

Safety in System
Protection for man and machine

PROGRAMMABLE MODULAR SAFETY CONTROLLER PROTECT PSC1



INTRODUCTION



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Managing Directors of the Schmersal Group

New solutions to improve production efficiency and machine safety

With its comprehensive range of about 25,000 products, Schmersal is one of the world's biggest suppliers of safety technology.

Schmersal is not only a manufacturer of safety components, but are also a system supplier. In developing the new PROTECT PSC1, we have taken a big step forward in the field of control technology.

The PROTECT PSC1 system consists of a safe, programmable compact control as well as safe extension modules, it is multifunctional and can be optimally adapted to the individual applications in the various industries. With its combination of certain properties, the new safety controller from Schmersal is unparalleled, as the PROTECT PSC1 has unique features that clearly set this control system apart from other solutions on the market.

The new generation of programmable modular safety controllers from Schmersal is embedded in a comprehensive offering of safety services. Many of our customers want planning and advice from the outset, e.g. in the design of complex automation systems. This also includes the development of customer-specific applications and their integration into higher-level control systems.

A central element here is application consulting. Certified Functional Safety Engineers advise our customers on the selection of suitable protective equipment, CE conformity assessment and risk assessment, and also carry out the safety analysis of existing machines, and all this worldwide.

With another service, that of application engineering, Schmersal targets users of safety controllers in automation technology. For them, we develop customised software modules that enable safety functions to be tailored perfectly to the machine's or system's specific application.

Above this, we regularly report to our customers and experts in the field on new developments in machine safety. In short, we offer our customers an all-embracing package of integrated systems solutions in the safety technology sector.

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Web shop



Already familiar with our new web shop?
Here you will find all details and data
on our products which you can order
directly online:

products.schmersal.com

PROTECT PSC1

PROGRAMMABLE MODULAR SAFETY CONTROLLER



Increasing demands on ease of use or new normative requirements are making today's machines more and more complex. This concerns both the safety-related consideration and the realisation of the safety functions. In addition, constantly changing markets require quick reactions and thus modular and easily scalable concepts.

The safety control system PSC1 consists of freely programmable compact safety controllers with I/O extension modules for signal processing of emergency stop switches, guard door switches, light grids and additional mechanical and electronic safety switchgear. Additionally there is the possibility via numerous functions to monitor axes. Using the universal communications interface a connection can be established to all the standard fieldbus systems.

- Safe logic control according to Annex IV of the Machinery Directive 2006/42/EC
- Safety functionalities up to SIL 3 according to IEC 61508 / IEC 62061, PL e and Cat. 4 according to EN ISO 13849-1
- Modular expansion with up to 272 inputs / outputs
- Secure 2 A p-switching semiconductor outputs, can be switched to secure p-/n-switching semiconductor outputs
- Freely programmable inputs / outputs
- Safe drive monitoring (SDM – Safe Drive Monitoring) according to EN 61800-5-2 for up to 12 axes
- Universal communication interface:
 - Supports all standard fieldbus systems
 - Setting and resetting of fieldbus protocols by software
 - Integrated Schmersal SD bus gateway to the standard fieldbus systems
- Optional:
 - Safe remote I/Os via Ethernet Safety Device to Device Communication (SDDC)
 - Safe cross communication via Ethernet Safety Master to Master Communication (SMMC)

USER SOFTWARE

PROGRAMMING SOFTWARE SAFEPLC2



Programming software SafePLC2

- Modern and intuitive development environment
- Preconfigured elements simplify programme creation and facilitate subsequent validation
- Programming assistance by various search functions
- Simple signal tracking by different colour representation and status messages
- Practice oriented libraries for logic, Safe Drive Monitoring, SD bus and encoder elements
- Configurable user permissions
- Offline simulation



SAFETY COMPACT CONTROLLER PSC1-C-100

The PSC1-C-100 is a freely programmable and modularly expandable compact controller for safe signal processing of safety switchgear. Different versions offer a suitable solution for diverse requirements. The controller has the following features:

- 14 safe inputs up to PL e respectively SIL 3
- 20 adjustable safe in-/outputs up to PL e respectively SIL 3
- 4 adjustable safe semiconductor outputs: 2 A p-switching or p-/n-switching
- 2 safe relay outputs for 24 VDC or 230 VAC, 2 A
- 6 signalling outputs, 250 mA
- 2 pulse outputs (clock outputs) for contact sensors
- Modular expandable with
 - up to 8 I/O modules
 - up to 6 safe drive monitoring modules (max. 12 axes, max 8 expansion modules in total)
- Optional universal communication interface (see page 15)



Basic version



With Memory-Card (SDHC)



With fieldbus



With fieldbus and cross communication (SDDC/SMMC)





SAFETY COMPACT CONTROLLER PSC1-C-10

The PSC1-C-10 is a freely programmable and modularly expandable compact controller for safe signal processing of safety switchgear. A wide variety of versions allow optimum adaptation to the respective application. The controller has the following features:

- 14 safe inputs up to PL e respectively SIL 3
- 4 adjustable safe semiconductor outputs: 2 A p-switching or p-/n-switching
- 2 safe relay outputs for 24 VDC or 230 VAC, 2 A
- 2 signalling outputs, 250 mA
- 2 pulse outputs (clock outputs) for contact sensors
- Modular expandable with up to 2 I/O expansion modules (central)
- Optional universal communication interface (see page 15)



Basic unit



With Memory-Card (SDHC)



With communication interface



With integrated Safe Drive Monitoring (SDM) for 1 axis



With integrated Safe Drive Monitoring (SDM) for 2 axes

SAFE I/O EXPANSION MODULES FOR THE COMPACT SAFETY CONTROLLERS PSC1-C-10 AND PSC1-C-100

The I/O expansion modules can be freely used for the compact controllers and differ in their application:

1. Central applications

- a. in the same cabinet, directly aligned to the compact controller
- b. communication via backplane bus

2. Decentral applications

- a. remote control cabinet
- b. communication to the compact controller via Ethernet SDDC

1) Central I/O expansion modules



Technical specification:
PSC1-E-31-12DI-10DIO
PSC1-E-131-12DI-10DIO

- 12 safe inputs up to PL e respectively SIL 3
- 10 adjustable safe in-/outputs up to PL e respectively SIL 3, 2 A p-switching
- 2 signalling outputs, 250 mA
- 2 pulse outputs (clock outputs) for contact sensors



Technical specification:
PSC1-E-33-12DI-6DIO-4RO
PSC1-E-133-12DI-6DIO-4RO

- 12 safe inputs up to PL e respectively SIL 3
- 6 adjustable safe in-/outputs up to PL e respectively SIL 3, 2 A p-switching
- 4 safe relay outputs for 24 VDC or 230 VAC, 2 A
- 2 signalling outputs, 250 mA
- 2 pulse outputs (clock outputs) for contact sensors



2) Decentral I/O expansion module – safe remote IO communication Ethernet SDDC (Safety Device to Device Communication)

In spatially extended systems, it can make sense to collect safety switches decentrally and transmit the data to the control system via a bus. This reduces the installation effort and thus saves time and costs. The decentralised modules are integrated and programmed like central expansions. The safe remote I/O modules transmit and receive their status via the safe local communication protocol Ethernet SDDC.

Technical specification: PSC1-E-37-14DI-4DO-2RO-RIO

- 14 safe inputs up to PL e respectively SIL 3
- 4 adjustable safe semiconductor outputs:
 - 2 A p-switching or p-/n-switching
- 2 safe relay outputs for 24 VDC or 230 VAC, 2 A
- 2 signalling outputs, 250 mA
- 2 pulse outputs (clock outputs) for contact sensors



SAFE DRIVE MONITORING (SDM)

SAFE DRIVE MONITORING FOR UP TO 12 AXES

For safe drive monitoring many safety features are supported:

- **Safe shutdown:** Safe Torque OFF (STO)
- **Safe stopping:** Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)
- **Safe movement:** Safely-Limited Speed (SLS), Safe Direction (SDI)
- **Safe monitoring:** Safe Cam (SCA)
- **Safe positioning:** Safely-Limited Position (SLP), Safely-Limited Increment (SLI), Safe Emergency Limit (SEL)

The drive monitoring is carried out depending on the application requirements, with one or two encoder systems. The following encoder signals are supported:

- **1 encoder system:** TTL, SIN/COS, SSI (Gray code / binary code)
- **2 encoder systems:** TTL, SIN/COS, SSI (Gray code / binary code), Resolver, HTL





a) Safe drive monitoring of the compact controller PSC1-C-10

The safe drive monitoring with the compact controller PSC1-C-10 is realised by an integrated solution. Depending on the order option, the compact controller can safely monitor 1 or 2 axes with one encoder system.

Order option: integrated safe drive monitoring up to 2 axes



1 axis



2 axes

b) Safe drive monitoring of the compact controller PSC1-C-100

Monitoring up to 12 axes with up to 6 expansion modules

A safe drive monitoring is realised with the compact controller PSC1-C-100 via extension modules. In this case, each axis can be safely monitored by one or two encoders. The drive monitoring modules are available for one or two encoders.



Safe drive monitoring with one encoder each

For 1 axis:

■ PSC1-E-21-SDM1

For 2 axes:

■ PSC1-E-23-SDM2



Safe drive monitoring with two encoders each

For 1 axis:

■ PSC1-E-22-SDM1-2



For 2 axes:

■ PSC1-E-24-SDM2-2



INTERNATIONAL ORDERING CODE CONTROLLER SYSTEM PROTECT PSC1

PSC1 - C - 10 - SDM1 - FB1 - MT

Programmable
Safety Controller

Module hierarchy

C	Controller
E	Extensions

Group hierarchy

10	Safe Programmable Logic Controller 10 series
100	Safe Programmable Logic Controller 100 series
2 x	Safe Drive Monitoring Expansion
3 x	I/O Expansion for PSC1-C-10 series
13 x	I/O Expansion for PSC1-C-100 series
37	Decentral I/O Expansion for PSC1-C-100 series

Options

SDM1	Safe Drive Monitoring for 1 axis
SDM2	Safe Drive Monitoring for 1 or 2 axes

Options

FB1	Ethernet based fieldbus with decentral communication
FB10	Ethernet based fieldbus without decentral communication
FB2	RS485 based fieldbus with decentral communication
FB20	RS485 based fieldbus without decentral communication

Options

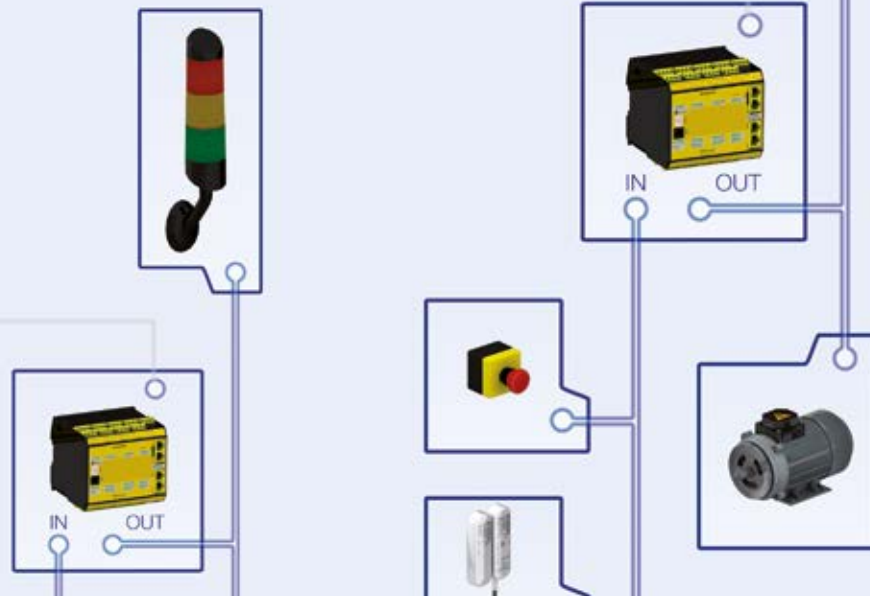
MT	Modbus/TCP only
PNPS	Additionally supporting PROFINET/PROFIsafe protocol
PBPS	Additionally supporting PROFIBUS/PROFIsafe protocol
ECFS	Additionally supporting EtherCAT®/FSOE protocol

