators are compatible.
- Thoroughly test all functions during verification and commissioning.
- Provide independent paths for critical control functions, for example emergency stop and limit conditions, according to the safety analysis and applicable codes and regulations.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Environmental Conditions

Overview

The control equipment, and their associated peripherals, are provided as open or enclosed equipment. Use the control equipment in overvoltage category II and in an industrial environment.

In the industry, the micro-environmental conditions surrounding the electronic devices can be diverse, including electromagnetic influences, dusty, aggressive, or explosive atmosphere, wide temperature ranges.

All these influences must be considered when selecting products, designing the system, and installing, testing, and operating the automation system.

Equipment Type

Install the automation devices and their controlling devices so that they are physically protected against any incident.

Two types of equipment are defined:

- Open equipment
- Enclosed equipment

Open Equipment

Open equipment can have an active and accessible electrical component and must be incorporated into other units designed for safety protection such as cabinets, enclosures, and so on.

Enclosed Equipment

Enclosed equipment is enclosed on all sides, may be except on the mounting side, to:

- Prevent the personnel to come into accidental contact with active or mobile parts inside the device
- Protect it from foreign body penetration in compliance with the recommendations related to mechanical rigidity, inflammability, and stability if applicable.

This equipment has a degree of protection equivalent to, or higher than, IP20.

Enclosed Equipment Installation

Enclosed equipment may be installed in:

- A housing such as cabinet, enclosure
- A restricted area or control access rooms: directly without any additional protection if the PLCs or associated systems (power supply, modules, and so on) already carry a protection index equivalent to IP20 or higher. This type of installation is implemented in premises with a low level of pollution, not exceeding 2. It concerns control stations or rooms without any machines or activities that generate dust or any other metal particles. The outside walls are therefore deemed to be the PLC casing.

Electrical Features

Overview

Many rules of wiring and capability to protect equipment against EMC are given in the *Electrical installation guide* and *Control Panel Technical Guide, How to protect a machine from malfunctions due to electromagnetic disturbance* *(see page 8)*.

Grounding

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Comply with national and local electrical standards with respect to the grounding of each equipment.

Failure to follow these instructions will result in death or serious injury.

Always connect the device to the protective ground in compliance with existing national and local standards.

Wiring

Verify that the completed system is free from short circuits and undesired groundings.

Position the signal cables so that the automation functions are not disrupted by any capacitive, inductive, or electromagnetic influences, and so on.

When system installation includes devices far away from each other, check the recommendations given in the equipment documentation, particularly for grounding and communication aspects.

Tighten connections at terminal in conformance with the specified torque and appropriate wire size specifications.

Voltage

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Comply with national and local electrical standards with respect to power supplies and current characteristics existing in the installation.

Failure to follow these instructions will result in death or serious injury.

Follow these rules when installing and setting up the devices:

- Check that the power voltages are within the tolerance ranges defined in the technical specifications for the devices.
- If the device is connected permanently to a main supply, include an emergency cut-out and a surge protection fault circuit-breaker in the wiring system.
- Protect low voltage circuits with a ground connection to help ensure dangerous voltage detection.
- Protect power line and output circuits by fuses or breakers to comply with local and national regulatory requirements for the rated current and voltage of the particular installation.

Powering Up

⚠ DANGER

EXPLOSION - HAZARDOUS LOCATIONS

Disconnect all power before removing components, if installed in a hazardous location where flammable gases or combustible dusts may be present. Electrical sparks in a hazardous location cause an explosion.

Failure to follow these instructions will result in death or serious injury.

Before powering up equipment:

- Check that the equipment is powered by an acceptable voltage.
- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Perform all start-up tests recommended by the manufacturer.

If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Start-up Testing

Overview

Before using electrical control and automation equipment for regular operation after installation, qualified personnel must perform start-up test to verify correct operation of the equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Follow all start-up tests recommended in the equipment documentation.

Perform software testing in both simulated and real environments.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Test Conditions

It is important that:

- Arrangements for such a check be made
- Enough time is allowed to perform complete and satisfactory testing

⚠ WARNING

EQUIPMENT OPERATION HAZARD

Before testing the system:

- Verify that all installation and set up procedures have been completed.
- Remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Maintenance

Power Supplies

Before working on a device (for example, opening a housing), in all cases, turn off all the power supplies connected to the device: disconnect the power plug or open the power cut-out device.

Before working on an onsite mechanical device, turn off its power supply and mechanically lock the moving parts.

Before removing a module, a memory cartridge, a PCMCIA card, and so on, check the documentation to see if this operation should be carried out with the power off or on. Always closely follow the instructions given in the documentation.

Wiring

On positive logic outputs or negative logic inputs, take all the necessary precautions to prevent any disconnected wires from coming into contact with the mechanical ground (risk of unwanted commands).

Repairing

When replacing parts or components, only use factory approved parts.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not attempt to repair any component.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Only the manufacturer can perform repairs.

Battery Replacing

When replacing batteries, use the same type of batteries and place the damaged batteries with toxic waste. Do not place in fire, open, recharge, or weld lithium and mercury batteries.

Contact your local dealer for information on how to dispose of used products in compliance with regulations.