# PowerLogic P1, Easergy MiCOM

## P10, P20, P30, P40, P90 and C264

EN SFTY/T16

Issue Date: 08/2024

Safety Guide

Schneider Electric

**Note**

The technical manual for this device gives instructions for its installation, commissioning, and operation. However, the manual cannot cover all conceivable circumstances or include detailed information on all topics. In the event of questions or specific problems, do not take any action without proper authorization. Contact the appropriate Schneider Electric technical sales office and request the necessary information.

Any agreements, commitments, and legal relationships and any obligations on the part of Schneider Electric including settlements of warranties, result solely from the applicable purchase contract, which is not affected by the contents of the technical manual.

This device MUST NOT be modified. If any modification is made without the express permission of Schneider Electric, it will invalidate the warranty, and may render the product unsafe.

# SAFETY GUIDE

| Chapter Applicability | |
|---|---|
| **Date:** | 08/2024 |
| **Products covered by this chapter:** | |
| | This chapter covers the specific versions of the PowerLogic P1 and Easergy MiCOM products listed below.<br>This includes **only** the following combinations of Software Version and Hardware Suffix. |
| **Hardware Suffix:** | All P1, P10, P20, P30, P40, P90 and C264 products |
| **Software Version:** | All P1, P10, P20, P30, P40, P90 and C264 products |

# CONTENTS

# 1. SAFETY INFORMATION

**Important Information**

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 death or serious 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, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

# 2. INTRODUCTION

This document and the relevant equipment documentation provide full information on safe handling, installation, testing, commissioning and operation of this equipment. This document also includes reference to typical equipment label markings.

Documentation for equipment ordered from Schneider Electric is dispatched separately from manufactured goods and may not be received at the same time as the equipment. Therefore this guide is provided to ensure that printed information which may be present on the equipment is fully understood by the recipient.

The technical data in this document provides typical information and advice, which covers a variety of different products. You must also refer to the Technical Data section of the relevant product publication(s) as this includes additional information which is specific to particular equipment.

**DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Only qualified personnel, trained, authorized and familiar with the contents of the latest issue of the Safety Guide, Safety Information, Technical Data chapters and the equipment rating label(s) shall work on installation, connection, commissioning, maintenance or servicing of the equipment.

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

You also need to make reference to the external connection diagram(s) before the equipment is installed, commissioned or serviced.

Language-specific, self-adhesive User Interface labels are provided in a bag for some equipment.

# 3. HEALTH AND SAFETY

The information in this part of the equipment documentation is intended to ensure that equipment is properly installed and handled in order to maintain it in a safe condition.

**People**

**Receipt, Handling, Storage and Unpacking Relays**

Although relays are of a robust construction, we recommend that you become familiar with the Installation chapter, as this describes important issues associated with receiving, handling, storage and unpacking relays.

**Planning**

**Live and Stored Voltages**

When electrical equipment is in operation, dangerous voltages will be present in certain parts of the equipment. Even if electrical power is no longer being supplied, some items of equipment may retain enough electrical energy inside them to pose a potentially serious risk of electrocution or damage to other equipment.

*NOTICE*

**HAZARD OF EQUIPMENT DAMAGE**

- Remember that placing equipment in a “test” position does not normally isolate it from the power supply or discharge any stored electrical energy.

**Failure to follow these instructions could result in equipment damage.**

**Warnings and Barricades**

Everyone must observe all warning notices. This is because the incorrect use of equipment, or improper use may endanger personnel and equipment and also cause personal injury or physical damage.

Unauthorized entry should also be prevented with suitably marked fixed barricades which will notify people of any dangers and screen off work areas.

People should not enter electrical equipment cubicles or cable troughs until it has been confirmed that all equipment/cables have been isolated and de-energised.

**Electrical Isolation**

Before working in the terminal strip area, all equipment which has the potential to provide damaging or unsafe levels of electrical energy must be isolated. You will need to isolate and de-energize the specific item of equipment which is being worked on.

Depending on the location, you may also need to isolate and de-energize other items which are electrically connected to it as well as those which are close enough to pose a risk of electrocution in the event of accidental physical or electrical contact.

Remember too that, where necessary, both load and line sides should be de-energized.

Before you make contact with any equipment use an approved voltage detection device to reduce the risk of electric shock.

**Risk of Accidental Contact or Arc Flash**

Be aware of the risk of accidental contact with hands, long hair, tools or other equipment; and be aware of the possibility of the increased risk of arc flash from areas of high voltage.

Always wear appropriate shock and arc flash personal protective equipment while isolating and de-energizing electrical equipment and until a de-energized state is confirmed.

**Temporary Protection**

Consider the use of temporary protective Earthing Clamps. This is required to establish and maintain de-energization when electrical equipment operates at greater than 1000 volts or there is potential for back-feed at any voltage.

Temporary protective earthing can be accomplished by installing cables designed for that purpose or by the use of intrinsic earthing clamp equipment. Temporary protective earthing clamp equipment must be able to carry maximum fault current available and have an impedance low enough to cause the applicable protective device to operate.

**Restoring Power**

To reduce the risks, the work plan should have a check list of things which must be completed and checks made before electrical power can be restored.

Be aware of the risk that electrical systems may have power restored to them at a remote location (possibly by the customer or a utility company). You should consider the use of lockouts so that the electrical system can be restored only when you unlock it. In any event, you should be aware of and be part of the process which determines when electrical power can be restored; and that people working on the system have control over when power is restored.

Inspect and test the electrical equipment to ensure it has been restored to a “safe” condition prior re-energizing. Replace all devices, doors and covers before turning on the power to any device.

**Qualified Personnel**

Proper and safe operation of the equipment depends on appropriate shipping and handling, proper storage, installation and commissioning, and on careful operation, maintenance and servicing. For this reason only qualified personnel may work on or operate the equipment.

