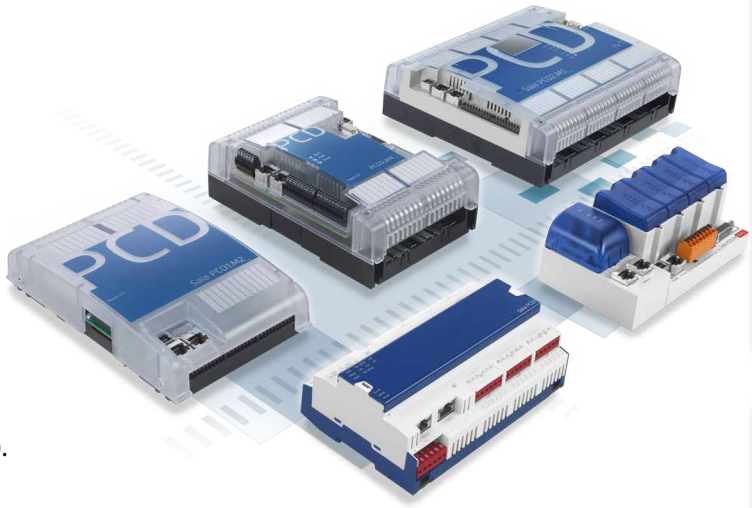
A

Products

A1

Automation stations

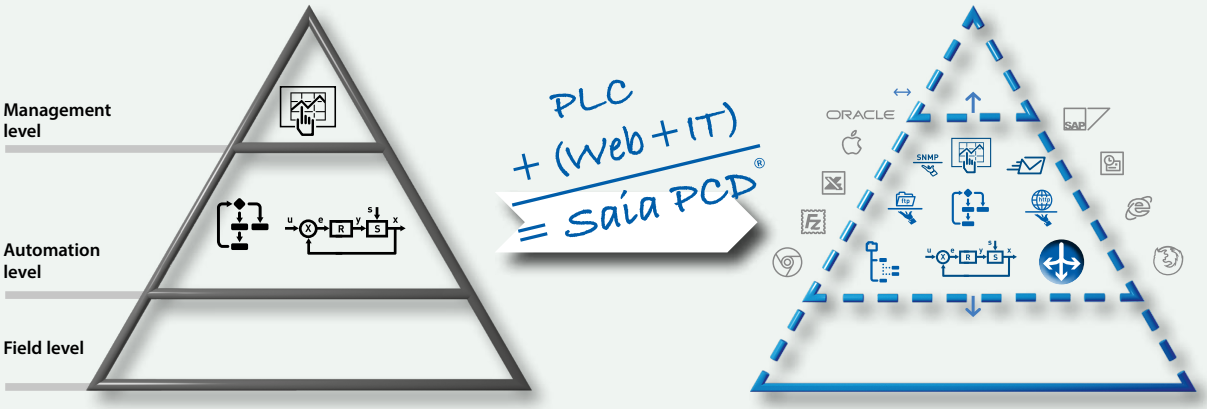
Programmable for measuring, regulation and control devices. Modular series consisting of industrial quality CPU, I/O and communication modules with a service life that will last for decades. The application software can be simply and reliably adapted and expanded throughout its service life. It can be used for all device series (Saia PCD1, 2 and 3).



1.1 Saia PCD® System description

PLC + (Web + IT) = Saia PCD®

Saia PCDs combine PLC functionality with innovative web and IT technology in an industrial quality system.
The basic equation Saia PCD® = PLC + (web + IT) means that the conventional automation pyramid is becoming an open, transparent structure.



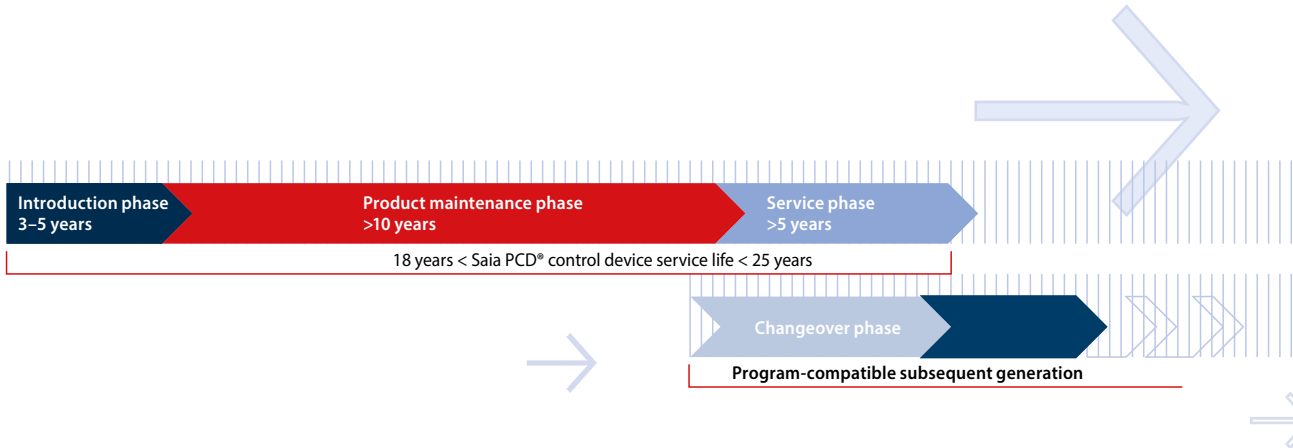
Automation pyramid by definition:
strictly separate levels; insulated from the outside world.

Automation pyramid Saia PCD® opens up through standard technology

The Saia PCD® system with its open technology stands for total transparency, combinability and openness. This applies between all the levels of the automation pyramid, the automation world and the actual operating environment of the user. To achieve this, all Saia PCD® control and regulation devices generally include comprehensive web + IT functions. These functions do not require additional hardware and form an integral part of every device. Machines and systems can therefore be very easily integrated into the existing IT infrastructure.

The service life of Saia PCD®: Compatibility and portability guaranteed for all device types across generations.

We develop our products to provide customers with direct added value that enables them to generate sustainable revenue. This requires products with a long service life and flawless and reliable operation. Previously installed products must always be able to adapt to changing needs. Existing investments should not always be made obsolete by unwanted, forced innovations and incompatibilities. This is why we attach such great importance to PLC-based technology with its sustained customer benefit and ease of upgrade. Our company has remained true to these values for over 50 years. Moreover, we only use components that comply with industrial standards and which have a service life of at least 20 years.



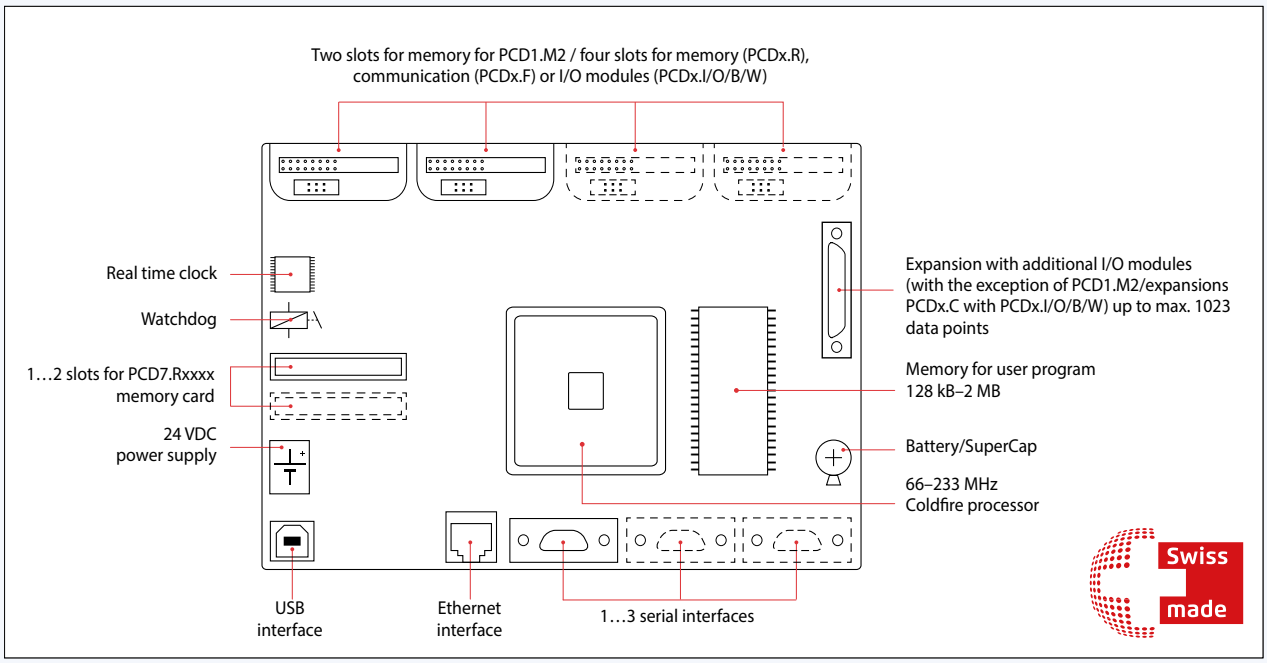
Standards

Saia PCD® controllers comply with the IEC EN 61131-2 standard in terms of design and production quality. This standard defines in 150 pages how electronic items should be developed and produced to meet PLC quality standards. All the important topics for the applications are covered: From the environmental conditions (temperature, humidity, vibration), to functionality (fluctuations in the power supply, interruptions) and electromagnetic compliance depending on the area of application.

As application settings often fail to behave in accordance with the standards, our SBC control technology is more robust against interference than required by the CE standard. The majority of Saia PCDs are also approved for maritime applications, where increased demands are made on the devices.

The quality and robustness of the Saia PCD® control technology is also evident in MTBF values, in the rates of returns from the field and in the feedback from our regular customer satisfaction surveys. See page 18 for more information on this topic.

Basic configuration of the Saia PCD® CPU modules



▲ Overview of the core elements of a Saia PCD® controller

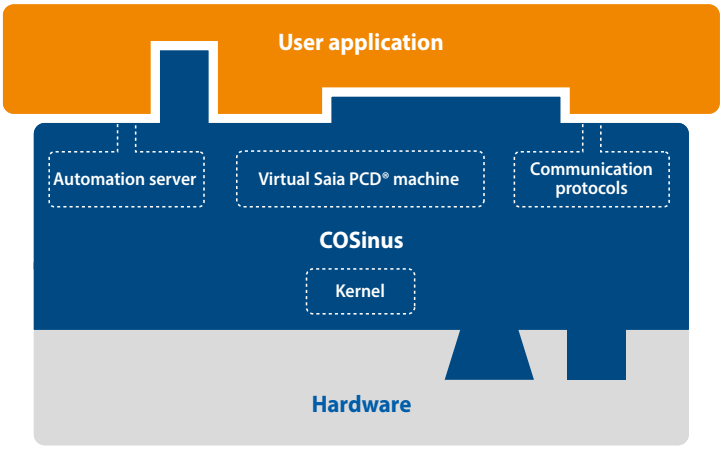
Saia PCD® hardware:

Common properties

- USB interface for configuration, programming and commissioning
- Ethernet interface with all the important web/IT protocols, including those for PG5 communication
- At least one onboard serial interface (Saia PCD3.M5/6: 3×)
- 24 VDC power supply
- Data remanence through battery and/or SuperCap
- Watchdog and fast interrupt inputs on the main CPU
- Slots for intelligent communication or memory modules
- Can be expanded in a modular way (except for Saia PCD1.M) up to 1023 data points

Saia PCD® COSinus – Control Operating System

We developed the core of the Saia PCD® operating systems between 2001 and 2003 as part of a European cooperation project with Philips and Nokia. We then expanded the core and focused on an operating system for advanced, industry-quality measuring, control and regulation devices. A dedicated operating system for ICA technology – a control operating system (COS). Developed in-house and with all aspects fully covered.



▶ Saia PCD® COSinus connects user programs and various hardware

The main components of Saia PCD® COSinus

1 **Multi-tasking kernel:** Abstracts the hardware, incl. I/Os and communication interfaces, provides basic multi-tasking functionality on which the program processing of Saia PCD® programming is also based.

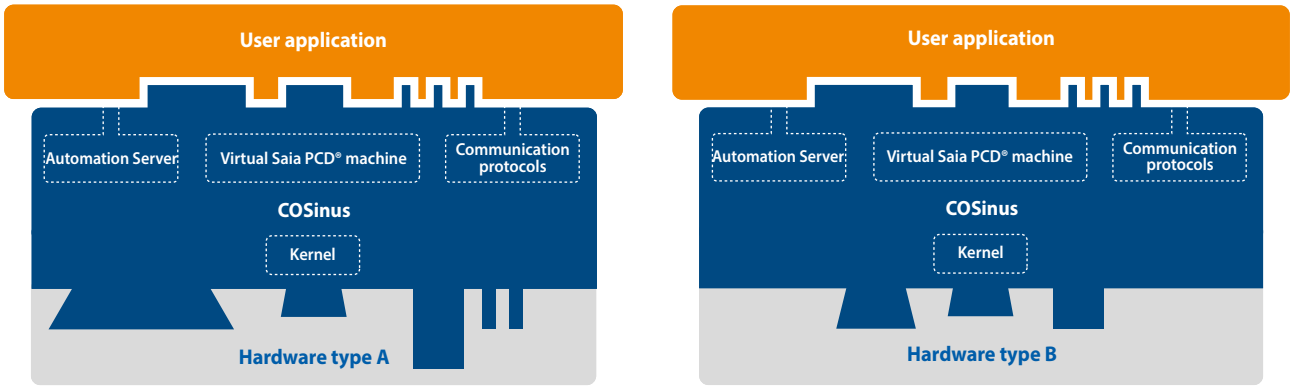
2 **Virtual Saia PCD® machine:** This is the logic machine that executes the PG5 programs. The virtual Saia PCD® code is interpreted and guarantees that programs are always executed in a consistent manner on different PCD controllers. The three hubs of the PG5 application program are the following:
- **Media:** Memory of the virtual PCD machine such as registers, flags, meters, etc.
- **Program execution:** Program and organisation blocks, text, monitoring, error processing, memory management, etc.
- **System functions:** Access to the hardware, I/Os, interfaces and drivers

3 **Automation Server:** The Automation Server includes widely used web/IT technologies and ensures data exchange between users and automation solutions with no proprietary hardware or software required.

4 **Communication protocols:** Various field and automation protocols such as BACnet®, LON, Profibus, Modbus, DALI, M-Bus, and many others.

Why COSinus?

The control operating system (COS) ensures that customers' application software will always operate on all platforms, is portable across device generations and expandable over several decades. Hardware and the Windows® programming tools may change, but the customer will not have to modify the application code. The hardware, software tool and application software can be compared to the sides of a triangle. If hardware and/or software changes, the angles must adjust for the application software to remain unchanged. We expanded the abbreviation COS to the name COSinus due to the trigonometric relationships in triangles.

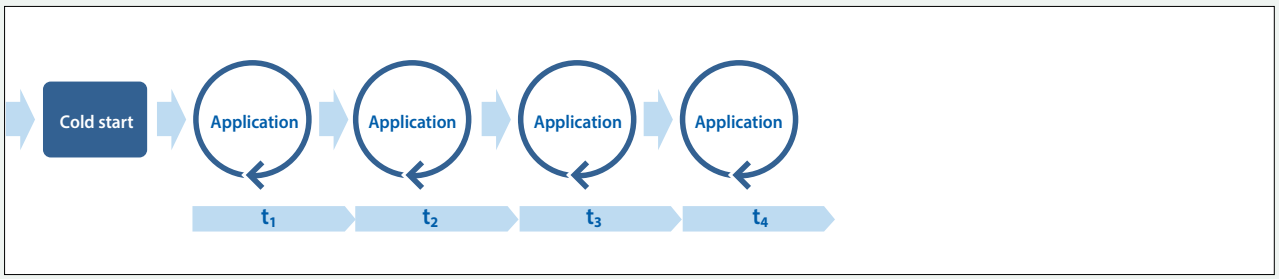


▲ The COSinus operating system always provides the application with the same infrastructure, regardless of the underlying hardware and processor. The key to this is the Saia virtual machine. It ensures that an application program created with PG5 works on all PCDs across generations.

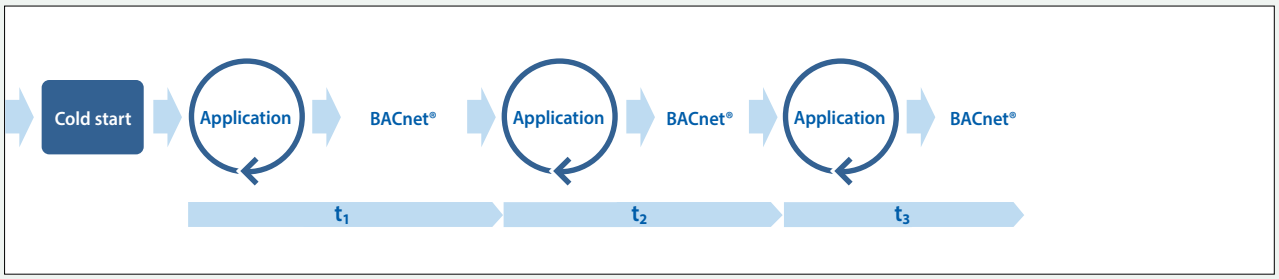
Execution of the user program

The user program consists of one or more organisation blocks that are executed by the PCD Interpreter. Each user program has at least one cyclical organisation block, COB, the COB0.
The PCDs are mono-processor systems. Saia PCD® 1, 2, 3 control and regulation devices have a main processor that processes all the tasks. The user program has a special role here and is processed as a core task. In addition to the user program, any communication tasks and server functions (web, FTP) are processed. The CPU capacity is allocated accordingly. The cycle time for the user program not only depends on the length of the program itself, but also on the simultaneous additional load.

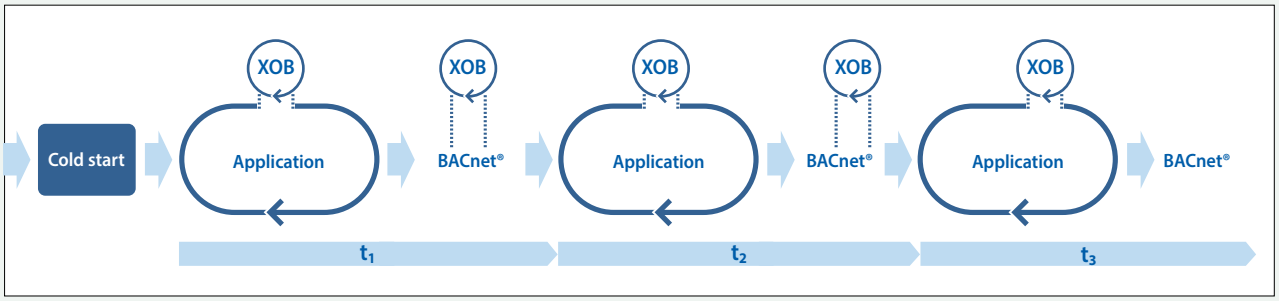
Examples:



▲ Cycle time with no additional communication



▲ Cycle time with BACnet® communication



▲ Cycle time with BACnet® communication and interrupt (XOB)

The more communication takes place, the longer the cycle time (t_x), which may result in variations in the cycle time. If this variation in the cycle time is not required, for example because regulation must take place in a fixed time period and ideally without jitters, make sure that this part of the program is executed in an XOB. The priority of the XOBs is higher than that of the COBs and higher than many other operating system tasks. The above example shows that a periodic XOB interrupts the cyclic program and the execution of the BACnet® task.

The COSinus operating system ensures that all tasks are processed. An intelligent load balance must be maintained between the user program and communication. This actually occurs in planning practice. It is only problematic if the contractor uses a lower performing Saia PCD® CPU than planned to save money or is "saving" on CPUs by concentrating tasks on one CPU.

The main XOBs and their priority levels

Priority 4
- XOB 0: Network out

Priority 3
- XOB 7: System overload – displayed if the interrupt XOB queue is overflowing
- XOB 13: Error flag – displayed in the event of communication or calculation errors or an invalid instruction

Priority 2
- XOB 16: Cold start
- XOBs 14, 15: Periodic XOBs
- XOBs 20…25: Interrupts

Priority 1
- XOB 2: Battery failure
- XOB 10: Nesting depth exceeded when PB/FBs are displayed
- XOB 12: Index register overflow

Data types and program blocks*

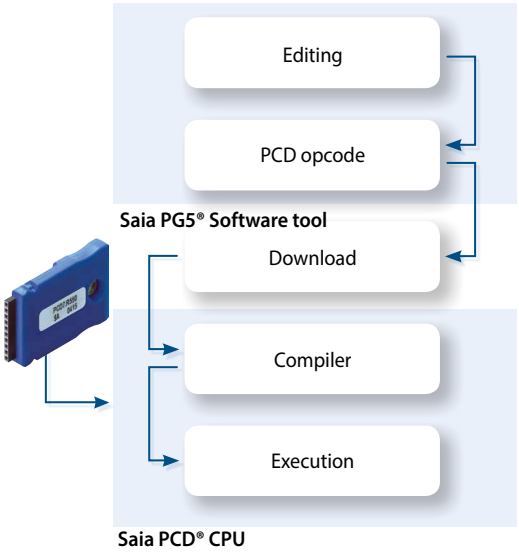
Register (32 bit)	16,384
Flags (1 bit):	16,384
Timers (31 bit) and meters (31 bit):	1600 (Partitioning configurable)
Cyclical organisation blocks COB:	0…31
"Exception" organisation blocks (XOB):	0…31
Program blocks (PB):	1000
Function blocks (FB):	2000
Text/data blocks DB:	8192
Sequential blocks (SB):	96

You can find a full list in the PG5 help section.

* This information is dependent on the hardware and the COSinus version.

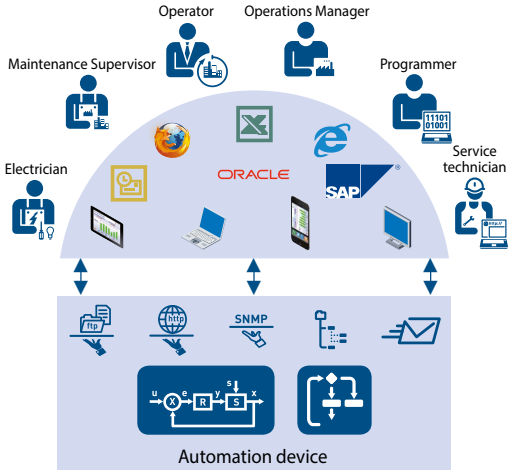
Saia PCD® Opcode

Saia PG5® generates a platform-independent opcode that is interpreted by the Saia PCD®. As a result, the same program runs on different platforms. This also enables the user program to be updated with a flash card as the operating system of the Saia PCD® performs the necessary actions to copy and execute the program from the flash card to the memory.
Code that is generated (= compiled) and optimised for the specific platform will of course run faster. This compiler is not integrated into the PC tool (Saia PG5®). Saia PCD® COSinus knows how this code should be implemented into the relevant hardware most effectively. The program is compiled when it is loaded into the Saia PCD®.



Automation server

The Automation Server is part of the COSinus operating system. It includes widespread web/IT technologies and ensures data exchange between users and automation solutions with no proprietary hardware or software required.
Specifically adjusted automation functions and objects form the relevant counterpart in the controller application. The web/IT functions can therefore be optimally and seamlessly integrated into the automation device and used efficiently.



▲ Target group-oriented data output

Automation Server components

Web server:
The system and process are visualised in the form of web pages and can be requested from the web server via browsers such as Internet Explorer, Firefox, etc.

File system:
Process data, records, etc. are stored in easy-to-access files. Standard formats make it easy to process them further, e.g. with Microsoft Excel

FTP server
Load files into the automation device over the network using FTP, or export files from it.

Email:
Critical system statuses, alarms and log data can be sent by email.

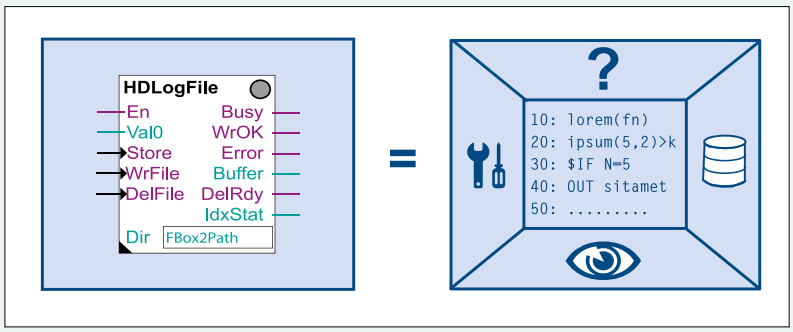
SNMP:
Messages and alarms are transmitted in accordance with IT standards. Access to automation data using the IT management system.

… SNTP, DHCP, DNS …

Memory management in the Saia PCD® systems

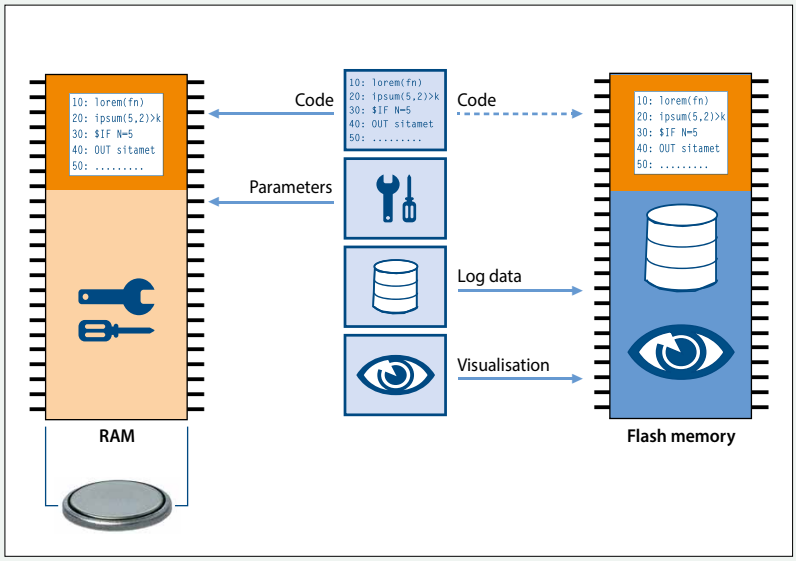
A user program may contain various data types. This includes data that is relevant for a fast regulation process and data records that must be collected over a long period or saved permanently. All these data types have different requirements in terms of hardware. For example, a regulation-relevant process requires a fast memory to calculate and provide current values. However, historical data records require sufficient remanent mass memory to cover a long period of time.

If a user program function is placed in PG5, various memory areas are required in the system. These areas can basically be divided into 3 groups. The parameter group controls the behaviour of the FBox that is processed in the user program. Defined statuses of the parameters result in responses in the FBox. Using the example of the HDLog function, the log data of the associated parameters is written to the file system in an Excel-compatible file format. Various templates are provided in the Web Editor to visualise this file in the web application.
These can be easily connected to the FBox using a range of parameters. As the visualisation pages only change when the Saia PG5® project is created, these are stored in the file system.



▲ Saia PG5® FBox shown as an object in the Saia PG5® Fupla engineering environment. To the right you can see which functions belong to the object.

Memory areas of the Saia PCD® systems
A distinction is made between two key memory areas.
The user memory, which ensures fast access for reading and writing, contains time-critical content such as media and the program code executed by the CPU. However, this memory is not a programmable read-only memory (PROM) and is buffered by a battery.
The flash memory, on the other hand, permanently saves data and provides space for historical data records or data that will not change during the operation of the system. The backup of the user application can be stored in a file system, which means that the processing of teh program is guaranteed.



▲ This is how the functions of a memory area belonging to the Saia PG5® FBox are mapped.

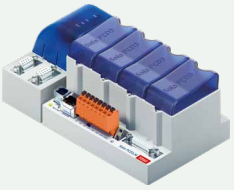
Memory management of the Saia PCD® systems with COSinus operating system

Automation devices with integrated µSD card

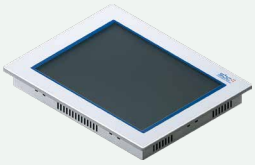
The automation devices Saia PCD3 Plus, Saia PCD1.M2 and the programmable panel are provided with an onboard µSD flash card. When loading a user application with Saia PG5®, all the necessary files in the internal flash memory are stored on the µSD card. If the operating voltage is connected to the automation device and there is no executable program in the user memory, COSinus attempts to load a valid program from the µSD card on startup.

Saia PCD1.M2220-C15

Saia PCD1.M2xxx



Saia PCD3.Mxx6x

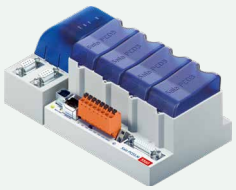


Saia PCD7.D4xxVT5F

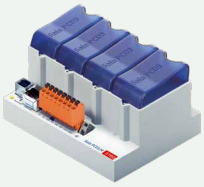
Automation devices with no integrated onboard flash

In the case of automation devices with no integrated µSD card and which are equipped with the COSinus system, the user application is copied direct to the user memory from Saia PG5®. If no valid program is detected in the user program when the controller is started up, a search is executed for a backup program in the onboard flash or an optional memory module.

Saia PCD2.M554x

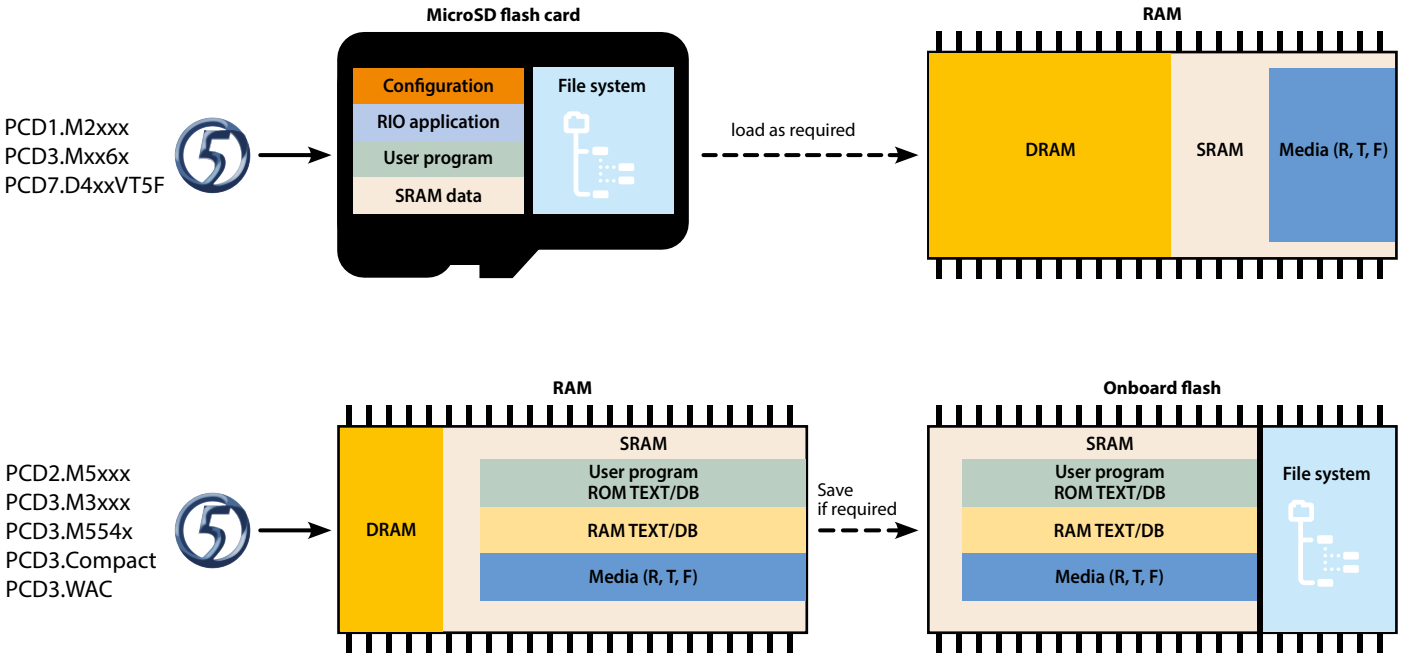


Saia PCD3.Mxx4x



Saia PCD3.M3xxx

Saia PCD3.Compact
Saia PCD3.Wide Area Controller



▲ Loading of the user program from Saia PG5® onto Saia PCD® automation devices and allocation of different data between the storage media.

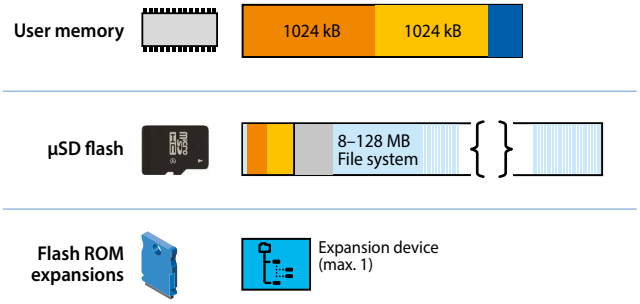
Memory expansion and resources of the Saia PCD® systems

Memory allocation of PCD1.M2xx0

RAM
- User program: 512 kByte … 1 MByte
- DB/text: 128 kByte … 1 MByte

Flash memory
- File system 8 … 128 Mbytes (maximum of 900 … 2,500 files or 225 … 625 directories)

Flash memory expansions
- 1 expansion module

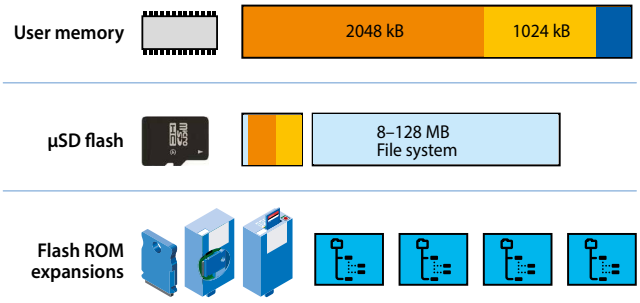


Memory allocation of PCD3.Mxx6x

RAM
- User program: 2 Mbyte
- DB/text: 1 Mbyte

Flash memory
- File system 128 Mbytes (maximum of 2,500 files or 625 directories)

Flash memory expansions
- 4 expansion modules

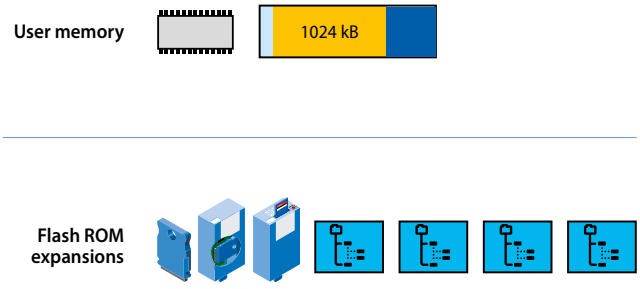


Memory allocation of PCD3.Mxxxx

RAM
- User program and DB/text 1024 kbytes

Flash memory
- Backup memory 1024 kbytes

Flash memory expansions
- 4 expansion modules

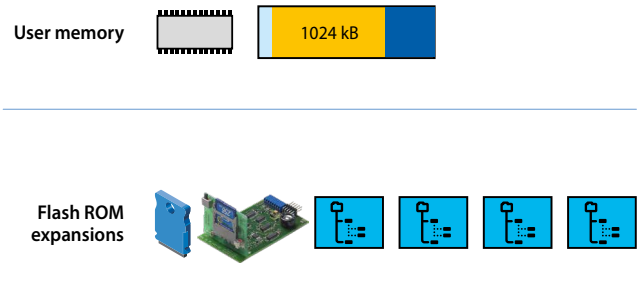


Memory allocation of PCD2.M5xx0

RAM
- User program and DB/text 1024 kbytes

Flash memory
- Backup memory 1024 kbytes

Flash memory expansions
- 4 expansion modules



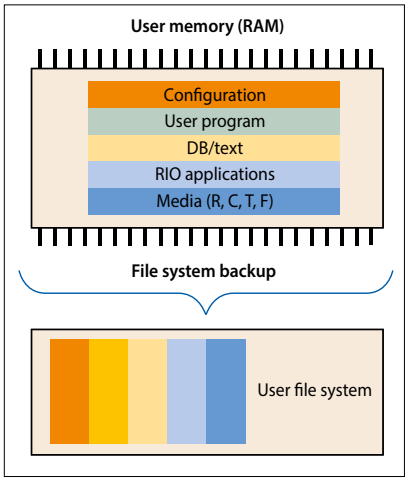
The system backup – entire automation project

▲ Memory media for external backups

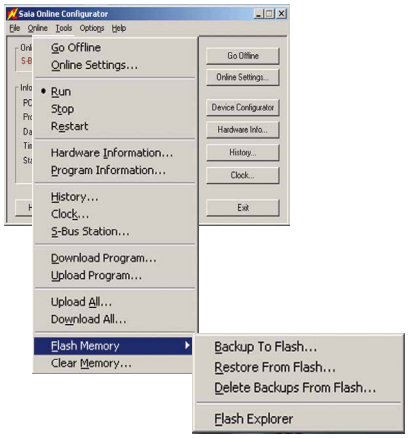
The application's system backup contains all the vital information and data that must be available to process the application. This enables users to easily and securely reset the controller to a saved and known state.
With the system backup function of the Saia PCD® COSinus operating system, it is also possible to fully duplicate a system and copy it to an identical piece of hardware with no additional adjustments required (copy/paste).
The system backup can be created in the office on a Saia PCD® memory module using an automation device of identical construction. Any technician (without training, a manual or software tools) can then perform a system restore or a system update direct on site should any changes be applied – totally within the meaning of lean automation.

Creating a system backup
A system backup can also be created by the licence-freeSaia PG5® software tool "Online Configurator".
The system can be backed up either on the internal flash memory module or on an optional memory module Saia PCD7.Rxxx.

Using a system backup
No dedicated software tools are required to restore a system backup. This only requires an optional Saia PCD7.Rxxx memory module that contains a system backup for the target controller.
Press and hold the run/stop button for 3 seconds to restore the application contained in the backup memory module. The COSinus operating system automatically looks for a system backup of the application in all the storage media connected to the automation device.
If a valid system backup of the operating system is found, it is "automatically" loaded into the user memory. The automation device restarts.



▲ Content of a system backup created on an external module with a file system



▲ Creation of a system backup with the Online Configurator

Expansion options of the user file system

Saia PCD® systems can be expanded by at least 1 to a maximum of 4 external memory modules that contain a user system. An external file system is ideal as a backup for the entire user application and enables users to save trend data, alarms and event lists, as well as log files defined by the user. An external file system may contain up to 900 files or 225 directories.

PCD3.R600 and PCD2.R6000
Module holder for SD flash memory cards
with 512 and 1024 MB

PCD7.R-SD512 / PCD7.R-SD1024
SD flash memory cards
with 512 MB / 1024 MB

512 MB
1024 MB

PCD7.R610 with PCD7.R-MSD1024
Basic module with Micro SD flash card
with 1024 MB

1024 MB

PCD7.R582 LON over IP
128 MB for file system and firmware expansion for LON over IP with LON configuration files

128 MB

PCD7.R562 BACnet®
128 MB for file system and firmware expansion for BACnet® configuration files with BACnet® applications

128 MB

FAQs for the design of automation systems

Can third-party local I/Os be connected via S-Bus?
In the manual we have excluded these for the Saia PCD® controllers. SBC S-Bus is a proprietary protocol that is essentially designed for communication with engineering and debugging tools, to connect the management level or process control systems and for PCD to PCD communication. It is not suitable or approved for the connection of local I/Os from different manufacturers. I/Os from third-party manufacturers should be integrated professionally and safely using one of the many manufacturer-independent field bus systems.

Can the Saia PCD controllers connect direct to the Internet?
When Saia PCD controllers are connected direct to the Internet, they are also a potential target of cyber attacks. Appropriate protective measures must always be taken to guarantee secure operation.

PCD controllers include simple, integrated protection features. However, secure operation on the Internet is only ensured if external routers are used with a firewall and encrypted VPN connections. For more information, please refer to our support site: http://sbc.do/Me4rLqwE

How do I connect a third-party device to the PCD if the protocol is not supported in the PCD firmware and there is not a corresponding FBox library either?
One of the greatest strengths of the Saia PCD® is that, in addition to the numerous "off the shelf" communication protocols available, users themselves can implement any protocol required in the user program. This is possible via a serial interface and also via Ethernet.
You can find PG5 example programs on our support site on this topic.

What is the difference between centralised and decentralised I/Os?
When remote I/Os are accessed, a communications task always has to run. This task interrupts the processing of the actual ICA task, thus extending the cycle time (page 11). If cycle time is important and critical, it is more efficient to use central I/Os.

How many central I/Os per Saia PCD®?
The I/O capacity of a Saia PCD® automation station depends on the maximum number of pluggable I/O modules, i.e. 64 modules for the Saia PCD2 and Saia PCD3 series. Each module requires 16 bits. This gives a maximum of 1024 binary signals overall. Each Saia PCD® CPU in this system catalogue can read all 1024 binary signals in under 10 msec and make them available to the user program logic. For calculation purposes, assume a value of 0.01 msec per binary I/O and 0.03 msec per analogue value.

In practice, the number of I/Os is limited by the cycle time required for the user program (see explanation page 11). If the Saia PG5® IL Editor is used to write a resource-efficient user program in text form, the 64 I/O slots of the Saia PCD® automation station will be fully usable. The cycle time will certainly be well below 100 msec.

If the graphic software engineering tool Saia PG5® Fupla and prefabricated system templates (Saia PG5® DDC Suite) are used to create the application software, then only half the 64 possible I/O modules should be equipped for a cycle time of <100 msec. Additional communication and data processing tasks will further increase cycle time.

In the case of fully graphic software engineering for control-intensive applications combined with additional tasks (e.g., BACnet®, gateway, management functions), it is inadvisable to use more than 300 I/Os per automation station.

How does communication influence the application cycle time?
If the PCD is set as the server (master station), it has little or no control over its partner stations. Should these partner stations send large amounts of data simultaneously, the PCD MUST receive them. The receiving/processing of these data packages will take priority over the application cycle time. The cycle time may consequently be increased depending on the workload. The PCD processing time may be significantly increased if several partner stations send large volumes of data simultaneously.
The impact will be minimal if the PCD is set as client (slave station).
The figures below are based on a PCD3.M5340 with a program cycle time of 100 ms, excluding additional communication.
Web server Displaying a page on a micro browser panel or PC does not have a major impact. Loading a large file such as a Java applet or an offline trend during the transfer can increase cycle time by 40…50%. The same applies when large files are transferred via FTP.
S-Bus or Modbus communication via Ethernet: Each partner station running under full load increases the cycle time by approx. 8%.
Serial S-Bus: Each slave-type communication at 38.4 kbit/s increases the cycle time by 5% (port #2). In the case of PCDx.F2xx modules, the increase is approx. 17%.
At 115 Kbits the cycle time is approximately 20% higher. ***Modbus RTU:*** A client at 115 kbit/s increases the cycle time by about 11% (port #2). In the case of PCDx.F2xx modules, the increase is approx. 45%.

What exactly does MTBF mean? Where can I find the MTBF values for Saia PCD® controllers?
MTBF stands for Mean Time Between Failures. The time referred to is the period of operation between two consecutive failures of a unit (module, device or system). The higher the MTBF value, the more "reliable" the device. On average, a device with a MTBF of 100 hours will fail more often than a similar device with a MTBF of 1,000 hours. The MTBF value can be calculated in purely mathematical terms or based on empirical values.
Please bear in mind that the MTBF value of the overall installation depends on the values of the individual switch cabinet components.
An overview of the MTBF values of the PCD controllers is included on our **support site.**
The return rate is of greater relevance in practice. We analyse all the devices that return from the field. The return rates of the current PCD controllers during the warranty period (30 months) are as follows:

- PCD2.M5xxx: 0.94%
- PCD3.M5xxx: 0.99%
- PCD3.M3xxx: 1.14%

What part of the memory will be lost if the battery fails, and how does the PDC react?
In theory, the user memory of the PCD, which contains the content of the media such as registers, counters, meters, flags, and the writeable part of the DB and text elements, will be lost in the event of a failure of the power supply with a battery that is also weak or defective. We now have to distinguish between two different types of PCDs.
Controllers equipped with an internal micro SD card store the user program and associated initial values of the media in a system partition. Should the user memory be lost with no backup, the data will be reloaded into the user memory and the program will be processed again with the parameters that were defined at the time of the download in PG5.
Controllers with no internal file system require a backup containing the user program and associated media. This backup can be created using PG5 when downloading the application. As a general rule, there should be a backup of the PCD of the last download of an application to an external file system of the PCD to restore the program and media content in the event of an empty memory.
If a backup of the application of a PCD is available and the content of the user memory is not feasible, the application will be restored from the point at which the backup was created.