PSC1 - E - 37 - 14DI - 4DO - 2RO - RIO

Options

XY DI	XY = Number, Digital Input
XY DO	XY = Number, Digital Output
XY DIO	XY = Number, Digital input/Output
XY RO	XY = Number, Relay Output
RIO	Remote I/O module

TOPOLOGIES



SAFE CROSS COMMUNICATION ETHERNET SMMC (SAFETY MASTER TO MASTER COMMUNICATION)

The safe cross-communication is used as a composite of safety controllers to safely exchange data via the local Ethernet SMMC communication.

In a complete system (consisting of individual system components) with concatenated EMERGENCY STOP signals or concatenated signals from solenoid interlocks, this requirement can be solved by using the safe cross-communication. The simultaneous operation of safe cross-communication and safe remote I/O communication and a fieldbus communication for a superordinate control is possible.

- Safe cross-communication with up to 4 compact controllers PSC1
- Free mixing of compact controllers PSC1-C-10 and PSC1-C-100

(only for -FB1 and -FB2 variants)

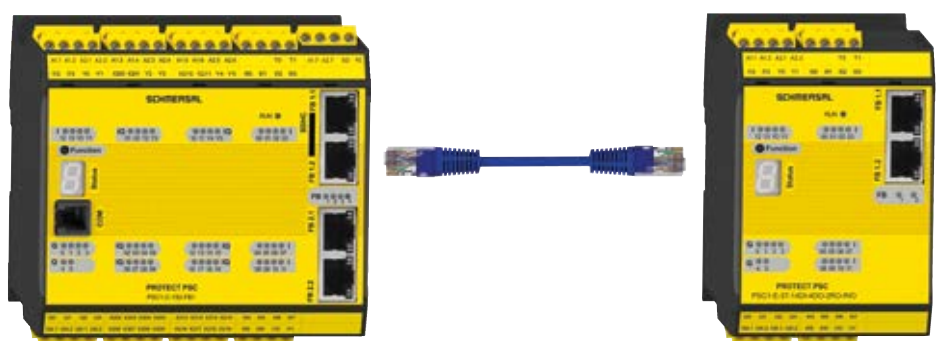


SAFE REMOTE I/O COMMUNICATION ETHERNET SDDC (SAFETY DEVICE TO DEVICE COMMUNICATION)

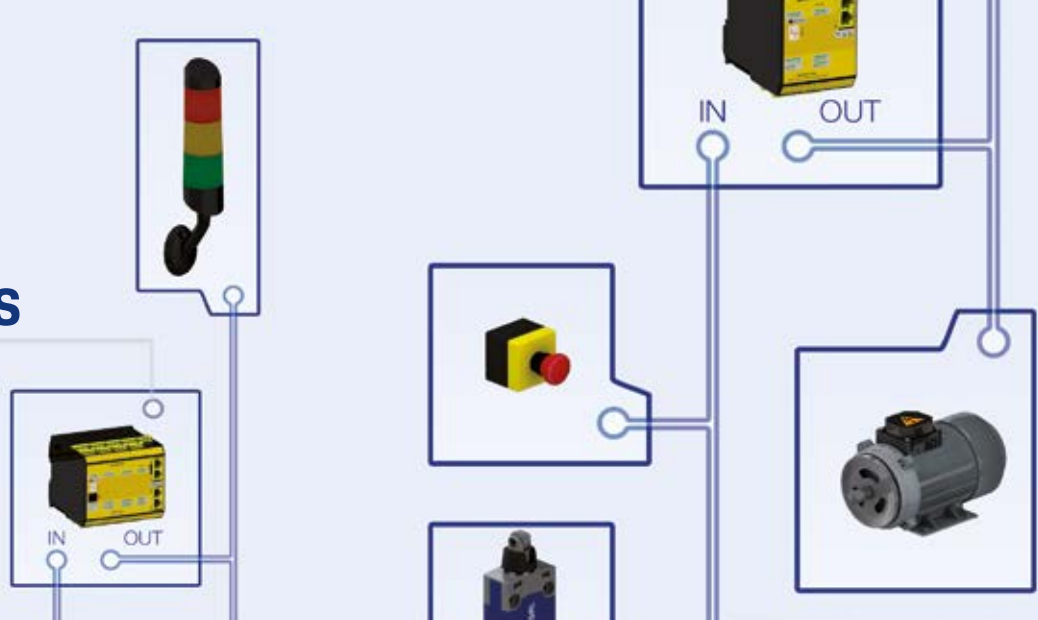
In conjunction with the FB1 and FB2 variants of the PSC1-C-100 series, the remote I/O expansion module PSC1-E-37-14DI-4DO-2RO-RIO is available for decentralised application requirements.