Qualified personnel are individuals who:

- Are familiar with the installation, commissioning, and operation of the equipment and of the system to which it is being connected
- Are able to safely perform switching operations in accordance with accepted safety engineering practices and are authorized to energize and de-energize equipment and to isolate, ground, and label it
- Are trained in the care and use of safety apparatus in accordance with safety engineering practices
- Are trained in emergency procedures (first aid)

**Documentation**

The equipment documentation gives instructions for its installation, commissioning, and operation. However, the manuals cannot cover all conceivable circumstances or include detailed information on all topics. In the event of questions or specific problems, do not take any action without proper authorization. Contact the appropriate Schneider Electric technical sales office and request the necessary information.

# 4. SYMBOLS AND LABELS ON THE EQUIPMENT

For safety reasons the following symbols and external labels, which may be used on the equipment or referred to in the equipment documentation, should be understood before the equipment is installed or commissioned.

## 4.1 Symbols

**Caution**
Refer to equipment documentation

**Caution**
Risk of electric shock

Protective Conductor (*Earth) terminal

Functional/Protective Conductor (*Earth) terminal

**Note**
This symbol may also be used for a Protective Conductor (Earth) Terminal if that terminal is part of a terminal block or sub-assembly e.g. power supply.

**⚠ CAUTION**

**HAZARD OF INJURY OR EQUIPMENT DAMAGE**

- The term “Earth” used throughout this technical manual is the direct equivalent of the North American term “Ground”.

**Failure to follow these instructions could result in injury or equipment damage.**

## 4.2 Labels

See the Typical Labels section for equipment labelling information.

# 5. INSTALLING, COMMISSIONING AND SERVICING

**Manual Handling**

Plan carefully, identify any possible hazards and determine whether the load needs to be moved at all. Look at other ways of moving the load to avoid manual handling. Use the correct lifting techniques and Personal Protective Equipment to reduce the risk of injury.

Many injuries are caused by:

- Lifting heavy objects
- Lifting things incorrectly
- Pushing or pulling heavy objects
- Using the same muscles repetitively

Follow European directives 89/654 EU, 89/655 EU, 89/656 EU, 90/269 EU and 90/270 EU for safety and health at work (EU-OSHA), the Health and Safety at Work, etc Act 1974, and the Management of Health and Safety at Work Regulations 1999.

**Equipment Connections**

Personnel undertaking installation, commissioning or servicing work for this equipment should be aware of the correct working procedures to ensure safety.

The equipment documentation should be consulted before installing, commissioning, or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present a hazardous voltage unless the equipment is electrically isolated.

The clamping screws of all terminal block connectors, for field wiring, using M4 screws shall be tightened to a nominal torque of 1.3 Nm.

Equipment intended for rack or panel mounting is for use on a flat surface of a Type 1 enclosure, as defined by Underwriters Laboratories (UL).

Any disassembly of the equipment may expose parts at hazardous voltage, also electronic parts may be damaged if suitable ElectroStatic voltage Discharge (ESD) precations are not taken.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electric shock or energy hazards.

**⚠ CAUTION**

**HAZARD OF INJURY OR EQUIPMENT DAMAGE**

- Voltage and current connections shall be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety.

**Failure to follow these instructions could result in injury or equipment damage.**

Watchdog (self-monitoring) contacts are provided in numerical relays to indicate the health of the device. Schneider Electric strongly recommends that these contacts are hardwired into the substation's automation system, for alarm purposes.

To ensure that wires are correctly terminated the correct crimp terminal and tool for the wire size should be used.

This equipment must be connected in accordance with the appropriate connection diagram.

**Protection Class I Equipment**

- Before energizing the equipment it must be earthed using the protective conductor terminal, if provided, or the appropriate termination of the supply plug in the case of plug connected equipment.

- The protective conductor (earth) connection must not be removed since the protection against electric shock provided by the equipment would be lost.
- When the protective (earth) conductor terminal (PCT) is also used to terminate cable screens, etc., it is essential that the integrity of the protective (earth) conductor is checked after the addition or removal of such functional earth connections. For M4 stud PCTs the integrity of the protective (earth) connections should be ensured by use of a locknut or similar.

The recommended minimum protective conductor (earth) wire size is 2.5 mm² (AWG 14) (3.3 mm² (AWG 12) for North America) unless otherwise stated in the technical data section of the equipment documentation, or otherwise required by local or country wiring regulations.

The protective conductor (earth) connection must be low-inductance and as short as possible.

All connections to the equipment must have a defined potential. Connections that are pre-wired, but not used, should preferably be grounded when binary inputs and output relays are isolated. When binary inputs and output relays are connected to common potential, the pre-wired but unused connections should be connected to the common potential of the grouped connections.

**Pre-Energization Checklist**
Before energizing the equipment, the following should be checked:

- Voltage rating/polarity (rating label/equipment documentation)
- Current Transformer (CT) circuit rating (rating label) and integrity of connections
- Protective fuse rating
- Integrity of the protective conductor (earth) connection (where applicable)
- Voltage and current rating of external wiring, applicable to the application

**Accidental Touching of Exposed Terminals**
If working in an area of restricted space, such as a cubicle, where there is a risk of electric shock due to accidental touching of terminals which do not comply with IP20 rating, then a suitable protective barrier should be provided.

**Equipment Use**
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Removal of the Equipment Front Panel/Cover**
Removal of the equipment front panel/cover may expose hazardous live parts, which must not be touched until the electrical power is removed.

**UL and CSA/CUL Listed or Recognized Equipment**
To maintain UL and CSA/CUL Listing/Recognized status for North America the equipment should be installed using UL or CSA Listed or Recognized parts for the following items: connection cables, protective fuses/fuseholders or circuit breakers, insulation crimp terminals and replacement internal battery, as specified in the equipment documentation.