1.2 PCD3 – modular cartridge construction

1.2.1 Overview of fully programmable controllers Saia PCD3 device series

Design of the Saia PCD3 series

Page 20

Description of the basic structure and general features of the modular Saia PCD3 series

Saia PCD3.Mxxxx controllers

Page 22

Base units with 4 slots for I/O modules

- PCD3.Mxx60 High Power CPU
- PCD3.M5xxx Standard CPU
- PCD3.M3xxx Minimum Basic CPU

Up to 5 integrated communication interfaces that can be expanded by up to 13 communication interfaces using plug-in modules.
Integrated Automation Server in all CPUs.

Saia PCD3.Txxx remote I/O stations RIOs

Page 35

Remote peripheral nodes

- PCD3.T66x Smart Ethernet RIO

Saia PCD3.Cxxx module holder for I/O expansion

Page 21

Module holder for I/O modules

- PCD3.C100 4 I/O slots
- PCD3.C110 2 I/O slots
- PCD3.C200 4 I/O slots with 24 VDC power supply

Expandable up to 1023 I/Os

Saia PCD3 input/output modules in cassette design

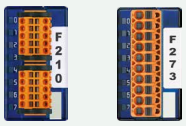
Page 26

Modules with various functions with plug-in terminals

- PCD3.Axxx Digital output modules
- PCD3.Bxxx Combined digital input/output modules
- PCD3.Exxx Digital input modules
- PCD3.Wxxx Analogue input/output modules

Saia PCD3 interface modules

Page 31



Plug-in modules to expand the communication interfaces
(up to 4 modules or 8 interfaces)

- PCD3.F1xx 1 serial interface RS-232, RS-422/485
- PCD3.F2xx 2 serial interfaces RS-232, RS-422/RS-485 BACnet® MSTP, DALI, M-Bus, Belimo MP-Bus

Saia PCD3 memory modules

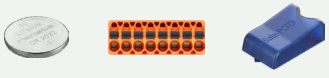
Page 32

Plug-in memory modules for data and program backup

- PCD3.R5xx Flash memory module for slots 0…3
- PCD3.R6xx Basic module for SD flash card for slots 0…3
- PCD7.R-SD SD Flash cards for PCD3.R6xx
- PCD7.R5xx Flash memory module for slots M1 and M2
- PCD7.R610 Basic module for micro SD flash card
- PCD7.R-MSD Micro SD flash cards for PCD7.R610

Consumables and accessories for Saia PCD3 controllers

Page 33



Batteries, terminals, system cables, labelling accessories…

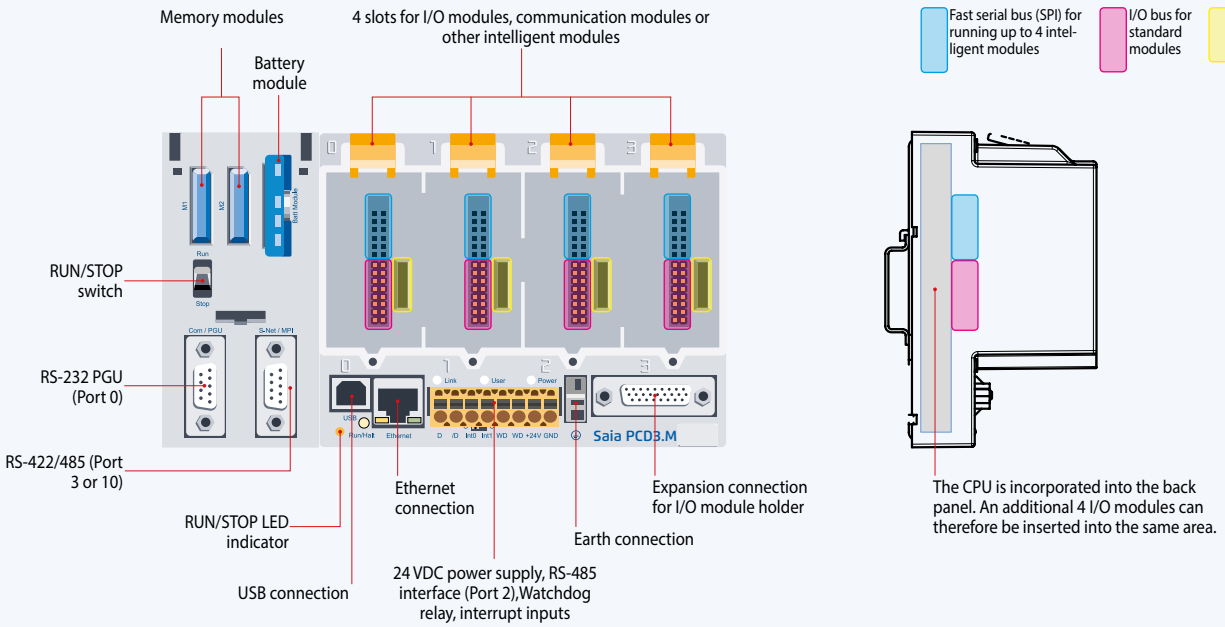
Design of Saia PCD3 controllers

The CPU has been incorporated into the back panel of the device, unlike comparable systems. Its capacity can be increased individually with plug-in communication modules and/or intelligent I/O modules. These have a direct, very fast bus connection to the CPU.

PCD3.Mxxxxx base unit

Base unit with CPU and 4 slots for I/O modules, communication or other specific modules (e.g. PCD3.Hxxx counter modules)

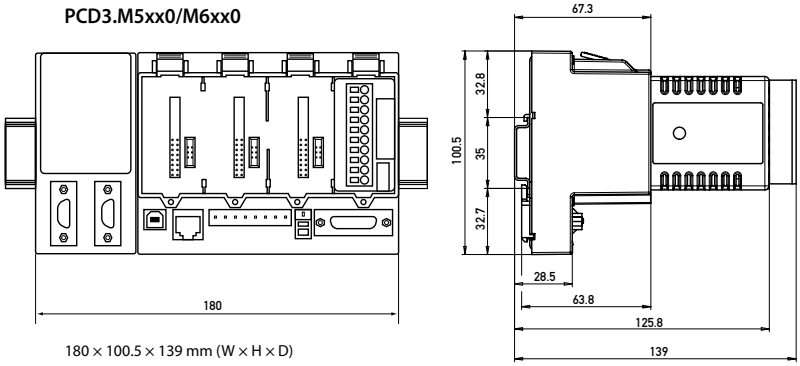
Device design



With the left expansion, the Standard (PCD3.M5/M6xxx) and High Power (PCD3.Mxx60) CPU types have slots for a battery holder module with LED indicators, a run/stop switch, two slots for flash memory modules and two additional communication interfaces. The LED indicators on the battery module display the status of the CPU and battery and any errors in the application. The battery also protects the data in the event of an interruption to the power supply. It can be replaced during operation while under power. The configuration, programs and data can be transferred from one controller to another using the plug-in flash memory modules. No programming tool is required for this.

Dimensions

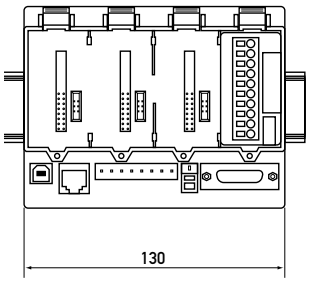
PCD3.M5xx0/M6xx0



180 × 100.5 × 139 mm (W × H × D)

▲ Standard and High Power CPU with slots for battery and memory modules, run/stop switch and additional interfaces

PCD3.M3xx0 without left expansion



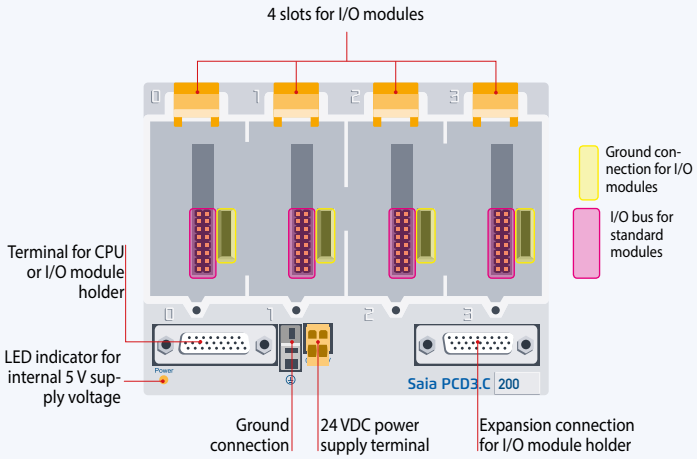
130 × 100.5 × 139 mm (W × H × D)

▲ Minimum Basic CPU without battery module. PCD3.Rxxx memory modules are plugged into an I/O slot.

Saia PCD3.Cxxx module holder

I/O expansion module holders are available in either a 2- or 4-slot version. This enables users to expand the PCD3 controllers to a max. 64 I/O modules or a max. 1023 I/Os.

Device design

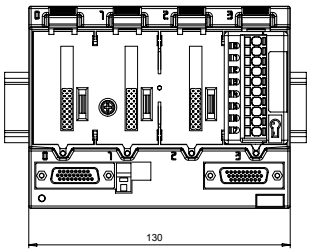


All standard I/O modules can be used in the expansion module holders. Communication modules or other intelligent modules can only be used in the slots of the Basic CPU.

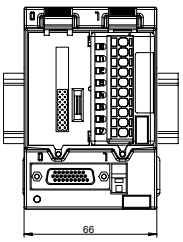
Available types

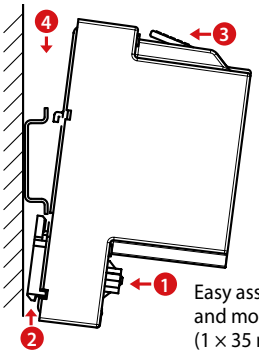
- PCD3.C100 Expansion module holder with 4 I/O slots
- PCD3.C110 Expansion module holder with 2 I/O slots
- PCD3.C200 Expansion module holder with 4 I/O slots and terminal connectors for 24 VDC power supply for all connected I/O modules, plus any downstream PCD3.C1xx module holders

PCD3.C100/200 with 4 I/O slots



PCD3.C110
with 2 I/O slots

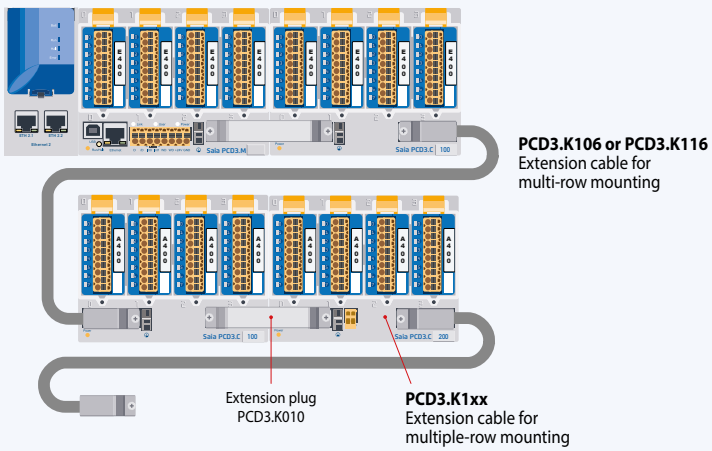


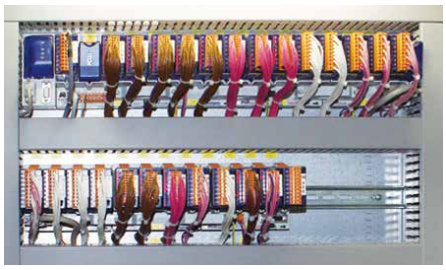


Easy assembly of the CPUs and module holders on DIN rail (1 × 35 mm)

System expansion up to 1023 I/O

Single- and multiple-row mounting of the module holders





PCD3 in multiple-row mounting in the switch cabinet

Extension plug and cables

- PCD3.K010 Extension plug
- PCD3.K106 Extension cable 0.7 m
- PCD3.K116 Extension cable 1.2 m

Saia PCD3.Mxx60 controllers

High-performance CPU for any requirement

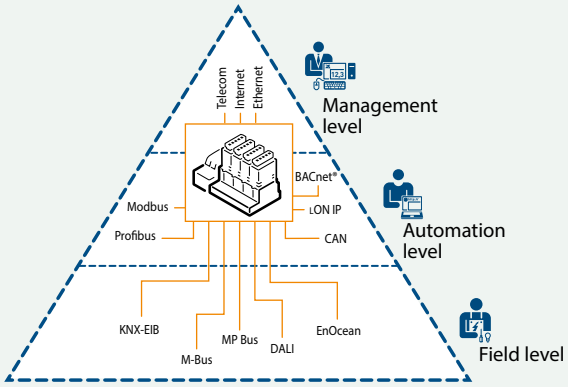
The fast processor and increased system resources provide the High Power CPU with sufficient power reserves to process the most demanding control and communication tasks.

System properties

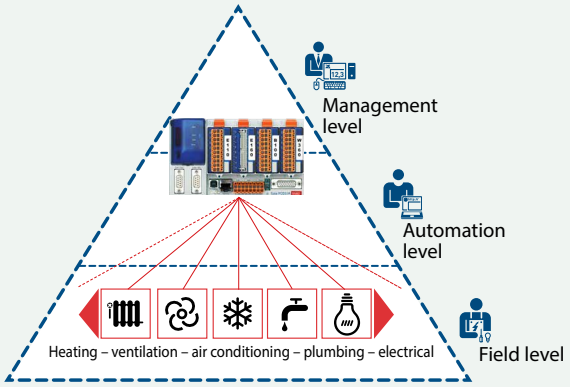
- Up to 1023 inputs/outputs
  Can be expanded remotely with RIO PCD3.T66x
- Up to 13 communication interfaces
- Onboard USB and Ethernet interface
- 2 Ethernet interfaces (PCD3.M6860 only)
- Fast program processing (0.1 µs for bit operations)
- Large onboard memory for programs (2 MB) and data (128 MB file system)
- Memory with SD flash cards can be expanded up to 4 GB
- Automation Server for integration in Web/IT systems

Types

- **PCD3.M5360** CPU basic module with Ethernet TCP/IP, 2 MB of program memory
- **PCD3.M5560** CPU basic module with Ethernet TCP/IP, 2 MB of program memory, Profibus-DP-Slave
- **PCD3.M6560** CPU basic module with Ethernet TCP/IP and Profibus-DP Master 12 Mbits, 2 MB of program memory
- **PCD3.M6860** CPU basic module with 2 Ethernet TCP/IP, 2 MB of program memory



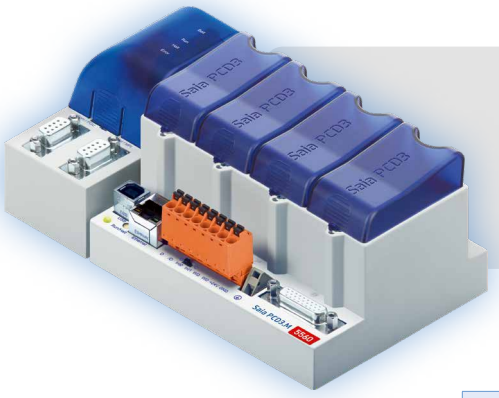
The Saia PCD3 Power CPU has sufficient system resources to operate up to 13 communication interfaces in the same device. Even the most demanding tasks, such as simultaneous communication via BACnet® and Lon IP, are handled reliably.

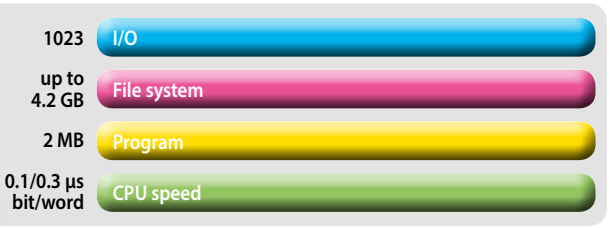


The generous memory resources (4 GB) of the new PCD3 Power CPU enable users to record/monitor, archive and control the data and statuses of all plants in the Saia PCD®, even with no computer equipment and control system software. Applications for the various plants (HVAC) can be created easily using the graphic PG5 engineering tool and application-specific software libraries.

Saia PCD3.Mxx60 controllers

High-performance CPU





Technical Data		PCD3.M5360	PCD3.M5560	PCD3.M6560	PCD3.M6860
		Power	Power DP Slave	Power DP Master	Power 2 × Ethernet
Number of inputs/outputs		1023			
or I/O module slots		64			
I/O expansion connection for PCD3.Cxxx module holder		Yes			
Processing time [µs]	bit operation	0.1…0.8 µs			
	word operation	0.3 µs			
Real-time clock (RTC)		Yes			

Onboard memory

Program memory, DB/text (flash)	2 MB
User memory, DB/text (RAM)	1 MB
Flash memory (S-RIO, configuration and backup)	128 MB
User flash file system (INTFLASH)	128 MB
Data backup	1…3 years with lithium battery

Onboard interfaces

USB 1.1	Yes			
Ethernet 10/100 Mbits, full-duplex, auto-sensing/auto-crossing	Yes			2×
RS-232 on D-Sub connector (PGU/Port 0)	up to 115 kbits			No
RS-485 on terminal block (Port 2) or RS-485 Profibus-DP Slave, Profi S-Net on terminal block (Port 2)	up to 115 kbits up to 187.5 kbits	up to 115 kbits No	up to 115 kbits up to 187.5 kbits	
RS-485 on D-Sub connector (Port 3)* or Profibus-DP Slave, Profi S-Net on D-Sub connector (Port 10)* or Profibus-DP Master on D-Sub connector (Port 10)*	Up to 115 kbits [1] No No	Up to 115 kbits [2] Up to 1.5 Mbits [2] No	No No up to 12 Mbits [2]	No No No

* can be used as an alternative
[1] electrically connected
[2] electrically isolated

Options

The data memory can be expanded to 4 GB with flash memory modules (with file system).

Optional data interfaces

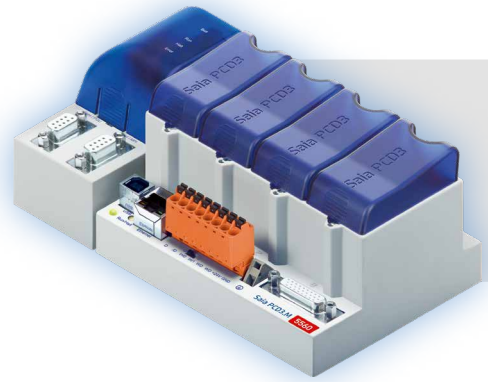
I/O slot 0	PCD3.F1xx modules for RS-232, RS-422, RS-485 and Belimo MP-Bus
I/O slot 0…3 up to 4 modules or 8 interfaces:	PCD3.F2xx modules for RS-232, RS-422, RS-485, BACnet® MS/TP, Belimo MP-Bus, DALI and M-Bus

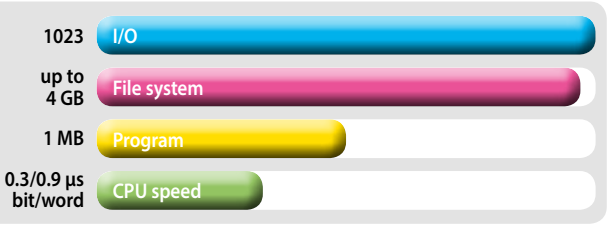
General specifications

Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC, –20/+25% max. incl. 5% ripple or 19 VAC ±15% two-way rectified (18 VDC)
Power consumption	typically 15 W for 64 I/Os
Capacity 5 V/+V (24 V) internal	max. 600 mA/100 mA

Saia PCD3.M5x40 controllers

The standard CPU for many applications





Types

- PCD3.M5340 CPU basic module with Ethernet TCP/IP, 1 MB program memory
- PCD3.M5540 CPU basic module with Ethernet TCP/IP and Profibus-DP Slave 1.5 Mbits, 1 MB program memory

Technical Data	PCD3.M5340 Standard	PCD3.M5540 Standard
Number of inputs/outputs	1023	
or I/O module slots	64	
I/O expansion connection for PCD3.Cxxx module holder	Yes	
Processing time [µs] bit operation	0.3…1.5 µs	
word operation	0.9 µs	
Real-time clock (RTC)	Yes	

Onboard memory

Main memory (RAM) for program and DB/TEXT	1 MB	
Flash memory (S-RIO, configuration and backup)	2 MB	
User flash file system (INTFLASH)	No	
Data backup	1…3 years with lithium battery	

Onboard interfaces

USB 1.1	Yes	
Ethernet 10/100 Mbits, full-duplex, auto-sensing/auto-crossing	Yes	
RS-232 on D-Sub connector (PGU/Port 0)	up to 115 kbits	
RS-485 on terminal block (Port 2) or RS-485 Profibus-DP Slave,	up to 115 kbits	
Profi S-Net on terminal block (Port 2)	up to 187.5 kbits	up to 115 kbits No
RS-422/485 (electrically connected) on D-Sub connector (Port 3) *	up to 115 kbits	No
RS-485 (electrically isolated) on D-Sub connector (Port 3) *	No	up to 115 kbits
Profibus-DP Slave, Profi S-Net on D-Sub connector (Port 10) *	No	up to 1.5 Mbits

* can be used as an alternative

Options

The data memory can be expanded to 4 GB with flash memory modules (with file system).

Optional data interfaces

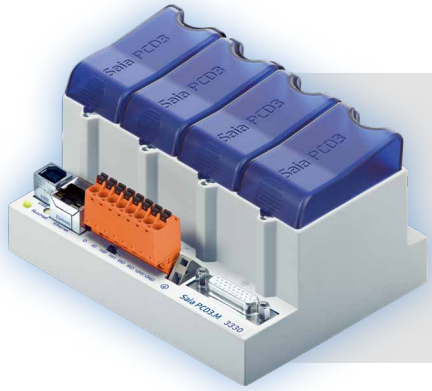
I/O slot 0	PCD3.F1xx modules for RS-232, RS-422, RS-485 and Belimo MP-Bus
I/O slot 0…3 up to 4 modules or 8 interfaces:	PCD3.F2xx modules for RS-232, RS-422, RS-485, BACnet® MS/TP, Belimo MP-Bus, DALI and M-Bus

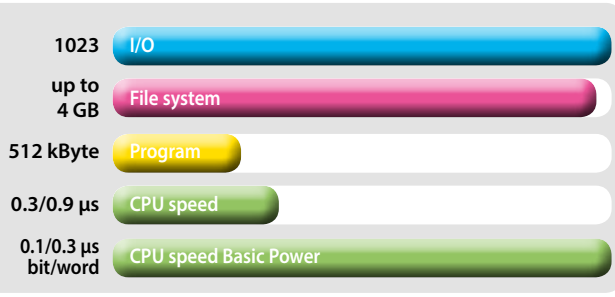
General specifications

Supply voltage (in accordance with EN/IEC 131-2)	24 VDC, –20/+25% max. incl. 5% ripple or 19 VAC ±15% two-way rectified (18 VDC)
Power consumption	typically 15 W for 64 I/Os
Capacity 5 V/+V (24 V) internal	max. 600 mA/100 mA

Saia PCD3.M3xx0 controllers

The base CPU for simple applications





Automation Server integrated in the base unit

Types

- PCD3.M3120 CPU basic module with Ethernet TCP/IP, 64 I/Os, 128 kByte of program memory
- PCD3.M3160 CPU basic module with Ethernet TCP/IP, 64 I/Os, 512 kByte of program memory
- PCD3.M3330 CPU basic module with Ethernet TCP/IP, 1023 I/Os, 512 kByte of program memory
- PCD3.M3360 CPU basic module with Ethernet TCP/IP, 1023 I/Os, 512 kByte of program memory

Technical Data	PCD3.M3120 Basic	PCD3.M3330 Basic	PCD3.M3160 Basic Power	PCD3.M3360 Basic Power
Number of inputs/outputs	64	1023	64	1023
or I/O module slots	4	64	4	64
I/O expansion connection for PCD3.Cxxx module holder	No	Yes	No	Yes
Processing times [µs] bit operation	0.3…1.5 µs		0.1…0.8 µs	
word operation	0.9 µs		0.3 µs	
Real-time clock (RTC)	Yes			

Onboard memory

Main memory (RAM) for program and DB/text	128 kByte	512 kByte	No
Program memory, DB/text (FLASH)	No		512 kByte
Working memory, DB/text (RAM)	No		128 kByte
Flash memory (S-RIO, configuration and backup)	2 MByte		128 MByte
User flash file system (INTFLASH)	No		128 MByte
Data backup	4 hours with SuperCap		

Onboard interfaces

USB 1.1	Yes
Ethernet 10/100 Mbits, full-duplex, auto-sensing/auto-crossing	Yes
RS-485 on terminal block (Port 2) or RS-485 Profibus-DP Slave, Profi-S-Net on terminal block (Port 2)	up to 115 kbits up to 187.5 kbits

Options

The data memory can be expanded to 4 GB with flash memory modules (with file system).

Optional data interfaces

I/O slot 0	PCD3.F1xx modules for RS-232, RS-422, RS-485 and Belimo MP-Bus
I/O slot 0…3 - up to 4 modules or 8 interfaces:	PCD3.F2xx modules for RS-232, RS-422, RS-485, BACnet® MS/TP, Belimo MP-Bus, DALI and M-Bus

General specifications

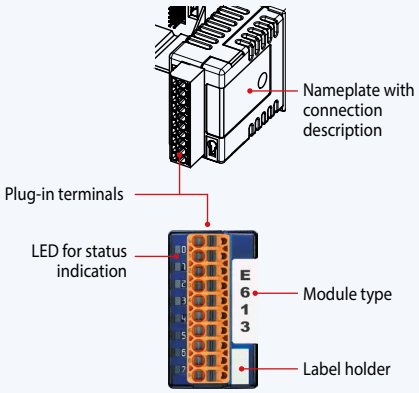
Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC, –20/+25% max. incl. 5% ripple or 19 VAC ±15% two-way rectified (18 VDC)
Power consumption	typically 15 W for 64 I/Os
Capacity 5 V/+V (24 V) internal	max. 600 mA/100 mA

Saia PCD3 input and output modules in cassette design

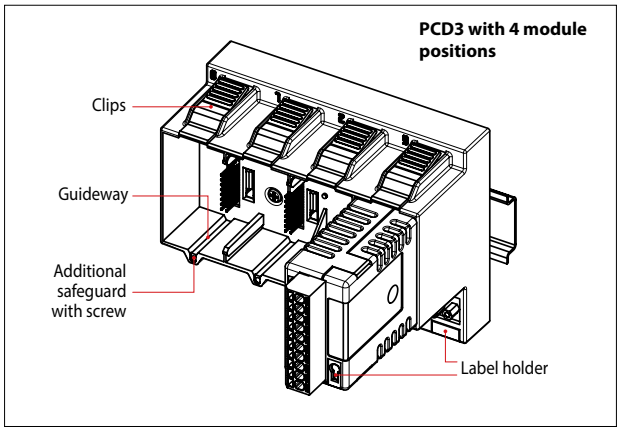
The functions of the Saia PCD3 can be expanded as required using a wide range of plug-in I/O modules and can be adapted to specific requirements. This not only ensures that a project can be implemented quickly, but also provides the option of expanding or modifying the system at any time.

System properties

- Numerous variants available
- Slot direct in the Saia PCD3 basic CPU or in the module holder
- Full integration in the Saia PCD3 housing
- Stable cartridge construction
- Connection to the I/O level via plug-in spring terminal blocks or ribbon cables and adapters
- I/O terminal blocks are supplied as standard
- No tools required for replacing modules



Insertion of I/O modules



▲ Simple exchange of I/O modules

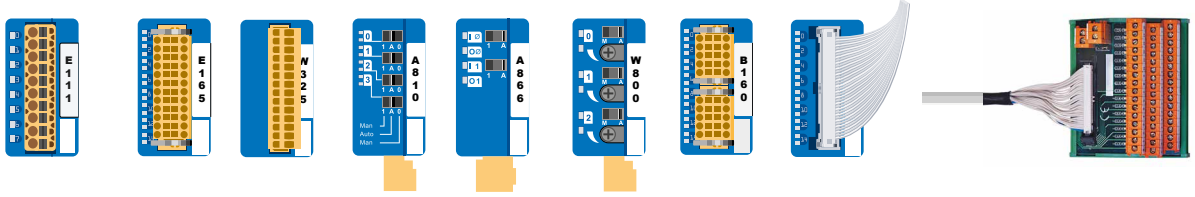
Over 50 modules available with different functionalities

Types

- **PCD3.Axxx** Digital output modules
- **PCD3.Bxxx** Combined digital input/output modules
- **PCD3.Exxx** Digital input modules
- **PCD3.Fxxx** Communication modules
- **PCD3.Hxxx** Fast counter modules
- **PCD3.Rxxx** Memory modules
- **PCD3.Wxxx** Analogue input/output modules

Connecting plugs/terminals

Type A[10-pin 2.5 mm2] | **Type C** 24-pin 1.0 mm² | **Type E** 14-pin 1.5 mm² | **Type F** 12-pin 1.5 mm² | **Type G + H** 4- + 6-pin 2.5 + 1.5 mm² | **Type J** 8-pin 1.5 mm² | **Type K** 10-pin 1.0 mm² | **Type D** Connecting plug for ribbon cable (not supplied with the module)



▲ Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories.

Saia PCD3 digital input and output modules

The digital I/O modules can be easily plugged into the Saia PCD3 Basis CPU or an appropriate module holder. In addition to inputs for various voltage levels, digital outputs are provided with both transistor construction and as mechanical relays. This means that electrical isolation from the switching electrical circuit can be achieved easily and reliably.

Digital input modules

Type	Number of inputs	Input voltage	Output switching capacity DC	AC	Input delay	Electrical isolation	Internal current draw 5 V-Bus [1] + V-Bus [2]		I/O connector type [3]
PCD3.E110 PCD3.E111	8 8	15…30 VDC 15…30 VDC	---	---	8 ms 0.2 ms	---	24 mA 24 mA	---	A A
PCD3.E160 PCD3.E161	16 16	15…30 VDC 15…30 VDC	---	---	8 ms 0.2 ms	---	10 mA 10 mA	---	D D
PCD3.E165 PCD3.E166	16 16	15…30 VDC 15…30 VDC	---	---	8 ms 0.2 ms	---	10 mA 10 mA	---	C C
PCD3.E500	6	80…250 VAC	---	---	20 ms	•	1 mA	---	A
PCD3.E610 PCD3.E613	8 8	15…30 VDC 30…60 VDC	---	---	10 ms 9 ms	• •	24 mA 24 mA	---	A A

Digital output modules

Type	Number of outputs	Input voltage	Output switching capacity DC	AC	Input delay	Electrical isolation	Internal current draw 5 V-Bus [1] + V-Bus [2]		I/O connector type [3]
PCD3.A200 PCD3.A210	4, relay (make)* 4, relay (break)*	---	2 A/50 VDC 2 A/50 VDC	2 A/250 VAC 2 A/250 VAC	---	• •	15 mA 15 mA	---	A A
PCD3.A220	6, relay (make)	---	2 A/50 VDC	2 A/250 VAC	---	•	20 mA	---	A
PCD3.A251	8, relay (6 changeover + 2 make)	---	2 A/50 VDC	2 A/48 VAC	---	•	25 mA	---	C
PCD3.A300	6, transistor	---	2 A/10…32 VDC	---	---	---	20 mA	---	A
PCD3.A400	8, transistor	---	0.5 A/5…32 VDC	---	---	---	25 mA	---	A
PCD3.A410	8, transistor	---	0.5 A/5…32 VDC	---	---	•	24 mA	---	A
PCD3.A460 PCD3.A465	16, transistor 16, transistor	---	0.5 A/10…32 VDC 0.5 A/10…32 VDC	---	---	---	10 mA 10 mA	---	D C
PCD3.A810 Manual operation	4, relay (2 changeover + 2 make)	---	2 A/50 VDC 2 A/50 VDC	5 A/250 VAC 6 A/250 VAC	---	• •	40 mA	---	F

* with contact protection

Digital input/output modules

Type	Number of I/Os	Input voltage	Output switching capacity DC	AC	Input delay	Electrical isolation	Internal current draw 5 V-Bus [1] + V-Bus [2]		I/O connector type [3]
PCD3.A860 Light and shade	2 Out, relay (make) 2 In	15…30 VDC	---	12 A/250 VAC	8 ms	•	18 mA	---	G H
PCD3.B100	2 In + 2 Out + 4 selectable In or Out	I: 15…32 VDC	0.5 A/5…32 VDC	---	8 ms	---	25 mA	---	A
PCD3.B160	16 I/O (configurable)	I: 24 VDC	0.25 A/18…30 VDC	---	8 ms or 0.2 ms	---	120 mA	---	2× K

Fast counter modules

Type	Number of counters	Inputs per counter	Outputs per counter	Counting range	Selectable digital filter	Current draw 5 V-Bus [1] + V-Bus [2]		I/O connector type [3]
PCD3.H112	2	2 Inp. + 1 configurable Inp.	1 CCO	0…16 777 215 (24 Bit)	10 kHz…150 kHz	50 mA	4 mA	K
PCD3.H114	4	2 Inp. + 1 configurable Inp.	1 CCO	0…16 777 215 (24 Bit)	10 kHz…150 kHz	50 mA	4 mA	2× K

Overview of the internal bus capacity of the module holders

Capacity	PCD3.Mxxx0	PCD3.Txxx	PCD3.C200
[1] Internal 5V	600 mA	600 mA	1500 mA
[2] Internal +V (24 V)	100 mA	100 mA	200 mA

The electrical requirement of the internal +5V and +V bus for the I/O modules is calculated in the PG5 2.0 Device Configurator.

[3] Plug-in terminal blocks are included with I/O modules.
Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories (see pages 34 and 168).

Saia PCD3 analogue input and output modules

The numerous analogue modules allow complex control tasks or measurements to be performed. The resolution is between 8 and 16 bits, depending on the speed of the AD converter. The digitised values can be further processed direct in the project in the Saia PCD3. The large number of different modules means that suitable modules are available for almost any requirement.

Analogue input modules

Type	Total Channels	Signal ranges/description	Resolution	Electrical isolation	Internal current draw 5 V-Bus [1]	+ V-Bus [2]	I/O connector type [3]
PCD3.W200	8 In	0…+10 V	10 Bit		8 mA	5 mA	A
PCD3.W210	8 In	0…20 mA [4]	10 Bit		8 mA	5 mA	A
PCD3.W220	8 In	Pt1000: –50 °C…400 °C/Ni1000: –50 °C…+200 °C	10 Bit	---	8 mA	16 mA	A
PCD3.W220Z03	8 In	NTC 10 temperature sensor	10 Bit		8 mA	16 mA	A
PCD3.W220Z12	4 In +4 In	4 In: 0…10 V 4 In: Pt1000: –50 °C…400 °C/Ni1000: –50 °C…+200 °C	10 Bit		8 mA	11 mA	A
PCD3.W300	8 In	0…+10 V	12 Bit		8 mA	5 mA	A
PCD3.W310	8 In	0…20 mA [4]	12 Bit		8 mA	5 mA	A
PCD3.W340	8 In	0…+10 V/0…20 mA 4) Pt1000: –50 °C…400 °C/Ni1000: –50 °C…+200 °C	12 Bit		8 mA	20 mA	A
PCD3.W350	8 In	Pt100: –50 °C…+600 °C/Ni100: –50 °C…+250 °C	12 Bit	---	8 mA	30 mA	A
PCD3.W360	8 In	Pt1000: –50 °C…+150 °C	12 Bit		8 mA	20 mA	A
PCD3.W380	8 In	–10 V…+10 V, –20 mA…+20 mA, Pt/Ni1000, Ni1000 L&S, NTC10k/NTC20k (configuration using software)	13 Bit		25 mA	25 mA	2× K
PCD3.W305	7 In	0…+10 V	12 Bit	•	60 mA	0 mA	I
PCD3.W315	7 In	0…20 mA [4]	12 Bit	•	60 mA	0 mA	I
PCD3.W325	7 In	–10 V…+10 V	12 Bit	•	60 mA	0 mA	I
PCD3.W720	2 In	Weighing module with 2 systems for up to 6 weighing cells	≤18 Bit	---	60 mA	100 mA	I
PCD3.W745	4 In	Temperature module for TC type J, K and 4-wire Pt/Ni 100/1000	16 Bit	•	200 mA	0 mA	[6]

Analogue output modules

Type	Number of channels	Signal ranges/description	Resolution	Electrical isolation	Internal current draw 5 V-Bus [1]	+ V-Bus [2]	I/O connector type [3]
PCD3.W400	4 Out	0…+10 V	8 Bit		1 mA	30 mA	A
PCD3.W410	4 Out	0…+10 V/0…20 mA/4…20 mA jumper-selectable	8 Bit	---	1 mA	30 mA	A
PCD3.W600	4 Out	0…+10 V	12 Bit		4 mA	20 mA	A
PCD3.W610	4 Out	0…+10 V/–10 V…+10 V/0…20 mA/4…20 mA jumper-selectable	12 Bit	---	110 mA	0 mA	A
PCD3.W605	6 Out	0…+10 V	10 Bit	•	110 mA	0 mA	I
PCD3.W615	4 Out	0…20 mA/4…20 mA parameters can be set	10 Bit	•	55 mA	0 mA	I
PCD3.W625	6 Out	–10 V…+10 V	10 Bit	•	110 mA	0 mA	I
PCD3.W800	4 Out, 3 of which are manually operated	0…+10 V, short circuit-proofed	10 Bit	---	45 mA	35 mA [5]	J

Analogue input/output modules

Type	Number of channels	Signal ranges/description	Resolution	Electrical isolation	Internal current draw 5 V-Bus [1]	+ V-Bus [2]	I/O connector type [3]
PCD3.W525	4 In +	**In:** 0…10 V, 0(4)…20 mA, Pt1000, Pt500 or Ni1000 (selectable via DIP switch)	In: 14 Bit	•	40 mA	0 mA	I
	2 Out	**Out:** 0…10 V or 0(4)…20 mA (selectable via software)	Out: 12 Bit				

Manual control modules

PCD3.A810
Relay outputs, 2 change-over and 2 make

PCD3.A860
Light and shade 2 relay outputs and 2 inputs

PCD3.W800
4 analogue outputs (3 of these operable)

Overview of the internal bus capacity of the module holders

Capacity	PCD3.Mxxx0	PCD3.Txxx	PCD3.C200
[1] Internal 5V	600 mA	600 mA	1500 mA
[2] Internal +V (24 V)	100 mA	100 mA	200 mA

The electrical requirement of the internal +5V and +V bus for the I/O modules is calculated in the PG5 Device Configurator.

[3] Plug-in I/O terminal blocks are included with I/O modules. Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories (see pages 34 and 174).

[4] 4…20 mA via user program

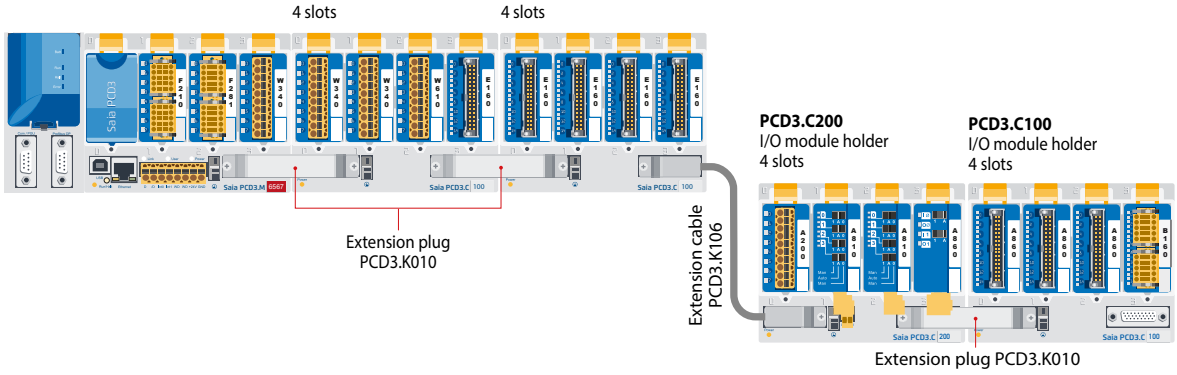
[5] At 100% output value and 3 kΩ load

[6] With soldered spring terminal block

Information for project planning with PCD3 module holders

The internal load current taken by the I/O modules from the +5V and +V (24V) supply must not exceed the maximum supply current specified for the CPUs, RIOs or PCD3.C200 module holders.

Example calculation for the current consumption of the internal +5V and +V (24V) bus of the I/O modules



Consumption M5540 + C100 + C100

Module	Internal 5V	Internal +V (24V)
Not used		
F210	110 mA	
F281	90 mA	15 mA
W340	8 mA	20 mA
Total M5540	**208 mA**	**35 mA**
W340	8 mA	20 mA
W340	8 mA	20 mA
W610	110 mA	0 mA
E160	10 mA	
Total C100	**136 mA**	**40 mA**
E160	10 mA	
E160	10 mA	
E160	10 mA	
E160	10 mA	
Total C100	**40 mA**	**0**
Total M5540	**384 mA**	**75 mA**

Consumption C200 + C100

Module	Internal 5V	Internal +V (24V)
A200	15 mA	
A810	40 mA	
A810	40 mA	
A860	18 mA	
Total C200	**113 mA**	
A460	10 mA	
A460	10 mA	
A460	10 mA	
W380	25 mA	25 mA
Total C100	**55 mA**	**25 mA**
Total C200	**168 mA**	**25 mA**

Capacity	PCD3.M5560	PCD3.C200
Internal 5V	600 mA	1500 mA
Internal +V (24V)	100 mA	200 mA

The calculation example shows that internal capacity is maintained in the CPU basic module PCD3.M5540 and the holder module PCD3.C200. The CPU basic module has a sufficient reserve to receive an additional communication module in the empty slot 0. The holder module PCD3.C200 also has sufficient reserves to connect an additional PCD3.C100 or PCD3.C110 holder module. The power consumption of the internal +5V and +V (24 V) bus for the I/O modules is automatically calculated in the PG5 2.0 Device Configurator.

The following aspects should be considered when planning PCD3 applications:

- In keeping with lean automation, it is recommended to leave the first slot in the CPU basic module free for any subsequent expansions. Both single I/O modules and communication modules can be used in this slot.
- The total length of the I/O bus is limited by technical factors; the shorter, the better.

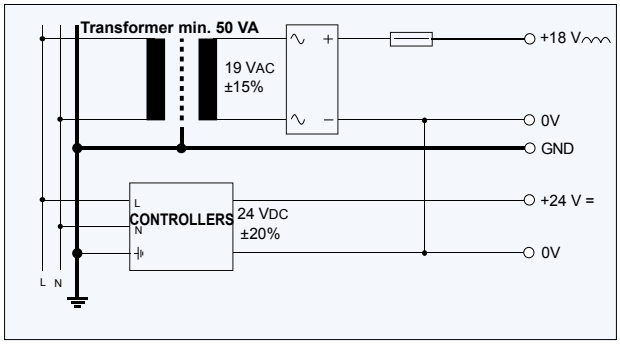
The PCD3.C200 is used to extend the I/O bus or for the internal power supply (+5V and +V (24V)) to a module segment. Please note the following rules:

- Do not use more than six PCD3.C200s in a single configuration, or the time delay will exceed the I/O access time.
- Use a maximum of five PCD3.K106/116 cables.
- Insert a PCD3.C200 after each cable (at the start of a row). Exception: In a small configuration with no more than 3 PCD3.C1xxs, these can be supplied from the PCD3.Mxxx. A PCD3.C200 is not required.
- If an application is mounted in a single row (max. 15 module holders), then after five PCD3.C100 a PCD3.C200 must be used to amplify the bus signal (unless the configuration ends with the fifth PCD3.C100).
- If the application is mounted in multiple rows, the restricted length of cable means that only three module holders (1× PCD3.C200 and 2× PCD3.C100) may be mounted in one row.

Saia PCD3 power supply and connection concept

External power supply

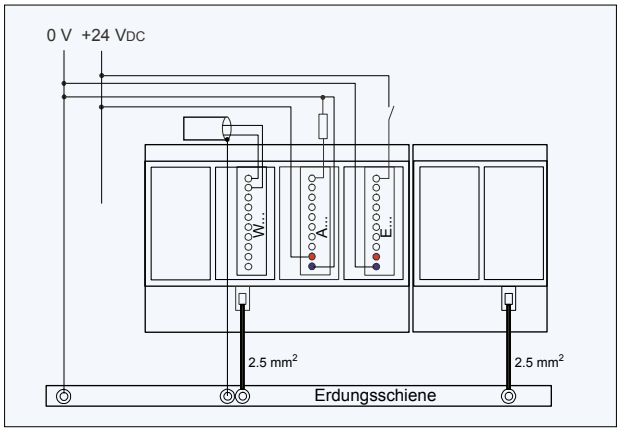
A two-way rectified supply can be used for most modules.
The following modules must be connected to smoothed 24 VDC:
PCD3. H1xx, H2xx, H3xx, PCD7.D2xx



It is generally recommended to use robust and interference-resistant SBC power supply units with 24 VDC output. See Chapter 5.1 for available types.