Communication is realised via the Ethernet SDDC protocol.

Simultaneous operation with safe cross and remote I/O communication via the universal communication interface is possible.



TOPOLOGIES



MODULAR COMPACT CONTROLLER PSC1-C-10 2 EXPANSION MODULES / UP TO 64 I/OS

Central structure:
I/O expansion modules

- PSC1-E-31-12DI-10DIO
- PSC1-E-33-12DI-6DIO-4RO



The compact controller PSC1-C-10 can be expanded with up to 2 I/O expansion modules.

MODULAR COMPACT CONTROLLER PSC1-C-100 8 EXPANSION MODULES / UP TO 272 I/OS



Central structure:
I/O expansion modules

- PSC1-E-131-12DI-10DIO
- PSC1-E-133-12DI-6DIO-4RO

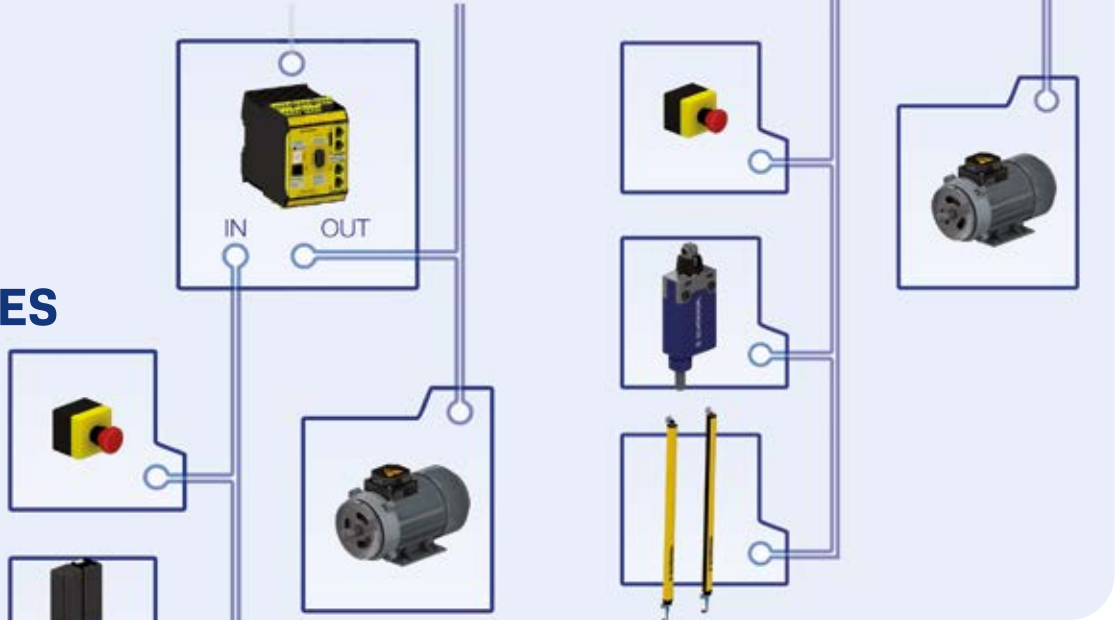
Decentral structure:
Expandable with the
remote I/O module

- PSC1-E-37-14DI-4DO-2RO-RIO



The compact controller PSC1-C-100 can be expanded with up to 8 I/O expansion modules.
A mixture of centralised and decentralised structures can be used.