For external protective fuses a UL or CSA Listed fuse shall be used. The Listed type shall be a Class J time delay fuse, with a maximum current rating of 15 A and a minimum DC rating of 250 V DC, for example type AJT15.

Where UL or CSA Listing of the equipment is not required, a high rupture capacity (HRC) fuse type with a maximum current rating of 16 A and a minimum DC rating of 250 V DC may be used, for example Red Spot type NIT or TIA.

**Equipment Operating Conditions**
The equipment should be operated within the specified electrical and environmental limits. This includes humidity as well as temperature limits.

**Current Transformer (CT) Circuits**

Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation. Generally, for safety, the secondary of the line CT must be shorted before opening any connections to it.

For most equipment with ring-terminal connections, the threaded terminal block for current transformer termination has automatic CT shorting on removal of the module. Therefore external shorting of the CTs may not be required, the equipment documentation should be checked to see if this applies.

For equipment with pin-terminal connections, the threaded terminal block for current transformer termination does NOT have automatic CT shorting on removal of the module.

**External Resistors, including Voltage Dependent Resistors (VDRs)**

Where external resistors, including Voltage Dependent Resistors (VDRs), are fitted to the equipment, these may present a risk of electric shock or burns, if touched.

**Battery Replacement**

Where internal batteries are fitted they should be replaced with the recommended type and be installed with the correct polarity to avoid possible damage to the equipment, buildings and persons.

**Insulation and Dielectric Strength Testing**

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part of the test, the voltage should be gradually reduced to zero, to discharge capacitors, before the test leads are disconnected.

**Insertion of Modules and PCB Cards**

Modules and PCB cards must not be inserted into or withdrawn from the equipment whilst it is energized, since this may result in damage.

**Insertion and Withdrawal of Extender Cards**

Extender cards are available for some equipment. If an extender card is used, this should not be inserted or withdrawn from the equipment whilst it is energized. This is to avoid possible shock or damage hazards. Hazardous live voltages may be accessible on the extender card.

**External Test Blocks and Test Plugs**

Great care should be taken when using external test blocks and test plugs such as the Easergy Test Block, Easergy Test Plug and MiCOM P99x types, as hazardous voltages may be accessible when using these. CT shorting links must be in place before the insertion or removal of Easergy test plugs, to avoid potentially lethal voltages.

*NOTICE*

**HAZARD OF EQUIPMENT DAMAGE**

- When a MiCOM P992 Test Plug is inserted into the MiCOM P991 Test Block, the secondaries of the line CTs are automatically shorted.

**Failure to follow these instructions could result in equipment damage.**

**Fiber Optic Communication**

Where fiber optic communication devices are fitted, these use laser light. These laser-light sources should not be viewed directly, as they can cause permanent damage to eyesight. Optical power meters should be used to determine the operation or signal level of the device.

**RJ45 Cable – Electric Shock Risk / Maximum Cable Length**

Do not use an RJ45 cable which is longer than 10 m (32.8 ft).
This is because the ground potential may be different for the equipment at each end of the RJ45 cable. If someone was touching a conductive part of the sleeve at the other end of the cable, they could be electrocuted (which could result in death or serious injury). It is recommended that you use optical fiber cables instead of RJ45.

**产品配置**

在修改或下载任何配置文件之后，在设备重新投入使用之前，用户有责任定义要执行的测试列表。这些测试应该足够全面，以确保产品的应用不会导致任何意外行为。

要进行的测试将取决于更改的性质，但范围可能从：

- 应用于设备的应用程序特定设置和原始书面应用程序特定设置记录之间的简单文件比较。

至

- 完成设备和功能的调试测试。

**清洁**

在装置没有通电情况下，可以使用蘸有干净水的无绒布清洁。测试插头的触头通常都使用凡士林油保护，请不要擦除。

## 5.1 Risk of Electric Shock using RJ45 Cables

This diagram shows how a MiCOM P40 protection relay could be connected to a Stand Alone Merging Unit (SAMU), using either an optical or an RJ45 cable. When connecting devices using RJ45 wired network cables, precautions for cabling must be taken to avoid any risk of electrical shock.

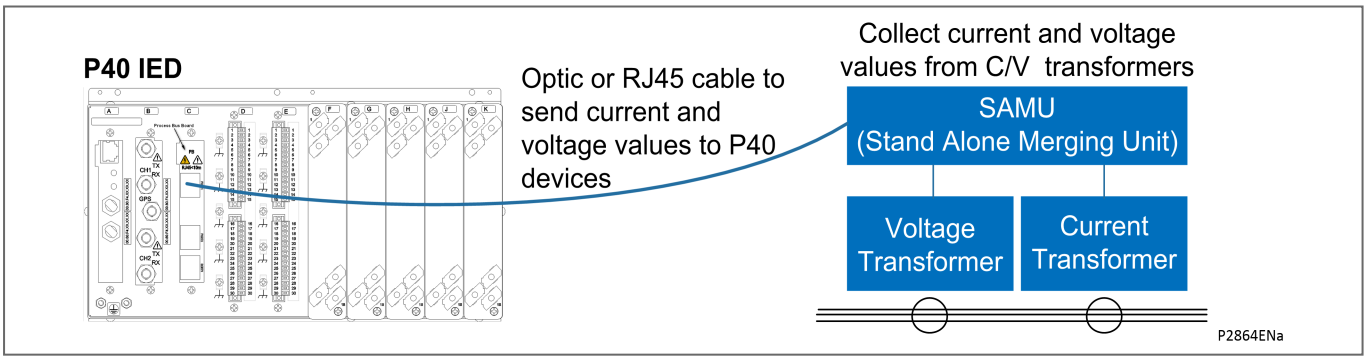



**Figure 1 - Connecting a MiCOM P40 device to a SAMU**

The risk arises due to the widely separated equipment having a different earth potential; and/or faults being propagated on the RJ45 cable. This diagram shows the possible risk:

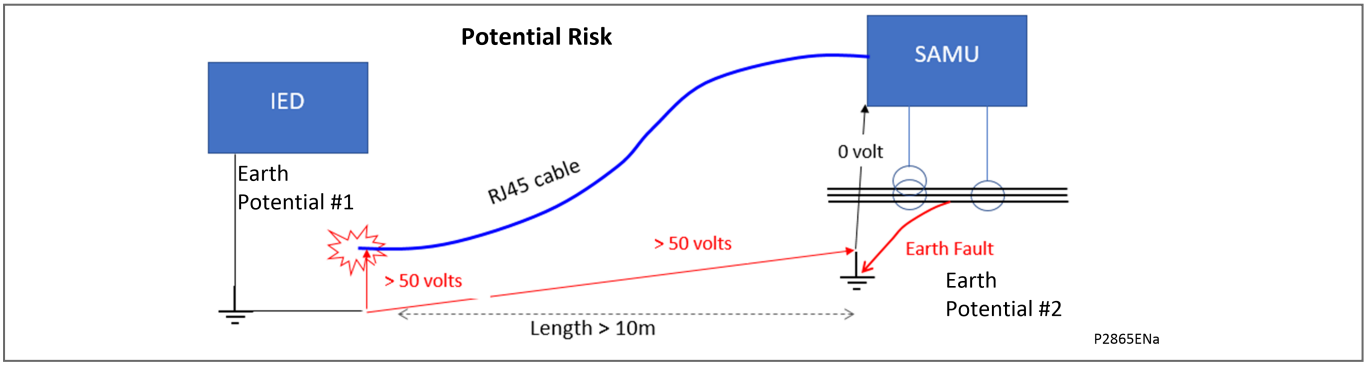



**Figure 2 - RJ45 connection electric shock risk**

The connection between the device and the SAMU is done using a RJ45 cable. An electric shock could occur if:

- A fault occurs on SAMU/Voltage Transformer/Current Transformer side
- There is an earth potential difference between the two locations
- An RJ45 cable is used instead of an optical cable, so that the earth potential difference and/or the fault is propagated along the RJ45 cable
- The distance from the MiCOM P40 protection relay (or a switch) to the SAMU is greater than 10 m (32.8 ft), so that there is a risk of electrical shock for someone who comes into electrical contact with the other end of the RJ45 cable (when it is disconnected from MiCOM P40 protection relay)

The latest advice for connecting a Low Power Instrument Transformer (LPIT) or a Stand Alone Merging Unit (SAMU) to an protection relay/switch is, if the distance from the protection relay/switch is:

- greater than 10 m: you must only use a fiber optic cable
- less than 10 m: you can use fiber optic or RJ45 cable

When a connection to a LPIT or SAMU is made with the RJ45 cable, this RJ45 cable must not be longer than 10 m (32.8 ft).

The reason is that, during a ground fault, the ground potential of the LPIT or the SAMU rises and is transmitted by the RJ45 cable. If someone was touching the conductive sleeve at the other end of the cable, they could be electrocuted or seriously injured.

**DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Do not connect items of equipment with different earth potentials with an RJ45 cable.
- Do not use RJ45 cable longer than 10 m (32.8 ft).

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

# 6. DE-COMMISSIONING AND DISPOSAL

**De-Commissioning**

The supply input (auxiliary) for the equipment may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the equipment (both poles of any DC supply), the capacitors should be safely discharged via the external terminals prior to de-commissioning.

**Disposal**

It is recommended that incineration and disposal to water courses is avoided. The equipment should be disposed of in a safe manner. Any equipment containing batteries should have them removed before disposal, taking precautions to avoid short circuits. Particular regulations within the country of operation, may apply to the disposal of the equipment.

# 7. EQUIPMENT WHICH INCLUDES ELECTROMECHANICAL ELEMENTS

**Electrical Adjustments**

It is possible to change current or voltage settings on some equipment by direct physical adjustment e.g. adjustment of a plug-bridge setting. The electrical power should be removed before making any change, to avoid the risk of electric shock.

**Exposure of Live Parts**

Removal of the cover may expose hazardous live parts such as relay contacts, these should not be touched before removing the electrical power.

# 8. TECHNICAL SPECIFICATIONS FOR SAFETY

Unless otherwise stated in the equipment technical manual, the following data is applicable.

## 8.1 Protective Fuse Rating

The recommended maximum rating of the external protective fuse for equipments is 16A, High Rupture Capacity (HRC) Red Spot type NIT, or TIA, or equivalent. Unless otherwise stated in equipment technical manual, the following data is applicable. The protective fuse should be located as close to the unit as possible.

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- CTs must NOT be fused since open circuiting them may produce lethal hazardous voltages.

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

## 8.2 Protective Class

| | |
|---|---|
| IEC 60255-27: 2013<br>EN 60255-27: 2014<br>BS EN 60255-27: 2014 | Class I (unless otherwise specified in the equipment documentation). This equipment requires a protective conductor (earth) connection to ensure user safety. |

## 8.3 Installation Category

| | |
|---|---|
| IEC 60255-27: 2013 | Installation Category III (Overvoltage Category III) |
| EN 60255-27: 2014<br>BS EN 60255-27: 2014 | Distribution level, fixed installation. |

Equipment in this category is qualification tested at 5 kV peak, 1.2/50 µs, 500 Ω, 0.5 J, between all supply circuits and earth and also between independent circuits.