Grounding and connection plan

- The zero potential (GND) of the 24 V supply is connected to the GND and the controller's grounding terminal. If possible, this should be connected to the ground bar with a short wire (<25 cm) with a cross section of 1.5 mm². The same applies to the negative connection to the PCD3.F1xx or the interrupt terminal.
- Any shielding of analogue signals or communication cables should also be brought to the same grounding potential, either via a negative terminal or via the ground bar.
- All negative connections are linked internally. For flawless operation, these connections should be reinforced externally by short wires with a cross section of 1.5 mm2.

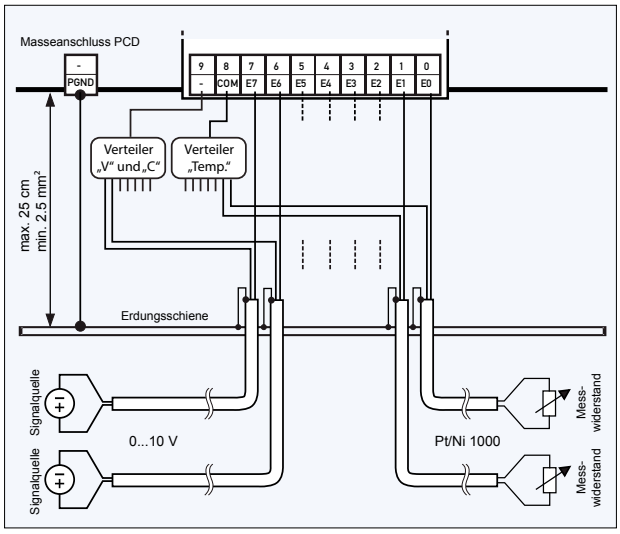


Grounding and connection concept analogue inputs that are not electrically isolated (PCD3.W2x0, PCD3.W3x0)

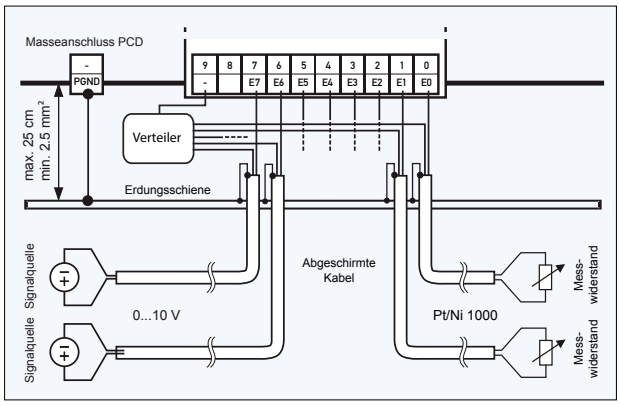
Signal sources (such as temperature sensors) should be connected direct to the input module wherever possible.

To obtain optimum measurement results, avoid connection to a ground bar. Additional external GND connections to the sensor signals may result in equalising currents which distort the measurement.

If shielded cables are used, the shielding should be continued to a ground bar.



Connection concept for PCD3.W3x0
The reference potential of voltage and current inputs must be wired to a common GND distributor at the "–" terminal. Temperature sensors must be wired to a common GND distributor at the "COM" terminal. The module PCD3.W380 has a 2-wire connection for the inputs and requires no external GND distributor.



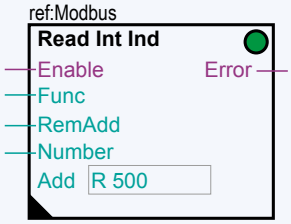
Connection concept for PCD3.W2x0
The reference potential of signal sources must be wired to a common GND distributor at the "–" terminal

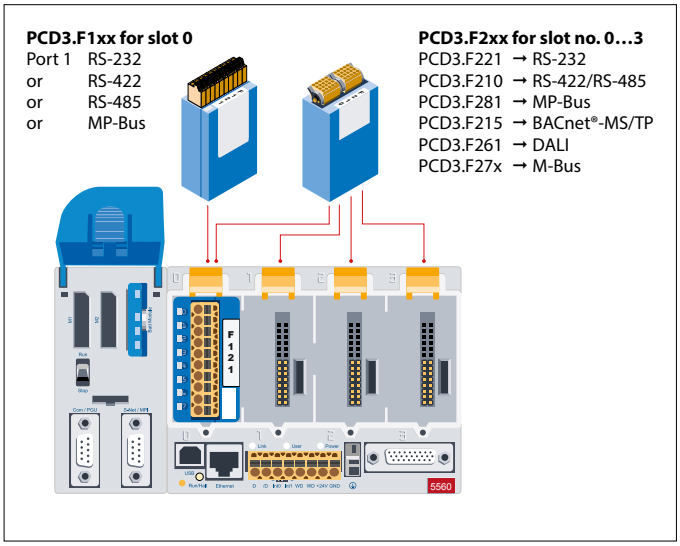
Communication interfaces of Saia PCD3.Mxxxx controllers

In addition to the interfaces that the Saia PCD3 has onboard, the interface functions can also be expanded using various slots. Numerous protocols are therefore supported by the PCD3. For the majority of protocols, the physical bus specifications are offered as a plug-in module. If this is not the case, the bus can be connected via an external converter.

Protocols supported by PCD3.Mxxxx via FBoxes

- Modem communication with the PCD
- S-Bus
- Modbus
- JCI N2-Bus
- KNX® S-Mode/EIB (with external converter)
- DALI
- EnOcean (with external converter)
- M-Bus
- BACnet® MS/TP
- HMI editor applications with PCD7.Dxxx text terminals (RS-232 only)





Fully programmable physical interfaces

Module	Specifications	Slot	Electrical isolation	Internal current draw 5V +V (24 V)		I/O connector type [1]
PCD3.F110	RS-422 with RTS/CTS or RS-485 [2]	I/O 0	---	40 mA	---	A
PCD3.F121	RS-232 with RTS/CTS, DTR/DSR, DCD	I/O 0	---	15 mA	---	A
PCD3.F150	RS-485 [2]	I/O 0	•	130 mA	---	A
PCD3.F210	RS-422/RS-485 [2], plus PCD7.F1xxS as option	I/O 0...3	---	110 mA	---	2× K
PCD3.F221	RS-232 plus PCD7.F1xxS as option	I/O 0...3	---	90 mA	---	2× K

Physical interfaces for specific protocols

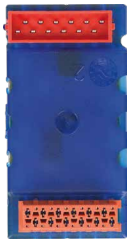
Module	Specifications	Slot	Electrical isolation	Internal current draw 5V +V (24 V)		I/O connector type [1]
PCD3.F180	Belimo MP-Bus, for connecting up to 8 drives on one line	I/O 0	---	15 mA	15 mA	A
PCD3.F215	BACnet® MS/TP or freely programmable	I/O 0...3	---	110 mA	---	2× K
PCD3.F240	LonWorks® interface module exclusively for PCD3.M5x6x	I/O 0...3	---	90 mA	---	A9
PCD3.F261	DALI	I/O 0...3	---	90 mA	---	A
PCD3.F270	M-Bus 240 nodes	I/O 0...3	---	70 mA	8 mA	A
PCD3.F271	M-Bus 20 nodes	I/O 0...3	---	70 mA	8 mA	A
PCD3.F272	M-Bus 60 nodes	I/O 0...3	---	70 mA	8 mA	A
PCD3.F281	Belimo MP-Bus with slot for PCD7.F1xxS modules	I/O 0...3	---	90 mA	15 mA	2× K

System properties required for PCD3.Fxxx modules:

The PCD3 system has a processor that serves both the application and the serial ports. To determine the maximum communication capacity for each PCD3.M5xx0 system, consult the information and examples provided in the manual 26-789 for PCD3.M5xx0.

Interface modules for optional insertion in PCD3.F2xx modules

Module	Specifications
PCD7.F110S	RS-422 with RTS/CTS or RS-485 [2] (electrically connected)
PCD7.F121S	RS-232 with RTS/CTS, DTR/DSR, DCD, suitable for modem, EIB connection
PCD7.F150S	RS-485 [2] (electrically isolated)d
PCD7.F180S	Belimo® MP-Bus for connecting up to 8 drives on one line



[1] Plug-in I/O terminal blocks are included with I/O modules. Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories (see pages 34 and 174).

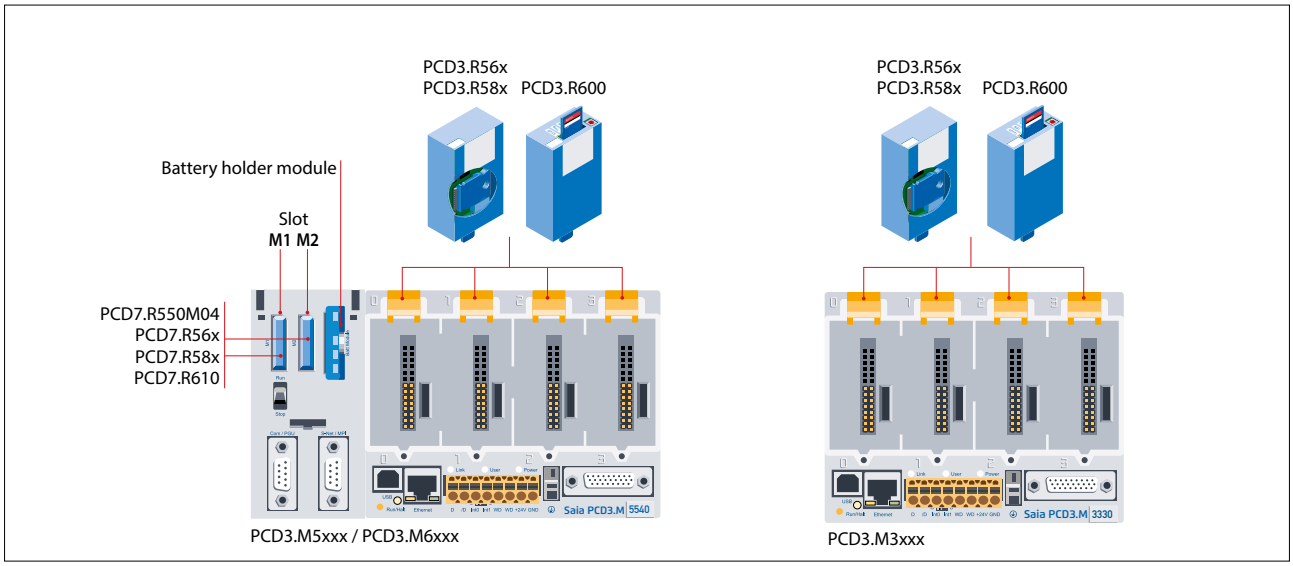
[2] with termination resistors that can be activated.

Memory modules of Saia PCD3.Mxxxx controllers

In addition to the onboard memory contained in the base units, PCD3 controllers can also be expanded in a modular way with various flash memory modules for programs and data. The various communication protocols where the firmware is installed on the flash cards can also be used by simply inserting the relevant card.
More information on memory management and construction can be found in Chapter 1.1 Saia PCD® System description.

System properties

- Configuration, programs and data can be transferred from one CPU to another
- Two slots (M1 and M2) for memory cards
- Additional memory cards can be inserted in the I/O slots using I/O adapters
- Memory can be expanded by up to 4 GB



PCD7.R550M04
PCD7.R56x
PCD7.R58x

PCD7.R610

Flash memory with file system, program and data backup, BACnet® for M1/M2 slot

Type	Description	Slot
PCD7.R550M04	4 MB flash card with file system	M1 & M2
PCD7.R562	Flash card with BACnet® and 128 MB file system	M1 & M2
PCD7.R582	Flash card with Lon IP and 128 MB file system	M1 & M2
PCD7.R610	Basic module for Micro SD flash cards	M1 & M2
PCD7.R-MSD1024	Micro SD flash card 1024 MB, PCD formatted	PCD7.R610

PCD3.R56x

Plug-in flash modules for I/O module slots for all PCD3.Mxxx0s

Type	Description	Slot
PCD3.R562	Flash card with BACnet® and 128 MB file system	I/O 0…3

PCD3.R600

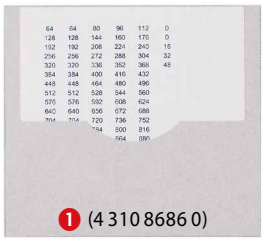
Saia PCD3 basic module for SD flash cards with file system

Type	Description	Slot
PCD3.R600	Basic module with slot for SD flash cards (Up to 4 modules in I/O slots 0 to 3 on a CPU)	I/O 0…3
PCD7.R-SD512	SD flash card, 512 MB with file system	---
PCD7.R-SD1024	SD flash card, 1024 MB with file system	---

Spare parts (battery and battery holder module) see consumables and accessories (see pages 34 and 174).

Consumables and accessories for Saia PCD3 controllers

Labelling accessories



1 (4 310 8686 0)

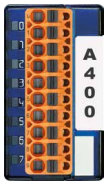
2 (4 329 4819 1)

Addressing and labelling of I/O modules and module holders

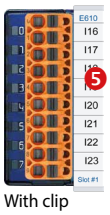
I/O module slots in the module holder are labelled with numbers:

- 0…3 (PCD3.Mxxxx /T66x/C100, C200)
- 0…1 (PCD3.C110)

The provided inscription labels 2 can either be used for additional labelling of the module holders or for the I/O modules themselves. They are blank and, depending on requirements, may either be labelled by hand or by using pre-printed adhesive strips 1.
The circuit diagram 3 printed on the side of each I/O module makes wiring easier and also helps during commissioning. Sufficient space 4 is available on the other side of the cassette for the user to add customised labelling with the self-adhesive labels supplied.



Without clip

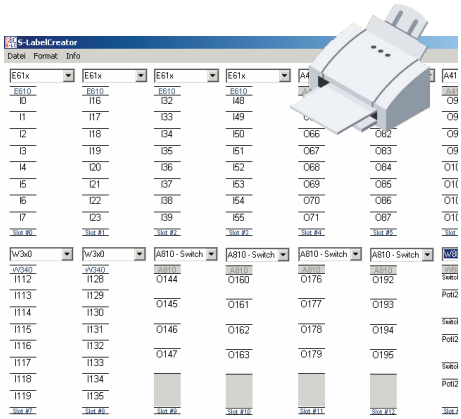


With clip

Order type
5 (4 310 8723 0)

Additional labelling on the front 5

The PCD3 modules can also be labelled on the front panel.
Neutral labels with a snap-on cover (clip) are available for this purpose.



Fast labelling of I/O modules with the LabelEditor

The LabelEditor is included in the PG5 Controls Suite Device Configurator. This software tool is used to label PCD3 label clips efficiently.

EPLAN macros

EPLAN macros are available for project planning and engineering

The EPLAN® electric P8 macros are available on the support site.

The macros and article data are also provided on the EPLAN® data portal.

Download:
www.sbc-support.com

Consumables and accessories for Saia PCD3.Mxxxx controllers

Saia PCD3 battery and battery holder module

Type	Description
PCD3.R010	Battery kit for PCD3.M3xxx Basic CPU (battery module for slot #3 incl. lithium battery CR2032)
4 639 4898 0	Battery holder module (for PCD3.M5xxx)
4 507 4817 0	Lithium battery for PCD Base CPU

Saia PCD3 housing covers

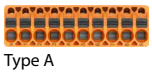
Type	Description
4 104 7493 0	Cover for PCD3.M5xxx and M6xxx
PCD3.E009	Empty module housing for unused PCD3 I/O slots
4 104 7515 0	Slot cover for unused PCD3 I/O slots
4 104 7502 0	Slot cover for unused PCD3 I/O slots without SBC logo

8-pin

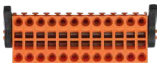
2-pin

Saia PCD3 plug-in screw terminal blocks for basic modules and module holders

Type	Description	
4 405 4995 0	8-pin spring terminal block	for power supply to PCD3.Mxxx0
4 405 4952 0	Screw terminal	2-pin for supply PCD3.C200



Type A



Type C

Type E

Type F

Type G

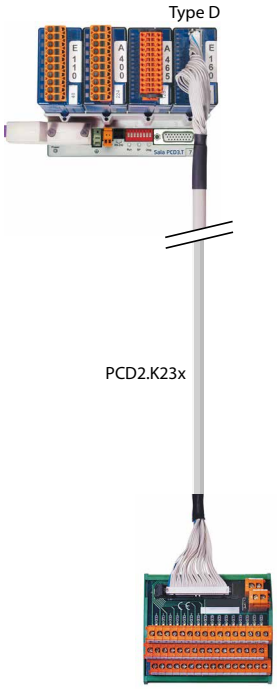
Type H

Type J

Type K

Saia PCD3 plug-in terminal blocks and labelling for I/O modules

Type	Description		
4 405 4954 0	Plug-in I/O spring terminal block	10 - pin for wires up to 2.5 mm²	type A
4 405 4956 0	Plug-in I/O spring terminal block	24 - pin for wires up to 1.0 mm²	type C
4 405 4998 0	Plug-in I/O spring terminal block	14 - pin for wires up to 1.5 mm²	type E
4 405 4936 0	Plug-in I/O spring terminal block	12 - pin for PCD3.A810 for wires up to 1.5 mm²	type F
4 405 5027 0	Plug-in I/O spring terminal block	4 - pin for PCD3.A860 for wires up to 2.5 mm²	type G
4 405 5028 0	Plug-in I/O spring terminal block	6 - pin for PCD3.A860 for wires up to 1.0 mm²	type H
4 405 5113 0	Plug-in I/O spring terminal block	9 - pin for PCD3.F240 for wires up to 2.5 mm²	type A9
4 405 4934 0	Plug-in I/O spring terminal block	8 - pin for PCD3.W800 for wires up to 1.5 mm²	type J
4 405 5048 0	Plug-in I/O spring terminal block	10 - pin for wires up to 1.0 mm²	type K
4 310 8723 0	Set of 10 units: Transparent snap-on label holder including neutral inscription labels (2× DIN A4)		
4 329 4819 1	Set of 10 units: Snap-on inscription carrier for modules		
4 310 8686 0	Set of 10 units: Pre-printed self-adhesive strips for snap-on label holder		



System cables and "ribbon screw terminal" adapters (see Chapter 5.10 for details)

Type	Description
System cables for digital modules with 16 I/Os	
PCD2.K221	Sheathed, round cable with 32 strands of 0.25 mm², 1.5 m long, PCD side 34-pin ribbon cable connector type D, process side: strand ends free, colour coded
PCD2.K223	Sheathed, round cable with 32 strands of 0.25 mm², 3.0 m long, PCD side 34-pin ribbon cable connector type D, process side: strand ends free, colour coded
System cables for adapters PCD2.K520/..K521/..K525	
PCD2.K231	Sheathed, half-round cable with 34 strands, each 0.09 mm², 1.0 m long, 34-pin ribbon connector at both ends type D
PCD2.K232	Sheathed, half-round cable with 34 strands, each 0.09 mm², 2.0 m long, 34-pin ribbon connector at both ends type D
System cables for 2 adapters PCD2.K510/..K511 or 1 adapter and relay interface PCD2.K551	
PCD2.K241	Sheathed, half-round cable with 34 strands, each 0.09 mm², 1.0 m long, PCD side 34-pin ribbon connector type D, process side two 16-pin ribbon connector
PCD2.K242	Sheathed, half-round cable with 34 strands, each 0.09 mm², 2.0 m long, PCD side 34-pin ribbon connector type D, process side two 16-pin ribbon connectors

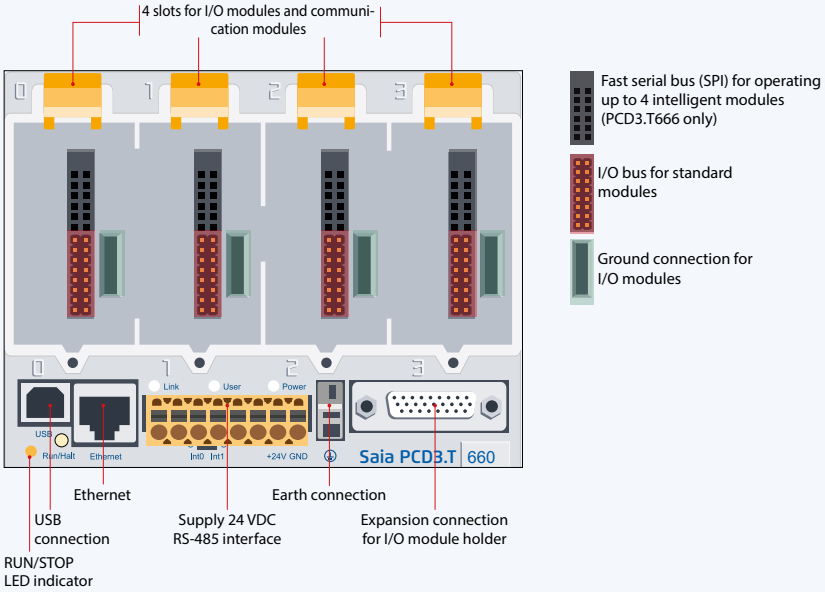
"Ribbon/screw terminal" adapters

Type	Description
PCD2.K510	for 8 inputs/outputs, with 20 screw terminals without LED
PCD2.K511	for 8 inputs/outputs, with 20 screw terminals and LED (for source operation only)
PCD2.K520	for 16 inputs/outputs, with 20 screw terminals without LED
PCD2.K521	for 16 inputs/outputs, with 20 screw terminals and LED (for source operation only)
PCD2.K525	for 16 inputs/outputs, with 3 × 16 screw terminals and LED (for source operation only)
PCD2.K551	Relay interface for 8 PCD transistor outputs with 24 screw terminals and LED
PCD2.K552	Relay interface for 8 PCD transistor outputs with 24 screw terminals, LED and manual control mode (on-off auto switch) and 1 output as feedback for manual control

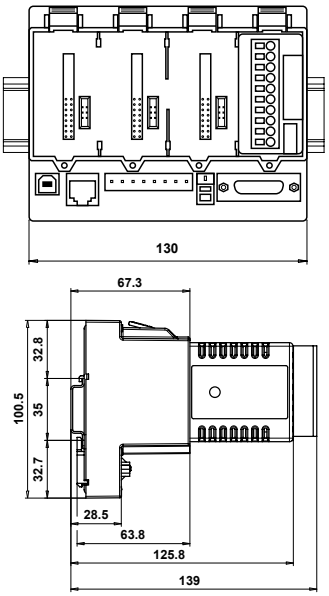
1.2.2 Saia PCD3.T66x remote I/O stations

The Smart RIOs are more than just another Ethernet remote I/O system. They can be programmed like a PLC and are therefore the ideal solution for distributed automation in line with the lean philosophy. Smart RIOs can be equipped with PCD3 I/O modules and expanded with PCD3 I/O module holders up to 256 I/Os per RIO station.

Design of Saia PCD3.T66x: Smart RIO head station with 4 slots for I/O modules



Dimensions

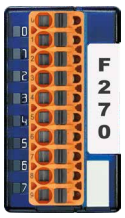


System properties

- Can be used as a simple remote I/O station or an intelligent programmable I/O station.
- Can be programmed with PG5. Important or time-critical tasks can be processed direct in the RIO.
- The RIO user programs are managed centrally in the Smart RIO Manager (PCD) and distributed to the RIOs automatically.
- Data exchange with efficient Ether S-IO protocol. Simple configuration with the RIO network configurator.
- Cross-communication with other PCD systems using Ether S-Bus (FBoxes).
- Intelligent communication modules (M-Bus, DALI) are supported with PCD3.T666.
- Other communication protocols (e.g. Modbus) via Ethernet TCP/IP and with PCD3.T666, also via the onboard RS-485 interface.
- Integrated Automation Server

I/O modules

The standard I/O modules of the PCD3 series can be used. For more information and types, see Chapter "Saia PCD3 input and output modules in cassette design" on page 26.

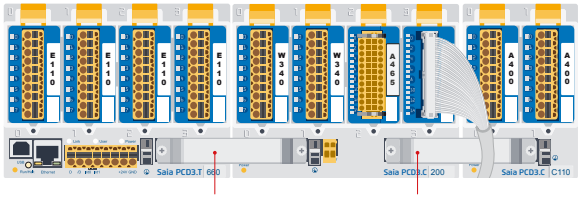


I/O extensions up to 256 I/O per RIO station

PCD3.T66x
CPU incl.
4 I/O slots

PCD3.C100
I/O module holder
4 slots

PCD3.C110
I/O module holder
2 slots



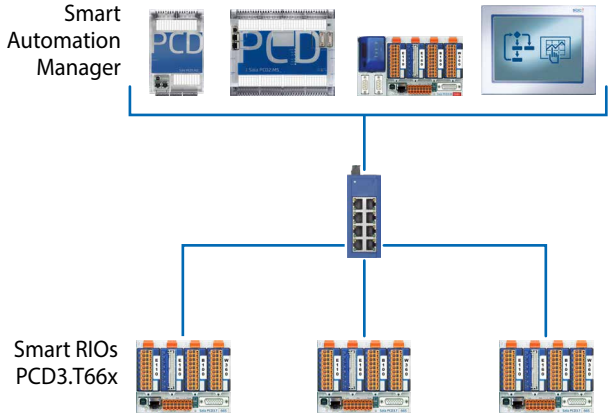
Extension plug PCD3.K010

Order details

Smart RIO	
PCD3.T665	Smart-RIO, Ether S-IO data exchange, programmable, 32 kByte program memory
PCD3.T666	Smart RIO, Ether S-IO data exchange, programmable, 128 kByte program memory, serial interfaces

I/O module holder	
PCD3.C100	Expansion module holder with 4 I/O slots
PCD3.C110	Expansion module holder with 2 I/O slots
PCD3.C200	Expansion module holder with 4 I/O slots and terminals for 24 VDC power supply

Distributed automation system design with Smart RIO



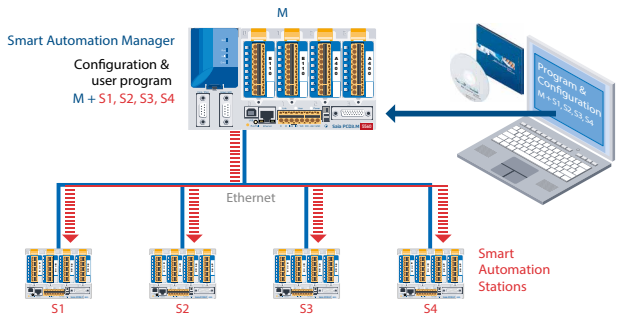
As Smart Automation Managers, PCD1.M21x0, PCD2.M5, PCD3.M2/3/5 CPUs and the programmable micro browser panel PCD7.D4xxxT5F can be used

Standard network components (e.g. Q.NET-5TX / 8TX) can be used to set up the Ethernet network

The maximum number of RIOs per Manager depends on the type of Manager used

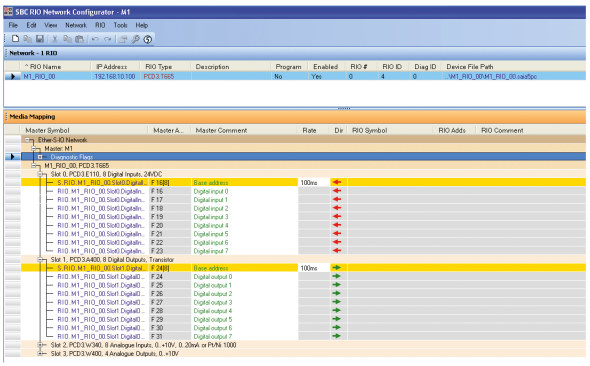
The Smart RIOs can be used both as simple remote I/O stations and as intelligent programmable RIO stations.

Central program management in the Manager



The application programs are centrally managed by the Smart Automation Manager and distributed to the Smart RIOs. If hardware is replaced, the programs and the configuration are reloaded automatically.
The Manager must have sufficient memory resources to save the RIO programs. The onboard program memory and the plug-in flash memory modules PCD7.Rxxx and PCD3.Rxxx can be used for this.

Data transfer with Ether S-IO protocol



Simple configuration of the data transfer in the RIO network configurator

Data transfer cycle times

Number of RIOs	Minimum data transfer cycle time
10	50 ms
20	100 ms
40	200 ms
80	400 ms
128	800 ms

2 different transfer cycle times can be set per RIO station:
– Short cycle time for high-priority data
– Normal cycle time for low-priority or slow data

The exchange of data can be easily configured in PG5 with the RIO network configurator. The configured exchange of data between RIO and the Manager is processed automatically by the operating system. No user program is required for this. The Manager sends the data to the Smart RIOs on a cyclical basis with broadcast or unicast telegrams. The RIOs also send their data or statuses of their inputs to the RIO Manager on a cyclical basis.

Technical Data

Property		PCD3.T665	PCD3.T666
Number of inputs/outputs		64 in base unit, expandable to 256	
I/O module slots		4 in base unit, expandable to 16	
I/O modules supported		PCD3.Exxx, PCD3.Axxx, PCD3.Bxxx, PCD3.Wxxx	
max. number of RIO stations		128	
Protocol for data transfer		Ether S-IO	
Ethernet connection		10/100 Mbits, full-duplex, auto-sensing, auto-crossing	
Default IP configuration		IP address: 192.168.10.100 Subnet mask: 255.255.255.0 Default gateway: 0.0.0.0	
USB interface for configuration and diagnostics		Yes	
Program memory		32 kByte	128 kByte
Web server for configuration and diagnostics		Yes	
Web server for user pages		Yes	
Onboard file system for web pages and data		512 kByte	
BACnet® or LonWorks®		No	No
Onboard interrupt inputs		2	
Onboard RS-485 interface		No	Yes
Special modules	for I/O slot 0 only	---	PCD3.F1xx
	for I/O slots 0…3 (up to 4 modules)	PCD3.H1xx --- ---	PCD3.H1xx counter PCD3.F26x DALI PCD3.F27x M-Bus
S-Web alarming/trending		No	No
Watchdog		No	
Real-time clock		No	
Software clock (not battery-powered)		yes, synchronised by the Manager	
Battery		No	

Smart Automation Manager (master station)

max. 16 RIO stations	PCD3.M2130, PCD3.M2330
max. 32 RIO stations	PCD1.M212x, PCD3.M3120, PCD3.M3160, PCD3.M3330, PCD3.M3360
max. 64 RIO stations	PCD1.M2160, PCD2.M4160, PCD3.M5340, PCD3.M5540, PCD3.M6x40, PCD7.D457VT5F, PCD7.D410VT5F, PCD7.D412DT5F
max. 128 RIO stations	PCD2.M4560, PCD3.M5360, PCD3.M5560, PCD3.M6560, PCD3.M6860

General data

Supply voltage	24 VDC ±20% smoothed or 19 VAC ±15% two-way rectified
Capacity of 5 V bus / +V bus (24 V)	max. 600 mA/100 mA
Ambient temperature	0…+55 °C or 0…+40 °C (depending on mounting position)
Storage temperature	–20…+70 °C
Relative humidity	30…95% RH with no condensation
Mechanical strength	in accordance with EN/IEC 61131-2

System properties/limits and recommendations for lean automation

In the case of lean automation, it is inefficient to exploit the specified limits or max. number of stations per Manager and max. number of I/Os per RIO. The following points should be considered:

- The load on the RIO Manager increases with the rising number of RIO stations. This has an impact on the overall application in the RIO Manager.
- If there is a large number of RIOs, a sufficiently large volume of PCD media must be reserved on the Manager for the data transfer.
- With the increased number of RIO stations, the build and download process in PG5 is extended accordingly. Likewise, the start-up behaviour of the Manager or the entire RIO network is proportionately longer.

Recommendation: 20 Smart RIOs per Manager is an effective configuration for efficient and flawless operation and easy commissioning and support.
The Smart RIOs do not have a battery. In the event of an interruption to the power supply, all the data in the RAM memory (registers, flags, DBs/text) will be lost. Data and parameters that are remanent must either be transferred by the Manager or stored in the RIO's flash file system. If this is not possible, it is recommended to use a normal controller instead of a Smart RIO.
The user programs are stored in the flash memory of the RIOs and are retained in the event of an interruption to the power supply.

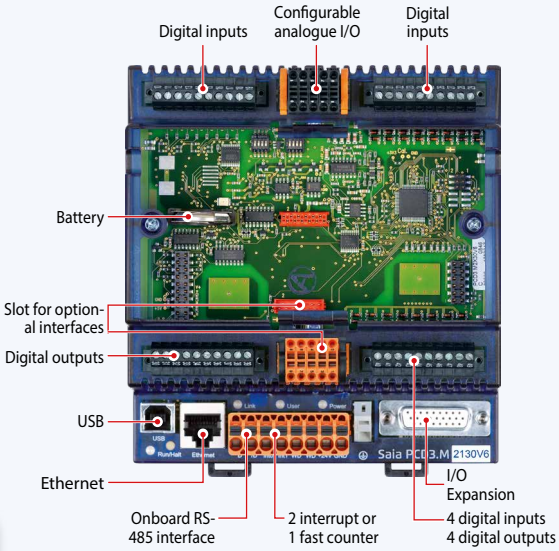
1.2.4 Saia PCD3.M2130V6 Compact

The PCD3 Compact combines high functionality in confined spaces. With its compact dimensions, it can fit into the smallest switch cabinets. This makes it ideal for upgrading existing installations. It includes all the features of PCD3 technology and also has I/Os directly onboard.

System properties

- Fully programmable with PG5
- Compact dimensions: 130 × 140 × 74 mm (W × H × D)
- Integral interfaces USB, Ethernet and RS-485
- Slot A for optional PCD7.F1xxS serial communication modules
- 38 inputs/outputs contained in the base unit
- Replaceable lithium battery
- Configurable analogue inputs for voltage, current and temperature
- Expandable with PCD3.C200 or PCD3.C110 I/O module holder
- Remote I/O expansion with remote I/O PCD3.T66x (Ethernet)

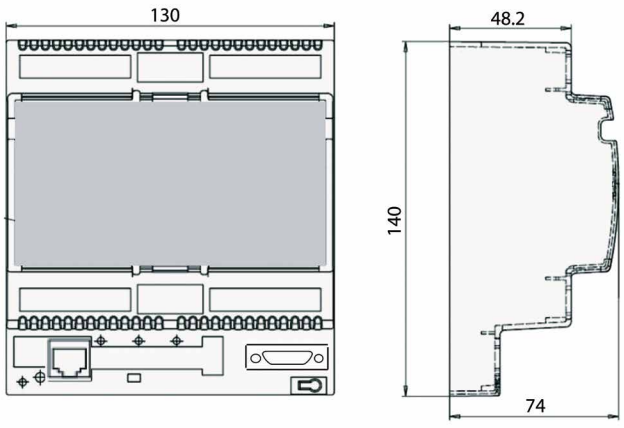
Automation Server integrated in the base unit

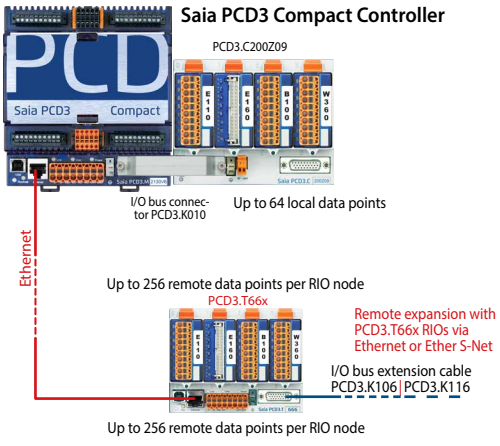


Onboard inputs/outputs

Type	Number	Input voltage	Signal ranges	Switching capacity VDC	Resolution	I/O connector type
Digital inputs	20	15…30 VDC	---	---	---	Plug-in screw terminals or push-in terminals with LED (optional)
Digital outputs transistor	12	---	---	0.5 A/ 5…32 VDC	---	Plug-in screw terminals or push-in terminals with LED (optional)
Analogue configurable inputs	4	---	–10 V…+10 V / 0…20 mA, Pt/Ni1000, Ni1000 L&S, resistance 0…2500 Ω	---	13 bit / 12 bit	Plug-in spring terminals
Analogue outputs	2	---	0…10 V	---	12 Bit	Plug-in spring terminals

Dimensions





Performance overview and accessories

Power supply

Type	Description
Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC –20 / +25% incl. 5% ripple
Current draw / input power	Type 175 mA / 4.2 W max. 500 mA / 12 W
Capacity 5 V/+V internal	max. 600 mA / 100 mA
Reclosing (in accordance with EN / IEC 61131-2)	≤ 10 ms for interval ≥ 1 s
Watchdog relay, make contact	48 VAC or VDC, 1 A

Communication interfaces to field level options in slot A

PCD7.F110S	RS-422 with RTS/CTS or RS-485 [1] electrically connected Suitable for Modbus, S-Bus, EnOcean, etc.
PCD7.F121S	RS-232 with RTS/CTS, DTR/DSR, DCD, suitable for modem, EIB, DALI connection.
PCD7.F150S	RS-485 [1] (electrically isolated)
PCD7.F180S	Belimo® MP-Bus, for connecting up to 8 drives on one line

[1] with line termination resistors that can be activated.

I/O expansions

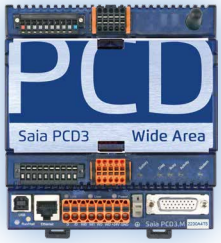
Type	Description	Capacity
PCD3.C110Z09	2 module slots (connection with PCD3.K010 connector or with PCD3.K106/K116 cable)	0 mA
PCD3.C200Z09	4 module slots, with 24 VDC supply (connection with PCD3.K010 connector or with PCD3.K106/K116 cable)	1500 mA / 200 mA (5 V / +V)
PCD3.C110	2 module slots (connection with PCD3.K106/K116 cable only)	0 mA
PCD3.C200	4 module slots, with 24 VDC supply (connection with PCD3.K106/K116 cable only)	1500 mA / 200 mA (5 V / +V)

I/O modules see pages 27 and 28

Order details

Type	Description
PCD3.M2130V6	Base units with 38 I/Os (supplied with plug-in screw terminals) CPU with 512 kByte user program, backup with onboard flash memory, 1 MB file system, USB port for programming with PG5, RS-485 interface, 2 interrupt inputs, integrated web and FTP server, 1 port (slot A) for PCD7.F1xxS communication modules, lithium battery for data backup for 1…3 years, Ethernet TCP/IP interface
4 405 5066 0	Optional: Pluggable 10-pin "push-in" terminal block with LEDs for digital I/Os

1.2.5 Saia PCD3.M2330A4Tx Wide Area Controller

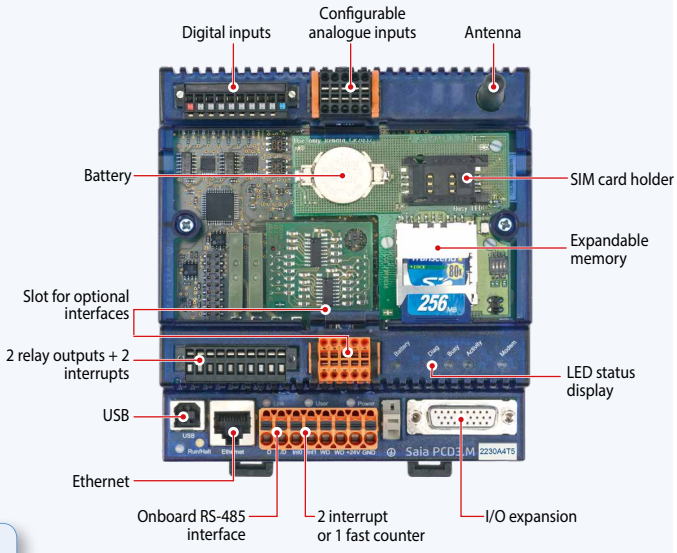


Saia PCD3 Wide Area Controllers are fully programmable, industrial control and automation devices with web, IT and telecommunications functions. Its potential uses therefore extend much further than those of classic RTU stations, which are normally only suitable for alarm monitoring with remote alarms and data logging. The PCD3 Wide Area Controller is also suitable for sophisticated control tasks.

System properties

- Fully programmable with PG5
- Compact dimensions: 130 × 140 × 74 mm (W × H × D) (without antenna)
- Management of historical data with up to 1 GB flash memory
- Integral telecommunications interface (PSTN, GSM/GPRS)
- Constantly accessible owing to redundant communication
- 14 inputs/outputs contained in the base unit

Automation Server integrated in the base unit



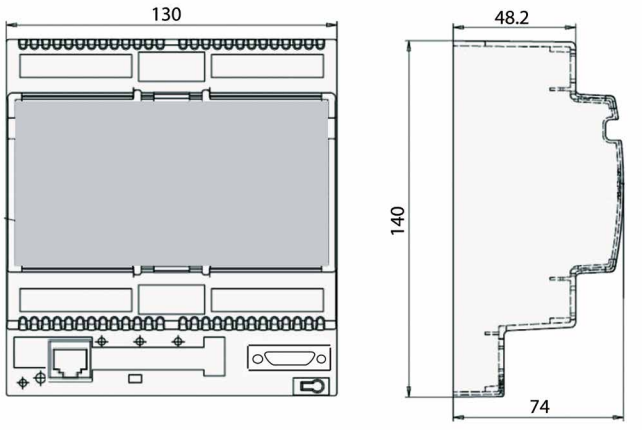
Onboard inputs/outputs

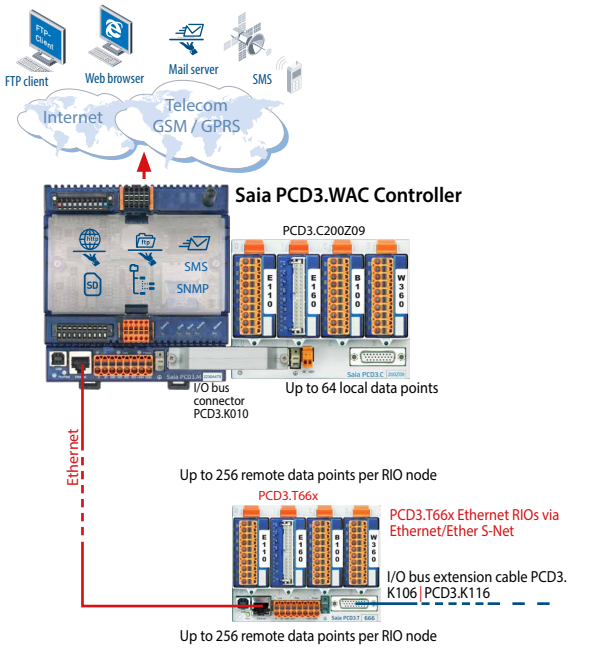
I/O data points	Properties
8 digital inputs + 2 interrupts	15…30 VDC
2 relay outputs	DC 2 A/50 V, AC 6 A/250 V
4 configurable analogue inputs	–10…+10 VDC, 0…±20 mA, Pt/Ni1000, Ni1000 L&S, 0…2500 Ω

Onboard interfaces

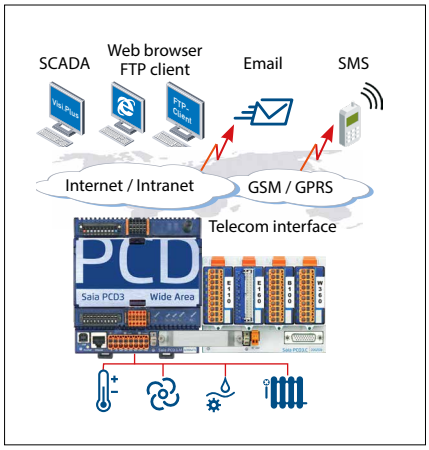
Interface	Transmission rate
RS-485 (serial) on terminal block for free protocols or Profi S-Net / Profibus-DP Slave	≤ 115.2 kbits ≤ 187.5 kbits
Ethernet TCP/IP	10/100 Mbits
USB 1.1 (PGU)	

Dimensions



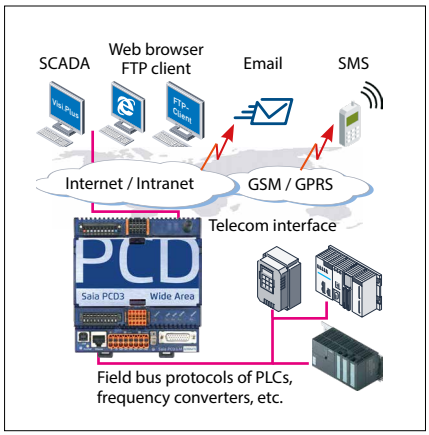


Examples of applications



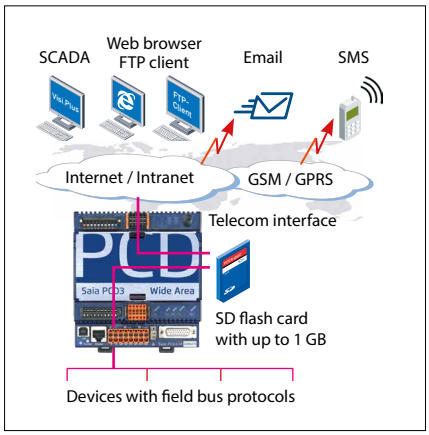
PCD3.WAC as an RTU controller

Send SMS messages and emails through the GSM/GPRS network. Use the PCD3.WAC with local I/Os to send messages, statuses or alarms to the SCADA system or to the end user via email and SMS.
Via integrated web and FTP servers can link external stations easily over Intranet and Internet. The integrated web server also permits access to external stations via standard web browsers.