TOPOLOGIES



UNIVERSAL COMMUNICATION INTERFACE UNIVERSAL FIELDBUS CONNECTION



Using the universal communication interface the required fieldbus protocol can be manually selected via software.

Parallel to the active fieldbus protocol the local communication within the PSC1 control system can be realised via the Ethernet SDDC and SMMC. This is possible in conjunction with the FB1 and FB2 variants of the PSC1-C-100 series

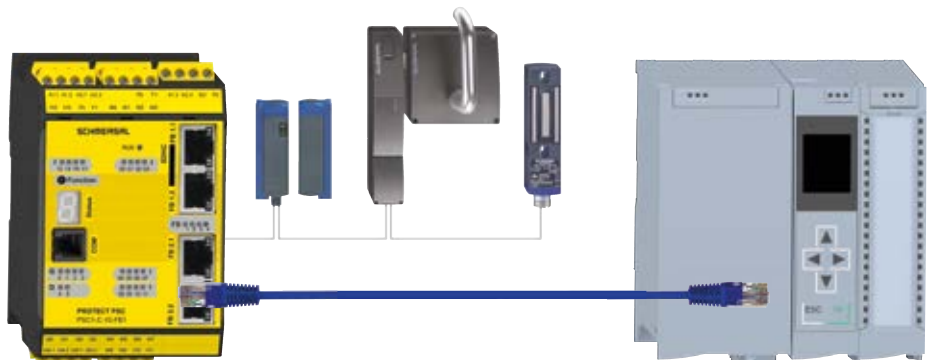
Available



UNIVERSAL COMMUNICATION INTERFACE INTEGRATED SD BUS GATEWAY

Up to 31 Schmersal SD bus sensors can be connected and evaluated with their extended diagnostic data directly onto the compact controller PSC1.

In doing so, the universal communication interface takes on the task of a gateway to the respective fieldbus protocols, set via software (communication to machine controller).



THE SCHMERSAL GROUP

PROTECTION FOR MAN AND MACHINE

In the demanding field of machine safety, the owner-managed Schmersal Group is one of the international market leaders. The company, which was founded in 1945, has a workforce of about 2,000 people and seven manufacturing sites on three continents along with its own companies and sales partners in more than 60 nations.

Customers of the Schmersal Group include “Global Players” in mechanical engineering and plant manufacturing and operators of machinery. They benefit from the company’s extensive expertise as a provider of systems and solutions for machine safety. In addition, Schmersal specialises in various areas including intralogistics, foodstuff production, the packaging industry, machine tool industry, lift switchgear, heavy industry and the automotive industry.

A major contribution to the systems and solutions offered by the Schmersal Group is made by tec.nicum with its comprehensive range of services: Certified Functional Safety Engineers advise machinery manufacturers and machinery operators in all aspects relating to machinery and occupational safety – and do so with product and manufacturer neutrality. Furthermore, they design and realise complex solutions for safety around the world in close collaboration with the clients.



SAFETY PRODUCTS

- Safety switches and sensors, solenoid interlocks
- Safety controllers and safety relay modules, safety bus systems
- Optoelectronic and tactile safety devices
- Automation technology: position switches, proximity switches

SAFETY SYSTEMS

- Complete solutions for safeguarding hazard areas
- Individual parametrisation and programming of safety controllers
- Tailor-made safety technology – be it for individual machines or a complex production line
- Industry-specific safety solutions

SAFETY SERVICES

- tec.nicum academy – Seminars and training
- tec.nicum consulting – Consultancy services
- tec.nicum engineering – Design and technical planning
- tec.nicum integration – Execution and installation



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