## 8.4 Environment

The equipment is intended for indoor installation and use only. If it is required for use in an outdoor environment then it must be mounted in a specific cabinet of housing which will enable it to meet the requirements of IEC 60529 with the classification of degree of protection IP54 (dust and splashing water protected).

| | |
|---|---|
| Pollution Degree | Pollution Degree 2 Compliance is demonstrated by reference to safety standards. |
| Altitude | Operation up to 2000 m (6561 ft) |
| IEC 60255-27: 2013 | |
| EN 60255-27: 2014 | |
| BS EN 60255-27: 2014 | |

## 8.5 Humidity During Storage

Sustained exposure to high humidity during storage may cause damage to electronics and reduce the lifetime of the equipment.

We recommend that storage humidity shall not exceed 50% relative humidity.

Once the MiCOM products have been unpacked, we recommend that they are energized within the three following months.

Where electrical equipment is being installed, sufficient time should be allowed for acclimatization to the ambient temperature of the environment, before energization.

# 9. TECHNICAL SPECIFICATION FOR FUNCTIONAL SAFETY

## 9.1 Technical Specification for Functional Safety

The following information is applicable when the MiCOM P130C, P132, P139, P141, P142, P143, P144, P145, P241, P242, P243, P341, P342, P343, P344 and P345 is used as an element in an automated safety function that is specified to achieve a Safety Integrity Level (SIL).

The reliability of the MiCOM P130C, P132, P139, P14x, P24x, P34x has been analyzed in accordance with IEC 61508 for use in SIL applications.

The information in this Safety Guide is intended to support the safety system integration phase in accordance with IEC 61508 (and to be available to those performing the system 'lifecycle phases' that follow) to enable the safety function(s) achieve the specified SIL. The information only applies to the specified products; the actual SIL achieved will depend on many system considerations that are outside the scope of this safety manual.

## 9.2 General Conditions or Restrictions for use in SIL Applications

1. Safety functions are intended to be automated. Any non-specified manual interaction that could interfere with the safety function during operation should be protected from inadvertent use.
2. The MiCOM P130C, P132, P139, P14x, P24x, P34x are not to be used in environments beyond claimed specification.
3. The instructions contained in this Safety Guide (or referred to in associated user documentation) should be strictly complied with to provide the correct level of systematic safety integrity.
4. Failure modes of the MiCOM P130C, P132, P139, P14x, P24x, P34x that are classified as 'dangerous detected' (quantified by the value $\lambda_{DD}$) shall result in a safe action with respect to the hazard(s) being controlled or be repaired within the time assumed in the PFD calculations.

## 9.3 Proof Testing

The MiCOM P130C, P132, P139, P14x, P24x, P34x shall be periodically proof tested, preferably in the installation, by a qualified person familiar with the operation of the device, to verify all aspects of the functional specification required for the application when it is used in 'low demand' safety functions. Low demand is defined in IEC 61508-4 as a demand to act less frequently than once a year.

A suitable proof test interval ($T_1$) should be used to achieve the required average probability of failure on demand ($PFD_{AVG}$). A nominal interval of 8,760 hrs (1 year) and Mean Time To Repair (MTTR) of 8 hours has been used in the calculations for $PFD_{AVG}$ illustration purposes.

## 9.4 Functional Safety Parameters

The MiCOM P130C, P132, P139, P14x, P24x, P34x have been assessed by CML B.V. (Notified Body number 2776) and by CMLEx (approved body number 2503) and found to comply with the functional safety requirements of IEC 61508-2:2010 clause 7.4.4.1.3 (Route 2H) and 7.4.10 (Route 2S / 'proven in use') for use in SIL 1 safety functions.This was done in accordance with the article 1(b) of ATEX Directive 2014/34/EU and with the Article 3 (b) part I of the UK regulation SI 2016 No. 1107 (as amended by UKSI 2019:696) for an intended use outside potentially explosive atmospheres. These are required for, or contributing to, the safe functioning of equipment and protective systems with respect to the risks of explosion, when used in accordance with the user documentation and subject to special conditions for safe

use specified in Section 14 of EU Type Examination Certificate CML 18ATEX3008X and in the Section 14 of UK Type Examination Certificate CML 21UKEX31194X.

| | | |
|---|---|---|
| **Feeder management and Bay Control relays:** | P130C, P132, P139 | All versions since 2011 |
| **Feeder management relays:** | P141, P142, P143, P144, P145 | All versions since 2011 |
| **Motor protection relays:** | P241, P242, P243 All versions since 2011 | All versions since 2011 |
| **Generator protection relays:** | P341, P342, P343, P344, P345 | All versions since 2011 |

| | |
|---|---|
| **Element safety function (common to all relays):** | To monitor the current supplied to electrical equipment in a hazardous area and isolate the equipment if a fault condition occurs that may lead to an ignition source. |

| | |
|---|---|
| **Product specification:** | Refer to Technical Manual for each product type. |

| | |
|---|---|
| **Random hardware failures:** | The assessment confirms the following quantitative reliability data (failure rates in $h^{-1}$) |