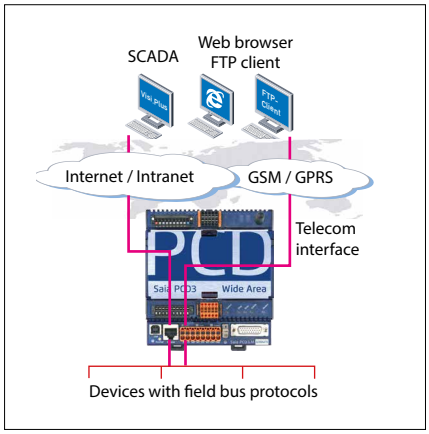
WAC communications gateway

The Saia PCD3.WAC can be used for non-SBC systems as a communications gateway to Internet or Intranet applications with integrated protocols such as FTP, HTTP or using open data modes, Ethernet or a serial interface.
Many field bus protocols are supported at the field level, such as Modbus TCP/RTU/ASCII, EIB, M-Bus, etc.



Ready for data management:

With up to 1 GB of memory, the Saia PCD3.WAC has enough memory to store data received from the field level over a long period. These data can be processed directly by the Saia PCD® and then transferred to the management or upstream monitoring systems by email, FTP, HTTP or data communication. This makes the Saia PCD3 Wide Area Controller independent of management stations and therefore suitable as a data concentrator.
Remote operation and control have various applications for taking measurements, monitoring the status of systems and the relevant transfer of data.



Permanently available owing to redundant communication

Bridging geographical distances is often a requirement for systems with a large number of distributed stations. With integrated telecommunications interfaces (GSM/GPRS, PSTN or ISDN) and an Ethernet interface, the Wide Area Controller is permanently available via its telecommunications interface and Ethernet port. Redundant communication paths (telecommunications or Ethernet interface) increase the reliability and availability of the system.

Performance overview, ordering information and accessories

Processor technology

RAM as program memory	512 kByte
Backup memory (flash)	512 kByte
Memory for file system (flash)	1 MB (onboard)
PCD media	8192 flags, 16,384 × 32-bit register

Telecom communication interface (alternatively integrated interfaces)

GSM / GPRS / SMS – sending and receiving

Internet and Intranet protocols

HTTP server	Visualisation with web browser and web panel
FTP Server	Easy data exchange
TCP/IP-PPP point-to-point protocol	Efficient communication
SMTP client	Sending emails with files (e.g. log files) as attachments
DHCP and DNS client	Easy integration in IP networks
SNTP client	Synchronisation of the internal clock
SNMP agent	Network management

Field level protocols

Serial S-Bus, Ether S-Bus and Profi S-Bus
MODBUS RTU or TCP EIB M-Bus IEC 870-5-101/103/104
For other protocols please refer to Chapter B2

Order type

PCD3.M2330A4T5	with GSM/GPRS modem (without antenna)

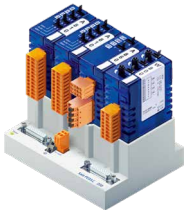
Additional data storage

Slot for SD flash cards	SBC SD card with up to 1 GB file system
Data files up to 900 files with file system	Download and upload via ftp
PCD7.R-SD512	SBC SD flash card, 512 MB with file system
PCD7.R-SD1024	SBC SD flash card, 1024 MB with file system

Communication interfaces for slot A

PCD7.F110S	RS-422 with RTS/CTS or RS-485 [1] electrically connected Suitable for Modbus, S-Bus, EnOcean, etc.
PCD7.F121S	RS-232 with RTS/CTS, DTR/DSR, DCD, suitable for modem, EIB, DALI connection.
PCD7.F150S	RS-485 [1] (electrically isolated)
PCD7.F180S	Belimo® MP-Bus, for connecting up to 8 drives on one line

[1] with line termination resistors that can be activated.



I/O expansions

PCD3.C110Z09	2 module slots (connection with PCD3.K010 connector or with PCD3.K106/K116 cable)	0 mA
PCD3.C200Z09	4 module slots, with 24 VDC supply (connection with PCD3.K010 connector or with PCD3.K106/K116 cable)	1500 mA / 200 mA (5 V / +V)
PCD3.C110	2 module slots (connection with PCD3.K106/K116 cable only)	0 mA
PCD3.C200	4 module slots, with 24 VDC supply (connection with PCD3.K106/K116 cable only)	1500 mA / 200 mA (5 V / +V)

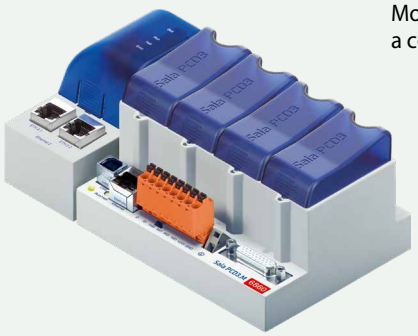
I/O modules see pages 27 and 28

1.3 Standby System

With the PCD3.M6880 standby controllers, redundant automation solutions can be achieved. This helps to ensure uninterrupted operation of systems and processes.

1.3.1 PCD3.M6880

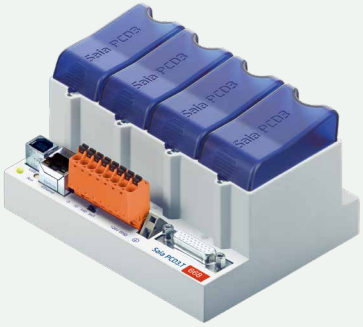
Seite 47



Modular PCD3 standby controller with 2 Ethernet TCP/IP ports and a coprocessor for standby operation.

1.3.2 PCD3.T668

Seite 49



Smart RIO for standby system, for connection to the PCD3.M6880 CPU1.

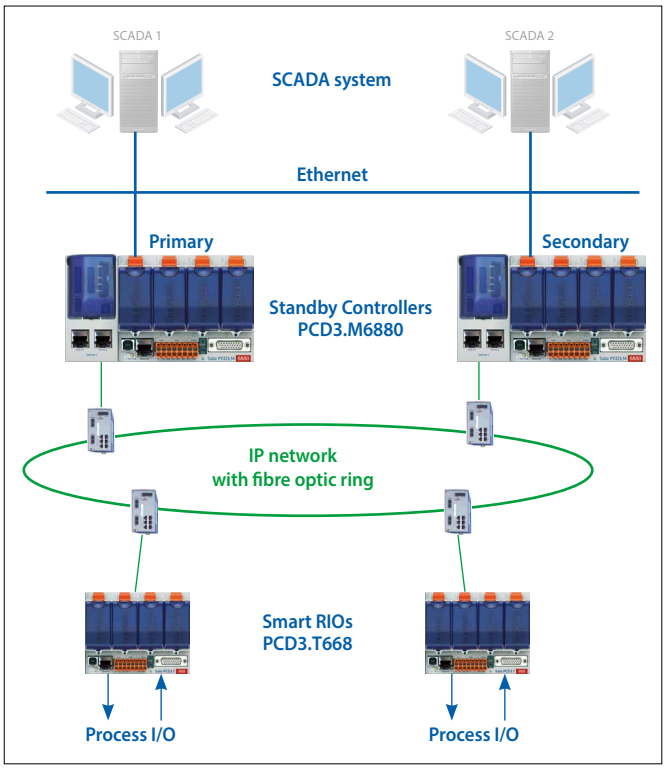
Standby System Overview

Introduction

The PCD3.M6880 Standby Controllers are for creating redundant automation solutions, to ensure the uninterrupted operation of systems and processes.

Standby (redundant automation) systems from SBC have the following characteristics:

- Based on the modular and robust PCD3 family, using standard modules.
- Simple system architecture to reduce costs.
- Standby processors with shared Ethernet Remote I/Os avoids the duplication of the inputs/outputs and the sensors/actuators.
- Programmable remote I/Os create intelligent decentralized nodes to provide additional reliability.
- The network uses standard Ethernet components, and can run over a standard Ethernet TCP/IP network along with other services.
- Easy engineering and commissioning, using the PG5 Project Manager to automatically generate the project.
- Uninterrupted switching from Standby to Active device.
- Standby controllers contain two processors. One processor runs the redundant program and monitors the active PCD. The second independent processor runs other non-redundant processes. This significantly increases the performance and flexibility of the system.
- Comprehensive diagnostic features to aid commissioning and fault finding.



Typical layout of a redundancy system with two PCD3.M6880 Standby devices and PCD3.T668 Ethernet Smart RIOs.

Terminology

The following definitions will provide a better understanding of the properties and operating principles:

Standby Controller	The PCD3.M6880 controller which supports the standby feature.
Primary PCD	The PCD which becomes the active device by default when the system is powered up, depending on the configuration.
Secondary PCD	The PCD which becomes the standby device on power up, and only takes over active control in the event of a fault on the active device.
Active PCD	The PCD whose CPU1 is in Active Mode, running the redundant program and controlling the inputs/outputs (PCD3.T668 RIOs).
Standby PCD	The PCD whose CPU1 is in Standby mode. It does not run the redundant program and the outputs (PCD3.T668 RIOs) are not controlled by this device.
Main CPU	CPU0 of the Primary or the Secondary PCD, which runs the non-redundant program. This program may be different on the Primary and Secondary devices.
Redundant CPU	CPU1 of the Primary or Secondary PCD, which contains the Redundant program. This program must be the same on the primary and Secondary devices. This CPU is either in Active mode and running the Redundant program, or in Standby mode and monitoring the Active PCD.

Redundant control solutions are created using two PCD3.M6880 Standby Controllers. The input/outputs (process signals) are connected and controlled via PCD3.T668 Ethernet smart RIOs. The RIO stations are connected to both controllers via an Ethernet connection. This means there is no need to have duplicate inputs, outputs, sensors and actuators. The two PCDs (primary and secondary) monitor each other. If the active PCD fails, the standby PCD takes over processing and control of the connected RIO stations. The process image (I/O) and the internal PCD media (F, R, T, C, DB) - the synchronization data - are continuously transferred from the active PCD to the standby PCD via the Ethernet connection. This ensures uninterrupted switching from the active to the standby PCD.

The Redundant CPU1 has two independent Ethernet interfaces. The ETH 2.x interface is reserved exclusively for operating the PCD3.T668 RIO stations. The PCDs also synchronize their process data via the same interface. For security reasons, we recommend setting up this network as a ring structure with specific network components from third-party providers. We have had good experiences with the industrial Ethernet switches from Hirschmann.

Ethernet 2
(2 port switch)

The ETH 1 interface on CPU0 is available for connecting and operating other systems and devices. For example, SCADA systems can be connected via this interface. SBC does not provide its own SCADA system for redundant automation solutions, but almost any system can be used. A single SCADA system, or an additional redundant SCADA system can be used if it supports redundant controllers.
The PCD3.M6880 controllers provide detailed status and diagnostic information which can be evaluated by the SCADA systems.

Ethernet 1

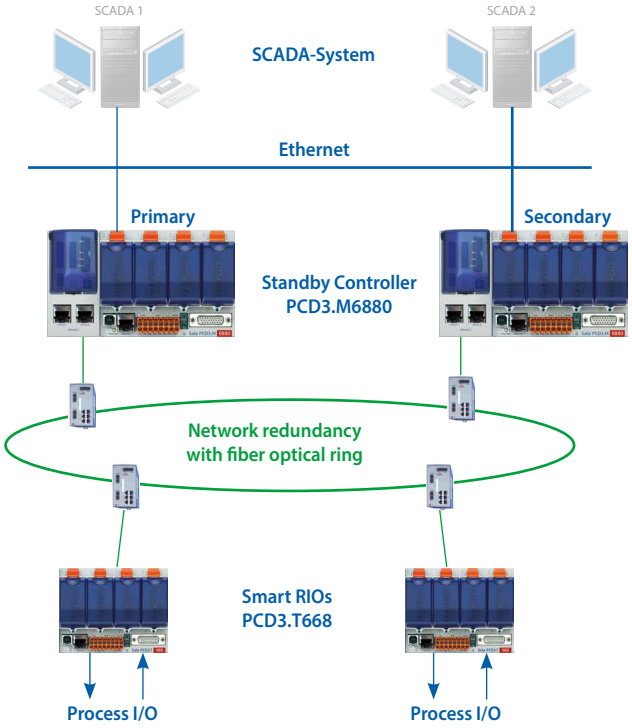
Ordering Information

Type	Description	Weight
PCD3.M6880	Modular PCD3 standby controller with 2 Ethernet TCP/IP ports and a coprocessor for standby operation.	820 g
PCD3.T668	Smart RIO for standby system, for connection to the PCD3.M6880 CPU1.	480 g

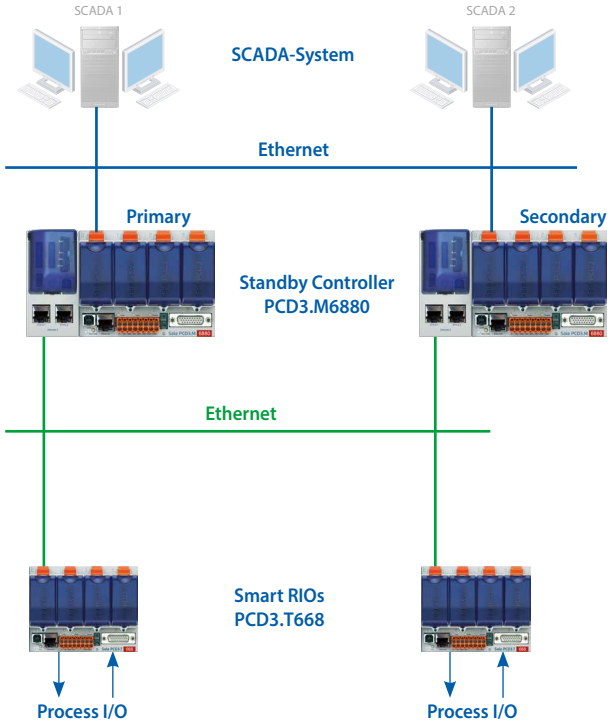
Designing the System

Redundant automation solutions can be achieved with various network topologies.

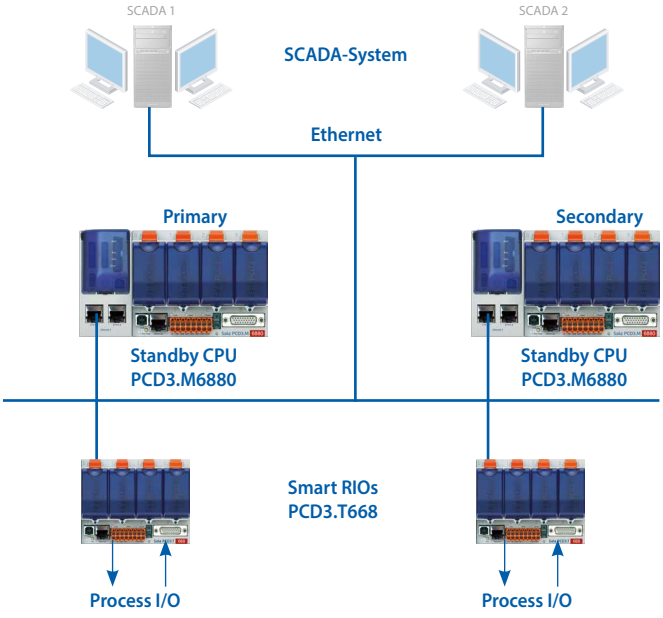
Physically separating the management network (SCADA systems) and the network for the remote I/Os is recommended. We also recommend setting up the remote I/O network in a ring structure using fibre-optic network components. This significantly increases the performance, security and, above all, the network availability and thus the system reliability. Standard devices from third-party providers can be used for the network components (switches). We have had good experiences with the switches (RS30) from Hirschmann. However, the networks can also be set up with standard components in a star structure. A shared physical network for the remote I/Os and management systems is also possible, but availability of the system will be reduced accordingly.



Recommended network topology with physically separate networks and a fibre-optic ring



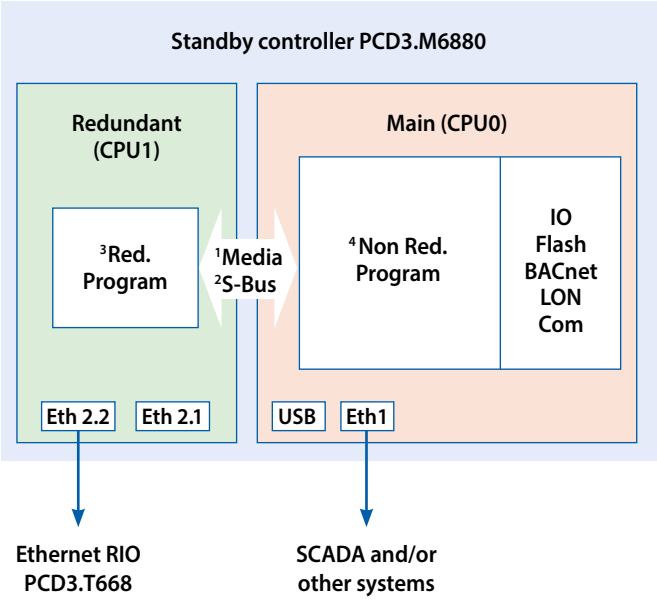
Physically separate networks in a star topology with standard components



Shared physical network in a star topology with standard components

1.3.1 PCD3.M6880 Standby Controller

Architecture of the PCD3.M6880



PCD3.M6880

[1] Data Media Transfer (Exchange Range or/and CSF/FBox)

[2] S-Bus GWY CPU0 to CPU1 (2 different S-Bus address)

[3] Redundant program on CPU1 runs only if active. Same program on both PCDs.

[4] Non-redundant program can be different in both PCDs.

The PCD3.M6880 standby controller has two independent processors (CPU0 and CPU1). Both processors have their own independent PCD media (F, R, T, C, DB/TX).

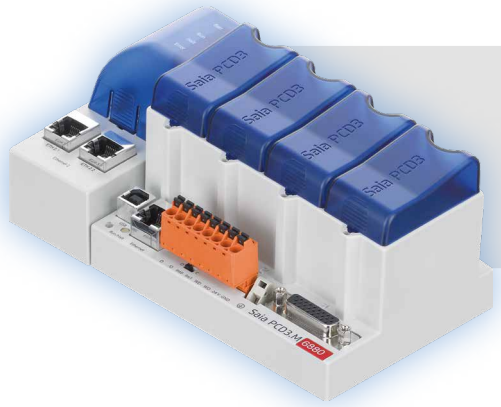
The redundant CPU1 runs the redundant user program and controls the shared inputs/outputs of the PCD3.T668 remote I/Os. The redundant programs in the primary and secondary PCD3.M6880s are identical. During normal operation, only the active PCD runs the redundant program. CPU1's internal used PCD media (F, R, T, C, DB/TX) are transferred from the active to the standby PCD via the Ethernet interface 2 (ETH2.x). In the event of a fault, the standby PCD takes over operation without interruption, and runs the redundant program using the last process image from the active PCD.

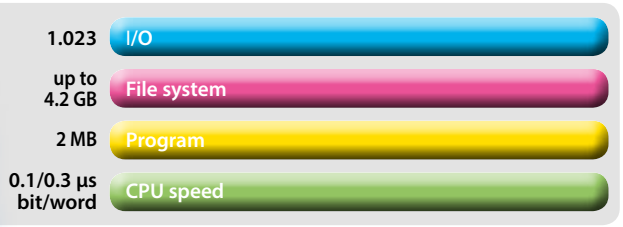
Depending on requirements, the user programs of the main CPU0 can be different in the primary and secondary PCD3.M6880. CPU0 has the same capabilities as a standard PCD (e.g. PCD3.M5560). Local I/Os in the PCD's slots, and the I/O expansion modules, are controlled by CPU0. External systems and devices (SCADA systems, web browsers and other external devices) communicate only with CPU0. CPU0's internal PCD media (F, R, T, C, DB) are not synchronized between the active and standby PCD.

CPU1's program cannot directly access the local IOs or CPU0's media (and vice versa). Data is exchanged between CPU0 and CPU1 using a data exchange mechanism. The data to be exchanged (PCD media) are define in global symbol files. This data is automatically exchanged between CPU0 and CPU1 on each program cycle.

Saia PCD3.M6880 controllers

High Power Standby Controller





Property/function		PCD3.M6880 Main CPU0	PCD3.M6880 Redundant CPU1
Number of inputs/outputs		1023	—
or I/O-module slots		64	—
I/O expansion connection for PCD3.C module holder		Yes	—
Processing time [µs]	bit operation	0.1…0.8 µs	
	word operation	0.3 µs	
Real time clock (RTC)		Yes	

On-Board memory

Program memory, DB/TEXT (Flash)		2 MByte	
User memory, DB/TEXT (RAM)		1 MByte	128 KByte
Flash memory (Program, S-RIO and configuration)		128 MByte	
User flash file system (INTFLASH)		128 MByte	—
PCD media:			
	Register	16384	16384
	Flag	16384	16384
	DB/TEXT	8192	8192

On-Board interfaces

USB 1.1	Yes	No
Ethernet 10/100 Mbit/s, full-duplex, auto-sensing/auto-crossing	ETH1	ETH2.x (2 port switch)
RS-485 on terminal block (Port 2) or RS-485 Profibus-DP Slave, Profi-S-Net on terminal block (Port 2)	up to 115 kbit/s up to 187.5 kbit/s	—

Optional communication interfaces

I/O slot 0: PCD3.F1xx modules for RS-232, RS-422, RS-485 and Belimo MP-Bus	Yes	No
I/O slot 0…3 up to 4 modules or 8 interfaces: PCD3.F2xx modules for RS-232, RS-422, RS-485, BACnet® MS/TP, Belimo MP-Bus, DALI and M-Bus	Yes	No

Other features

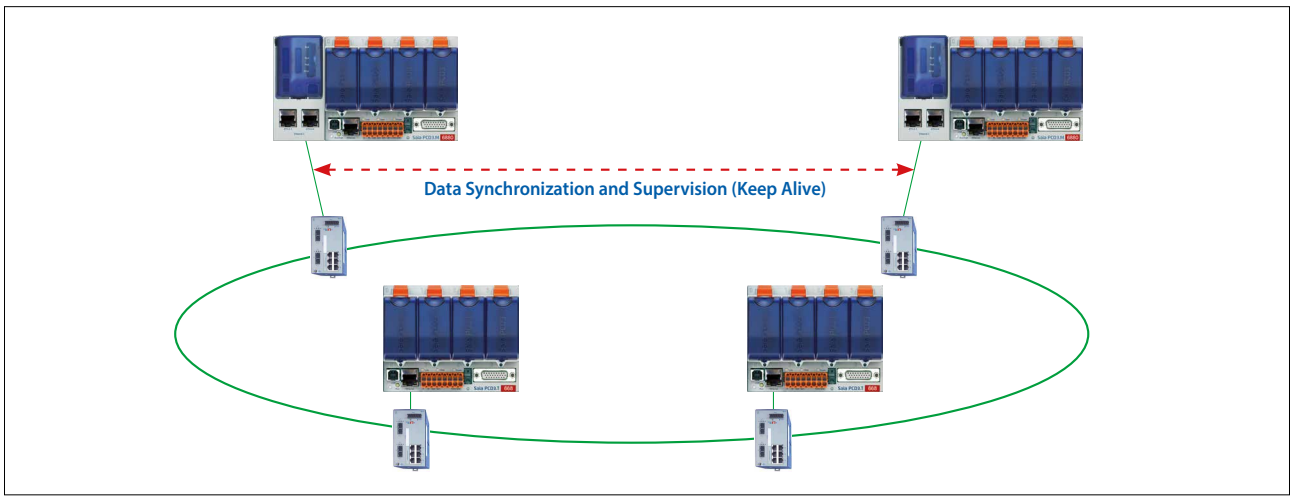
Communication protocols/systems (BACnet, Modbus, LonWorks®, DALI, M-Bus…)	As PCD3.M6860 without 2nd Ethernet	No
Automation server (web server, FTP server, e-mail, SNMP, flash file system…)	Yes	No
Connection and operation of PCD3.T668 remote I/O Number of supported RIO stations	No —	Yes 64
Connection and operation of PCD3.T665/T666 remote I/O Number of supported RIO stations	Yes 64	No —
Access to the I/O slots in the basic housing as well as to the PCD3.Cxxx I/O terminal bases	Yes	No

Switchover Criteria

Each of the Standby PCDs (CPU1) sends a „Keep Alive" telegram to its partner for supervision.

The STANDBY PCD switches to ACTIVE when:

- No Keep Alive telegram has been received within the „Keep alive timeout" period defined with the Redundant CPU's Device Configurator. The "Keep Alive Timeout" can be adjusted between 100…500 ms. By this the max. switchover latency is <100…500 ms.
- The ACTIVE PCD's state is not RUN or STOP (stops sending Keep Alive).
- A manual Switchover command is executed. This is only possible if the Primary device does not have priority, the „Primary device has priority" option must be „No".



Data Synchronisation and Program Cycle:

The used PCD medias (R, F, T/C, DB/TX) in the redundant CPU1 are cyclically synchronized between the active and the standby PCD. The synchronization time for all PCD media is normally less than 200 ms. This time is reduced accordingly if only a part of the PCD media is used. The total program cycle time is calculated as follows:

Total cycle time = program execution time + data synchronization time

The max. value for a large application can be calculated as follows: 100 ms + 200 ms = 300 ms max.
For smaller applications where less PCD media are used the cycle time is reduced correspondingly.

1.3.2 PCD3.T668 Standby RIO

Architecture of the PCD3.T668

The PCD3.T668 remote I/Os are exclusively for use with the PCD3.M6880 Standby Controllers. With the exception of the redundancy function, they support the same properties/functions as the PCD3.T666 remote I/O station. The PCD.T665 and PCD3.T666 standard remote I/Os cannot be used with Standby Controllers.

- Can be used as a simple local I/O station or an intelligent programmable I/O station
- Can be programmed with the PG5. Important or timecritical tasks can be processed directly in the RIO
- The RIO's user programs are managed centrally by the Smart RIO Manager (PCD) and downloaded to the RIOs automatically
- Data exchange uses the efficient Ether-S-IO protocol. Simple configuration with the RIO Network Configurator
- Cross-communication with other PCD systems using Ether-S-Bus (FBoxes)
- Intelligent communication modules (e.g. M-Bus, DALI) are supported
- Other communication protocols (e.g. Modbus) via Ethernet TCP/IP and also by the onboard RS-485 interface
- Integrated Web Server

Technical data

Property		PCD3.T668
Number of inputs/outputs		64 in base unit, extensible to 256
I/O-module slots		4 in base unit, extensible to 16
I/O-modules supported		PCD3.Exxx, PCD3.Axxx, PCD3.Bxxx, PCD3.Wxxx
Max. number of RIO stations		128
Protocol for data transfer		Ether-S-IO
Ethernet connection		10/100 Mbit/s, full-duplex, auto-sensing, auto-crossing
Default IP configuration		IP address: 192.168.10.100 Subnet mask: 255.255.255.0 Default gateway: 0.0.0.0
USB port for configuration and diagnostics		yes
Program memory		128 kByte
Web server for configuration and diagnostics		yes
Web server for user pages		yes
On-Board file system for web pages and data		512 kByte
BACnet® or LonWorks®		no
On-Board interrupt inputs		2
On-Board RS-485 interface		yes
Special modules	for I/O-slot 0 only	PCD3.F1xx
	for I/O-slots 0…3 (up to 4 modules)	PCD3.H1xx counter PCD3.F26x DALI PCD3.F27x M-Bus
S-Web alarming/trending		no
Watchdog		no
Real-time clock		no
Software clock (not battery-powered)		yes, synchronized by the Manager
Battery		no

General data

Supply voltage	24 VDC ±20 % smoothed or 19 VAC ±15 % full-wave rectified
Capacity of 5 V bus / 24 V bus	max. 650 mA/100 mA
Ambient temperature	0…+55 °C or 0…+40 °C (depending on mounting position)
Storage temperature	–20…+70 °C
Relative humidity	30…95 % RH with no condensation
Mechanical strength	according to EN/IEC 61131-2

System properties/limits and recommendations for lean automation

With lean automation, it is not recommended to make full use of the specified limits with regard to the maximum number of stations per Manager and the maximum number of I/Os per RIO. The following points should be taken into account:

- The load on the RIO Manager increases with the rising number of RIO stations. This has an impact on the overall application in the RIO Manager.
- If there is a large number of RIOs, a sufficiently large amount of PCD media must be reserved on the Manager for the data transfer.
- With a rising number of RIO stations, the build and download process in PG5 is lengthened accordingly. Likewise, the start-up behavior of the Manager or the entire RIO network is proportionately longer.

Recommendations: 20 Smart RIOs per Manager is a sensible configuration for efficient and problem-free operation, and simple commissioning and support.
The Smart RIOs do not have a battery. In the event of an interruption to the power supply, all the data in the RAM memory (registers, flags, DBs/text) will be lost. Data and parameters that are to remain must either be transferred by the Manager or stored in the RIO's flash file system. If this is not possible, the use of a normal controller in place of a Smart RIO is recommended. The user programs are stored in the flash memory of the RIOs and are retained in the event of an interruption to the power supply.

1.4 PCD2 – modular, expandable, compact CPU

Overview of fully programmable controllers Saia PCD2 device series

Saia PCD2 controllers

Page 52

Base unit with 4 slots for I/O modules

- PCD2.M4160 Basic 64 I/Os
- PCD2.M4560 Extended 1023 I/Os

Base unit with 8 slots for I/O modules

- PCD2.M5540 Expanded with Ethernet switch

Up to 4 integrated communication interfaces. With plug-in modules expandable up to max.15 communication interfaces.
Integrated Automation Server in all CPUs.

Saia PCD2 module holder for I/O expansion

Page 56

Module holder for I/O modules

- PCD2.C1000 4 I/O slots
- PCD2.C2000 8 I/O slots

Expandable up to 1023 I/Os

Saia PCD2 input/output modules

Page 57

Modules with various functions with plug-in terminals

- PCD2.Exxx Digital input modules
- PCD2.Axxx Digital output modules
- PCD2.Bxxx Digital input/output modules
- PCD2.Wxxx Analogue input/output modules
- PCD2.Gxxx Combined input/output modules

Saia PCD2 interface modules

Page 60

Plug-in modules to expand the communication interfaces (up to 4 modules or 8 interfaces)

- PCD7.F1xxS 1 serial interface RS-232, RS-422/485, Belimo MP-Bus
- PCD2.F2xxx 2 serial interfaces RS-232, RS-422/RS-485
- PCD2.F2150 BACnet® MSTP
- PCD2.F2400 LonWorks®
- PCD2.F2610 DALI
- PCD2.F27x0 M-Bus
- PCD2.F2180 Belimo MP-Bus

Saia PCD2 memory modules

Page 61

Plug-in memory modules for data and program backup

- PCD2.R6xx Basic module for SD flash cards for slots 0…3
- PCD7.R-SD SD flash cards for PCD3.R6xx
- PCD7.R5xx Flash memory modules for slots M1 & M2
- PCD7.R610 Flash memory modules for slot M1 & M2

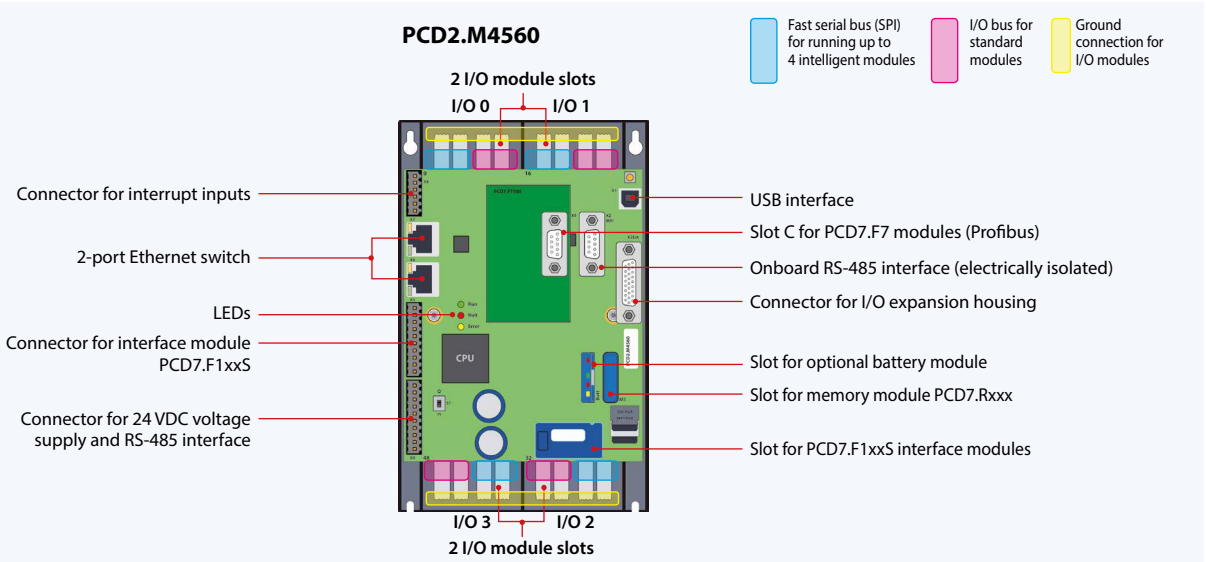
Consumables and accessories for Saia PCD2 controllers

Page 62

Housing covers, plug-in screw terminal blocks, I/O bus connection, battery, system cables and adapters

Saia PCD2.M4xx controllers

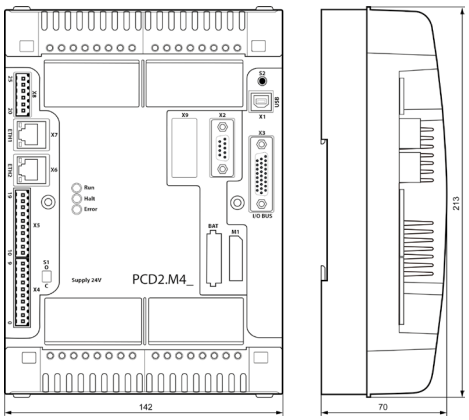
The PCD2.M4x60 controller is based on a flat, space-saving housing design that has already been successfully used in the OEM and project business for many years. This modular, fully programmable CPU is suitable for both small and large applications, for example in machine controllers, building automation and infrastructure automation. The modular CPU is powerful, compact and can be expanded with up to 1,023 local data points Generous memory resources and sufficient CPU power for demanding communication tasks with up to 14 interfaces (BACnet, LonWorks®, Profibus, M-Bus, Modbus, DALI, etc.).



System properties

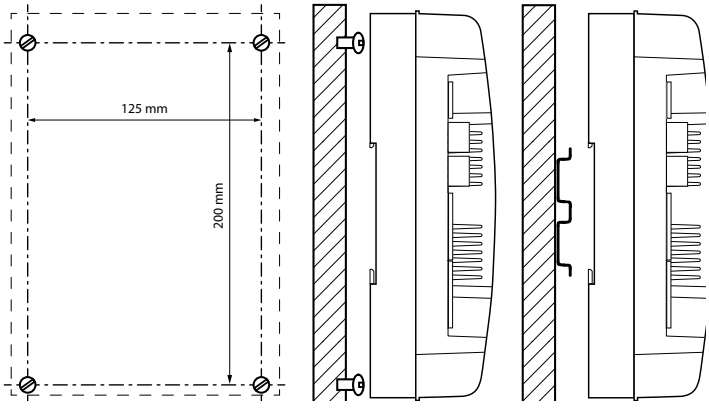
- Up to 14 communication interfaces
- 4 slots for PCD2 I/O modules in base unit
- Up to 64 inputs/outputs in base unit, can be expanded locally to up to 1,023 I/O
- Automation Server onboard
- Large onboard memory for programs (2 MB) and data (128 MB)
- Memory with SD flash cards can be expanded up to 4 GB
- Battery-free with FRAM technology – protects PCD media (R, F, DB/TEXT) from loss even in a de-energised state

Dimensions



Compact mass:
142 × 213 × 49 mm

Mounting



Screw diameter: less than Ø 4.9
Screw head diameter: less than Ø 8.0

Technical data and ordering information for PCD2.M4xxx controllers

Technical overview

Technical data	PCD2.M4160	PCD2.M4560
Number of digital inputs onboard	4 digital inputs (24 V, 4× interrupt)	
Number of digital inputs/outputs in the base unit resp. I/O module slots in the base unit	64 4	
Number of digital inputs/outputs expandable with PCD2.C2000 and PCD2.C1000 module holders resp. I/O module slots		960 60
Processing time [µs] Bit operation Word operation	0.1…0.8 µs 0.3 µs	
Real-time clock (RTC)	Yes	
Supercap to support real-time clock	< 10 days	
Slot for optional battery holder module Order number 4 639 4898 0	Yes, to support real-time clock for < 3 years	

Onboard memory

Program memory, DB/text (flash)	512 kB	2 MB
User memory, DB/text (RAM)	128 kB	1 MB
Flash memory (S-RIO, configuration and backup)	128 MB	128 MB
User flash file system (INTFLASH)	8 MB	128 MB
Data backup with FRAM technology (the data is retained in a de-energised state)	for R, F, DB, TEXT	for R, F, DB, TEXT

Onboard interfaces

USB 1.1	≤ 12 Mbit/s	
Ethernet, 2-port switch	≤ 10/100 Mbit/s, full duplex, auto-sensing/auto-crossing	
RS-485 on terminal block (port 0)	≤ 115.2 kbit/s	
RS-485 free protocols on D-Sub connector (port 2) or RS-485 Profibus-DP Slave, Profi-S-Net on D-Sub connector (port 10)	No	≤ 115.2 kbit/s ≤ 1.5 Mbit/s (elec. isolated)

Additional interfaces

PCD2.F2xxx modules for RS-232, RS-422, RS-485, BACnet MS/TP, Belimo MP-Bus, DALI and M-Bus	I/O slot 0…1 2 modules	I/O slot 0…3 4 modules
Slot A for PCD7.F1xxS modules	Yes	
Slot C for Profibus module PCD7.F7500	No	Yes

General data

Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC, –20/+25% max. incl. 5% ripple
Power consumption	typically 15 W for 64 I/Os
Load capacity 5 V/+ V internal	max. 800 mA/250 mA

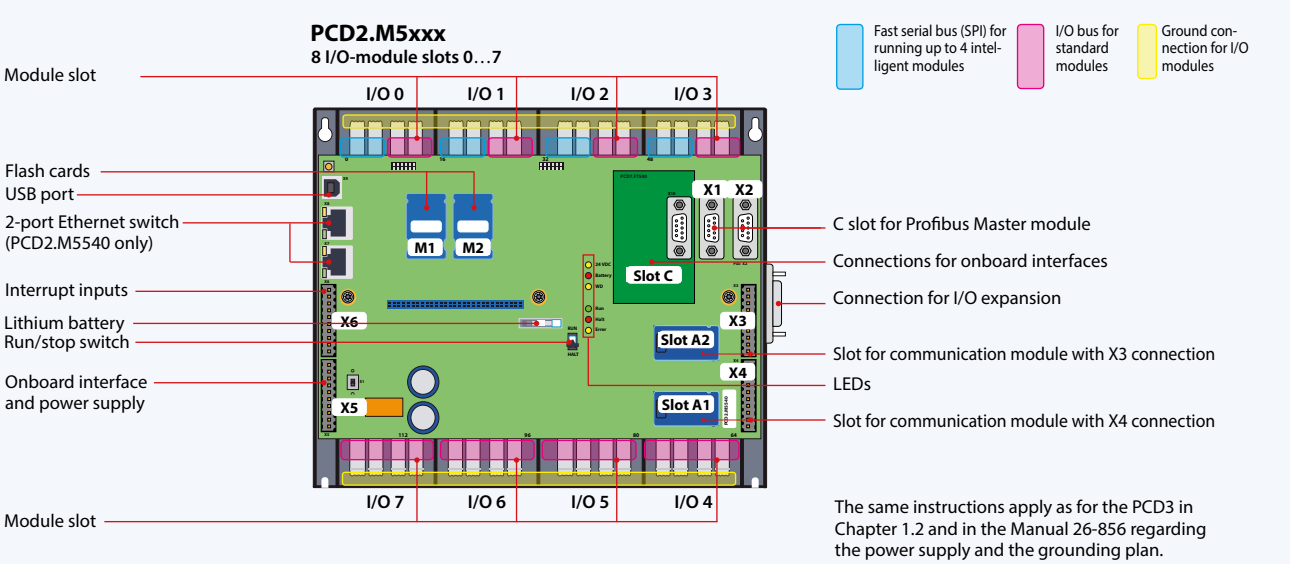
Ordering information

Type	Description
PCD2.M4160	PCD2 processor unit with Ethernet TCP/IP, 512 kbytes program memory, 64 I/Os
PCD2.M4560	PCD2 processor unit with Ethernet TCP/IP, 2 MB program memory, 1,023 I/Os

- Accessories, e.g. connectors, covers, etc. are described in the last page of this chapter.
- Details can be found in the manual 27-645.

Saia PCD2.M5xxx controllers

Due to its flat housing design, the Saia PCD2.M5xxx is ideal for space-saving applications. The powerful CPU enables the control and regulation functions of complex applications with up to 1023 central data points. This allows the PCD2 to be expanded for LON IP® or BACnet®-compatible controller using plug-in memory modules. The PCD2 has communication interfaces such as USB, Ethernet, RS-485 and onboard Automation Server.



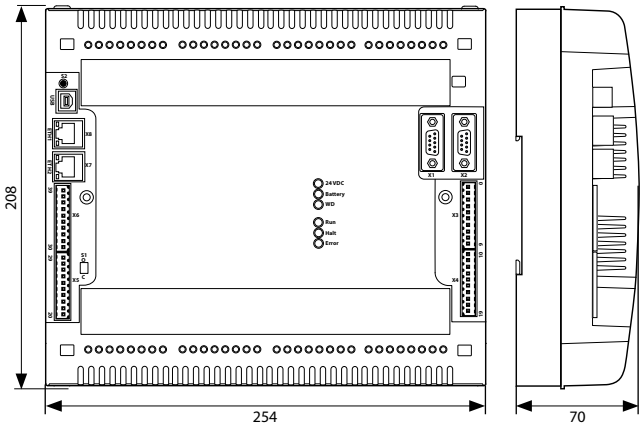
System properties

- Up to 15 communication interfaces (RS-232, RS-485, etc.)
- 8 I/O slots that can be expanded using module holders to max. 64 slots (1023 central data points)
- Remote I/O expansion with RIO PCD3.T66x (Ethernet)
- 1 MB of program memory
- Automation Server Onboard
- Data memory with flash memory modules that can be expanded to 4 GB
- 6 fast interrupt/counter inputs on the CPU
- Compatible with all PCD3 module holders

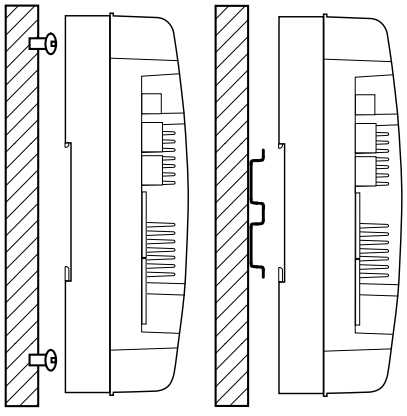
Onboard interfaces of the Saia PCD2.M5xxx

Type	Connection	Port	Transmission rate
RS-232 (serial) or RS-485 (serial)	X2 (D-Sub) X5 (terminal)	0 0	≤ 115.2 kbit/s ≤ 115.2 kbit/s
RS-485 (serial) for free protocols or Profi S-Net / Profibus DP Slave	X1 (D-Sub) X1 (D-Sub)	3 10	≤ 115.2 kbit/s ≤ 1.5 Mbit/s
Ethernet (2-port switch) (PCD2.M5540 only)	Ethernet	9	10/100 Mbit/s
USB 1.1 (PGU)	USB	---	≤ 12 Mbit/s

Dimensions



Mounting



Technical data and ordering information for PCD2.M5xxx controllers

Technical overview

Technical data

Number of onboard digital inputs/outputs		6 digital inputs (24 V, 4× interrupt) 2 digital outputs (2 × PWM, 24 V 100 mA)
Number of digital inputs/outputs in the base unit or I/O module slots in the base unit		128 8
Number of digital inputs/outputs with 7 PCD2.C2000 module holders or I/O module slots		 896 56
Processing times [µs]	bit operation word operation	0.3…1.5 µs 0.9 µs
Real-time clock (RTC)		Yes

Onboard memory

Main memory (RAM) for program and DB/Text	1 MB
Flash memory (S-RIO, configuration and backup)	2 MB
User flash file system (INTFLASH)	No
Data backup	1…3 years with lithium battery

Onboard communication interfaces

RS-232, RS-485 / PGU	≤ 115 kbit/s
RS-485 Profibus DP–Slave, Profi S-Net (S-IO, S-Bus)	≤ 1.5 Mbit/s
USB 1.1 (PGU)	≤ 12 Mbit/s
Ethernet, 2-port switch (PCD2.M5540 only)	≤ 10/100 Mbit/s (full duplex, auto-sensing/auto-crossing)

General specifications

Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC, –20/+25% max. incl. 5% ripple
Load capacity 5 V / + V internal	max. 1400 mA / 800 mA
Automation Server	Flash memory, file system, FTP and web server, email, SNMP

Order details

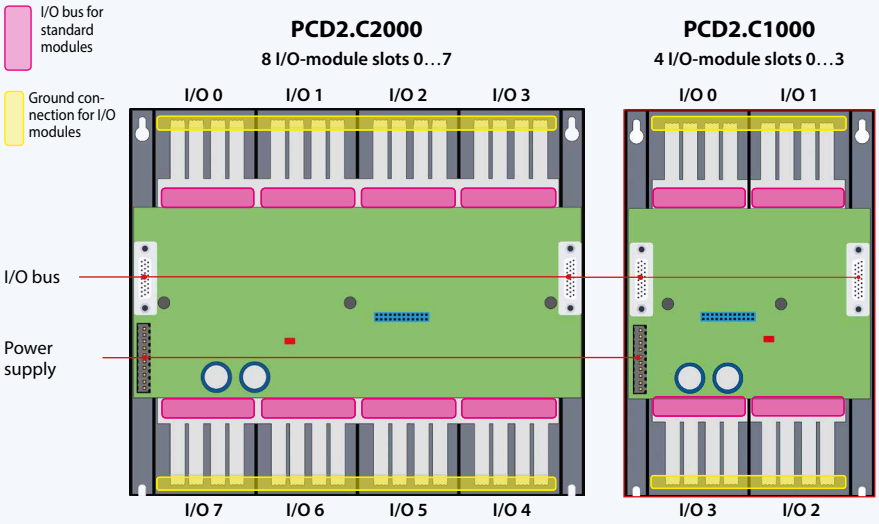
Saia PCD2

Type	Description
PCD2.M5540	Programmable controller, 1024 kByte of RAM, Ethernet interface

Additional accessories, e.g. connectors, covers, etc. are described on the last page of this Chapter.

Saia PCD2.Cxxxx module holder

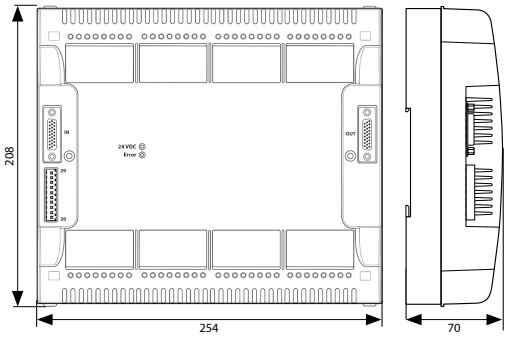
Up to 8 Saia PCD2.C1000 or Saia PCD2.C2000 module holders can be connected to the Saia PCD2.M4x60 (7 with PCD2.M5xxx). This makes it possible to connect up to 64 I/O modules or 1023 digital I/Os. A module holder has space for 4/8 I/O modules. In addition to Saia PCD2.Cxxxx module holders, all Saia PCD3 module holders can also be connected.



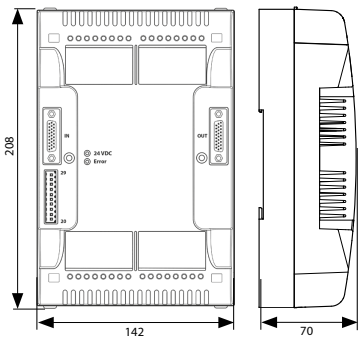
System properties

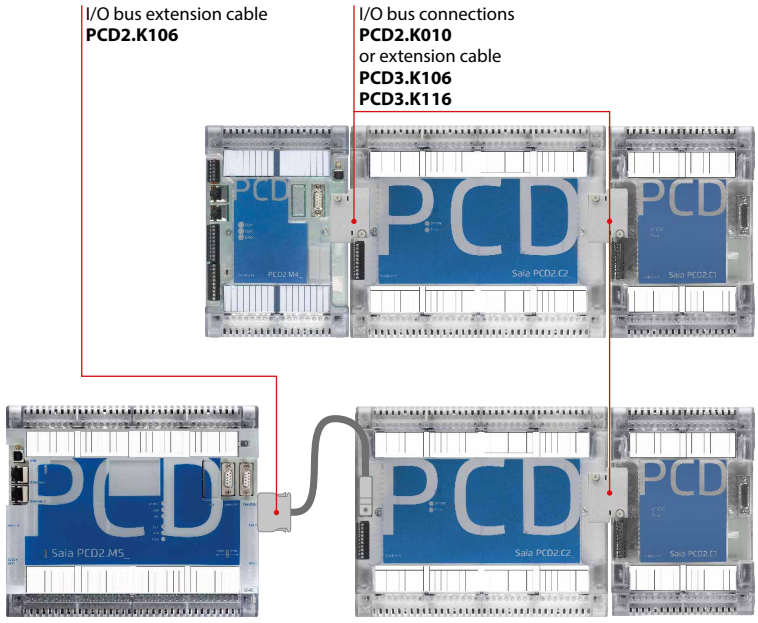
- Up to 1023 central data points
- Numerous module variants can be plugged in
- Mounting is quick and easy
- Can be combined with Saia PCD3.Cxxx module holders
- Connections for a power supply on each module holder
- Can be connected below or next to each other

Dimensions PCD2.C2000



Dimensions PCD2.C1000





PCD2.M5x40 to PCD2.Cx000	PCD2.M4x60 to PCD2.Cx000	PCD2.Cx000 to PCD2.Cx000
PCD2.K106	PCD2.K010 PCD3.K106 PCD3.K116	PCD2.K010 PCD3.K106 PCD3.K116

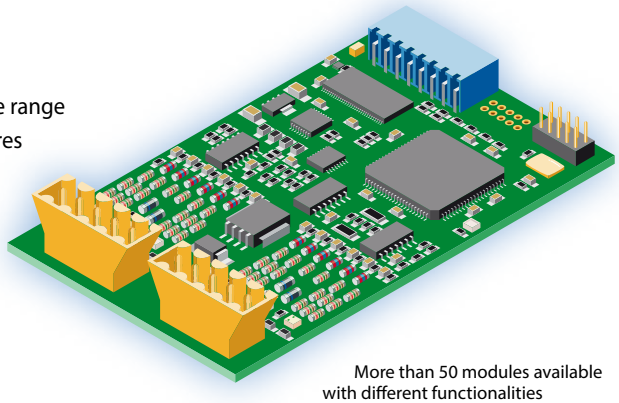
Saia PCD2 I/O module holder

Type	Description
PCD2.C1000	Expansion module holder with 4 I/O slots
PCD2.C2000	Expansion module holder with 8 I/O slots
PCD2.K010	I/O bus connector
PCD2.K106	I/O bus extension cable length 0.9 m (connection between PCD2.M5xxx and PCD2.Cxxxx)
PCD3.K106	I/O bus extension cable length 0.7 m (connection between two module holders)
PCD3.K116	I/O bus extension cable length 1.2 m (connection between two module holders)

No more than 5 extension cables may be used for this.

Overview of Saia PCD2 plug-in I/O modules:

The functions of the Saia PCD2 can be expanded as required using a wide range of plug-in I/O modules and adapted to specific needs. This not only ensures that a project can be implemented quickly, but also provides the option of expanding the system at any time during operation.



More than 50 modules available with different functionalities

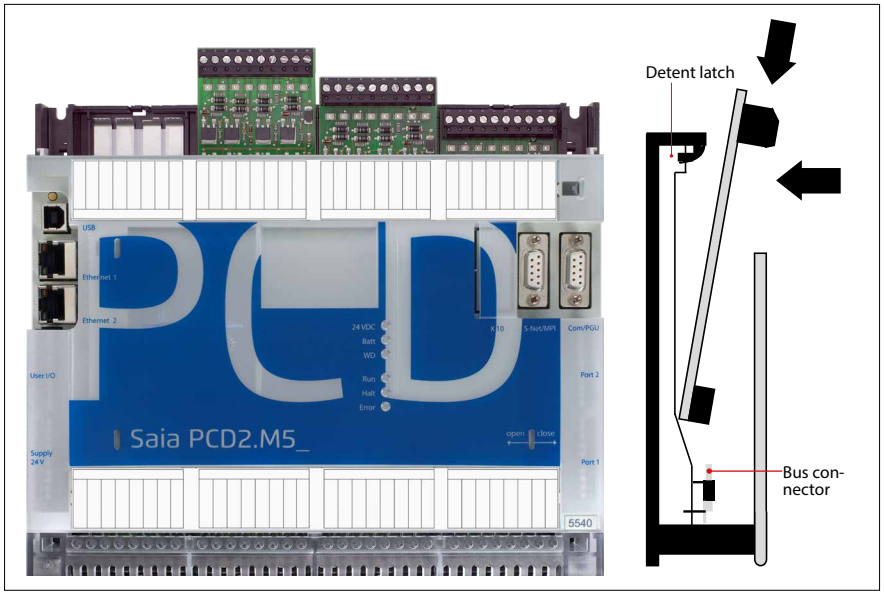
System properties

- Numerous variants available
- Slot direct in the Saia PCD2.M4x60, PCD2.M5540, PCD1.M2xxx or on the module holder
- Full integration into the Saia PCD2 housing
- Compact design
- Up to 16 I/Os per module
- Modules with an input delay of 0.2 ms

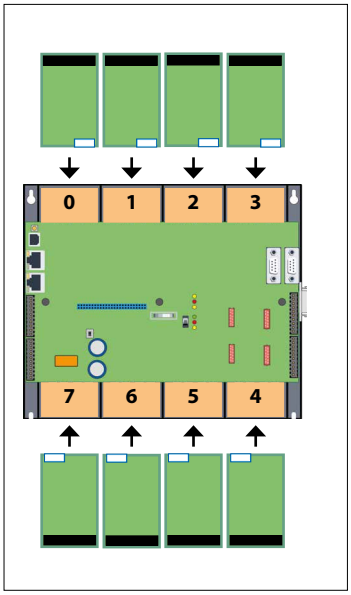
General type key

- **PCD2.Axxx** Digital output modules
- **PCD2.Bxxx** Combined digital input/output modules
- **PCD2.Exxx** Digital input modules
- **PCD2.Fxxx** Communication modules
- **PCD2.Hxxx** Fast counter modules
- **PCD2.Rxxx** Memory modules
- **PCD2.Wxxx** Analogue input/output modules

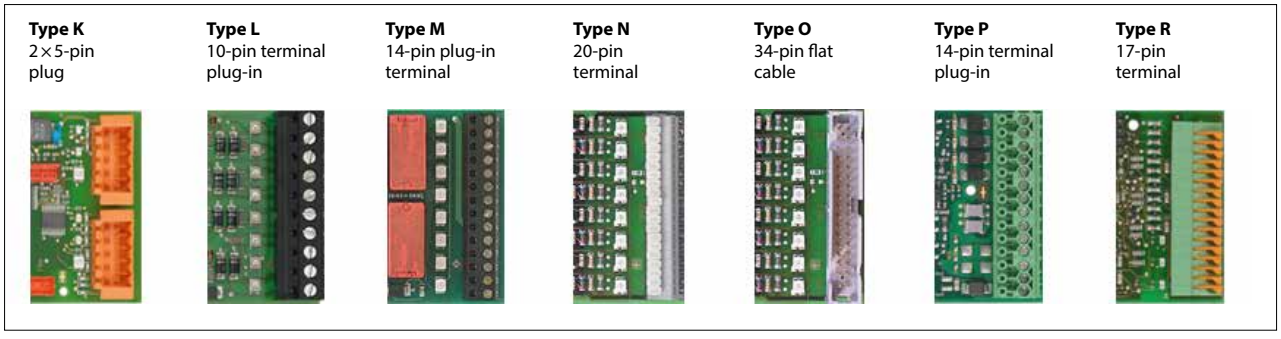
Insertion into housing



Slots for I/O modules



Differences between the terminals of the I/O modules



The screw terminal blocks and connectors can also be ordered individually as accessories.

Saia PCD2 digital input and output modules

The digital I/O modules can be easily plugged into Saia PCD2 and Saia PCD1 base units or a suitable I/O module holder.
In addition to inputs for various voltage levels, digital outputs are provided with both transistor construction and as mechanical relays.
This means that electrical isolation from the switching electrical circuit can be achieved easily and reliably.

Digital input modules

Type	Number of inputs	Input voltage	Switching capacity DC	Switching capacity AC	Input filter	Electrical isolation	Current draw 5V-Bus [1]	Current draw +V-Bus [2]	I/O connector type [3]
PCD2.E110	8	15…30 VDC	---	---	8 ms	---	24 mA	---	L
PCD2.E111	8	15…30 VDC			0.2 ms		24 mA		L
PCD2.E160	16	15…30 VDC	---	---	8 ms	---	72 mA	---	O
PCD2.E161	16	15…30 VDC			0.2 ms		72 mA		O
PCD2.E165	16	15…30 VDC			8 ms		72 mA		N
PCD2.E166	16	15…30 VDC			0.2 ms		72 mA		N
PCD2.E500	6	80…250 VAC	---	---	20 ms	•	1 mA	---	L
PCD2.E610	8	15…30 VDC	---	---	10 ms	•	24 mA	---	L
PCD2.E611	8	15…30 VDC			0.2 ms	•	24 mA		L
PCD2.E613	8	30…60 VDC			9 ms	•	24 mA		L

Digital output modules

Type	Number of outputs	Input voltage	Switching capacity DC	Switching capacity AC	Input filter	Electrical isolation	Current draw 5V-Bus [1]	Current draw +V-Bus [2]	I/O connector type [3]
PCD2.A200	4, relay (make with contact protection)	---	2 A/50 VDC	2 A/250 VAC	---	•	15 mA	---	L
PCD2.A210	4, relay (break with contact protection)		2 A/50 VDC	2 A/250 VAC		•	15 mA		L
PCD2.A220	6, relay (make)	---	2 A/50 VDC	2 A/250 VAC	---	•	20 mA	---	L
PCD2.A250	8, relay (make)	---	2 A/50 VDC	2 A/48 VAC	---	•	25 mA	---	M
PCD2.A300	6, transistor	---	2 A/10…32 VDC	---	---	---	20 mA	---	L
PCD2.A400	8, transistor	---	0.5 A/5…32 VDC	---	---	---	25 mA	---	L
PCD2.A410	8, transistor	---	0.5 A/5…32 VDC	---	---	•	24 mA	---	L
PCD2.A460	16, transistor (with short circuit protection)	---	0.5 A/10…32 VDC	---	---	---	74 mA	---	O
PCD2.A465	16, transistor (with short circuit protection)	---	0.5 A/10…32 VDC	---	---	---	74 mA	---	N

Digital input/output modules

Type	Number of I/Os	Input voltage	Switching capacity DC	Switching capacity AC	Input filter	Electrical isolation	Current draw 5V-Bus [1]	Current draw +V-Bus [2]	I/O connector type [3]
PCD2.B100	2 In + 2 Out + 4 selectable In or Out	15…32 VDC	0.5 A/5…32 VDC	---	8 ms	---	25 mA	---	L
PCD2.B160	16 I/O (in blocks of 4 configurable)	24 VDC	0.25 A/18…30 VDC	---	8 ms or 0.2 ms	---	120 mA	---	2× K

Fast counter modules

Type	Number of counters	Inputs per counter	Outputs per counter	Counting range	Selectable digital filter	Current draw 5V-Bus [1]	Current draw +V-Bus [2]	I/O connector type [3]
PCD2.H112	2	2 In + 1 configurable In	1 CCO	0…16 777 215 (24 bit)	10 kHz…150 kHz	50 mA	4 mA	K
PCD2.H114	4	2 In + 1 configurable In	1 CCO	0…16 777 215 (24 bit)	10 kHz…150 kHz	50 mA	4 mA	2× K

The internal load current drawn by the I/O modules from the +5V and +V bus supply must not exceed the maximum supply current specified for the PCD2.M4x60, PCD2.M5540, PCD2.Cxxxx and PCD1.M2xxx.

Overview of the internal bus capacity of the module holders

Capacity	PCD1.M2xxx	PCD2.M4x60	PCD2.M5540	PCD2.C1000	PCD2.C2000
[1] Internal 5V bus	500 mA	800 mA	1400 mA	1400 mA	1400 mA
[2] Internal +V (24 V)	200 mA	250 mA	800 mA	800 mA	800 mA

The electrical requirement of the internal +5V and +V bus for the I/O modules is calculated in the PG5 2.1 Device Configurator.

[3] Plug-in I/O terminal blocks are supplied with I/O modules. Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories (see pages 63 and 174).

More information on counting modules, stepper motor control and positioning modules
http://sbc.do/fkwy2HYe

Saia PCD2 analogue input and output modules

The numerous analogue modules allow complex control tasks or measurements. Depending on the speed of the AD converter, the resolution is between 8 and 16 bits. The digitised values can be processed further direct in the project in the PCD2 and PCD1. The large number of different modules means that the most suitable module is available for almost any requirement.

Analogue input modules

Type / Order no.	Number of channels	Signal range	Resolution	Electrical isolation	Current draw 5V-Bus [1]	+V-Bus [2]	I/O connector type [3]
PCD2.W200	8 In	0…+10 V	10 bits	---	8 mA	5 mA	L
PCD2.W210	8 In	0…20 mA (4…20 mA via user program)	10 bits		8 mA	5 mA	L
PCD2.W220	8 In	Pt1000: –50 °C…400 °C/Ni1000: –50 °C…+200 °C	10 bits		8 mA	16 mA	L
PCD2.W220Z02	8 In	NTC 10 temperature sensor	10 bits		8 mA	16 mA	L
PCD2.W220Z12	4 In + 4 In	4 I: 0…10 V and 4 I: Pt1000: –50 °C…400 °C/Ni1000: –50 °C…+200 °C	10 bits		8 mA	11 mA	L
PCD2.W300	8 In	0…+10 V	12 bits	---	8 mA	5 mA	L
PCD2.W310	8 In	0…20 mA (4…20 mA via user program)	12 bits		8 mA	5 mA	L
PCD2.W340	8 In	0…+10 V/0…20 mA (4…20 mA via user program) Pt1000: –50 °C…400 °C/Ni1000: –50 °C…+200 °C	12 bits		8 mA	20 mA	L
PCD2.W350	8 In	Pt100: –50 °C…+600 °C/Ni100: –50 °C…+250 °C	12 bits		8 mA	30 mA	L
PCD2.W360	8 In	Pt1000: –50 °C…+150 °C	12 bits		8 mA	20 mA	L
PCD2.W380	8 In	0–10 V…+10 V, –20 mA…+20 mA, Pt/Ni1000, Ni1000 L&S, NTC10k/NTC20k (configuration via software)	13 bits		25 mA	25 mA	2× K
PCD2.W305	7 In	0…+10 V	12 bits	•	60 mA	0 mA	P
PCD2.W315	7 In	0…20 mA (4…20 mA via user program)	12 bits	•	60 mA	0 mA	P
PCD2.W325	7 In	–10 V…+10 V	12 bits	•	60 mA	0 mA	P
PCD2.W720	2 In	Weighing module with 2 systems for up to 6 weighing cells	≤ 18 bits	---	60 mA	100 mA	P
PCD2.W745	4 In	Temperature module for TC type J, K and 4-wire Pt/Ni 100/1000	16 bits	•	200 mA	0 mA	R

Analogue output modules

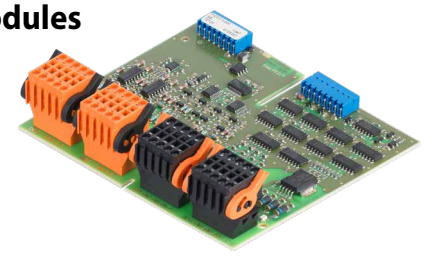
Type Order no.	Number of channels	Signal range	Resolution	Electrical isolation	Current draw 5V-Bus [1]	+V-Bus [2]	I/O connector type [3]
PCD2.W400	4 Out	0…+10 V	8 bits	---	1 mA	30 mA	L
PCD2.W410	4 Out	0…+10 V/0…20 mA/4…20 mA jumper-selectable	8 bits		1 mA	30 mA	L
PCD2.W600	4 Out	0…+10 V	12 bits	---	4 mA	20 mA	L
PCD2.W610	4 Out	0…+10 V/–10 V…+10 V/0…20 mA/4…20 mA selectable with jumper	12 bits		110 mA	0 mA	L
PCD2.W605	6 Out	0…+10 V	10 bits	•	110 mA	0 mA	P
PCD2.W615	4 Out	0…20 mA/4…20 mA, configurable	10 bits	•	55 mA	0 mA	P
PCD2.W625	6 Out	–10 V…+10 V	10 bits	•	110 mA	0 mA	P

Analogue input/output modules

Type / Order no.	Number of channels	Signal range	Resolution	Electrical isolation	Current draw 5V-Bus [1]	+V-Bus [2]	I/O connector type [3]
PCD2.W525	4 In + 2 Out	I: I:0…10 V, 0(4)…20 mA, Pt 1000, Pt 500 or Ni 1000 (selectable by DIP switch) O: 0…10 V or 0(4)…20 mA (selectable by software)	In: 14 bits Out: 12 bits	•	40 mA	0 mA	P

Saia PCD2 mixed digital and analogue input and output modules

With the multi-function I/O module PCD2.G200 a total of 24 digital and analogue inputs and outputs is achieved. Thus, the need for additional module holders can be avoided, and sophisticated small applications can be implemented cost-effectively.



Multifunctional input/output modules

Type / Order no.	Number of channels	Signal range	Resolution	Input filter	Electrical isolation	Current draw 5V-Bus [1]	+V-Bus [2]	I/O connector type [3]
PCD2.G200	4 In	Digital: 15…30 VDC		8 ms	---	12 mA	35 mA	KB black
	4 Out	Digital: 0.5 A/10…32 VDC			---			KB black
	2 In 2 In 4 In	Analogue: 0…10 V Analogue: Pt1000 or Ni1000 Analogue: Universal, 0…10 V, 0…20 mA, Ni/Pt1000 (selectable via DIP switch)	12 bits 12 bits 12 bits	10 ms 20 ms 10 ms Ni/Pt 20 ms	---			K orange
	8 Out	Analogue: 0…10 V	10 bits		---			K orange

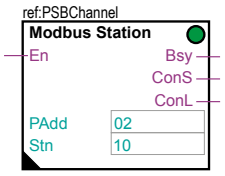
[1] [2] [3] See page 58

Communication interfaces of the Saia PCD2 controllers

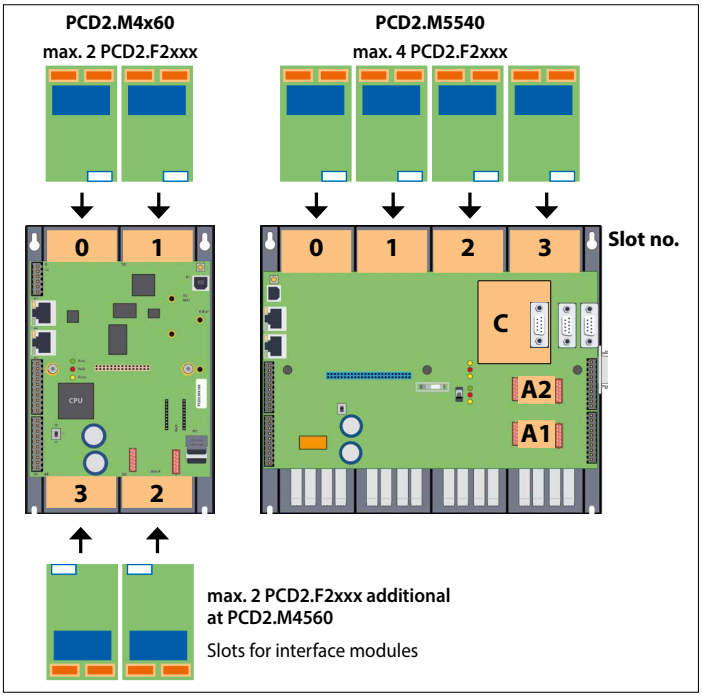
In addition to the onboard interfaces of Saia PCD2, the interface functions can also be expanded in a modular way with various slots. The PCD2 series therefore supports numerous protocols. The physical bus specifications are available for most protocols as a plug-in module. If this is not the case, the bus can be connected via an external converter.

Protocols supported by the PCD2.M4x60, PCD2.M5540 via FBoxes

- Modem communication with the PCD
- HMI editor applications with PCD7.Dxxx text terminals
- Serial S-Net (S-Bus)
- Modbus
- JCI N2-Bus
- KNX® S-Mode/EIB (with external converter)
- DALI
- EnOcean (with external converter)
- M-Bus
- BACnet®



Saia FBoxes for Modbus



Physical interfaces that can be fully programmed

PCD7.F150S

PCD2.F2150 with PCD7.F150S

Module	Specifications	Electrical isolation	Current draw 5V-Bus	+V-Bus	Slot	I/O connector type [1]
PCD7.F110S	RS-422 with RTS/CTS or RS-485 [2]	---	40 mA	---	A1 / A2	
PCD7.F121S	RS-232 with RTC/CTS, DTR/DSR, DCD, suitable for modem or EIB connection	---	15 mA	---	A1 / A2	
PCD7.F150S	RS-485 [2]	•	130 mA	---	A1 / A2	
PCD2.F2100	RS-422/RS-485 [2], plus PCD7.F1xxS as an option	---	110 mA	---	I/O 0-3	2× K
PCD2.F2210	RS-232 plus PCD7.F1xxS as option	---	90 mA	---	I/O 0-3	2× K

Physical interfaces for specific protocols

PCD2.F2210

PCD2.F2150

PCD2.F2810

Module	Specifications	Electrical isolation	Current draw 5V-Bus	+V-Bus	Slot	I/O connector type [1]
PCD7.F180S	Belimo MP-Bus, for connecting up to 8 drives on one line	---	15 mA	15 mA	A1 / A2	
PCD2.F2150	BACnet® MS/TP or fully programmable	---	110 mA	---	I/O 0-3	2× K
PCD2.F2400	LonWorks® interface module [3]	---	90 mA	---	I/O 0-3	L9
PCD2.F2610	DALI	---	90 mA	---	I/O 0-3	L
PCD2.F2700	M-Bus 240 nodes	---	70 mA	8 mA	I/O 0-3	L
PCD2.F2710	M-Bus 20 nodes	---	70 mA	8 mA	I/O 0-3	L
PCD2.F2720	M-Bus 60 nodes	---	70 mA	8 mA	I/O 0-3	L
PCD2.F2810	Belimo MP-Bus with base for PCD7.F1xxS modules	---	90 mA	15 mA	I/O 0-3	2× K
PCD7.F7500	Profibus DP Master	---	200 mA	---	C	

[1] Plug-in I/O terminal blocks are included with I/O modules. Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories (see pages 63 and 174).

[2] with line termination resistors that can be activated.

[3] For 254 network variables, with base for PCD7.F1xxS modules.

System properties of PCD2.F2xxx modules

The following points must be noted when using the PCD2.F2xxx interface modules:

- Up to 4 PCD2.F2xxx modules (8 interfaces) can be used in slots 0…3 for each PCD2 system.
- The PCD2 system has a processor to process both the application and the serial interfaces. Processing of the interface modules requires the appropriate CPU capacity.
- Consult the information and examples provided in the Manual 26-856 for PCD2.M5 to determine the maximum communication capacity for each PCD2.M5 system.

Memory modules of the Saia PCD2 controllers

The functions of the Saia PCD2 can be expanded using flash memory. Memory cards with file systems and data backup are available for this task. The various protocols whose firmware is installed on the flash cards can also be used by simply inserting the relevant card. The controller therefore becomes BACnet® or LON IP compatible. More information to memory management and structure is contained in Chapter 1.1 Saia PCD® System Description.

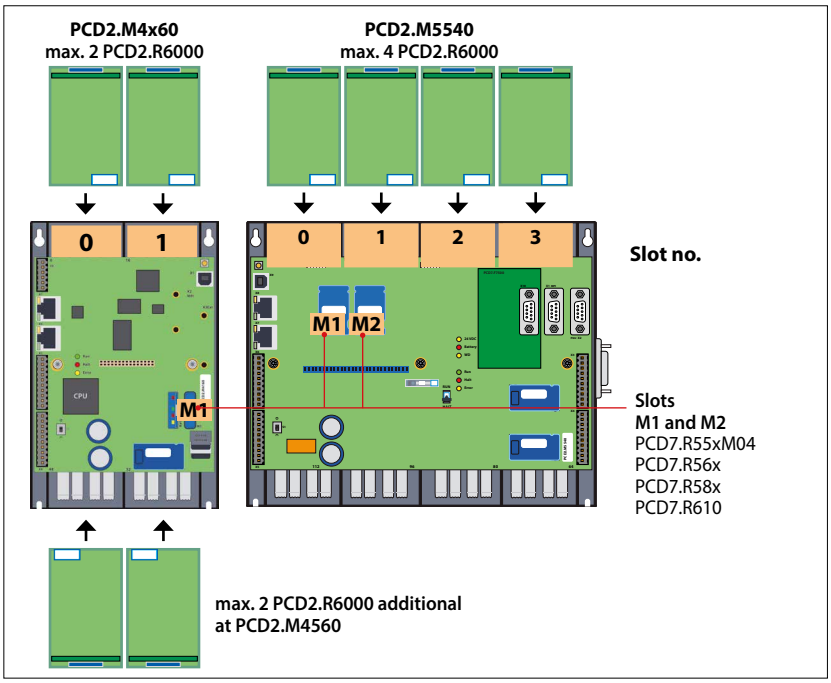
System properties

Onboard user memory:

- 1024 kByte RAM for program + DB/text
- 2 MB flash memory (S-RIO, configuration and backup)

Expansion options:

- Two slots (M1 and M2) for memory cards integrated into the CPU
- Additional SD memory cards can be inserted in the I/O slots 0 to 3 using adapters



Slots for memory modules

Flash memory with file system, program and data backup, BACnet®

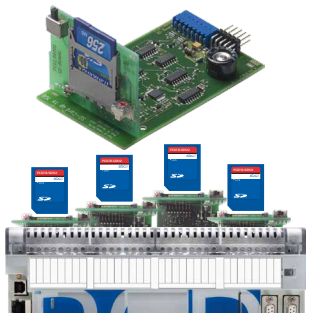
Type	Description	Slot
PCD7.R550M04	4 MB flash card with file system	M1 & M2
PCD7.R562	Flash card with BACnet® and 128 MB file system	M1 & M2
PCD7.R582	Flash card with LON IP and 128 MB file system	M1 & M2
PCD7.R610	Holder module for micro SD card	M1 & M2
PCD7.R-MSD1024	MicroSD memory card 1 GB, PCD formatted	PCD7.R610

PCD7.R55xM04

PCD7.R610

PCD2 SD flash memory cards for I/O slots

		PCD2.M4160	PCD2.M4560 PCD2.M5540
Type	**Description**	**Slot**	**Slot**
PCD2.R6000	Basic module with slot for SD flash memory cards (up to 4 modules in I/O slots 0 to 3 on a CPU)	E/A 0–1	E/A 0–3
PCD7.R-SD512	SD flash memory card, 512 MB with file system	---	---
PCD7.R-SD1024	SD flash memory card, 1024 MB with file system	---	---



Battery for data backup

Type	Description
4 639 4898 0	Battery holder module for PCD2. M4x60
4 507 4817 0	Lithium battery for PCD processor unit (RENATA button battery type CR 2032)

System properties of PCD7.R5xx modules

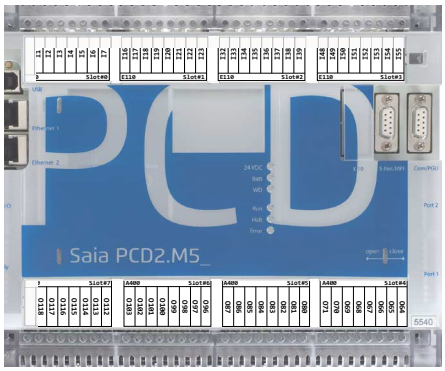
- Only one BACnet® or one LON IP module can be operated per PCD2.M5xxx.

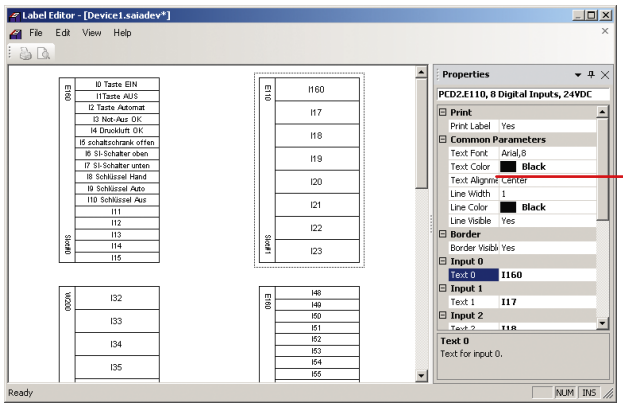
Consumables and accessories for Saia PCD2 controllers

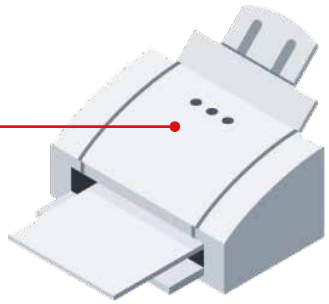
Fast labelling of I/O modules with the Saia LabelEditor

The software tool efficiently labels the PCD2 labelling strip. The user can enter the unique data point text in the tool. This can then be printed out on A4 paper. The user selects appropriate distance formats for the various types of PCD2 modules. The text entered can be saved as templates and reused.

SBC Label Editor is delivered with the PG5 Controls Suite.







EPLAN macros

EPLAN macros are available for project planning and engineering

The EPLAN® electric P8 macros are available on the support site.

The macros and article data are also available on the EPLAN® data portal.

Download area:
www.sbc-support.com

Consumables and accessories for Saia PCD2 controllers

Saia PCD2 housing covers

Type	Description
4 104 7719 0	Cover for PCD2.M5x40 without logo (neutral housing cover)
4 104 7758 0	Cover for PCD2.C1000 without logo (neutral housing cover)
4 104 7720 0	Cover for PCD2.C2000 without logo (neutral housing cover)

Saia PCD2 plug-in screw terminal blocks for onboard I/Os

Type	Description
4 405 4916 0	Plug-in screw terminal block, 10-pin, labelling 0… 9
4 405 4917 0	Plug-in screw terminal block, 10-pin, labelling 10…19
4 405 4918 0	Plug-in screw terminal block, 10-pole, labelling 20…29
4 405 4919 0	Plug-in screw terminal block, 10-pole, labelling 30…39

Plug-in screw terminal blocks and connectors for Saia PCD2 I/O modules

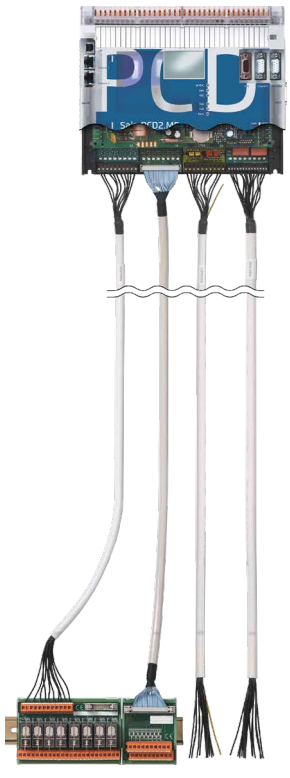
Type	Description
4 405 5109 0	Plug-in screw terminal block, 9-pin (type L9) for PCD2.F2400, for wires up to 1.5 mm²
4 405 4847 0	Plug-in screw terminal block, 10-pin (type L) for wires up to 1.5 mm², labelling 0…9
4 405 4869 0	Plug-in screw terminal block, 14-pin (type M) for wires up to 0.6 mm²
4 405 5048 0	Plug-in spring terminal block 2 × 5-pin (type K) for wires up to 1.0 mm², orange
4 405 5054 0	Plug-in spring terminal block 2 × 5-pin (type KB) for wires up to 1.0 mm², black

I/O bus connection

Type	Description
PCD2.K010	I/O bus connector
PCD2.K106	I/O bus extension cable

Battery

Type	Description
4 639 4898 0	Battery carrier module for PCD2. M4x60
4 507 4817 0	Lithium battery for PCD2.M5540



System cables for digital modules with 16 I/Os[1)]

PCD2.K221	Sheathed, round cable with 32 strands, each 0.25 mm², 1.5 m long, PCD side: 34-pin ribbon connector type D, process side: strand ends free, colour coded
PCD2.K223	Sheathed, round cable with 32 strands, each 0.25 mm², 3.0 m long, PCD side: 34-pin ribbon connector type D, process side: strand ends free, colour coded

System cables for adapters PCD2.K520/…K521/…K525[1)]

PCD2.K231	Sheathed, half-round cable with 34 strands, each 0.09 mm², 1.0 m long, with 34-pin ribbon connector type D at both ends
PCD2.K232	Sheathed, half-round cable with 34 strands, each 0.09 mm², 2.0 m long, with 34-pin ribbon connector type D at both ends

System cables for 2 adapters PCD2.K510/…K511 or 1 adapter and relay interface PCD2.K551[1)]

PCD2.K241	Sheathed, half-round cable with 34 strands, each 0.09 mm², 1.0 m long, PCD side 34-pin ribbon connector type D, process side: two 16-pin ribbon connectors
PCD2.K242	Sheathed, half-round cable with 34 strands, each 0.09 mm², 2.0 m long, PCD side 34-pin ribbon connector type D, process side: two 16-pin ribbon connectors

"Ribbon connector ←→ screw terminal" adapters

PCD2.K510	for 8 inputs/outputs, with 20 screw terminals, without LED
PCD2.K511	for 8 inputs/outputs, with 20 screw terminals and LED (for source operation only)
PCD2.K520	for 16 inputs/outputs, with 20 screw terminals, without LED
PCD2.K521	for 16 inputs/outputs, with 20 screw terminals and LED (for source operation only)
PCD2.K525	for 16 inputs/outputs, with 3 × 16 screw terminals and LED (for source operation only)
PCD2.K551	Relay interface for 8 PCD transistor outputs with 24 screw terminals and LED
PCD2.K552	Relay interface for 8 PCD transistor outputs with 24 screw terminals, LED and manual control mode (switch on-off-auto) and 1 output as feedback for the manual control mode

[1)] For details, see Chapter 5.10

1.5 PCD1 – modular, expandable, compact CPU

The Saia PCD1 systems are the smallest programmable Saia PCD® controllers in a flat design. Along with the standard communication interfaces, integrated data memory and web/IT functionality, all controllers also have at least 18 integrated I/Os. The PCD1 controllers are ideally suited to small-scale automation tasks, whose challenges and tasks can be successfully processed by the powerful CPU.

The many communication options are another advantage:
Ethernet TCP/IP, USB port, the onboard RS-485 interface and the expansion options with BACnet® or Lon IP, for instance, are a small sample of the performance capability of PCD1.

1.5.1 Saia PCD1.M2 series

Page 66

Saia PCD1.M2xxx are compact and may be expanded via modules.

Types
- PCD1.M2160 with Ethernet TCP/IP and expanded memory
- PCD1.M2120 with Ethernet TCP/IP

18 integrated I/Os
2 free I/O slots

Potential use
in primary switch cabinet

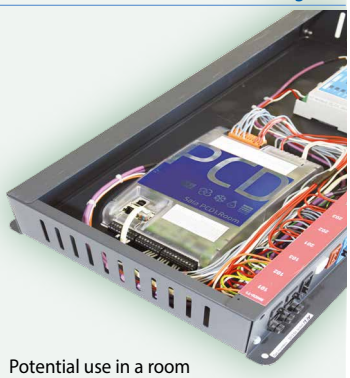
1.5.2 Saia PCD1.Room (PCD1.M2110R1)

Page 70

Saia PCD1.Room is for applications in the field of room automation and HeaVAC.

Type
- PCD1.M2110R1 with Ethernet TCP/IP for room automation applications

24 integrated I/Os
1 free I/O slot



Potential use in a room
(example: in a room box)

Saia PCD® E-Controller (PCD1.M0160E0)

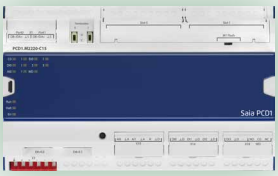
Page 154

The E-controller in compact design includes in the default delivery condition S-Monitoring (energy)-functionalities, which can be customized with Saia PG5

Type: PCD1.M0160E0 with S-Monitoring function
- 18 integrated E/As
- no free I/O slots

Saia PCD1.M2220-C15

Page 78

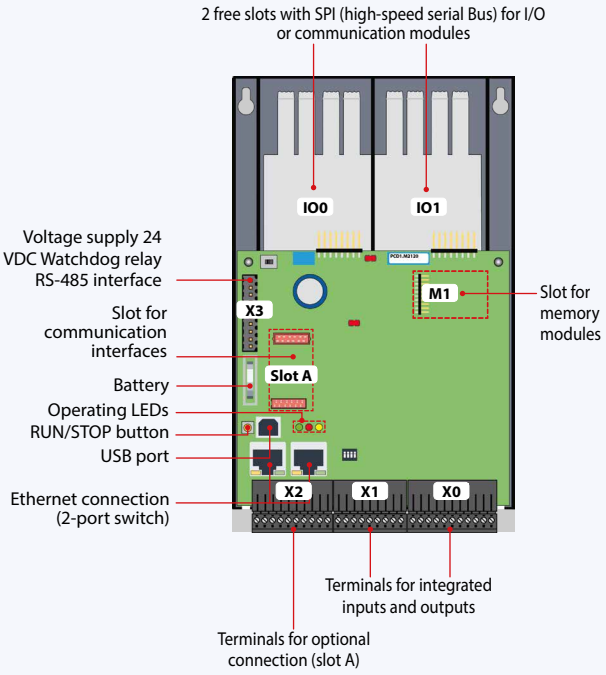


The E-Line control is ideally suited by the compact design for installation in an electrical sub-distribution. It can be used for example for the other E-Line modules as zoning / master station.
Type: PCD1.M2220-C15 E-Line CPU with Ethernet, 512kB
- integriatede I/Os (4 DI, 2AI, 1 WD)
- two free I/O Slots
- a variety of communication options

1.5.1 Saia PCD1.M2xxx controller

The Saia PCD1.M2xxx series is a compact controller with onboard I/Os and in addition two free I/O slots for plug-in or communication interface modules. The Web/IT functionality, the onboard memory, the range of standard communication interfaces and the expansion options offer ideal solutions for small to medium systems.

Device design



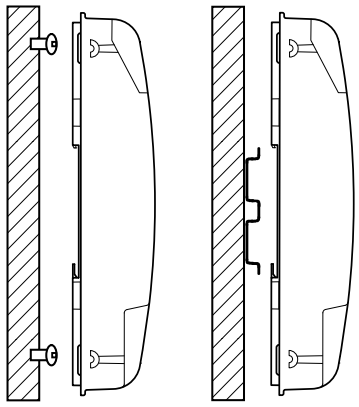
System properties

- Up to 50 inputs/outputs
  May be expanded remotely with RIO PCD3.T66x
- Up to 8 communication interfaces
- USB and Ethernet interface onboard
- Large onboard memory for programs (up to 1 MB) and data (up to 128 MB file system)
- Automation Server for integration into Web/IT systems

Types

- **PCD1.M2160** with Ethernet TCP/IP and expanded memory
- **PCD1.M2120** with Ethernet TCP/IP

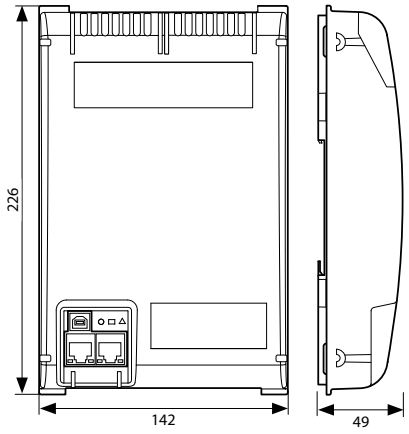
Mounting



on a level surface

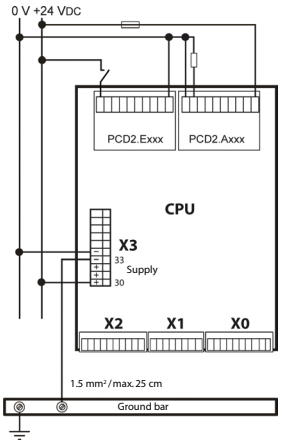
on two DIN rails (2 × 35 mm in accordance with DIN EN 60715 TH35)

Dimensions



Compact mass:
142 × 226 × 49 mm

Power supply and connection concept



Additional information is provided in the Chapter Saia PCD3 power supply and connection concept, and in the Manual 26-875.