## 9.5 Random Hardware Failures ($h^{-1}$)

| Product [Note 1] | Dangerous failure rate $\lambda_D$ [Note 2] | Diagnostic coverage [Note 3] | Dangerous Undetected failure rate $\lambda_{DU}$ | Dangerous Detected failure rate $\lambda_{DD}$ | $PFD_{AVG}$ [Note 4] | $PFD_{AVG}$ [Note 5] | ATEX | SIL1 |
|---|---|---|---|---|---|---|---|---|
| P130C | 7.87 $E^{-07}$ | 60% | 3.15 $E^{-07}$ | 4.72 $E^{-07}$ | 4.00 $E^{-03}$ | 6.48 $E^{-03}$ | Yes | Yes |
| P132 | 6.67 $E^{-07}$ | 60% | 2.67 $E^{-07}$ | 4.00 $E^{-07}$ | 3.39 $E^{-03}$ | 5.50 $E^{-03}$ | Yes | Yes |
| P139 | 1.18 $E^{-06}$ | 60% | 4.74 $E^{-07}$ | 7.10 $E^{-07}$ | 6.02 $E^{-03}$ | 9.75 $E^{-03}$ | Yes | Yes |
| P14x | 4.28 $E^{-07}$ | 60% | 1.71 $E^{-07}$ | 2.57 $E^{-07}$ | 2.18 $E^{-03}$ | 3.53 $E^{-03}$ | Yes | Yes |
| P24x | 4.82 $E^{-07}$ | 60% | 1.93 $E^{-07}$ | 2.89 $E^{-07}$ | 2.45 $E^{-03}$ | 3.97 $E^{-03}$ | Yes | Yes |
| P34x | 5.31 $E^{-07}$ | 60% | 2.12 $E^{-07}$ | 3.18 $E^{-07}$ | 2.70 $E^{-03}$ | 4.37 $E^{-03}$ | Yes | Yes |

| |
|---|
| Note 1<br>Refer to full list of products (‘Product Identification’ above) in scope where “x” appears |
| Note 2<br>Worst case assumptions have been used to classify a “dangerous failure” |
| Note 3<br>Diagnostic coverage is conservatively estimated by analysis of the design |
| Note 4<br>Calculated assuming proof test interval 8,760 hours and MTTR 8 hours |
| Note 5<br>Calculated assuming proof test interval 8,760 hours and MTTR 8 hours and proof test coverage factor of 90%, mission time 20 years |

## 9.6 Parameters Common to All Products in Scope

| | |
|---|---|
| **Safe failure fraction (SFF):** | Not assessed. The SFF parameter is not required for the 'Route 2H' compliance option in IEC 61508-2 |
| **Diagnostic coverage (DC):** | 60% (proportion of dangerous failures in the product that are self-diagnosed) |
| **Type classification (A/B):** | 'Type B' in accordance with IEC 61508-2, 7.4.4.1.3 (contains some complex components whose fault behavior cannot be completely determined) |
| **Architectural constraints:** | SIL 1 in accordance with the Route 2H method with a hardware fault tolerance (HFT) = 0 |
| **Systematic capability:** | SC 1 which limits an application that uses this product to no higher than SIL 1 |
| **Demand mode:** | Safety function applications are expected to be low demand (greater than 1 year between demands) |
| **Restrictions, conditions and general information:** | • Refer to information in this Safety Guide and the relevant product Technical Manual for all conditions, restrictions in use, installation, maintenance, test and all other functional safety related information.<br>• It is the responsibility of the system designer, installer and end user to ensure a specified safety integrity level (SIL) is achieved by reference to the data in this document and adhering to all the conditions and restrictions herein. Use of this data to ensure safety functions meet a specified SIL should only be made by persons who are competent in the functional safety activities they are performing.<br>• Cyclic diagnostic test intervals assume the process safety time is 50ms (although in some cases trip time can increase due to intentional time delays within the protection function).<br>• The watchdog relay is energized during normal operation and is de-energized with its contacts closed (for monitoring by the SCADA system) in the event of a fault. |
| **Restrictions when using the MiCOM P30 and P40 in hazardous area applications:** | • No use shall be made of binary inputs to ensure the safety function is not interfered with.<br>• No reliance of data from communication interfaces shall be made to perform the safety function.<br>• Tripping of the circuit breaker shall be made directly using an output contact from the protection relay. (As contact allocation is configurable it is possible to assign multiple contacts to this tripping function to mitigate risk of contact failure as the external contact operation is not directly able to be monitored).<br>• Unauthorised access to the device configuration shall be prevented through the use of physical protection and/or password control.<br>• Protection functions using data from thermal or other sensors are not considered as safety functions. (RTD or CLIO inputs). |

## 9.7 Maintaining Systemic Safety Integrity

The systematic safety integrity of MiCOM products listed in this section meet the requirements of SIL1 when the products are installed, used and maintained in accordance with the product and safety manuals.

To maintain functional safety and systematic safety integrity a suitable proof testing interval; 8,760 operational hours has been used for calculation, should be used. In view of the critical nature of protective and control equipment, and their infrequent operation, it is desirable to confirm that the equipment is operating correctly at regular interval periods following installation. Although MiCOM relays are self-supervising and therefore require less maintenance than earlier designs, periodic checks are necessary to ensure the equipment is functioning correctly and to ensure external wiring to the equipment remains intact. It is particularly important to check the equipment for alarms, the functionality of opto-isolated inputs and relay outputs and measurement accuracy to prove the product calibration is maintained.

The product specific commissioning and maintenance guides should be followed to confirm that equipment is operating within specification. The maintenance results should be assessed against the original commissioning results (or previous maintenance results), any deviation outside tolerance should result in appropriate corrective action being taken.

Equipment repair or replacement should follow the recommendation of the maintenance chapter found in the specific product manual.

## 9.8 Safety Function End of Life

When a product has reached the end of its useful service life, a mission time of 20 years has been used for the purposes of calculation, the product must be disposed according to the legislation of the local country. MiCOM products are in the scope of European Union Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) Regulations 2013. For Product End of Life Instructions, the documentation found on the Schneider Electric web site should be followed.

## 9.9 Fault Reporting

Any goods returned to Schneider Electric will require an RMA number which can be initiated by contacting a Technical Support Representative or the local country Sales Representative.

If a fault has been determined with a product the following details are required by Technical Support

- Contact name, email address and phone number
- Company name
- Serial number of unit(s)
- Model number of unit(s)
- Brief description of the problem(s)
- Invoice address
- Shipping address (if it is not the same as above)

A form with the assigned RMA number, along with details of the problem will be emailed to the contact email provided. All information on the form should be verified, the form should be included with the product(s) being returned. The RMA number must be marked on the outside of the box.