Overview Saia PCD1.M2xxx

Technical data

Memory and file system — Types:	PCD1.M2160	PCD1.M2120
Program memory, DB/Text (Flash)	1 MB	512 kByte
User memory, DB/Text (RAM)	1 MB	128 kByte
Onboard user flash file system	128 MB	8 MB
Integrated communication		
Ethernet connection (2-port switch) 10/100 Mbit/s, full-duplex, auto-sensing, auto-crossing	Yes	Yes
USB port USB 1.1 device 12 Mbit/s	Yes	Yes
RS-485 (terminal X3), up to 115 kbit/s	Yes	Yes

General specifications

Operating voltage	24 VDC, –20/+25 % max. inkl. 5% ripple (in accordance with EN/IEC 61131-2)
Battery for data backup (replaceable)	Lithium battery with a service life of 1 to 3 years
Operating temperature:	0…55 °C
Dimensions (W × H × D)	142 × 226 × 49 mm
Mounting location	2× DIN rails in accordance with DIN EN60715 TH35 (2 × 35 mm) or on a flat surface
Protection type	IP 20
Capacity 5 V/+V (24 V) internal	max. 500 mA/200 mA
Power consumption	typically 12 W

Onboard inputs/outputs

Inputs:

6 Digital inputs (4 + 2 interrupts)	15…30 VDC, 3 ms input filter (0.2 ms for the interrupts)	Terminal X1
2 Analogue inputs, selectable via DIP switch	–10…+10 VDC, 0…±20 mA, Pt1000, Ni1000, Ni1000 L&S, 0…2.5 kΩ, 12 bit resolution	Terminal X1

Outputs:

4 Digital outputs	24 VDC / 0.5 A	Terminal X0
1 PWM output	24 VDC / 0.2 A	Terminal X0

selectable/configurable via PG5

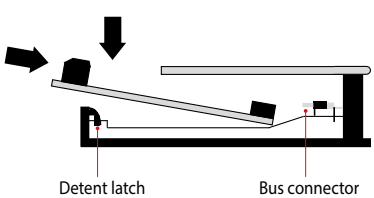
4 Digital inputs or outputs	24 VDC / data as digital inputs or outputs Outputs:	Terminal X0
1 Watchdog relay or make contact	48 VAC or VDC, 1 A With DC switching voltage a free-wheeling diode should be connected in parallel to the load	Terminal X3

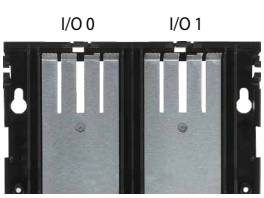
Analogue output module Saia PCD7.W600

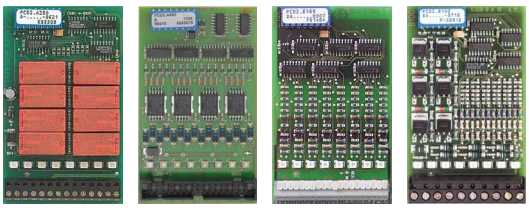
This module has 4 analogue outputs 0 to +10 V with a 12-bit resolution and has been specifically developed for the new PCD1 CPUs (PCD1.M2xxx, PCD1.M0160E0, PCD1.M2110R1). It can be plugged into slot A of the PCD1 CPU like the PCD7.F1xxS communication module.

Plug-in I/O modules for slots I/O 0 and I/O 1

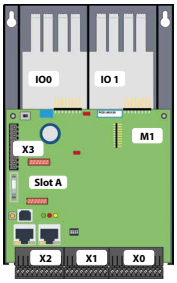
The modules listed in the PCD2.M5 series (Chapter 1.4) are also used for the Saia PCD1 series.







Saia PCD1.M2xxx interface options



In addition to the onboard interfaces, the interface functions can also be expanded in a modular way using the various slots. Numerous protocols are therefore supported by the Saia PCD1.M2 series. Detailed information and an overview is contained in the Chapter BA communication systems.

Communication		Electrical isolation	Internal current consumption 5V	+V (24 V)	Slot	I/O connector type [1]
PCD7.F110S	RS-485/RS-422	---	40 mA	–	Slot A	
PCD7.F121S	RS-232 with RTC/CTS, DTR/DSR, DCD suitable for modem, EIB connection	---	15 mA	–	Slot A	
PCD7.F150S	RS-485 with termination resistors that can be activated	•	130 mA	–	Slot A	
PCD7.F180S	Belimo MP-Bus, for connecting up to 8 drives on one line	---	15 mA	15 mA	Slot A	
PCD2.F2100	RS-422/RS-485 plus PCD7.F1xxS as option	---	110 mA	–	IO 0/1	2× K
PCD2.F2150	BACnet® MS/TP RS-485 plus PCD7.F1xxS as an option	---	110 mA	–	IO 0/1	2× K
PCD2.F2210	RS-232 plus PCD7.F1xxS as an option	---	90 Ma	–	IO 0/1	2× K
PCD2.F2400	LonWorks® interface module	---	90 Ma	–	IO 0/1	L9
PCD2.F2610	DALI Master for up to 64 DALI devices	---	90 Ma	–	IO 0/1	L
PCD2.F27x0	M-Bus master with 2 M-Bus interfaces	---	70 mA	8 mA	IO 0/1	L
PCD2.F2810	Belimo MP-Bus plus PCD7.F1xxS as an option	---	90 Ma	15 mA	IO 0/1	2× K

[1] Plug-in I/O terminal blocks are included with I/O modules. Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories.

System properties of PCD2.F2xxx modules

The following points must be noted when using the PCD2.F2xxx interface modules:

- Max. 2 modules PCD2.F2xxx (4 interfaces) can be used in slots I/O 0/1 per PCD1.M2 system.
- Consult the information and examples provided in the Manual 26-875 for PCD1.M2 to determine the maximum communication capacity for each PCD1.M2 system.

Memory modules

The onboard memory of the Saia PCD1.M2xxx can be expanded using a Saia PCD7.Rxxx module in slot M1. In addition, the Saia PCD1.M21x0 can be expanded with BACnet® IP or Lon IP.

Additional information about the memory management and structure is contained in the Chapter Saia PCD® System Description.

Memory expansion and communication

PCD7.R550M04	Flash memory module with a 4 MB file system (for user program backup, web pages, etc.)	M1
PCD7.R562	Flash memory module for BACnet® firmware with 128 MB file system	M1
PCD7.R582	Flash memory module for Lon IP firmware with 128 MB file system	M1
PCD7.R610	Basic module for Micro SD flash card	M1
PCD7.R-MSD1024	Micro SD flash card 1024 MB, PCD formatted	PCD7.R610

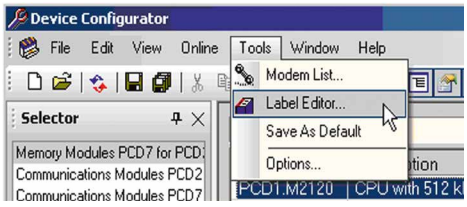
PCD7.R550M04

PCD7.R610

Accessories and consumables for Saia PCD1.M2xxx

Labelling

The self-adhesive labels can be printed direct with the SBC LabelEditor from the PG5 Device Configurator



EPLAN macros

EPLAN macros are available for project planning and engineering.

The EPLAN® electric P8 macros are available on the support site.

The macros and article data are also provided on the EPLAN® data portal.

Battery for data backup

Type	Description
4 507 4817 0	Lithium battery for PCD processor unit (RENATA button battery type CR 2032)

Plug-in screw terminal block

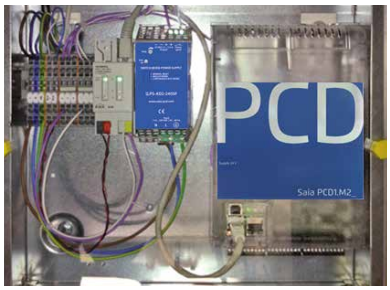
4 405 5089 0	Plug-in screw terminal block, 11-pin, labelling 0…10	Terminal X0
4 405 5087 0	Plug-in screw terminal block, 9-pin, labelling 11…19	Terminal X1
4 405 5088 0	Plug-in screw terminal block, 10-pin, labelling 20…29	Terminal X2
4 405 4919 0	Plug-in screw terminal block, 10-pin, labelling 30…39	Terminal X3

Cover

4 104 7759 0	Housing cover for PCD1.M2xxx without logo on-site with an overlay that can be individually designed

Range of uses

- For small and medium systems
- Modernisation and expansion of existing systems through, for example, the compact construction
- Versatile interface options, including to existing systems as a gateway, for example: optimisation of a cooling system by setting all the free parameters



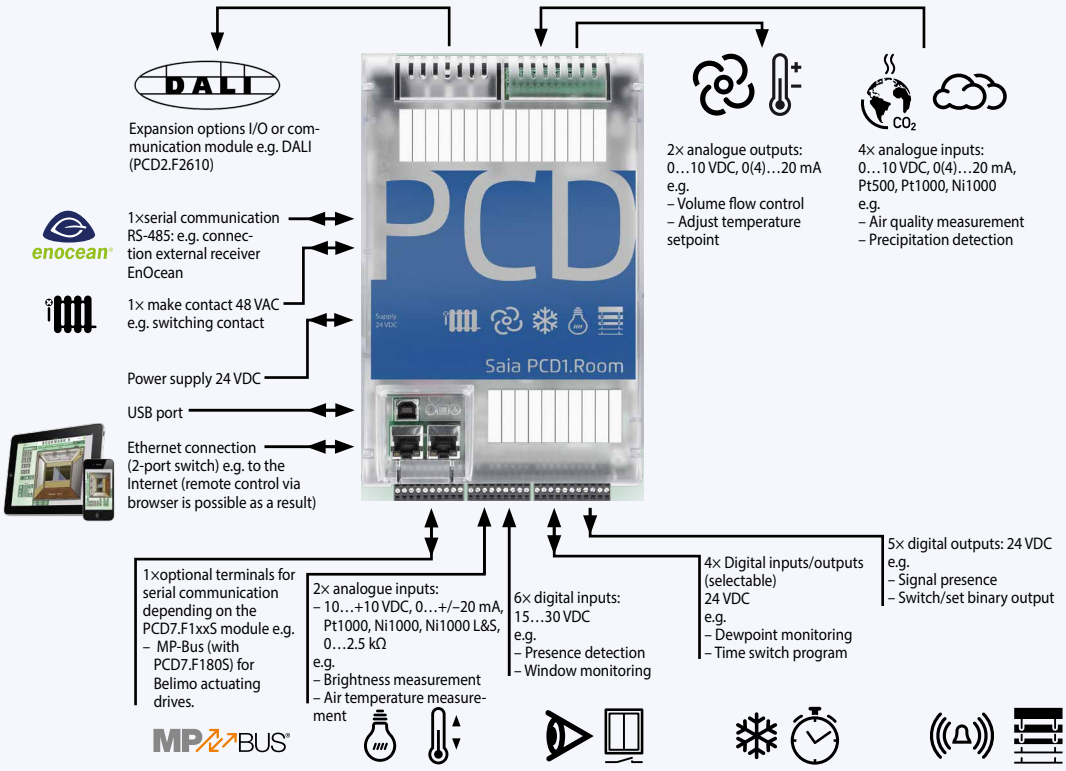
Connection to an existing EIB/KNX installation providing conference rooms with a web connection

Use as communication interface with M-Bus in a district heating network

1.5.2 Saia PCD1.Room (PCD1.M2110R1)

Saia PCD1.Room (PCD1.M2110R1) is a programmable room controller for complex solutions with many communication options. In addition to the I/Os that are already integrated, the controller has a free I/O slot for individual expansion with inputs/outputs or communication options. Web/IT functions for mobile operation, for instance, are also already onboard. Furthermore, Saia PCD1.Room offers various possibilities for integrating other systems in the room using standard communication interfaces. (Energy) efficient and individual room automation can be easily implemented as a result. The controller also provides a good basis for achieving the energy efficiency classes in accordance with EN 15232:2012.

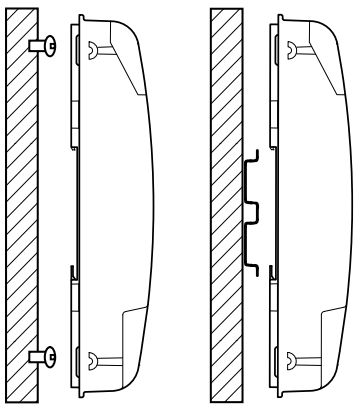
Device design with connection example



Lighting, sun protection and individual room regulation can be optimally coordinated with one another with this controller. This example showing possible assignments was compiled based on applications in accordance with the VDI 3813 list of room automation functions and the DIN EN 15232 list of building automation functions.

The Smart RIO Manager function is not supported!

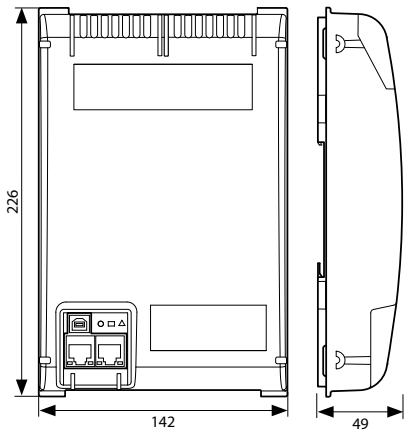
Mounting



on a level surface

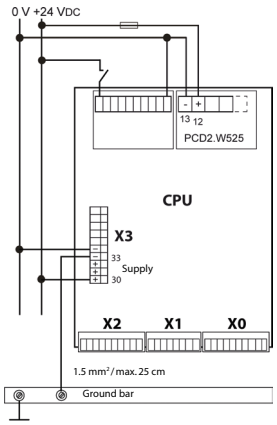
on two DIN rails (2 × 35 mm in accordance with DIN EN 60715 TH35)

Dimensions



Compact mass: 142 × 226 × 49 mm

Power supply and connection concept



Further information is provided in the Chapter Saia PCD3 power supply and connection concept, and in the Manual 26-875.

Overview of Saia PCD1.Room (PCD1.M2110R1)

Technical data

Memory and file system	**Type:**	**PCD1.M2110R1**
Program memory, DB/text (Flash)		256 kByte
User memory, DB/text (RAM)		128 kByte
Onboard user flash file system		8 MB
Integrated communication		
Ethernet connection (2-port switch) – 10/100 Mbit/s, full-duplex, auto-sensing, auto-crossing		yes
USB port – USB 1.1 device 12 Mbit/s		yes
RS-485 – (terminal X3), up to 115 kbit/s		yes

General specifications

Operating voltage	24 VDC, –20/+25 % max. inkl. 5% ripple (in accordance with EN/IEC 61131-2)
Battery for data backup (replaceable)	Lithium battery with a service life of 1 to 3 years
Operating temperature:	0…55 °C
Dimensions (W × H × D)	142 × 226 × 49 mm
Mounting location	2× DIN rails in accordance with DIN EN60715 TH35 (2 × 35 mm) or on a smooth surface
Protection type	IP 20
Capacity 5 V/+V (24 V) internal	max. 500 mA/200 mA
Power consumption	typically 12 W
Automation Server	Flash memory, file system, FTP and web server, email, SNMP

Onboard inputs/outputs

Inputs:

6	Digital inputs (4 + 2 interrupts)	15…30 VDC, 3 ms / 0.2 ms input filter	Terminal X1
2	Analogue inputs, selectable via DIP switch	–10…+10 VDC, 0…±20 mA, Pt1000, Ni1000, Ni1000 L&S, 0…2.5 kΩ, 12 bit resolution	Terminal X1
4	Analogue inputs, selectable via DIP switch	0…10 VDC, 0(4)…20 mA, Pt1000, Pt 500, Ni1000, 14 bit resolution	IO 1

Outputs:

4	Digital outputs	24 VDC / 0.5 A	Terminal X0
1	PWM output	24 VDC / 0.2 A	Terminal X0
2	Analogue outputs, selectable via PG5	0…10 VDC or 0(4)…20 mA, 12 bit resolution	IO 1

selectable/configurable via PG5

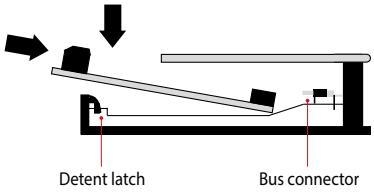
4	Digital inputs or outputs	24 VDC / data as digital inputs or digital outputs	Terminal X0
1	Watchdog relay or as make contact	48 VAC or VDC, 1 A With DC switching voltage a free-wheeling diode should be connected in parallel to the load	Terminal X3

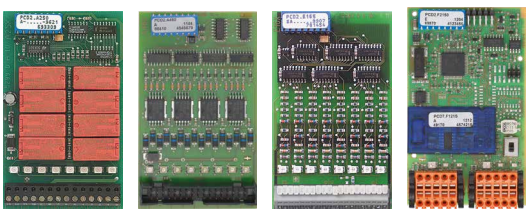
Analogue output module Saia PCD7.W600

This module has 4 analogue outputs 0 to +10 V with a 12-bit resolution and has been developed specifically for use with the new PCD1 CPUs (PCD1.M2xx0, PCD1.M0160E0, PCD1.M2110R1). It can be plugged into slot A of the PCD1 CPU like the PCD7.F1xxS communication module.

Plug-in I/O modules for slot I/O 0

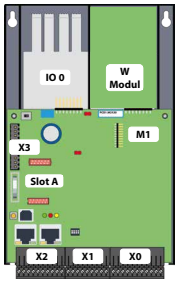
The modules listed in the PCD2.M5 series (Chapter 1.4) are also used for the Saia PCD1 series.





Only a PCD2.W525 module that is already supplied with the controller in the default setup functions in slot I/O 1.
If the module is removed, the controller will go to Stop!

Saia PCD1.Room (PCD1.M2110R1) interface options



In addition to the onboard interfaces, the interface functions can also be expanded in a modular way using the various slots. Numerous protocols are therefore supported by the Saia PCD1.M2110R1. A detailed list of all the protocols can be found in the Chapter BA communication systems.

Communication		Electrical isolation	Internal current consumption 5V +V (24 V)		Slot	I/O connector type [1]
PCD7.F110S	RS-422 avec RTS/CTS ou RS-485 [2]	---	40 mA	–	Slot A	
PCD7.F121S	RS-232 with RTC/CTS, DTR/DSR, DCD, suitable for modem or EIB connection	---	15 mA	–	Slot A	
PCD7.F150S	RS-485 [2]	•	130 mA	–	Slot A	
PCD7.F180S	Belimo MP-Bus, for connecting up to 8 drives on one line	---	15 mA	15 mA	Slot A	
PCD2.F2100	RS-422/RS-485 [2], plus PCD7.F1xxS en option	---	110 mA	–	IO 0/1	2× K
PCD2.F2150	BACnet® MS/TP RS-485 plus PCD7.F1xxS as an option	---	110 mA	–	IO 0/1	2× K
PCD2.F2210	RS-232 plus PCD7.F1xxS as an option	---	90 Ma	–	IO 0/1	2× K
PCD2.F2400	LonWorks® interface module	---	90 Ma	–	IO 0/1	L9
PCD2.F2610	DALI master for up to 64 DALI devices	---	90 Ma	–	IO 0/1	L
PCD2.F27x0	M-Bus master with 2 M-Bus interfaces	---	70 mA	8 mA	IO 0/1	L
PCD2.F2810	Belimo MP-Bus plus PCD7.F1xxS as an option	---	90 Ma	15 mA	IO 0/1	2× K

[1] Plug-in I/O terminal blocks are supplied with I/O modules.
Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories.
[2] with line termination resistors that can be activated.

System properties of PCD2.F2xxx modules

The following points must be noted when using the PCD2.F2xxx interface modules:

- Per PCD1.M2110R1 Room Edition a max. of 1 module PCD2.F2xxx (2 interfaces) can be used with slot I/O0.
- Consult the information and examples provided in the Manual 27-619 for PCD1.M2110R1 to determine the maximum communication capacity for each PCD1.M2 system.

Memory modules

The onboard memory can be expanded using a PCD7.Rxxx module in slot M1. In addition, BACnet® IP or Lon IP can be activated.

Additional information about the memory management and structure is contained in the Chapter Saia PCD® System description.

Memory expansion and communication		
PCD7.R550M04	Flash memory module with a 4 MB file system (for user program backup, web pages, etc.)	M1
PCD7.R562	Flash memory module for BACnet® firmware with 128 MB file system	M1
PCD7.R582	Flash memory module for Lon IP firmware with 128 MB file system	M1
PCD7.R610	Basic module for Micro SD flash card	M1
PCD7.R-MSD1024	Micro SD flash card 1024 MB, PCD formatted	PCD7.R610

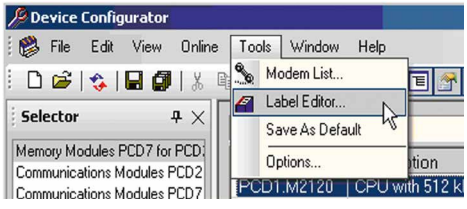
PCD7.R550M04

PCD7.R610

Accessories and consumables for Saia PCD1.Room (PCD1.M2110R1)

Labelling

The self-adhesive labels can be printed direct with the SBC LabelEditor from the PG5 Device Configurator



EPLAN macros

EPLAN macros are available for project planning and engineering

The EPLAN® electric P8 macros are available on the support site.

The macros and article data are also provided on the EPLAN® data portal.

Battery for data backup

Type	Description
4 507 4817 0	Lithium battery for PCD processor unit (RENATA button battery type CR 2032)

Plug-in screw terminal block

4 405 5089 0	Plug-in screw terminal block, 11-pin, labelling 0…10	Terminal X0
4 405 5087 0	Plug-in screw terminal block, 9-pin, labelling 11…19	Terminal X1
4 405 5088 0	Plug-in screw terminal block, 10-pin, labelling 20…29	Terminal X2

Cover

4 104 7759 0	Housing cover for PCD1.M2xxx without SBC logo on-site with an overlay that can be individually designed

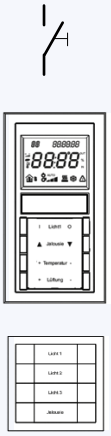
Range of uses:

Applications

Options for programmable applications:

- Radiators
- Fan coil applications
- Cooling ceiling
- VAV – variable air volume
- Air quality control
- Signal contacts (occupancy control, presence detection, window monitoring)
- Lighting control
- Blind control
- etc.

Room control units



Connection options via the following:

- Analogue signals (onboard)
- S-Bus (onboard)
- Modbus (onboard)
- Internet access, web server (onboard)
- BACnet® with PCD7.R56x (slot M1)
- BACnet® MS/TP with PCD2.F2150 (slot I/O 0)
- LON IP with PCD7.R58x (slot M1)
- LON FTT10 with PCD2.F2400 (slot I/O 0)
- KNX over IP (IP onboard)
- KNX TP with an external coupler
- EnOcean with external receiver

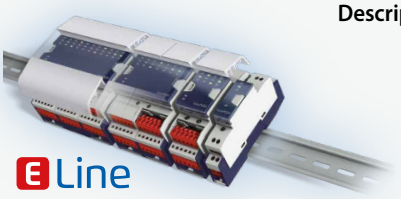
Applications must take the exact number of I/Os into account. Coupling relays (e.g.: PCD7.L252) or El-Line-RIO (S-Bus) required. The S-Bus stations are limited to a maximum of 10 units per PCD1.Room.
The same applies to Modbus stations (total of 10 units).

1.6 PCD1 E-Line – compact design for electrical distributors

Overview of Saia PCD E-Line device series

1.6.1 PCD1 E-Line system overview

Page 76



Description of the basic structure and system of the PCD1 E-Line series

1.6.2 PCD1 controller for E-Line

Page 78

The E-Controller for installation in electrical distributors is the ideal controller as a master and Ethernet interface for the Saia PCD1 E-Line

- PCD1.M2220-C15
- additional Saia PCD® controllers

1.6.3 PCD1 E-Line full programmable modules

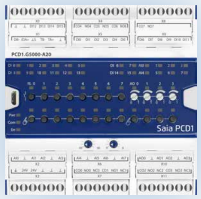
Page 81

Programmable modules for specific applications

- PCD1.G1100-C15 Light and shade module
- PCD1.G360x-C15 Room module
- PCD1.F2611-C15 DALI module and add. RS-485
- PCD1.W5300-C15 Analogue module

1.6.4 PCD1 E-Line input and output modules

page 88



I/O modules with override operating level

- S-Series
- L-Series

1.6.5 E-Line system components

page 92

Extension of the communication options

- Power supplies
- PQA Power Quality Manager

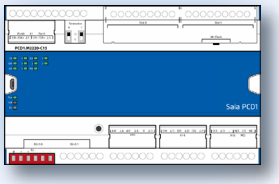
1.6.1 PCD1 E-Line system overview

The Saia PCD1 E-Line series was specifically developed for installation in electrical sub-distributors. The compact design enables automation in confined spaces. The two-wire bus connection between individual modules enables both centralised and decentralised automation over a distance of up to 1000 m. The modules are designed and produced in accordance with IEC 61131-2 to industrial quality. The extensive programmability and integration of Web+IT technologies enables effective automation over the entire service life of plants and properties.

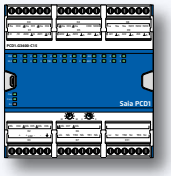
Ethernet

RS-485

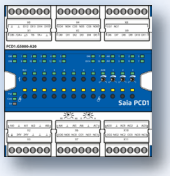
Control system
Visualisation and control of the connected components is an important aspect of automation. The web server can directly undertake the tasks of the control system for this purpose for small applications. For more complex projects, data is transferred to a control system via standard communication protocols such as BACnet. The Saia Visi.Plus® control system is suitable for this.



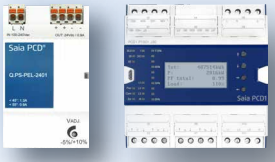
Controller
The Saia PCD® controller functions as a master for the attached modules. Here it can undertake more complex controls and form the interface to the control level. The integrated automation server and the Web+IT functions can be directly used here to visualise the control via a web panel or browser. Saia PCD® is the ideal interface for other plants thanks to the support of numerous protocols such as BACnet, LON, Modbus, etc.



Programmable I/O modules
The programmable I/O modules of the Saia PCD1 E-Line series with Saia PG5® enable the autonomous and safe operation of the modules even if communication to the master station is interrupted.
The local function of a room, for example, is therefore guaranteed at any time. The modules are programmed with Saia PG5® via the master controller or directly via USB.



I/O modules
The PCD1 E-Line I/O modules enable centralised automation in the control cabinet and the decentralised distribution of the components through the bus connection. They can be commissioned quickly using the implemented override operation.

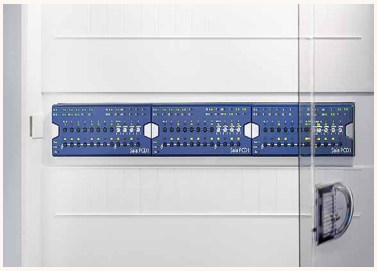


System Accessories
Power supplies and Network Analyzers are offered as a supplement for installation in the electrical distribution.

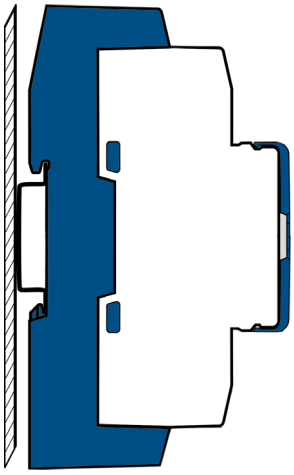
General properties of the Saia PCD1 E-Line modules

Mounting in the sub-distributor

The E-Line design enables the modules to be mounted in standard electrical sub-distributors. This significantly reduces the complexity of the mounting compared to automation control cabinets.



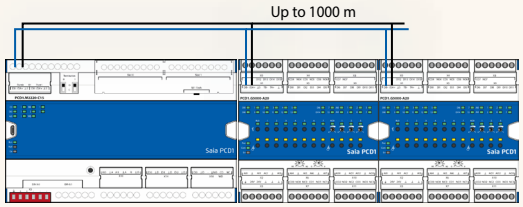
Mounting



on DIN rails 35 mm
(in accordance with DIN EN 60715) TH35

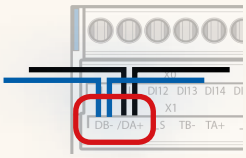
Bus topology

Communication with the S-Bus protocol is optimised for speed and creates a reliable connection up to 1000 m. The modules can be used as local or remote modules.



Bus wiring

DB- and /DA+ terminals must be used for exchanging data between the modules. The bus is through-wired to a terminal to ensure the exchange between modules to avoid an interruption in the bus connection.



Flexible cables with a cross section of no more than 0.75 mm² are permissible for bus wiring. 1.5 mm² on maximum applies for the overall terminal.

Product number key (ASN key)

Some main features of the E-Line modules can be identified immediately using the product number key. For example, if a module is fully programmable (5 at the end) or suitable for RIO mode (a 0).

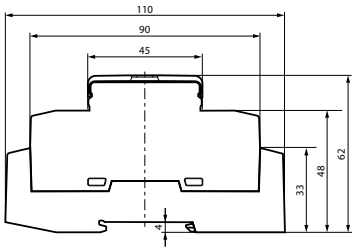
Example:

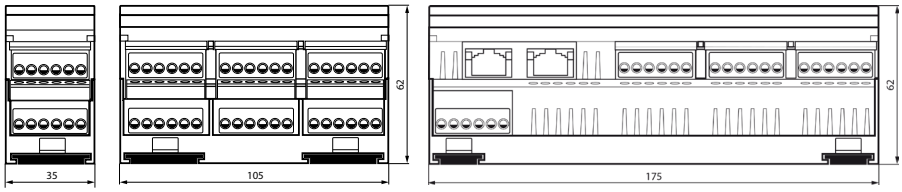
PCD1.Gxxxx-C15

- 0: not programmable
  5: programmable
- 1: with LED for I/O
  2: with LED and man. override op.
  3: with LED and display
- A: 24 VDC
  C: 24 VDC / VAC
  F: 230 VAC
  J: 110…230 VAC

Dimensions

Compatible with electrical control cabinets (in accordance with DIN 43880, size 2 × 55 mm)





Housing width
2 HP (35 mm)
2 module wide

Housing width
6 HP (105 mm)
6 module wide

Housing width
10 HP (175 mm)
10 module wide

Accessories and consumables*

EPLAN macros

EPLAN macros are available for project planning and engineering

The EPLAN® electric P8 macros are available on the support site.

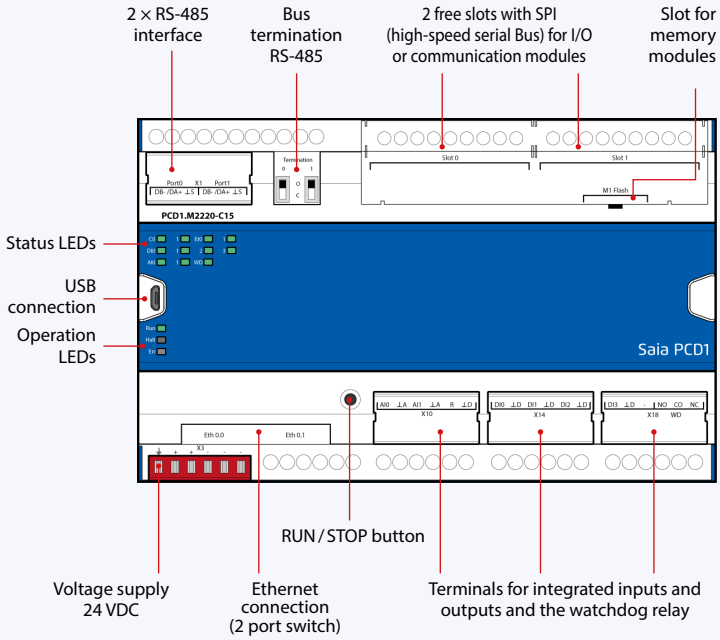
The macros and article data are also provided on the EPLAN® data portal.

*In preparation

1.6.2 PCD1 E-Line controller

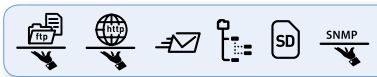
The Saia PCD1 E-Line CPU series was specifically developed for installation in electrical sub-distributors. The compact design enables automation in confined spaces. The E-Line CPU is designed and produced to industrial quality in accordance with IEC 61131-2. The extensive programmability and integration of web+IT technologies enables effective automation over the entire service life of plants and properties. The Saia PCD® E-Line CPU is the ideal interface for other plants owing to the support of numerous protocols such as BACnet, LON, Modbus, etc. It is also ideal to achieve (energy-) efficient and individual room automation. It also provides a good basis to achieve the energy efficiency classes in accordance with EN 15232:2012.

Device design



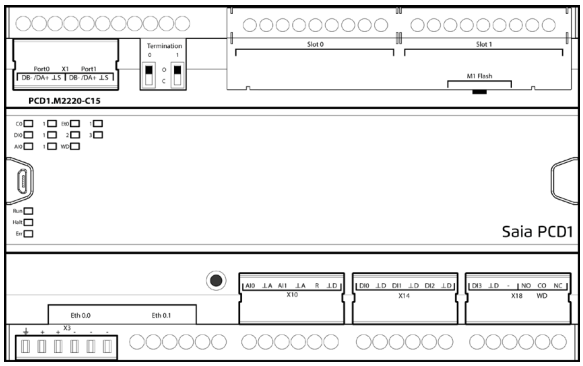
Features

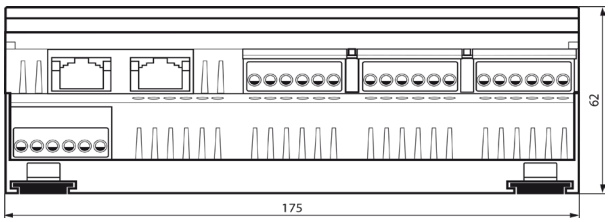
- 4 digital inputs
- 2 analogue inputs, individually configurable via software
- 1 Watchdog relay/changeover contact
- Electrical isolation between supply, bus and I/Os
- Pluggable terminal blocks protected by flaps
- Status LEDs on the front
- Ethernet switch, 2× RS-485 and USB interface
- Large onboard memory for data (up to 128 MByte file system)
- Automation server for integration in web+IT systems
- Freely programmable with Saia PG5®
- FRAM technology



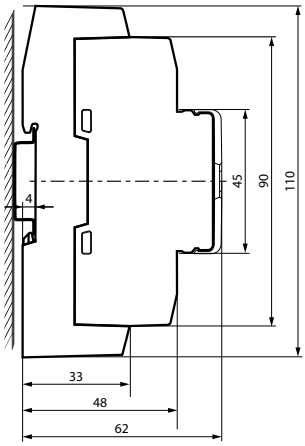
Automation Server integrated in the base unit

Dimensions and installation





Housing width 10 HP (175 mm)
Compatible with electrical control cabinets
(in accordance with DIN 43880, size 2 × 55 mm)



on DIN rails 35 mm
(in accordance with DIN EN 60715 TH35)

Connection concept

The device is supplied by a 24 VDC or AC voltage supply.

Overview Saia PCD1.M2220-C15

Technical data

Memory and file system	Types:	PCD1.M2220-C15
Program memory, DB/Text (Flash)		512 kByte
User memory, DB/Text (RAM)		128 kByte
Onboard user flash file system		128 MB
Integrated communication		
Ethernet connection (2-port switch) 10/100 Mbit/s, full-duplex, auto-sensing, auto-crossing		Yes
Service interface: Micro USB		Yes
RS-485, up to 115 kbit/s		Yes

General specifications

Operating voltage	Nominal 24 VAC (50 Hz) or DC, 24 VDC, –20/+25 % incl. 5% ripple, 24 VAC, –15 %/+15% (in accordance with EN/IEC 61131-2)
Operating temperature:	0…55 °C
Dimensions (W × H × D)	175 × 110 × 62 mm
Mounting location	2 × DIN rails in accordance with DIN EN60715 TH35 (2 × 35 mm) or on a flat surface
Power consumption	typically 6.5 W

Onboard inputs/outputs

Inputs:

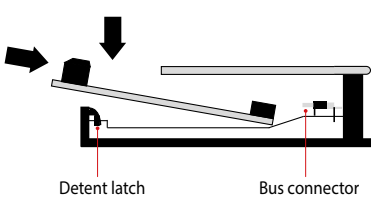
4	Digital inputs	24 VAC / VDC source operation (positive switching) or sink operation	Terminal X14 + X18
2	Analogue inputs, selectable via "Device Configurator"	–10…+10 VDC, Pt1000, Ni1000, Ni1000 L&S, 0…2.5 kΩ, 0…7.5 kΩ, 0…300 kΩ (NTC10k and NTC20k), 12 bit resolution	Terminal X10

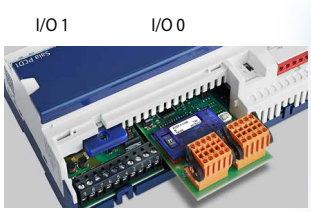
Outputs:

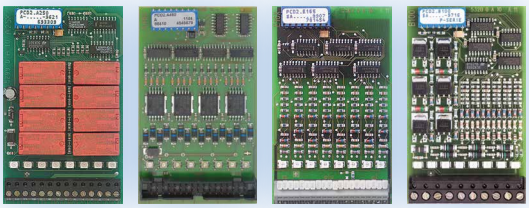
1	Watchdog relay or change-over contact	48 VAC or VDC, 1 A With DC switching voltage a free-wheeling diode should be connected in parallel to the load	Terminal X18

Plug-in I/O modules for slots I/O 0 and I/O 1

The modules listed in the PCD2.M4 and PCD2.M5 series (Chapter 1.4) are also used for the E-Line CPUs.







PCD1.M2220-C15 interface options

In addition to the onboard interfaces, the interface functions can also be expanded in a modular way using the various slots. Numerous protocols are therefore supported by the Saia PCD1.M2220-C15. Detailed information and an overview is contained in the Chapter BA communication systems.

Communication		Electrical isolation	Internal current consumption 5V	+V (24 V)	Slot	I/O connector type [1]
PCD7.F110S	RS-422 with RTS/CTS or RS-485 [2]	---	40 mA	–	Slot A [3]	
PCD7.F121S	RS-232 with RTC/CTS, DTR/DSR, DCD, suitable for modem or EIB connection	---	15 mA	–	Slot A [3]	
PCD7.F150S	RS-485 [2]	•	130 mA	–	Slot A [3]	
PCD7.F180S	Belimo MP-Bus, for connecting up to 8 drives on one line	---	15 mA	15 mA	Slot A [3]	
PCD2.F2100	RS-422/RS-485 [2], plus PCD7.F1xxS en option	---	110 mA	–	IO 0/1	2× K
PCD2.F2150	BACnet® MS/TP RS-485 plus PCD7.F1xxS as an option	---	110 mA	–	IO 0/1	2× K
PCD2.F2210	RS-232 plus PCD7.F1xxS as an option	---	90 Ma	–	IO 0/1	2× K
PCD2.F2400	LonWorks® interface module	---	90 Ma	–	IO 0/1	L9
PCD2.F2610	DALI master for up to 64 DALI devices	---	90 Ma	–	IO 0/1	L
PCD2.F27x0	M-Bus master with 2 M-Bus interfaces	---	70 mA	8 mA	IO 0/1	L
PCD2.F2810	Belimo MP-Bus plus PCD7.F1xxS as an option	---	90 Ma	15 mA	IO 0/1	2× K

[1] Plug-in I/O terminal blocks are supplied with I/O modules.
Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories.
[2] with line termination resistors that can be activated.
[3] On slot A of the PCD2 communication cards PCD2.Fxxxx.

System properties of PCD2.F2xxx modules

The following points must be noted when using the PCD2.F2xxx interface modules:

- Max. 2 modules PCD2.F2xxx (4 interfaces) can be used in slots I/O 0/1 per PCD1.M2220-C15.

Memory modules

The onboard memory of the E-Line CPU can be expanded using a Saia PCD7.Rxxx module in slot M1.
In addition, the controller can be expanded with BACnet® IP or Lon IP.

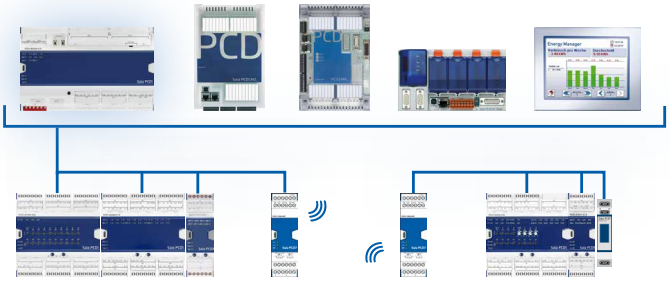
Additional information about the memory management and structure is contained in the chapter Saia PCD® System Description.

Memory expansion and communication		
PCD7.R550M04	Flash memory module with a 4 MB file system (for user program backup, web pages, etc.)	M1
PCD7.R562	Flash memory module for BACnet® firmware with 128 MB file system	M1
PCD7.R582	Flash memory module for Lon IP firmware with 128 MB file system	M1
PCD7.R610	Basic module for Micro SD flash card	M1
PCD7.R-MSD1024	Micro SD flash card 1024 MB, PCD formatted	PCD7.R610

PCD7.R55xM04

PCD7.R610

System design with PCD1 E-Line modules and Saia PCD® controllers



The PCD1.M0/PCD1.M2 controllers and PCD2.M5-, PCD3.M3/5/6 CPUs as well as the programmable Micro Browser panel PCD7.D4xxxT5F can be used as head-end stations.
Here, the controller can process higher-level control processes and gather, process and visualise data and form the interface to the control level.

1.6.3 PCD1 E-Line fully programmable modules

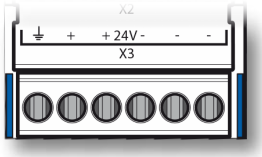
The Saia PCD1 E-Line fully programmable modules are for specific applications. For example for room automation, zone control and decentralised automation. The modules are freely programmed using the Saia PG5® tool. The Saia PCD1 E-Line series enables autonomous and safe operation of the modules even if communication to the master station is interrupted. The local function of a room, for example, is therefore guaranteed at any time.

System properties

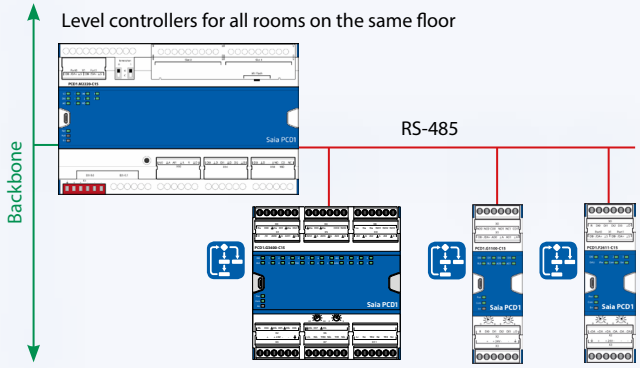
- Freely programmable modules for specific applications
- Galvanic isolation between supply, bus and I/Os
- Pluggable terminal blocks protected by covers
- Status LEDs on the front
- RS-485 and USB interface
- Industrial quality
- Each wire is a connection

Connection concept

The modules are supplied with a 24 VDC or AC voltage supply. Supply to the modules is below.



Bus topology and applications



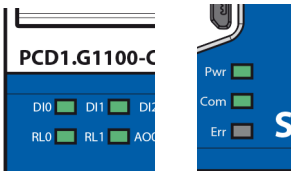
All the modules are freely programmable and can be operated as "standalone". Data is exchanged between them via the RS-485 connection and a terminal, e.g. a level controller.

Thanks to the options with the autonomous functions, the modules are ideally suitable for:

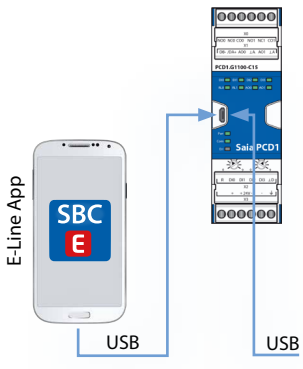
- Room automation
- Zone control
- Decentralised automation

LED

The currently active statuses are displayed on the respective LEDs for the inputs and outputs. The same applies to the voltage supply, communication and errors.



Commissioning with the smartphone



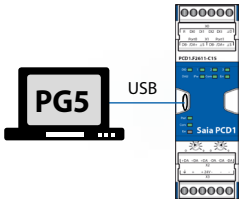
SBC E-Line app

The E-Line modules have a Micro-USB interface.
Various services for commissioning and service are available using a suitable end device (for example, Samsung Galaxy S4) and the SBC E-Line app. For example, the connections can be tested without a loaded program.
The E-Line app can also be used by using a link via the Micro-USB connection to the module with the end device.

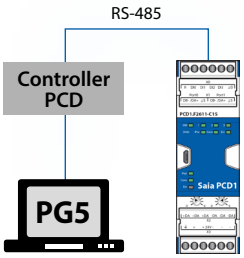
More details on which end devices are supported by this technology and app can be found on our support page at www.sbc-support.com.
A USB OTG (on to go) cable is required for connecting via USB.

Programming

The modules are programmed with Saia PG5® via a master controller or directly via Micro-USB. This enables additional options for commissioning and during operation.



Programming direct via USB
E-Line modules have a Micro-USB connection at the front of the module. For example, the user program for the related module or a firmware update for the module can be loaded via the direct connection of the PC to the module via USB.



Programming via a master controller (PCDx.Mxxxx)
The master controller connected to the freely programmable E-Line modules uses the RS-485 bus (S-Bus), to load the user program or a firmware update on the corresponding modules.
Here the master controller is used as a gateway.

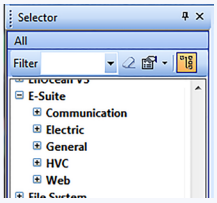
The modules are programmed with Saia PG5® using FBoxes or IL.
A range of FBoxes is therefore available to simplify engineering.

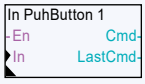
List of libraries that are supported:

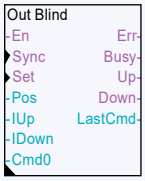
PG5 standard FBox libraries

- Binary
- Blinker
- Block Control (no SB)
- Buffers
- Com.Text (not interpreted)
- Converter
- Counter
- DALI E-Line Driver (new)
- Data Block
- Data Buffer
- EIB Driver (partly)
- EnOcean (partly)
- Flip-Flop
- Floating Point (IEEE only)
- HVC (partly)
- Indirect
- Integer
- Ladder
- Move In / Out
- Modbus (E-Suite)
- Regulation (partly)
- Special, sys Info (partly)
- Timer
- PHC

In addition to these libraries, a new "E-Suite V2" library is available for specific applications that can be created with the Saia PCD1 E-Line modules.
An example for the electrical plant: Shade control, light dimming…







Program
Non-volatile memory (Flash memory)

Program blocks	
COB	COB 0
XOB	XOB 10, 12, 13 and 16
PB / FB	100 with maximum hierarchy of 8
Data types	
ROM Text / DB	50
Memory	
Program memory	64 kBytes

The media
Volatile memory (RAM) without battery backup

Data types	
Register	2000
Flag	2000
Timer / Counter	200
Memory	
Memory (RAM) for 50 Text / DB	5 kBytes
Memory (EEPROM) for parameter (media) backup	256 Bytes
Cyclic synchronisation with PCD controller	Real-time clock (RTC)

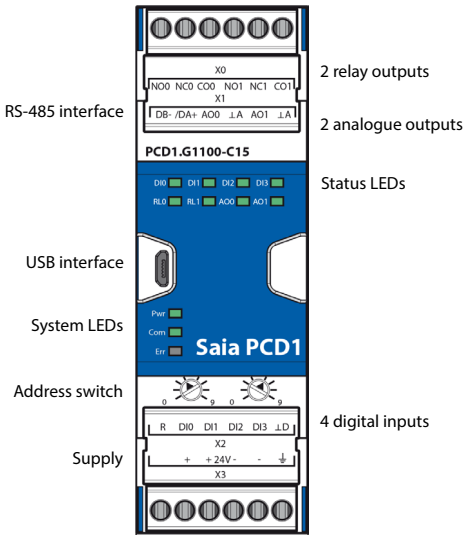
Not all functions are available compared to a PCDx.Mxxxx controller. These modules do not have an automation server for example.

More details on which FBoxes are supported is available on our support page
www.saia-support.com

PCD1.G1100-C15 (light and shade module)

The freely programmable module with a housing width of 35 mm (2 HP) can be controlled via RS-485 and enables light and shade control. It has two analogue and two relay outputs and four digital inputs. The user can optionally use the relay for the direct switching of two light groups or control of window shading. The blinds or shading can be positioned and defects localised via the integrated load current measurement. The user can use the digital inputs to connect electrical sensors.

Device design



System properties

- 4 digital inputs
- 2 relays incl. current detection
- 2 analogue outputs
- Galvanic isolation between supply, bus and I/Os
- Pluggable terminal blocks protected by covers
- Status LEDs on the front
- RS-485 and USB interface
- Freely programmable with Saia PG5®

Technical Data

Interfaces	
Communication interface	RS-485 with galvanic isolation Baud rate: 9,600, 19,200, 38,400, 57,600, 115,200 bps (autobauding)
Address switch for S-Bus address	Two rotary switches 0…9
Service interface	USB (Micro-USB)
General specifications	
Supply voltage	Nominal 24 VAC (50 Hz) or VDC (in accordance with EN / IEC 61131-2) 24 VDC, –15 / +20% max., incl. 5% ripple 24 VAC, –15 / +10%
Electrically isolated	500 VDC between power supply and RS-485 and between current supply and inputs/outputs
Dimensions	Housing width 2 HP (35 mm), compatible with electrical control cabinet (in accordance with DIN 43880, size 2 × 55 mm)
Mounting type	DIN rail in accordance with DIN EN 60715 TH35 (1 × 35 mm)
Ambient temperature	Operation: 0…+55°C, without forced ventilation Storage: –40…+70°C
Power consumption	Typical 2 W

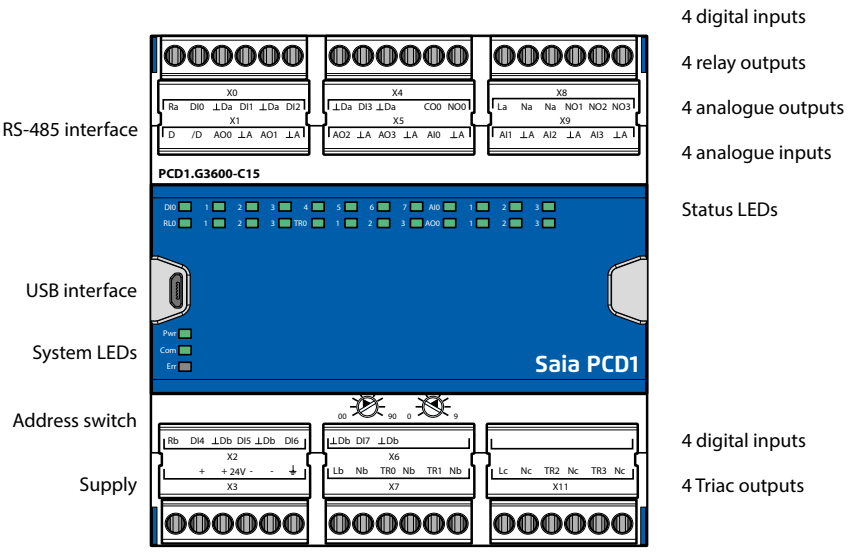
Inputs and outputs

Inputs	
4 digital inputs	24 VAC / VDC
Outputs	
2 analogue outputs	0…10 VDC, 12 bit resolution
2 relays (inrush)	250 VAC / 30 VDC 8 AAC (AC1) / 8 ADC (resistive load) Max. inrush current 15 A Current measurement ≥ 200 mA, resolution 100 mA

PCD1.G360x-C15 (room module)

The programmableroom module with a housing width of 105 mm (6 HP) can be controlled via RS-485.
For example, it allows individual room control with commonly found room automation components. It allows controller tasks from the HVAC and electrical plant areas to be combined. All relevant sensors for measuring temperature, humidity, CO_2, VOC and digital 24 VAC/VDC signals are detected via the diverse inputs. The Triac and 0…10 V outputs enable the silent setting of valves. Fan coil devices can also be directly controlled.

Device design



System properties

- 8 digital inputs
- 4 analogue inputs, individually configurable via software
- 4 analogue outputs
- 4 Triac outputs
- 4 relay outputs
- Galvanic isolation between supply, bus and I/Os
- Pluggable terminal blocks protected by covers
- Status LEDs at the front
- RS-485 and USB interface (for PCD1.G3601-C15 also 1× RS-485)
- Freely programmable with Saia PG5®

Technical Data

Interfaces	
Communication interface	RS-485 with galvanic isolation Baud rate: 9,600, 19,200, 38,400, 57,600, 115,200 bps (autobauding)
Address switch for S-Bus address	Two rotary switches 0…9
Service interface	USB (Micro-USB)
Additional interface	RS-485 in SASI Mode C for PCD1.G3601-C15 (E-Suite, Modbus, EnOcean, PHC)
General specifications	
Supply voltage	Nominal 24 VAC (50 Hz) or VDC (in accordance with EN / IEC 61131-2) 24 VDC, –15 / +20% max., incl. 5% ripple 24 VAC, –15 / +10%
Electrically isolated	500 VDC between current supply and RS-485 and between current supply and inputs/outputs
Dimensions	Housing width 6 HP (105 mm), compatible with electrical control cabinet (in accordance with DIN 43880, size 2 × 55 mm)
Mounting type	DIN rail in accordance with DIN EN 60715 TH35 (1 × 35 mm)
Ambient temperature	Operation: 0…+55°C without forced ventilation Storage: –40…+70°C
Power consumption	Typical 2 W

Inputs and outputs

Inputs	
8 digital inputs	24 VAC / VDC, 8 ms / 0.2 ms input filter
4 analogue inputs (adjustable via software)	0…10 V, ±10 V, ±20 mA (0…20 mA, 4…20 mA), Pt/Ni1000, Ni1000 L&S, 0…2,500 Ω, 0…7,500 Ω, 0 Ω…300 kΩ 12/13 bit resolution, depending on the measured values
Outputs	
4 analogue outputs	0…10 VDC, ±10 V, 12 bit resolution
1 relay (inrush)	250 VAC / 30 VDC 10 AAC (AC1) / 10 ADC (resistive load) Max. inrush current 65 A
3 relays	250 VAC / 30 VDC 6 AAC (AC1) / 6 ADC (resistive load) Max. inrush current 15 A
4 Triacs	24 VAC / 230 VAC, current load rating 1 A (AC)

Order details

Type	Description
PCD1.G3600-C15	E-Line room control module
PCD1.G3601-C15	E-Line room control module + aux. RS-485

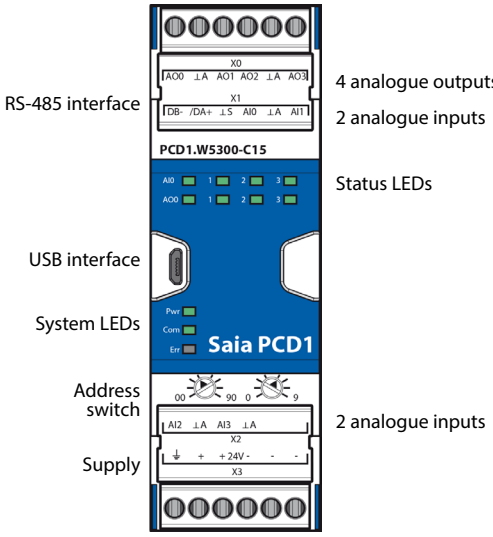
Accessories

Type	Description
PCD1.K0206-005	E-Line cover and labeling set consisting of 5× covers (6HP=105mm) and Labelling sheets for installation in automation control cabinets

PCD1.W5300-C15 (analogue module)

The programmable analogue module with a housing width of 35 mm (2 HP) has four inputs and outputs. Each input and output is electrically separated and can be configured separately. Small and purely analogue tasks such as recording the room temperature and subsequent control of 0–10 V drives can therefore be realised.

Device design



System properties

- 4 analogue inputs
- 4 analogue outputs
- Galvanic isolation between supply, bus and I/Os
- Pluggable terminal blocks protected by covers
- Status LEDs at the front
- RS-485 and USB interface
- Freely programmable with Saia PG5®

Technical Data

Interfaces	
Communication interface	RS-485 with galvanic isolation Baud rate: 9,600, 19,200, 38,400, 57,600, 115,200 bps (autobauding)
Address switch for S-Bus address	Two rotary switches 0…9
Service interface	USB (Micro-USB)
General specifications	
Supply voltage	Nominal 24 VAC (50 Hz) or VDC (in accordance with EN / IEC 61131-2) 24 VDC, –15 / +20% max., incl. 5% ripple 24 VAC, –15 / +10%
Electrically isolated	500 VDC between power supply and RS-485 as well as between current supply and inputs/outputs
Dimensions	Housing width 2 HP (35 mm), compatible with electrical control cabinet (in accordance with DIN 43880, size 2 × 55 mm)
Mounting type	DIN rail in accordance with DIN EN 60715 TH35 (1 × 35 mm)
Ambient temperature	Operation: 0…+55°C, without forced ventilation Storage: –40…+70°C
Power consumption	Typical 2 W

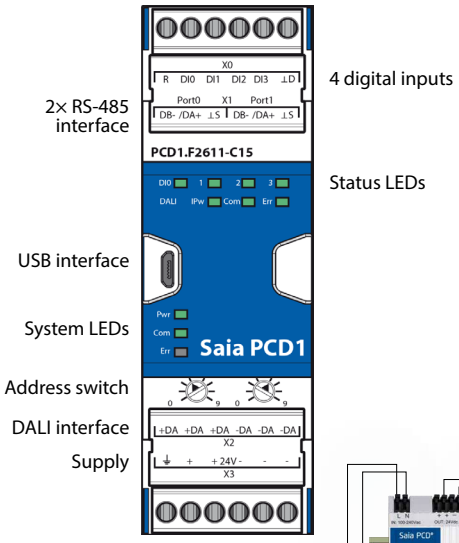
Inputs and outputs

Inputs	
4 analogue inputs (adjustable via software)	0…10 V, ±10 V, ±20 mA (0…20 mA, 4…20 mA), Pt/Ni1000, Ni1000 L&S, 0…2500 Ω, 0…7500 Ω, 0 Ω…300 kΩ 12/13 bit resolution, depending on the measured values
Outputs	
4 analogue outputs	0…10 VDC, ±10 V, 12 bit resolution

PCD1.F2611-C15 (DALI module + add. RS-485)

The freely programmable module with a housing width of 35 mm (2 HP) can be controlled via RS-485 and enable the direct control of 64 DALI subscribers. It has the DALI line as well as four digital inputs. The user can implement the digital inputs to connect electrical sensors. The module is freely programmable and can also be used as a "standalone" DALI small controller. For example, smaller DALI lighting systems for enhanced individual rooms can therefore be implemented and subsequent linking to a higher level controller is no longer an obstacle.

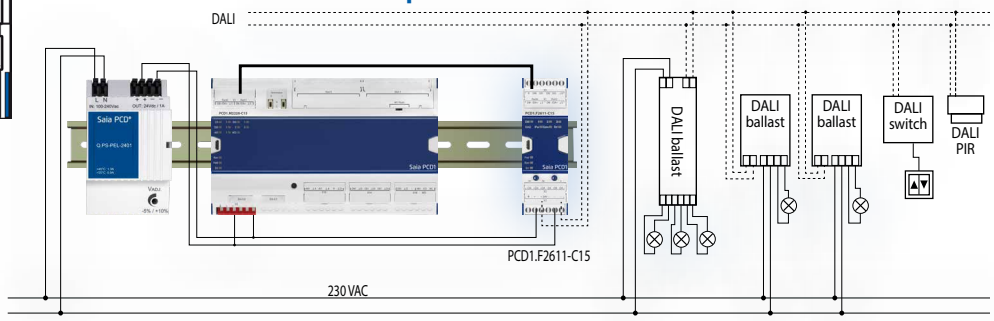
Device design



System properties

- S-Bus (RS-485) / DALI interface
- incl. DALI voltage supply (can be deactivated)
- Up to 64 DALI ballasts
- 4 digital inputs
- Galvanic isolation between supply, bus and I/Os
- Pluggable terminal blocks protected by covers
- Status LEDs on the front
- RS-485 and USB interface
- Freely programmable with Saia PG5®

Connection example



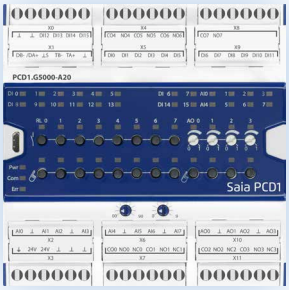
Technical Data

Interfaces	
Communication interface	RS-485 with galvanic isolation Baud rate: 9,600, 19,200, 38,400, 57,600, 115,200 bps (autobauding)
Address switch for S-Bus address	Two rotary switches 0…9
Service interface	USB (Micro-USB)
DALI	incl. DALI voltage supply (can be deactivated) for up to 64 DALI subscribers 160 mA max. Output current basic insulation (1350 VAC)
Additional interface	RS-485 in SASI mode C (E-Suite, Modbus, EnOcean, PHC)
General specifications	
Supply voltage	Nominal 24 VAC (50 Hz) or VDC (in accordance with EN / IEC 61131-2) 24 VDC, –15 / +20% max., incl. 5% ripple 24 VAC, –15 / +10%
Electrically isolated	500 VDC between current supply and RS-485 and between current supply and inputs/outputs
Dimensions	Housing width 2 HP (35 mm), compatible with electrical cabinet (in accordance with DIN 43880, size 2 × 55 mm)
Mounting type	DIN rail in accordance with DIN EN 60715 TH35 (1 × 35 mm)
Ambient temperature	Operation: 0…+55°C without forced ventilation Storage: –40…+70°C
Power consumption	Typical 2 W

Inputs

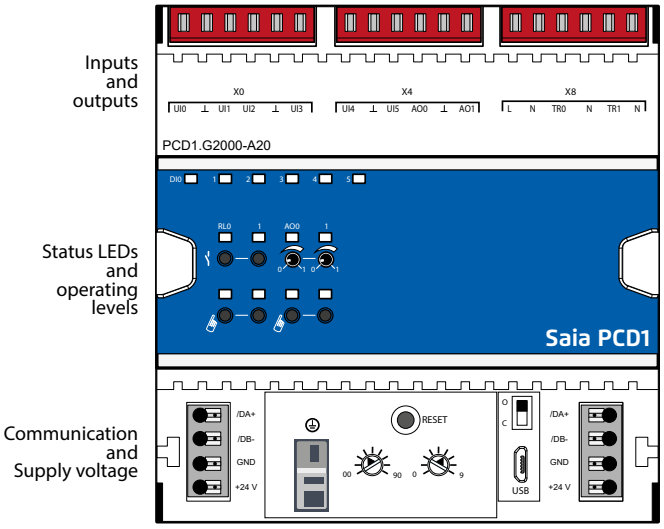
Inputs	
4 digital inputs	24 VAC / VDC

1.6.4 PCD1 E-Line input and output modules



The remote I/O modules are controlled via RS-485 and enable decentralised automation using industrial quality components. The data point mix is specifically designed for applications in the HVAC sector. Moreover, the compact design enables the use of electrical distribution boxes alongside installations even in confined spaces. Commissioning and servicing are facilitated due to the local override operating level for each output. Remote maintenance is also possible using the optional access to the override operating level via the web interface in the Saia PCD® controller. Programming is also very efficient and fast using a comprehensive FBox library with web templates.

Device design – S-Serie

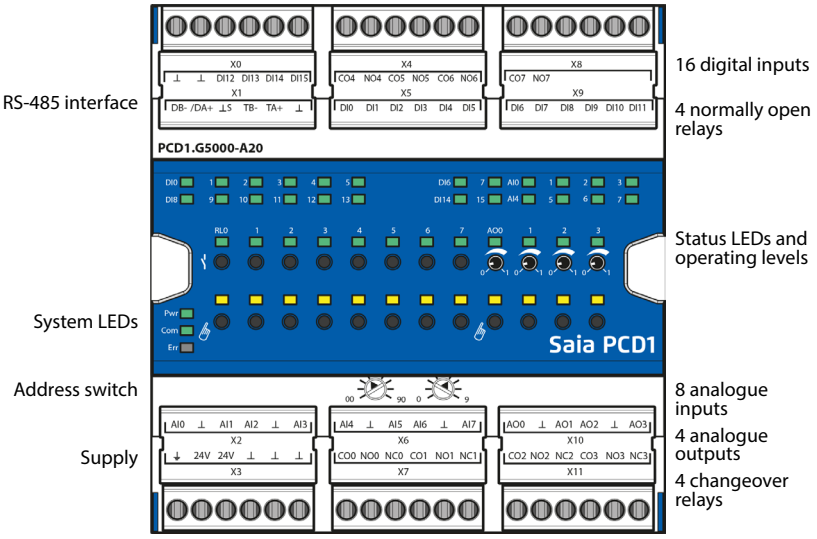


Address switches

System properties

- Optimised S-Bus protocol for fast data communication
- Local override operating level via web panel or buttons on the module
- Specific I/O mix suitable for HVAC systems
- Convenient programming using the FBox library and web templates
- Industrial quality in accordance with IEC EN 61131-2
- Pluggable terminal blocks protected by covers
- RS-485 interface
- Easy installation with connector bridge

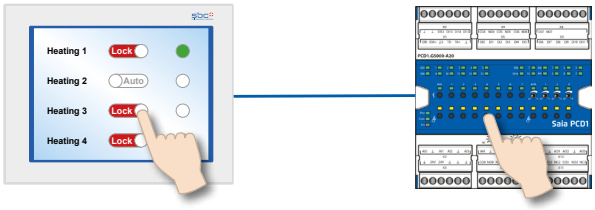
Device design – L-Serie



System properties

- Optimised S-Bus protocol for faster communication (4 × faster)
- Local override operating level via web panel or buttons on the module
- Specific I/O mix suitable for HVAC systems
- Convenient programming using the FBox library and web templates
- Industrial quality in accordance with IEC EN 61131-2
- Pluggable terminal blocks protected by covers
- Electrically isolated RS-485 interface
- High I/O density thanks to two-sided connection terminals

Manual or remote override operating level



For modules with a manual override operating level, commissioning can occur independent of the master station.

The manual operating level can also be controlled remotely from a touch panel. If the bus line is disconnected, the module retains the manually set values. Traditional manual operating levels in the control cabinet door via potentiometers and switches can therefore be completely replaced.

Five security levels can be defined for the manual operating level:

1. Manual operation completely deactivted
2. Operation permitted only from the module
3. Operation permitted from the module and limited operation from the panel. If manual operation is activated at the module, it cannot be reset from the panel.
4. Unlimited operation from the panel and module.
5. Operation permitted only from "remote".

Depending on the application, manually set values may not be reset from the panel. This can therefore be deactivated or limited.

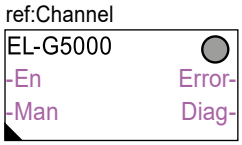
Bus wiring

S-Series : Easy and reliable installation through connector bridges for communication and supply voltage.

L-Series : Most modules are equipped with integrated terminating resistors that enable wiring without additional external components.

Programming

The modules are addressed and programmed via FBoxes.



Communication FBox:

- Data exchange for I/O via optimised S-Bus
- Configurable fall back state for bus interruption or timeout
- Direct generation of the symbols
- Reading and writing of the status of the override operating level
- Direct compatibility for web macros

Web templates:

- Web templates are available for the operation and visualisation of the override operating level

General technical data

Power supply	
Supply voltage	24 VDC, –15 / +20% max., incl. 5% ripple (in accordance with EN / IEC 61131-2)
Electrically isolated	500 VDC between power supply and RS-485 and between inputs/outputs and RS-485 *
Power consumption max.	3 W
Interfaces	
Communication	RS-485 with galvanic isolation * / baud rate: 9,600, 19,200, 38,400, 57,600, 115,200 bps (autobauding)
Address switch for S-Bus	Two rotary switches 0…9
Terminating resistor	Integrated, can be activated via a wire jumper
General specifications	
Ambient temperature	Operation: 0…+55°C without forced ventilation / storage: –40…+70 °C
Terminals	Push-in spring-loaded terminals – max. 1.5 mm^2.
Width	6TE (105mm)

* Only for L-Series

Technical data for inputs and outputs

Digital inputs	
Input voltage	24 VDC, high active
Relay outputs	
Switching voltage max.	250 VAC / 30 VDC
Switching current max.	see below board, datasheet
Contact protection	n/a
Analogue inputs	
Resolution	12/13 bit resolution, depending on the measured values
Measured values	0…10 V, Pt/Ni1000, Ni1000 L&S, NTC, 0…2,500 Ω, 0…7,500 Ω, 0 Ω…300 kΩ can be set via FBoxes
Precision	0.3% at 25°C
Analogue outputs	
Resolution	10 bits
Signal range	0…10 V (10 mA max.)
Man. Override operation	Operation via buttons and potentiometer

S-Series

Type	Digital input (DI), universal input (UI)	Relay, triac, digital output (DO)	Analogue output	Manual override operation
PCD1.A1000-A20	---	10 DO 24 VDC, 0.5 A	---	Yes
PCD1.A2000-A20	---	6 relays 230 V, 16 A	---	Yes
PCD1.B5000-A20	6 DI 230 VAC	3 relays 230 V, 6 A	---	Yes
PCD1.B5010-A20	6 DI 24 VAC/VDC	3 relays 230 V, 6 A	---	Yes
PCD1.E1000-A10	12 DI 24 VDC	---	---	---
PCD1.G2000-A20	6 UI	2 triacs 24…230 VAC, 1 A	2	Yes
PCD1.G2100-A10	8 UI	---	---	---
PCD1.G2200-A20	8 UI	---	4	Yes
PCD1.W5200-A20	---	---	8	Yes

L-Series

Type	Digital input	Relay (NO / changeover)	Analogue input	Analogue output	Manual override operation
PCD1.B1000-A20	4	10 (6/4), 4A	---	---	Yes
PCD1.B1010-A20	24	10 (6/4), 4A	---	---	Yes
PCD1.B1020-A20	16	4 (0/4), 4A	---	---	Yes
PCD1.G5000-A20	16	8 (4/4), 4A	8	4	Yes
PCD1.G5010-A20	12	4 (0/4), 4A	12	8	Yes
PCD1.G5020-A20	8	4 (0/4), 4A	16	4	Yes

Accesories

Type	Short text	Description	Weight
32304321-003-S	Terminal set – S+L-Serie	6-pin terminal. Set of 6 terminal blocks	40 g
In preparation	Connector bridge – S-Serie	Set of 10 connector bridges for interconnection of power supply and communication bus.	100 g

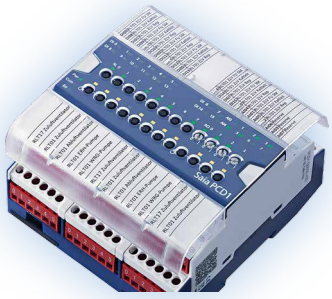
Accessories

Type	Short text	Description	Weight
PCD1.K0206-005	E-Line Cover Set 5×6 HP*	E-Line cover and labelling set consisting of 5× covers (6 HP=105 mm) and labelling sheets for installation in automation control cabinets	365 g
PCD1.K0206-025	E-Line Cover Set 5×6 HP* w.h.	E-Line cover and labelling set w.h. consisting of 5× covers (6 HP =105 mm) with holes for the manual priority operating level and labelling sheets for installation in automation control cabinets	365 g

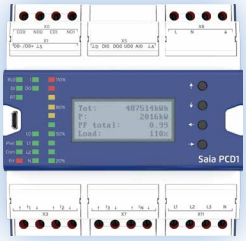
* Horizontal pitch: 1 HP corresponds to 17.5 mm

Mounting and labelling in the automation control cabinet

The modules can be mounted in the standard automation control cabinet as well as mounting in the electrical sub-distributor. Covers are available for this for easy labelling. They also serve as contact protection for the buttons and terminals to prevent faulty operation.

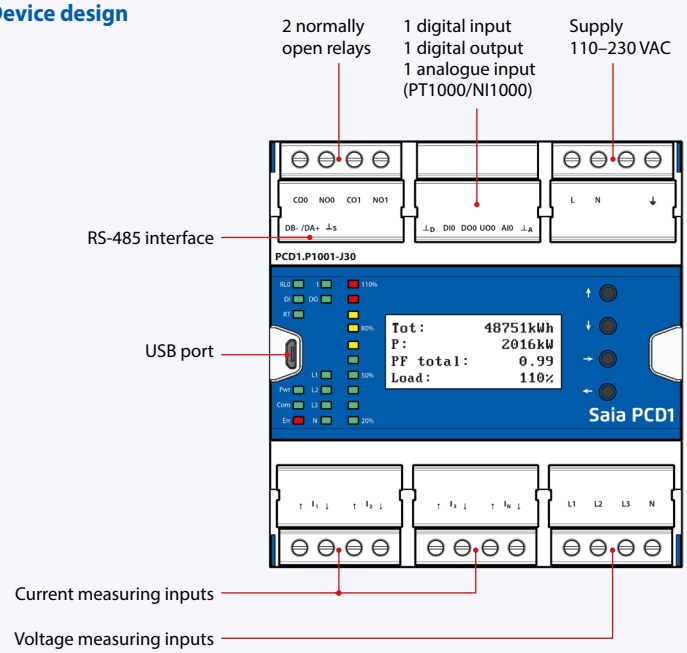


PCD1.P1001-J30
(Power Quality Analyzer)



The Power Quality Analyser (PQA) is a device to measure and check the quality of the power supply and is manufactured as an industrial grade DIN rail device. The compact E-Line design enables installation in restricted spaces in electrical distributor boxes. The extensive measurement options enable an analysis of any disturbances with cyclic/event-oriented data capture and automatic messaging if a measured variable is outside the tolerance limits. The integrated RS-485 interface is available in the S-Bus/Modbus and enables communication with a Saia PCD® controller or other master devices. Programming is also very efficient and fast using a comprehensive FBox library with web templates.

Device design



System properties

- Network analyser with 0.5% measurement accuracy
- Measurement of the 3 phases and neutral conductor
- Current measurement inputs for current converter connection
- Measurement data storage (event/cyclic) in internal memory
- 1.9 inch LCD
- Electrically isolated measuring inputs
- Temperature measuring input
- Electrically isolated RS-485 interface for S-Bus/Modbus (switchable)
- 105 mm wide DIN rail devices (6 modules)

General technical data

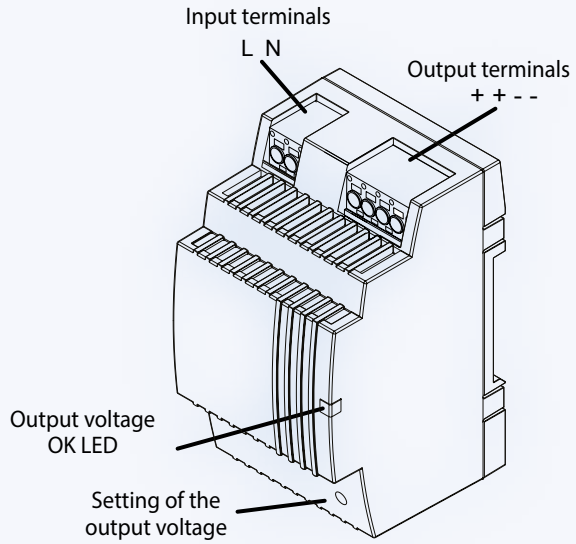
Power supply	
Supply voltage	110–230 VAC, +15% –20%, 50/60 Hz
Electrically isolated	4,000 VAC between power supply and RS-485
Power consumption	Max.: 6 W typically: 1.5 W
Interface	
Communications interface	RS-485 with electrical isolation Baud rate: 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 bps
Bus protocol	S-Bus or Modbus interface: Selectable via LCD
Configuration	Parity: Selectable via LCD
Address	Address range: S-Bus: 0 … 255 Modbus: 1 … 253 Selectable via LCD
Terminating resistor	Integrated, can be activated via the display and interface
General data	
Ambient temperature	Operation: –25°C … +55°C Storage: –30°C … +70°C
Mounting type	Top-hat rail pursuant to DIN EN 60715 TH35 (1 × 35 mm)
Measurement accuracy	
Active energy/power	Resistive load: ± 0.5% (5 A CT); ± 1.0% (1 A CT) Inductive load: ± 0.6% (5 A CT); ± 1.0% (1 A CT)
Reactive energy/power	Resistive load: ± 1.0% (5 A CT); ± 1.0% (1 A CT) Inductive load: ± 1.0% (5 A CT); ± 1.0% (1 A CT)

More details are in Chapter 4 “Consumer data acquisition” on page 148.

1.6.5 E-Line system components

Power units for installation in electrical distributor boxes

The compact Q.PS-PEL-240x power units with 24 VDC output voltage can be installed in a very restricted space and therefore the installation in cost-effective electrical distributor boxes in accordance with DIN 43880 is possible. They are therefore ideally suited for combining with the E-Line family. Modern push-in terminals enable efficient and fast wiring without the use of tools.



Power unit overview

Single phase 110/230 VAC

- Q.PS-PEL-2401: 24 VDC / up to 1.3 A
- Q.PS-PEL-2403: 24 VDC / up to 4.0 A

Standards and certifications

Compliant certifications

- CE
- DNV GL (shipping approval)
- UL (cURus, cULus)
- EAC

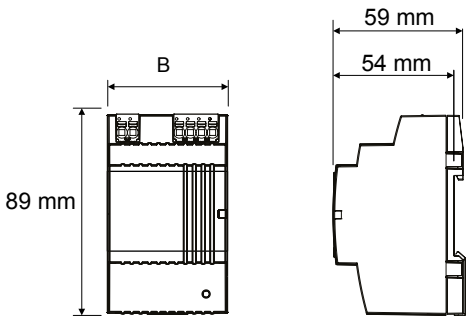
Electrical safety

- EN61558
- EN60950 (SELV)

EMC

- EN61204-3
- Immunity pursuant to EN61000-6-2 (for the industrial sector)
- Emitted interference in accordance with EN61000-6-4 (for the domestic sector)

Dimensions



Model	Q.PS-PEL-2401	Q.PS-PEL-2403
Width (W)	54 mm	90 mm

System properties

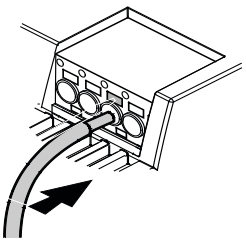
- Short-circuit protection and constant overload limiter
- Protection class II (in closed switch cabinet) -> dual isolation
- Power failure bypass up to 100 ms
- LED for output voltage OK display
- Stabilised and adjustable output voltage for the conductor resistance compensation
- Parallel operation possible to increase max. output current
- IP20 housing for mounting on DIN rail

Mounting in the sub-distributor

The design of the Q.PS-PEL2-40x power units complies with the required standard dimensions according to DIN 43880. The power units can therefore be easily integrated in electrical distribution boxes and are ideally suited to supply the components of the E-Line family with voltage

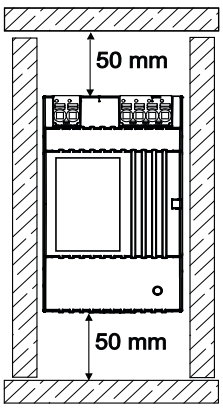
Terminal technology

Push-in terminals for efficient and fast wiring without tools for single wire conductors with a cross section of up to 2.5 mm^2 or fine wire ferrules up to 1.5 mm^2. However fine wire conductors up to 2.5 mm^2 can also be connected directly by simply applying pressure (screwdriver).



Installation information

Distance to adjacent parts:
Right/left: no minimum distance required
Top/bottom: min. 50 mm



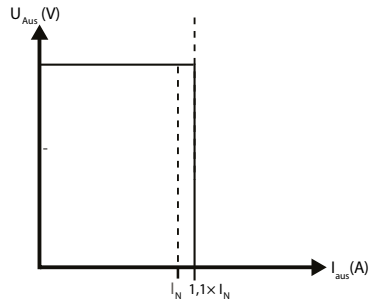
Technical data

Input data	Q.PS-PEL-2401	Q.PS-PEL-2403
Input voltage	100…240 VAC	
Permitted input voltage range	85…264 VAC	
Nominal frequency range	44…66 Hz	
Nominal input current for nominal load (110 / 230 VAC)	0.7 / 0.5 A	1.6 / 0.9 A
Internal input fuse	2 AT	4 AT
Recommended external pre-fuse	6 A, 10 A, 16 A, characteristics B, C	
Power failure bypass for nominal load (110 / 230 VAC)	10 / 80 ms	15 / 100 ms
Output data		
Output voltage (V_N)	24 VDC ± 2%	
Output voltage range (V_{ADJ})	22.8…26.4 VDC	
Output current (I_N) at ≤ 45°C	1.3 A	4 A
Output current (I_N) at ≤ 55°C	0.9 A	2.8 A
Current load rating for any installation system	max. 0.9 A	max. 2.4 A
Efficiency	typical 82%	typical 88%
Residual ripple (for nominal load)	≤ 100 mVpp	
Overload behaviour	Constant current (U/I characteristic curve)	
Short-circuit protection	Yes	
Overvoltage output protection	Yes (max. 30 VDC)	
Parallel connection	Yes	
Status		
Operating indicator	LED green	
Environment		
Ambient temperature (operation)	–25°C to +55°C (load reduction >45°C, 3%/°C)	
Storage temperature	–25°C to +80°C	
Permitted humidity	30–85% relative humidity, no condensation permitted	
Areas of use	Use in areas with contamination level 2	
Connection terminals		
Connections	Push-in	
Input/output terminals	Single wire and fine wire conductors up to max. 2.5 mm² / conductors with wire ferrules up to max. 1.5 mm²	

Output characteristics

Voltage/current characteristic curve for short-circuit and overload protection

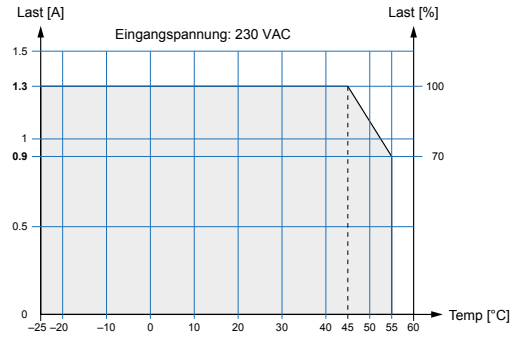
Output characteristic curve (U/I characteristic curve)



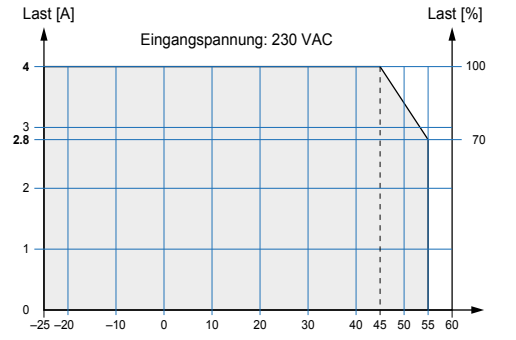
The current overload protection limits the current to a constant value of 1.1 × nominal current

Output derating curve

Q.PS-PEL-2401



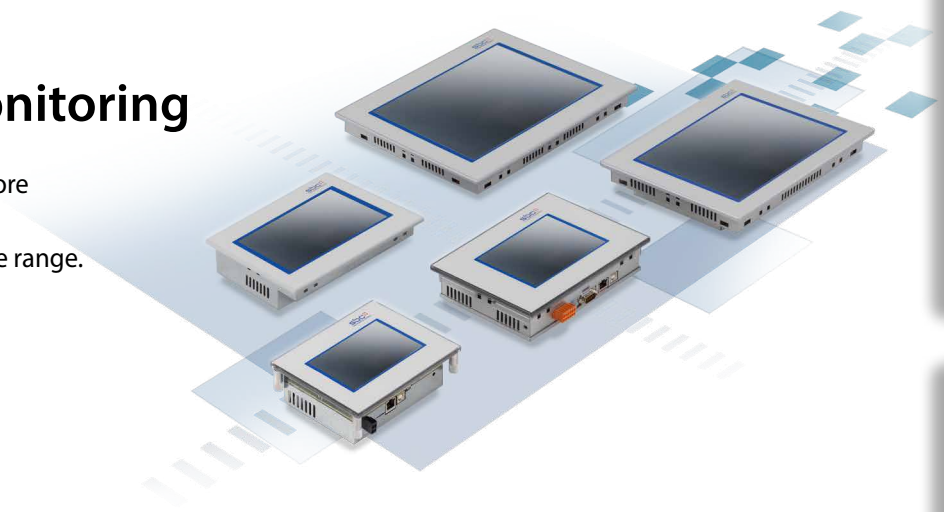
Q.PS-PEL-2403



A2

Operation and monitoring

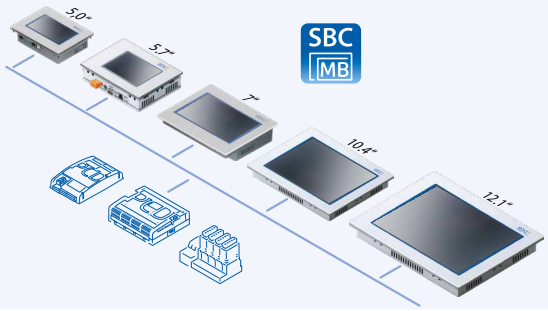
SBC microbrowser devices form the core
and main part of the HMI range.
Windows-based systems complete the range.



2.1 Overview of types, sizes and resources

Devices with Saia PCD® COSinus – control operating system

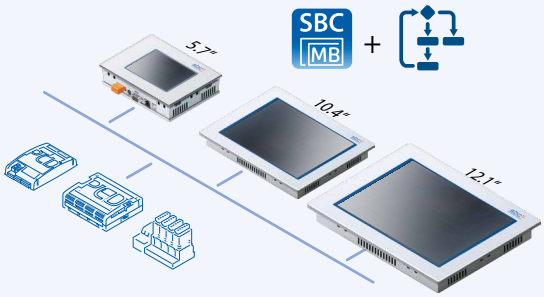
Saia PCD® Web Panels MB|Standard devices



Saia PCD® Web Panels MB|Standard devices
Robust control panel for displaying web visualisations created with the Saia PG5® Web Editor.
Ready to use with no software installation required.

Display sizes 5.0" / 5.7" / 7.0" / 10.4" / 12.1"
- Ethernet, USB and serial
- FTP server
- File system

Saia PCD® pWeb Panels MB | with programmable logic controller



Saia PCD® pWeb Panels MB|with programmable logic controller
The programmable Web Panels combine an automation server for visualisation with control and management functions in a single device.

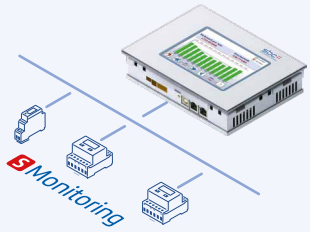
Display sizes 5.7" / 10.4" / 12.1"
- 2× Ethernet (switch), USB and RS-485
- Integrated logic controller
- Programmable with Saia PG5®
- Automation server
- 128 MB of flash memory

Saia PCD® Web Panels MB – room

Fully programmable devices in a high-quality design for use in room applications. The visualisation can be custom-designed with the web editor.

- Display size 4.3"
- 1 × Ethernet, 1 × RS-485, USB
- PCAP touch technology
- User file system 4…128 MB
- Temperature and ambient sensors

Saia PCD® Web Panels MB – Functional HMI|Visualisation and operation with ready-to-use functions



One step closer to the application

Functional HMI systems provide functions that support the user in the implementation of complex applications such as recording and visualising data records. The devices come with a preinstalled application. This application can be modified or expanded.

→ **For more information, see Chapter 4**

Windows®

Devices with Windows® operating system

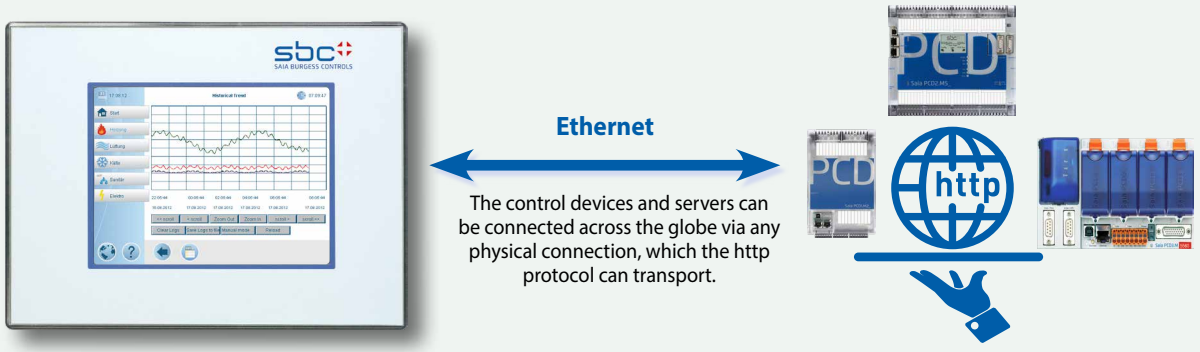
Industrial Web Panels with the Windows® operating system
Functions can be expanded for complex visualisations using JAVA or .Net components. Access to standard websites

Display sizes 12" / 15" / 21"
- Visualisation using microbrowser technology
- 2× Ethernet, USB and serial
- 500 MHz and 1.6 GHz CPU
- Web, FTP and VNC server
- Windows® CE 6.0 and Windows® 7

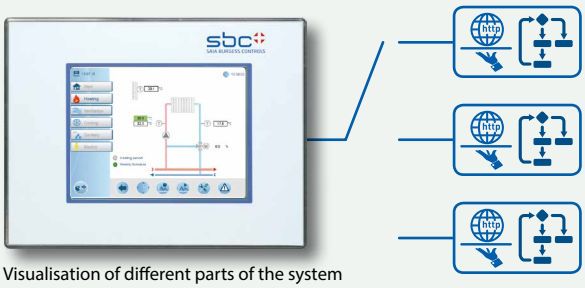
2.2 **Web Panels MB** | Web technology

Combination of openness, international standards and universality

A system for operation/monitoring with web technology consists of essentially just two functional elements: a web server and a browser. The protocol linking them is http. These two functional elements can be combined in the same automation device or located on opposite sides of the globe.