Schneider Electric warranty does not cover failures due to incorrect installation, misuse, abnormal operating conditions or lack of routine maintenance.

# 10. COMPLIANCE MARKING FOR APPLICABLE EUROPEAN DIRECTIVES AND UK REGULATIONS

The following European directives may be applicable to the equipment, if so it will carry the relevant marking(s) shown below:

CE

For the Low Voltage Directive (LVD) 2014/35/EU, the following product specific harmonized standard was used to establish product safety compliance:

EN 60255-27:2014

For the Electromagnetic Compatibility Directive (EMCD) 2014/30/EU, the following product specific harmonized standard was used to establish the EMC compliance:

EN 60255-26:2013

For the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS) Directive 2015/863/EU, the following harmonized standard was used to establish ROHS compliance:

EN IEC 63000:2018

The following UK regulations may be applicable to the equipment, if so it will carry the relevant marking(s) shown below:

UK CA

For the electrical equipment (safety) regulations SI 2016 No. 1101, the following product specific designated standards were used to establish product safety compliance:

BS EN 60255-27:2014

For the Electromagnetic Compatibility regulations SI 2016 No. 1091, the following product specific designated standard was used to establish the EMC compliance:

BS EN 60255-26:2013

For the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS) regulations, SI 2012 No. 3032, the following standard was used to establish ROHS compliance:

BS EN IEC 63000:2018

The compliance is demonstrated via Technical Files, with reference to product safety and EMC standards.

Where applicable:
Equipment and protective systems intended for use in potentially explosive atmospheres European directive 2014/34/EU and UK regulations SI 2016 No. 1107 (as amended by SI 2019:696)

**II (2) G [Ex eb]**

The equipment is compliant with Article 1(b) of ATEX Directive 2014/34/EU and with Article 3 (b) part I of the UK regulation SI 2016 No. 1107, amended by SI 2019 No. 696. It is approved for use outside potentially explosive atmospheres. It is required for the safe operation of 'Increased Safety - Ex eb' protected electrical machines, when used in accordance with the user documentation and subject to special conditions for safe use specified in Section 14 of EU Type Examination Certificate CML 18ATEX3008X and in the Section 14 of UK Type Examination Certificate CML 21UKEX31194X.

**⚠CAUTION**

**HAZARD OF INJURY OR EQUIPMENT DAMAGE**

- Equipment with this marking is not itself suitable for operation within a potentially explosive atmosphere.

**Failure to follow these instructions could result in injury or equipment damage.**

Compliance demonstrated through the following documents:

- EN 50495:2010 / BS EN 50495:2010
- EN 60079-7:2015 / BS EN 60079-7:2015+A1:2018
- EN 60079-14:2003 / BS EN 60079-14:2014
- EN ISO/IEC 80079-34:2018 / BS EN ISO/IEC 80079-34:2020
- EU Type Examination Certificate CML 18ATEX3008X
- UK Type Examination Certificate CML 21UKEX31194X

**Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Classification:**

**Group II** - equipment intended for use in potentially explosive atmospheres, except in mines.

**(2)** - Category 2 equipment intended for use in areas in which potentially explosive atmospheres are likely to occur. The number shown in brackets means that the equipment is approved for use outside potentially explosive atmospheres but are required for or contributing to the safe functioning of equipment and protective systems with respect to the risks of explosion.

**G** - equipment contributing to the safe functioning of equipment and protective systems with respect to the risks of explosion in gas zones 1 and 2.

**[Ex eb]** – Increased Safety electrical machines - additional measures are applied and employed so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks in normal service or under specified abnormal conditions.

For more information regarding CE documentation, please contact:

CE

**Schneider Electric Industries SAS**

35 rue Joseph Monier

92500 Rueil-Malmaison

FRANCE

For more information regarding UKCA documentation, please contact:

UK CA

**Schneider Electric Limited**

Stafford Park 5

Telford, TF3 3BL

UNITED KINGDOM

# 11. REQUIREMENTS FOR THE USA AND CANADA

## 11.1 Recognized and Listed Marks for North America

**CSA** Canadian Standards Association

**UL** Underwriters Laboratory of America

If applicable, the following marks will be present on the equipment:


UL Recognized to UL (USA) requirements


UL Recognized to UL (USA) and CSA (Canada) requirements


UL Listed to UL (USA) requirements

UL Listed to UL (USA) and CSA (Canada) requirements


Certified to CSA (Canada) requirements

## 11.2 Information for MiCOM Relays Complying with USA & Canadian Requirements

### 11.2.1 Typical Equipment Marking

Listed by UL for compliance with USA and Canadian requirements.
UL = Underwriters Laboratories Inc.

### 11.2.2 Rack and Panel Mounted Equipment

The MiCOM protection relay ranges are intended for use on a flat surface of a Type 1 enclosure, as defined by Underwriters Laboratories Inc. (UL).

### 11.2.3 Operating Temperature

The maximum rated continuous operating temperature, in surrounding air, of the equipment is 55 °C (131 °F).

Pollution Degree – Pollution Degree 2

### 11.2.4 External Branch Circuit Protection

For external protective fuses a UL or CSA Listed or Recognized fuse and fuseholder shall be used. The fuse type shall be a Class J time delay fuse, with a maximum current rating of 15 A and a minimum rating of 250 V DC and 250 V AC, for example type AJT15.

Where UL or CSA Listing of the equipment is not required, a high rupture capacity (HRC) fuse type with a maximum current rating of 16 A and a minimum DC rating of 250 V DC and 250 V AC may be used, for example Red Spot type NIT or TIA.

### 11.2.5 Wire Terminations (Field Wiring) - Power and Signal Circuits

Equipment wire terminations for power circuits shall be made using UL/CSA Listed wire and suitable insulated pressure/crimp terminals or terminal kits only.

These shall have a minimum temperature rating of 75 °C (167 °F).

The minimum wire size used shall be:

| | |
|---|---|
| Relay Protective Ground/Earth Conductor: | AWG 12 (3.3 mm²) for North America, AWG 14 (2.5 mm²) elsewhere |
| Current Transformers (CTs): | AWG 12 (3.3 mm²) for North America, AWG 14 (2.5 mm²) elsewhere |
| Auxiliary Supply, Vx: | AWG 16 (1.5 mm²) |
| EIA (RS) 485 Port (See Note 1): | AWG 22 (0.25 mm²) |
| Low voltage signal circuits (e.g. RTD) (See Note 2) | AWG 22 (0.25 mm²) using screw clamp connectors |
| Other Circuits (See Note 3): | AWG 18 (1.0 mm²) |

Note 1
Pressure/crimp push-on or ring or pin terminals may be used for communication circuit connections.

Note 2
Low voltage signal circuits using screw clamp connectors, wire may be clamped directly or terminated in a pressure/crimp pin terminal and clamped.

Note 3
Only insulated pressure/crimp ring terminals shall be used for connections to other circuits.

### 11.2.6 M4 Terminal Screw Torque

The terminal screws of all connector blocks, for field wiring, using M4 screws shall be tightened to a nominal torque of 1.3 Nm.

### 11.2.7 Output Relay Ratings

**MiCOM Px2x:**

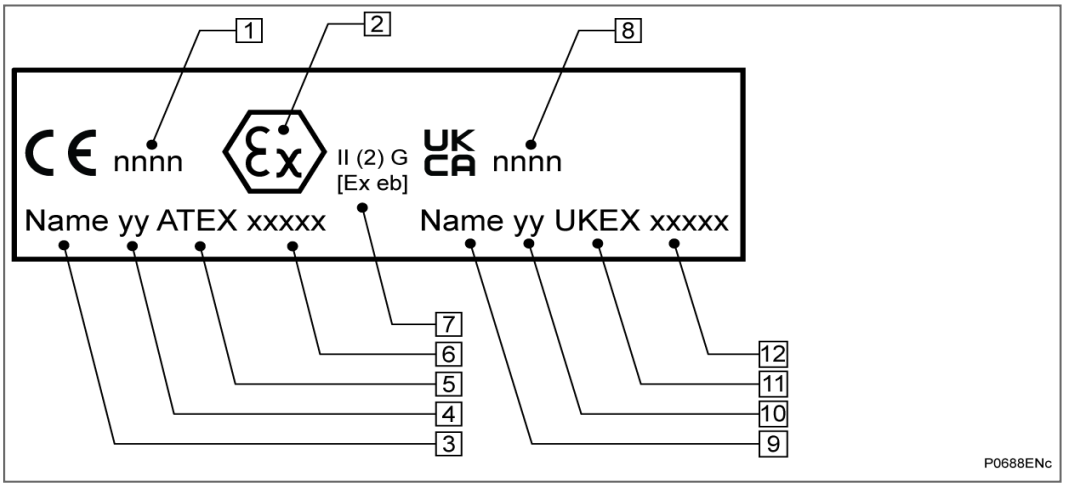
| | |
|---|---|
| Watchdog relay (make and carry): | 5 A, 250 V AC |
| Standard output relay (make and carry): | 5 A, 250 V AC |

Standard output relay:
Make and carry 5 A, 250 V AC.
Tripping:
Make 30 A, carry 30 A for 0.2 s, 250 V AC/V DC, 15 s cycle as per ANSI C37.90.
Continuous 16 A, 250 V AC.
High Break:
Make 30 A, carry 30 A for 0.2 s, 250 V AC/V DC, 15 s cycle as per ANSI C37.90 including break 30 A.
Continuous 16 A, 250 V AC.

### 11.2.8 Output Relay Contact Symbols

# 12. TYPICAL LABELS

## 12.1 Typical Compliance Label




[1] nnnn - identifying number of the Notified Body which demonstrated manufacturing Quality Assurance compliance to EN 80079-34:2018, e.g. 0891.

[2] Ɛx logo - signifies compliance with the European directive 2014/34/EU and with the UK regulation SI 2016 No. 1107, amended by SI 2019 No. 696.

[3] Name - Notified Body which carried out the EU Type Examination of the equipment design and construction, e.g. CML.

[4] yy - year certificate issued e.g. 18 for 2018.

[5] Compliance with European ATEX directive 2014/34/EU.

[6] xxxxx - approval number given by the Notified Body for the Type Examination of the equipment, e.g. 3008X.

[7] The equipment is compliant with Article 1(b) of ATEX Directive 2014/34/EU and with Article 3 (b) part I of the UK regulation SI 2016 No. 1107, amended by SI 2019 No. 696. It is approved for use outside potentially explosive atmospheres. It is required for the safe operation of 'Increased Safety - Ɛx eb' protected electrical machines, when used in accordance with the user documentation and subject to special conditions for safe use specified in Section 14 of EU Type Examination Certificate CML 18ATEX3008X and in the Section 14 of UK Type Examination Certificate CML 21UKEX31194X.

[8] nnnn - identifying number of the Approval Body which demonstrated manufacturing Quality Assurance compliance to BS EN ISO/IEC 80079-34:2018, e.g. 0891.

[9] Name - Approval Body which carried out the UK Type Examination of the equipment design and construction, e.g. CML.

[10] yy - year certificate issued for compliance with UK regulation SI 2016 No. 1107, e.g. 21 for 2021.

[11] Compliance with UK regulation SI 2016 No. 1107.

[12] xxxxx - approval number given by the Approval Body for the UK Type Examination of the equipment, e.g. 31194X.

# Notes:

## Customer Care Centre

http://www.se.com/ccc

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