The operation/monitoring project is created once using the Saia PG5® Web Editor and saved to the associated Saia PCD® web server. Each browser can freely access any web server of the automation devices recognised in the network and run its web HMI application. A web server can handle multiple browsers simultaneously. Web HMI eliminates complex engineering, duplication of project expenses, software licensing problems and system breaks during operation/monitoring.



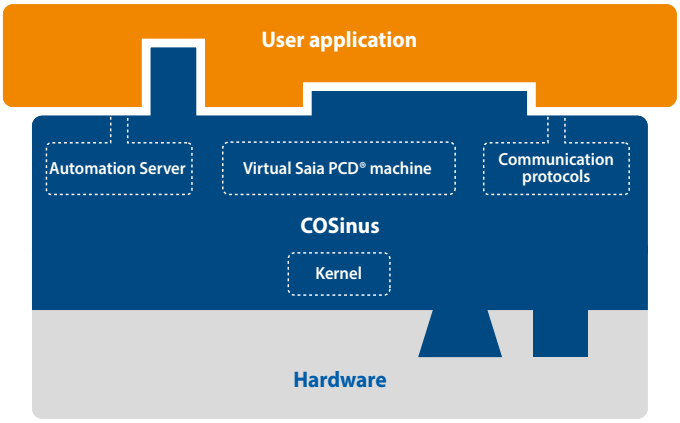
Visualisation of different parts of the system at one location

The web pages generated in Saia PG5® Web Editor are saved in a binary file format. This reduces communication costs to allow efficient visualisation even for lower power connections. Therefore, only the process points of the current view between the Web Panel and the automation server are cyclically exchanged via a CGI interface.

Saia PCD® COSinus

Saia PCD® COSinus

Systems are often expanded or equipped with new functions and must be maintained throughout their entire service life. The Saia PCD® COSinus operating system was specifically developed from scratch in-house for use in automation environments. It is therefore possible to ensure the industrial service life without being pressurised by large companies that influence the market. The top priority for Saia PCD® COSinus is a reliable and continuous operation.



The SBC microbrowser Panel series are essentially based on this reliable system which has been expanded with the microbrowser application. This allows the visualisation and operation of web projects which have been created with Saia PG5® Web Editor. Here, the visualisation project can be saved locally or on a remote server.

2.3 **Web Panels MB** | Standard devices

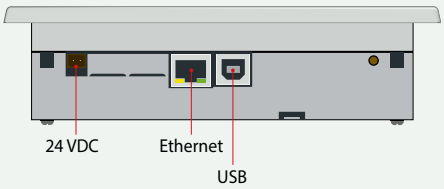
The microbrowser standard device series is the visualisation and control interface for automations with Saia PCD® controllers. The panels – finished to industrial quality – are available in various sizes to handle various requirements. The internal memory allows all devices to display data trending and alarm history so that dynamic visualisation can be implemented. An application saved in the controller can be displayed on the panel without any additional configuration tool.

Main features

- Large selection of display sizes, colour TFT display, in VGA or SVGA resolution
- Fast and easy commissioning without additional applications with an internal setup menu
- Connection to the web server via Ethernet

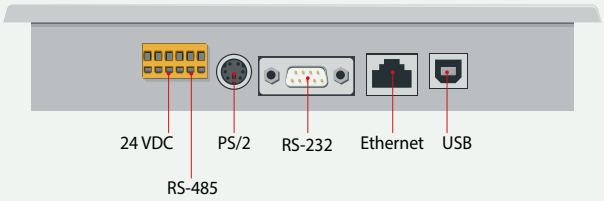
Device design

5.0“

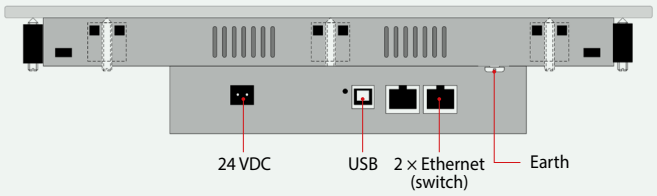


Device installation

5.7“ / 10.4“



12.1"



EPLAN macros

EPLAN macros are available for project planning and engineering

The eplan® electric P8 macros are available on the support page.

The macros and article data are also provided on the eplan® data portal.

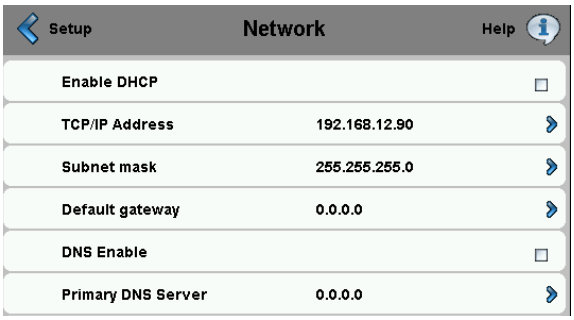
SBC MB App

Operation and monitoring on iPhone, iPad and Android

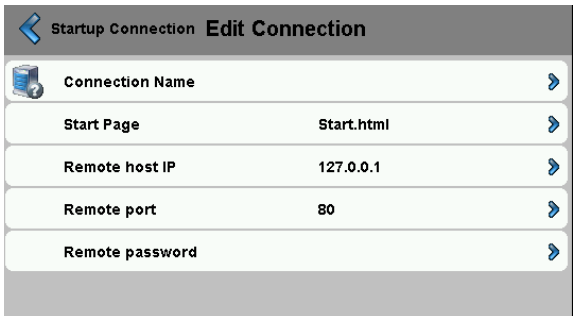
Setup menu

The panel is configured in two stages via the setup menu directly on the panel. No additional software or a connection to a laptop is required for commissioning.

1st Stage: Network configuration

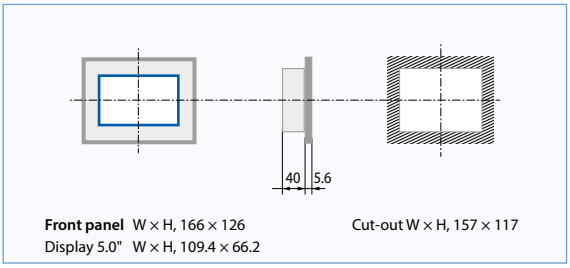


2nd Stage: Web server configuration



Dimensions (W × H × D) and cut-out (W × H) mm

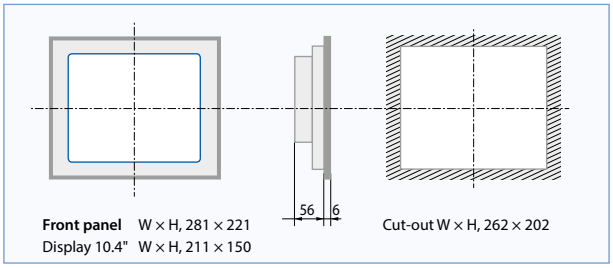
PCD7.D450WTPF



Front panel W × H, 166 × 126
Display 5.0" W × H, 109.4 × 66.2

Cut-out W × H, 157 × 117

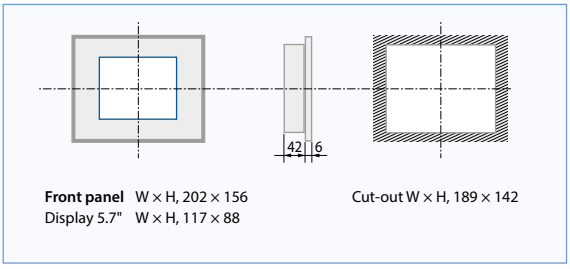
PCD7.D410VTCF



Front panel W × H, 281 × 221
Display 10.4" W × H, 211 × 150

Cut-out W × H, 262 × 202

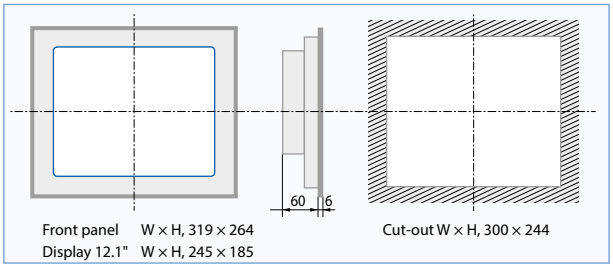
PCD7.D457VTCF



Front panel W × H, 202 × 156
Display 5.7" W × H, 117 × 88

Cut-out W × H, 189 × 142

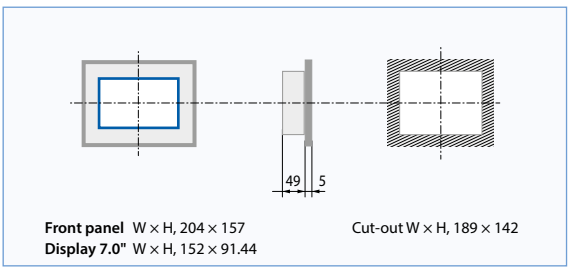
PCD7.D412DTPF



Front panel W × H, 319 × 264
Display 12.1" W × H, 245 × 185

Cut-out W × H, 300 × 244

PCD7.D470WTPF



Front panel W × H, 204 × 157
Display 7.0" W × H, 152 × 91.44

Cut-out W × H, 189 × 142

General specifications

Operating system	Saia PCD® COSinus with microbrowser expansion
Protection type (front)	IP 65
Temperature range	Operation 0 … +50 °C (7.0" –25 … +70 °C) Storage –25 … +70 °C
Humidity	Operation 10 … 80 % Storage 10 … 80 % non-condensing
Contrast adjustment	Yes
FTP server	Yes
Supply voltage	24 VDC ±20 %

Swiss made

Technical Data	PCD7.D450WTPF	PCD7.D457VTCF	PCD7.D470WTPF	PCD7.D410VTCF	PCD7.D412DTPF
Display size	5.0" TFT	5.7" TFT	7.0" TFT	10.4" TFT	12.1" TFT
Resolution (pixels)	WVGA 800 × 480	VGA 640 × 480	WVGA 800 × 480	VGA 640 × 480	SVGA 800 × 600
Touch screen	Resistive touch screen	Resistive touch screen	Resistive touch screen	Resistive touch screen	Resistive touch screen
Background lighting	LED	LED	LED	LED	LED
Colours:	65,536	65,536	65,536	65,536	65,536
Onboard file system	128 MB	4 MB	128 MB	4 MB	128 MB
Processor	240 MHz	66 MHz	240 MHz	66 MHz	240 MHz
Interfaces	USB 1.1/2.0 Device Ethernet 10/100 M	RS-232, RS-485 USB 1.1 Device Ethernet 10/100 M	USB 1.1/2.0 Device Ethernet 10/100 M	RS-232, RS-485 USB 1.1 Device Ethernet 10/100 M	USB 1.1/2.0 Device Ethernet 10/100 M
Current requirements	approx. 350 mA	approx. 500 mA	approx. 400 mA	approx. 500 mA	approx. 600 mA
Real-time clock (RTC)	Yes (Supercap)	No	Yes (Supercap)	No	Yes (Supercap)

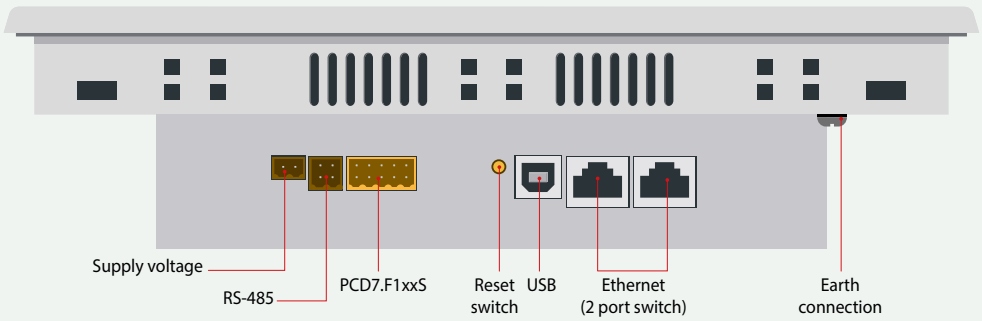
2.4 pWeb Panels MB

In addition to the functions of the standard MB panel, a programmable logic controller is integrated into the pWeb Panels. Based on the COSinus operating system of the Saia PCD®, specific, complex control logic and local data processing logic can be implemented in one device. The priority here are the operating and visualisation functions that enable small control systems to be implemented. The control functions have a lower priority.

Main features

- Ethernet interfaces (2 port switch)
- RS-485 interface
- 240 MHz processing power
- Expandable via PCD7.F1xxS modules
- Can be used as a RIO Master

Device installation

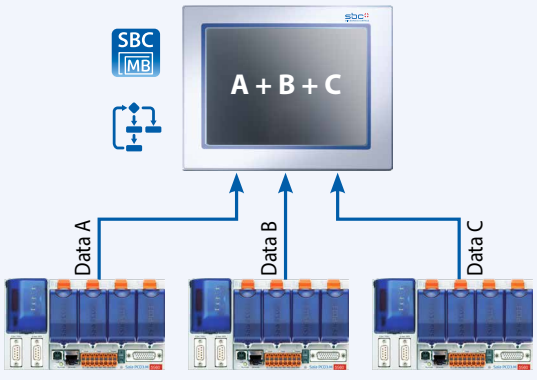


The high priority given to visualisation in the program workflow offers the best basis for displaying data from various devices. Simple control tasks can also be implemented directly in the panel.
It is not advisable to use pWeb panels when constructing closed control loops or utilising HVAC and DDC Suite controllers. In these cases, a Saia PCD® controller is recommended.

Application examples

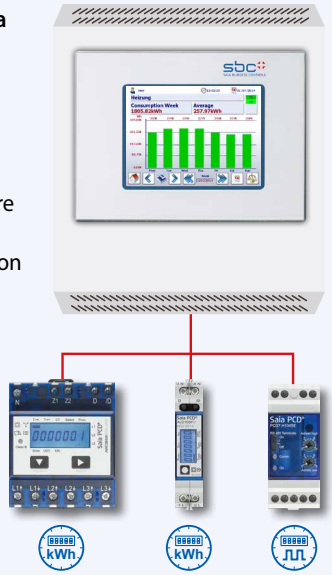
Data concentrator

The logic enables users to collect and link the data and status of multiple connected Saia PCD® controllers and to visualise the data at a higher level.



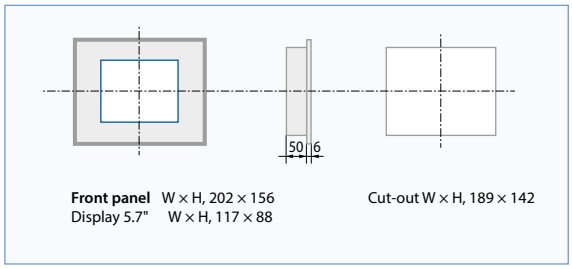
Acquire and visualise data

Values of any type can be counted and displayed by loading the S-monitoring application. Each system's consumption is thereby made transparent. For more information, see chapter 4 "Acquisition of Consumption Data"



Dimensions (W × H × D) and cut-out (W × H) mm

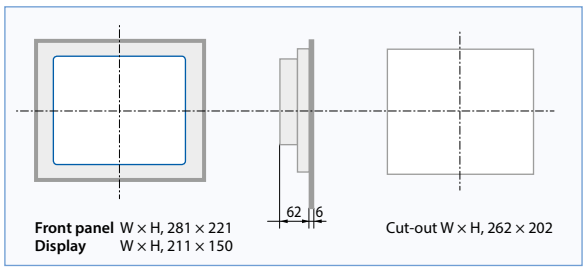
PCD7.D457VT5F



Front panel W × H, 202 × 156
Display 5.7" W × H, 117 × 88

Cut-out W × H, 189 × 142

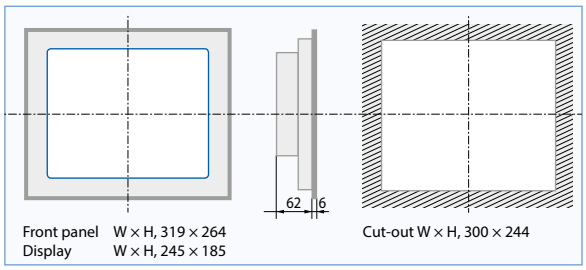
PCD7.D410VT5F



Front panel W × H, 281 × 221
Display W × H, 211 × 150

Cut-out W × H, 262 × 202

PCD7.D412DT5F



Front panel W × H, 319 × 264
Display W × H, 245 × 185

Cut-out W × H, 300 × 244

General specifications

Operating system	Saia PCD® COSinus with microbrowser extensions
Protection class	IP65
User program, ROM/DB/ Text	1 MB
RAM/DB/Text	1 MB
Media	16,384 flags / 16,384 registers
Backup for users	The user program is saved on the integrated microSD card
File system for users	128 MB onboard
Program cycle time	10 cycles/sec. maximum
Field level protocols	Serial S-Bus, Ether S-Bus, Ether S-IO, Modbus RTU or TCP
Internet services	SBC microbrowser, automation server

Interfaces

Ethernet	2 × RJ45 (Switch)
USB	1 × (1.1 / 2.0)
Serial interfaces	RS-485 1 slot for PCD7.F1xxS
Temperature range	Operation: 0…50°C typically Storage: –25…70°C
Humidity	Operation 10 … 80 % Storage 10 … 80 % non-condensing
Processor	Coldfire CF5373L, 240 MHz
Battery	Lithium Renata CR 2032 (service life of 1…3 years)
Real-time clock (RTC)	with battery buffer

Technical Data

	 **PCD7.D457VT5F**	 **PCD7.D410VT5F**	 **PCD7.D412DT5F**
Display size	5.7" TFT	10.4" TFT	12.1" TFT
Resolution / pixels	VGA 640 × 480	VGA 640 × 480	SVGA 800 × 600
Touch screen	Resistive touch screen	Resistive touch screen	Resistive touch screen
Contrast adjustment	Yes	Yes	Yes
Background lighting	LED	LED	LED
Power supply	24 VDC ±20%	24 VDC ±20%	24 VDC ±20%
Current draw	approx. 500 mA	approx. 500 mA	approx. 600 mA
Status front LED	––	––	Yes

Communication

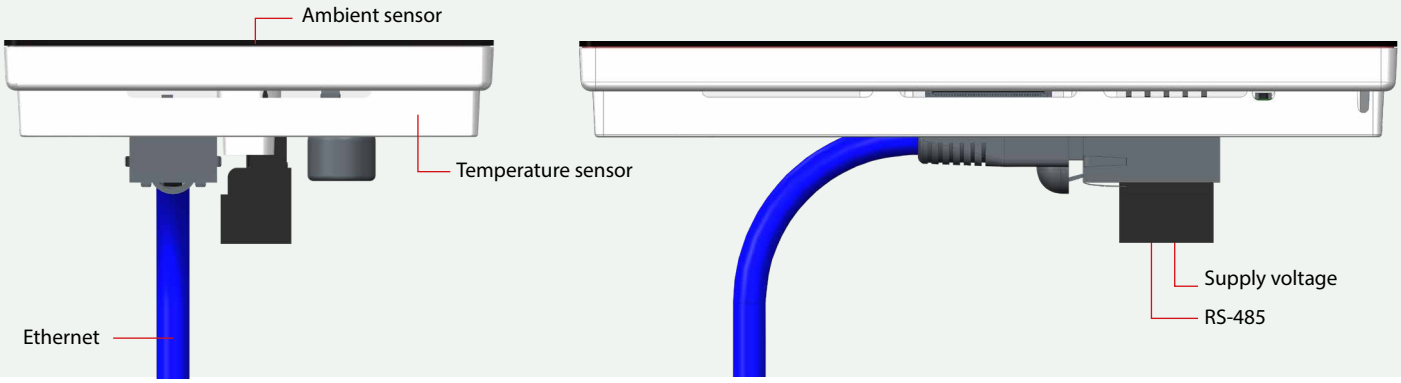
The Saia PCD® pWeb Panel MB units can be expanded with one slot for various communication modules PCD7.F1xxS and memory modules PCD7.Rxxx. The modules are described in the section Saia PCD1.

2.5 Room Panels

Attractively designed, in the housing colour white or black, the panels will fit beautifully into any room.
Autonomous room applications with the integrated logic controller (fully programmable) enable users to control the room functions without a head-end station and therefore the associated delays through long communication channels.

Main features

- Fully programmable visualisation with the Web Editor 8
- Fully programmable logic controller for autonomous room applications
- Mounting in standard wall boxes
- Onboard temperature sensor
- TFT colours with a colour depth of 65,000
- Capacitive touch screen technology for a very sensitive response



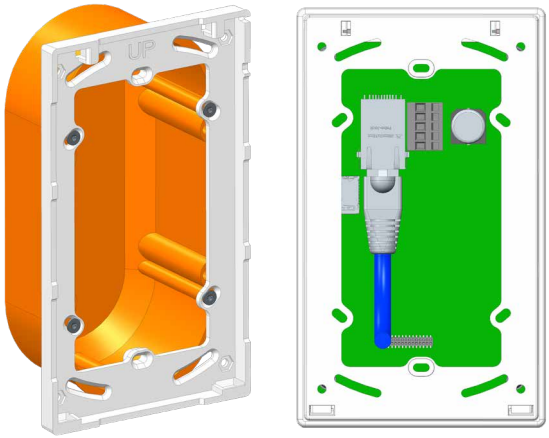
Mounting

The installation of the panels is carried out using an adapter included in the package on standardised, double wall boxes.

Such as electrical material Type No. L 8102

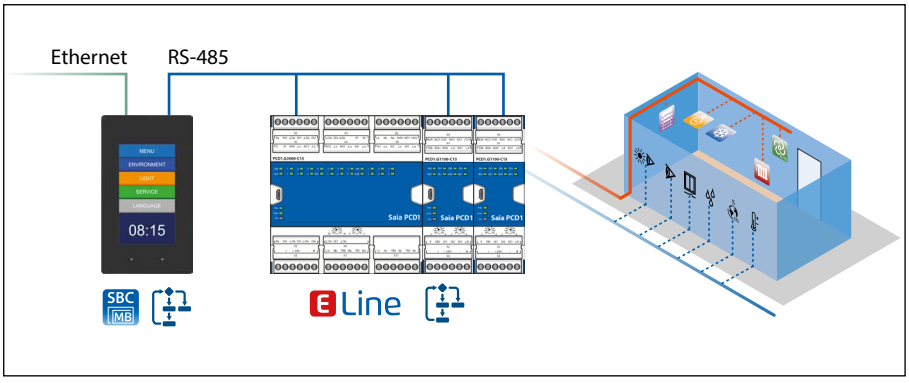
HSB-Weibel AG	No. 372 104 747
Agro	No. 9922
Blass-Elektro	No. 22031
Bticino	No. 504E

The panel is anchored in the adapter, and can only be removed with the use of tools.



Application examples

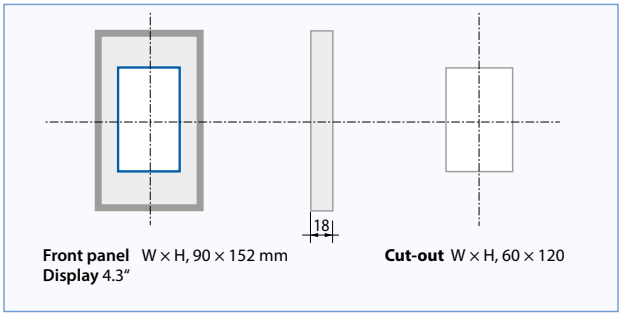
Operation and regulation of autonomous room applications. Implementation using the programmable microbrowser room panel and the fully programmable E-Line modules. Connection based on the RS-485 interface to the E-line modules in the room, and Ethernet connection to the floor controller.



You will find more examples in Chapter B4 "Room Automation"

Dimensions

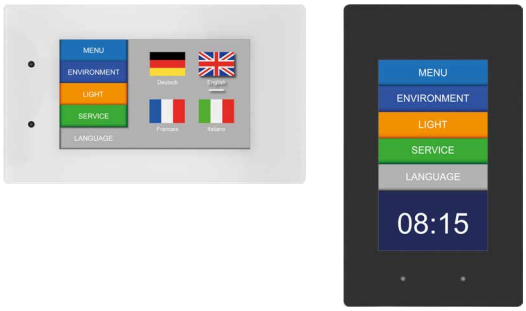
PCD7.D443WTxRx



Front panel W × H, 90 × 152 mm
Display 4.3"

Cut-out W × H, 60 × 120

The panel can also be mounted transversely



The location of the panel can slightly influence the temperature measurement, an easy calibration allows to remedies this and so increases the accuracy.

In any case ensure that the ventilation slots are not obstructed (LED on the left side !).

Warning: To restrict the maintenance there is no internal battery on the devices and therefore the Media are non-retentive. However, the "EL Backup Restore Media" FBox from the E-Suite Library allows to easily backup in the non-volatile registers the values which has to be stored, like the adjust parameters.

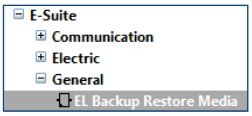
General technical data

	PCD7.D443WTxR PCD7.D443WTxRW
Operating system	Saia PCD® COSinus with micro browser expansion
Display	
Display size [inch]	4.3"
Resolution [pixels]	WQVGA / 480 × 272 pixels
Contrast adjustment	Yes
Background lighting	LED (dimming in 20 steps)
Touchscreen	PCAP technology
Interfaces	
USB	1 × (1.1 / 2.0)
Ethernet	Ethernet 10/100 full-duplex, auto-sensing/auto-crossing
Real-time clock	Yes (SuperCap)
Sensors	
Temperature	Accuracy: ±1°C easy calibration
Power supply	
Supply voltage	24 VDC ±20 %
Current draw	Approx. 4 watts / 160 mA
Environment	
Temperature range	Operation: 0…50°C typically Storage: –25…+70°C
Humidity	Operation: 10…80%, storage: 10…80%, non-condensing
Protection class	IP20
Mechanic	
Weight	approx. 200 g

Technical Data

	White case	PCD7.D443WTPRW	PCD7.D443WT5RW
	Black case	PCD7.D443WTPR	PCD7.D443WT5R
File system		4 MB	128 MB
Logic controller (no remanence)		No	Yes
User program, ROM/DB/Text		No	128 KB
RAM/DB/Text		No	128 KB
Media		No	16,384 flags / 16,384 registers
Memory for parameter (media) backup		No	1,000 non-volatile registers
Serial interfaces		No	RS-485

[1] To restrict the maintenance there is no internal battery on the devices and therefore the Media are non-retentive. However, the "EL Backup Restore Media" FBox from the E-Suite Library allows to easily backup in the non-volatile registers the values which has to be stored, like the adjust parameters.



2.6 Accessories for microbrowser panels

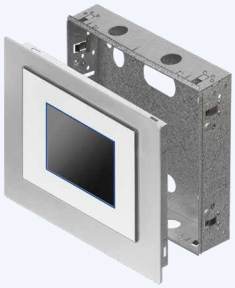
2.6.1 Installation systems for the microbrowser family

The correct mounting kit for all Web HMI devices

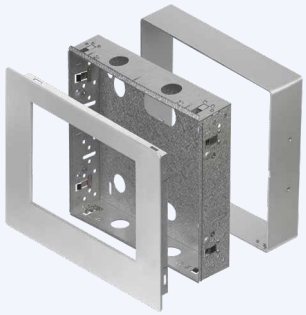
The microbrowser panel series not only fits in a switch cabinet, but also enables this modern technology to be easily and correctly integrated into the area in close proximity to the user using industrial in-wall and off-wall mounting kits. The mounting kits therefore enable simple wall mounting, which is consistently available for all panels. These kits minimise logistics and mounting costs.

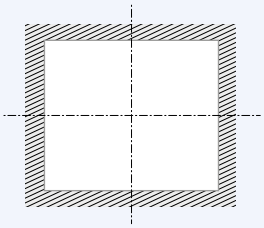
5.7" / 7"

In-wall
PCD7.D457-IWS2



On-wall
PCD7.D457-OWS2



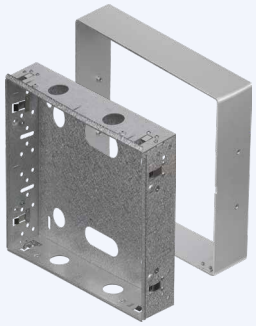


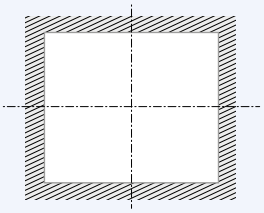
Cut-out W × H, 270 × 211
Minimum depth
For solid walls 75 mm
For cavity walls 65 mm

10.4"

In-wall
PCD7.D410-IWS

On-wall
PCD7.D410-OWS



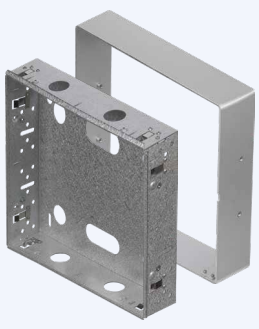


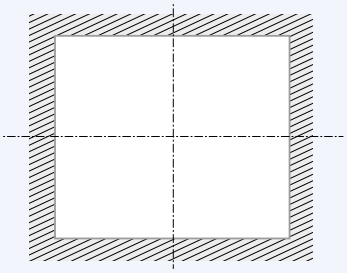
Cut-out W × H, 270 × 211
Minimum depth
For solid walls 75 mm
For cavity walls 65 mm

12.1"

In-wall
PCD7.D412-IWS

On-wall
PCD7.D412-OWS

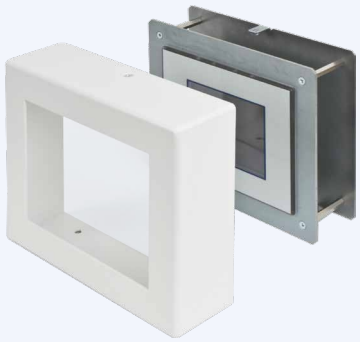


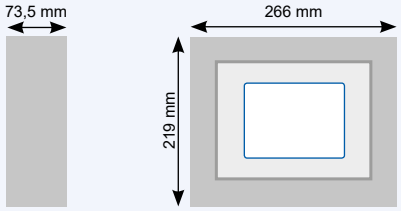


Cut-out W × H, 309 × 245
Minimum depth
For solid walls 75 mm
For cavity walls 65 mm

On-wall mounting kit 5.7" / 7"

on-wall PCD7.D457-OWS

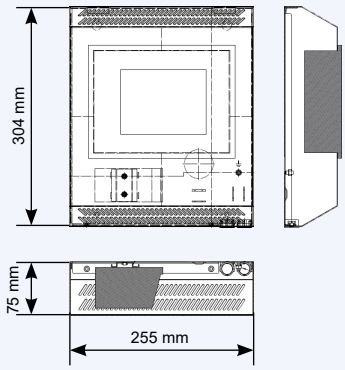




Width 266 mm
Height 219 mm
Depth 73.5 mm

Wall mounting kit 5.7" / 7"

PCD7.D457-OWS1



OEM or proprietary design

Panels with a neutral front can also be delivered in small quantities.

The standard Micro Browser Panel provide space for your own creativity. In large quantities, the panels can be visually adapted to individual room needs, with customized front foils.

Panels with neutral front
PCD7.D450WTPZ11
PCD7.D470WTPZ11
PCD7.D410VTCZ11
PCD7.D412DTPZ11
PCD7.D457VT5Z11
PCD7.D410VT5Z11
PCD7.D412DT5Z11

2.6.2 Fixation sets for Web Panels MB

Order details

Type	Description
3 230 9178-001	Fixation set (4 pieces) for the models PCD7.D450, PCD7.D457, 2 sets necessary for the model PCD7.D412
3 230 9178-002	Fixation set (6 pieces) for the models PCD7.D470, PCD7.D410

2.6.2 SBC Micro-Browser App

The SBC Micro Browser App is a small browser application that allows to display and operate web based applications created with the Saia PG5® Web Editor5/Web Editor8 and stored on a Saia PCD® Device. The Micro Browser App behaves like a browser using Java (IMaster.jar). The "look and feel" of the visualisation is similar to Micro-Browser panels PCD7.D4xx.
Of course, web based Alarming and Trending functionality's are included. The integrated station list makes it easy to navigate fast between different web servers, or allows to create user specific access on one overview page to different parts in an application, system or device.

2.6.2.1 SBC Micro-Browser App for Apple and Android

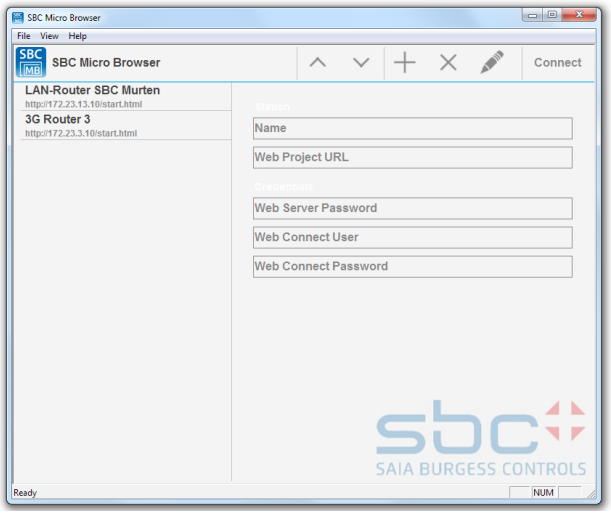
The SBC microbrowser apps overcome the limitations of the industrial world. Most tablets or smartphones are optimised for a long mobile runtime with high performance. The microbrowser app is therefore the ideal way to plug the gap between stationary and mobile areas of use. This provides the foundation for 24-hour monitoring and direct intervention in system operation.

Technical Data	SBC MB LITE	SBC MB	SBC MB LITE	SBC MB
Operating system version	iOS > iOS Version 3.2		Android > Android V.2.2	
Resolution / pixels	Depending on the devices used			
Update management	AppStore		Google Play	
Restrictions	No station list No URL skipping	No limitations	No station list No URL skipping	No limitations

2.6.2.2 SBC Micro-Browser App for Windows

The SBC Micro Browser App for Windows runs on Windows based operating systems (W7, W8, W10, …). The Micro Browser App for Windows includes following specific additional features.

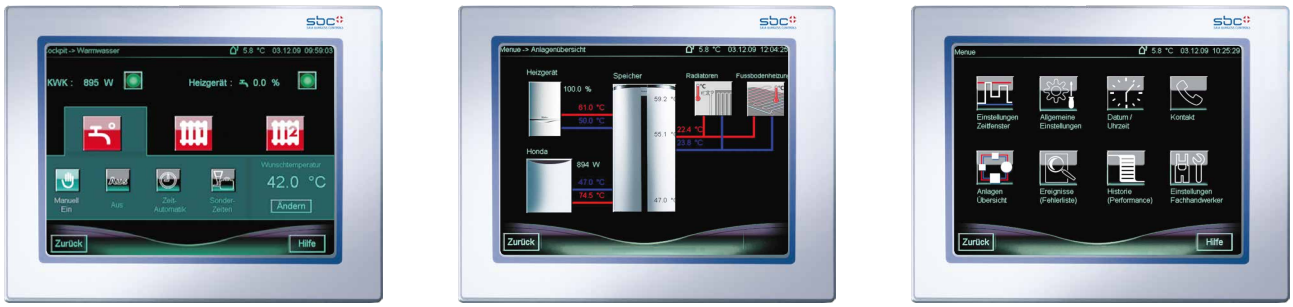
- Print of the current visible window content
- Screen Capture of the current visible window content
- Different scaling modes "Auto resize", "Best fit" and "Fixed size"



2.6.3 Ways of using the Web Panels with S-Web technology

Using S-Web technology combined with the microbrowser panel systems, operation can be transparent and clear for all users.
Each individual operating side has a fully flexible design and can be created using the standard objects or existing function templates.

DDC Suite / HVAC templates created with Saia PG5® Web Editor 8

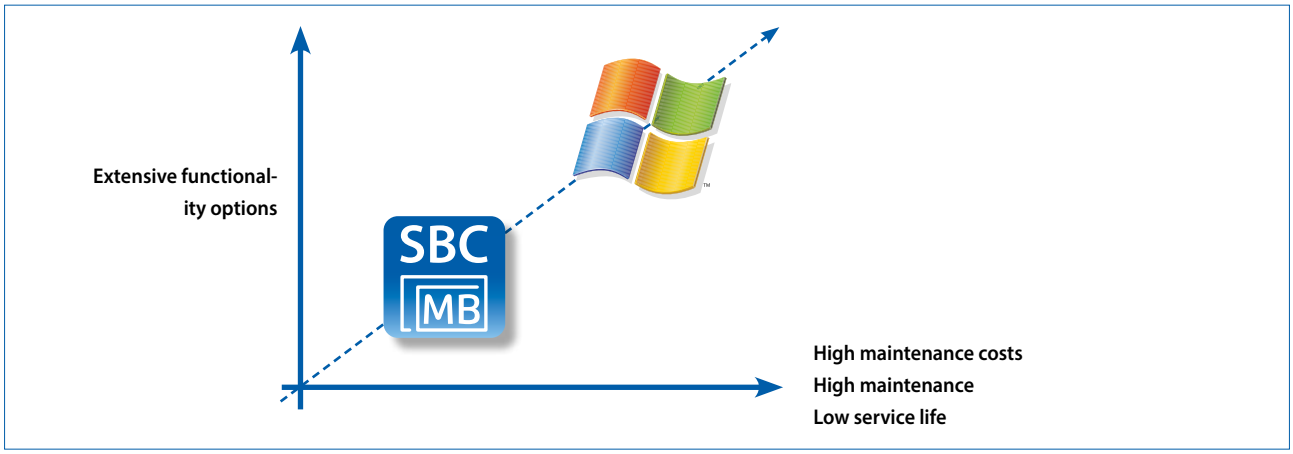


My HMI: Web pages created with Saia PG5® Web Editor 8

For further information, see the chapter "S-Web technology"

2.6.4 Extensive visualisation options with Windows-based devices

The Windows operating system allows users to confront the constant challenges of the world of automation. This is made possible by the vast application landscape (apps) which provides quick solutions for any application. Should you find no application on the market for your purposes, you can create a high-level language quickly and effectively based on .Net.



However, please exercise caution when using Windows-based systems. Development of the Windows operating systems is constantly progressing to meet the variety of different requirements. As a result, applications may have to be constantly adjusted for changes in the system. The maintenance requirements of Windows-based systems are greater compared to microbrowser devices, but provide increased functionality.

2.7 Web Panels with Windows® operating system

Control panel for web visualisations with Windows®:

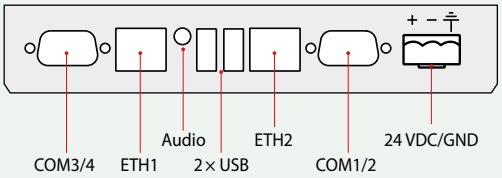
Saia PCD® Web Panels are specifically based on the requirements of web visualisations and preconfigured with all the relevant applications and software tools. No complicated installation and software updates. Saia PCD® Web Panels are ready to use immediately.

Main features

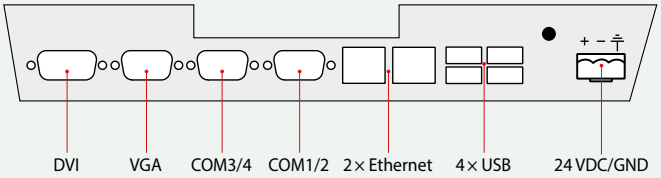
- Preconfigured and ready to use for web visualisations, optimised for Saia PCD® controllers
- 12"/15"/21" Colour TFT display and touch operation
- 2× Ethernet

Device installation

PCD7.D51xxWTA010
PCD7.D61xxWTA010



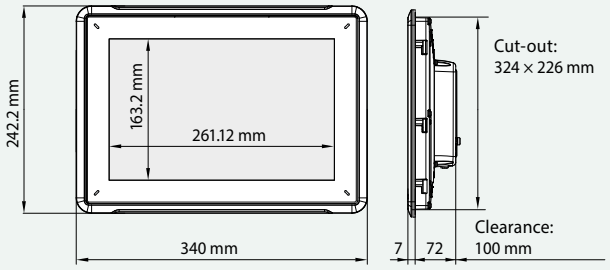
PCD7.D6150WTC010
PCD7.D6210WTI010



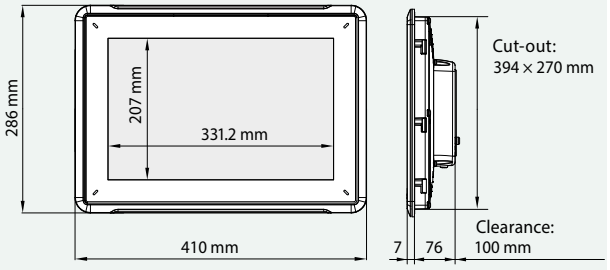
Technical Data	PCD7.D5120WTA010	PCD7.D5150WTA010	PCD7.D6120WTA010	
	Saia PCD® Web Panels for web visualisations			
Display size (inch)	**12"/16:10**	**15"/16:10**	**12"/16:10**	
Operating system	Windows® CE 6.0 R3	Windows® CE 6.0 R3	Windows® Embedded Standard 7	
Resolution (pixels)	1280 × 800	1280 × 800	1280 × 800	
Brightness	400 cd/m²	450 cd/m²	400 cd/m²	
CPU	Intel® Atom 1.6 GHz	Intel® Atom 1.6 GHz	Intel® Atom 1.6 GHz	
Main memory	1 GB	1 GB	2 GB	
Internal ROM	4 GB MLC	4 GB MLC	16 GB CFast	
Expandable ROM	2 GB SD (OS)	2 GB SD (OS)	SD (optional)	
Power consumption	22 W	24 W	22 W	
USB	3 × USB 2.0	3 × USB 2.0	3 × USB 2.0	
External monitor	– –	– –	– –	
.Net	Compact Framework	Compact Framework	Framework 4.0	

Dimensions (W × H × D) and cut-out (W × H) mm

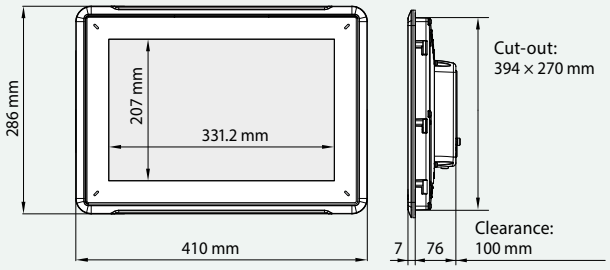
12" Web Panel **PCD7.D5120WTA010**
PCD7.D6120WTA010



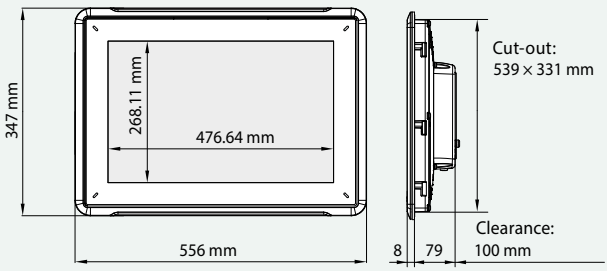
15" Panel PC **PCD7.D6150WTC010**



15" Web Panel **PCD7.D5150WTA010**
PCD7.D6150WTA010



21" Panel PC **PCD7.D6210WTI010**



General specifications

Protection type (front)	IP 65
Web/FPT/VNC/File Server	Yes
Supply voltage	24 VDC ±20%
Serial	2× (RS-232 and RS-485 combined on a D-Sub 9-pin)
Applications	JAVA Runtime, microbrowser
Temperature range	Operation: 0…50 °C, storage: –20…70 °C
Humidity	Operation: 10…75%, storage: 10…95% non-condensing
Touch screen	Resistive touch screen

	PCD7.D6150WTA010	PCD7.D6150WTC010	PCD7.D6210WTI010
	Saia PCD® Web Panels for web visualisations	Saia PCD® Panel PCs designed for the high requirements of applications	
	15"/16:10	**15"/16:10**	**21"/16:10**
	Windows® Embedded Standard 7	Windows® Embedded Standard 7	Windows® Embedded Standard 7
	1280 × 800	1280 × 800	1920 × 1080
	450 cd/m²	450 cd/m²	250 cd/m²
	Intel® Atom 1.6 GHz	Intel® Celeron® 8810E 2 × 1.6 GHz	2.1 GHz Intel® I7-2715QE
	2 GB	2 GB	4 GB
	16 GB CFast	100 GB HDD	100 GB HDD
	SD (optional)	via USB	via USB
	24 W	114 W	125 W
	3 × USB 2.0	4 × USB 2.0	4 × USB 2.0
	––	DVI/VGA	DVI/VGA
	Framework 4.0	Framework 4.0	Framework 4.0

A3 Programmable and configurable room controllers

From room controllers with integrated, configurable applications to the Saia PG5 freely programmable room controller allowing flexible and individual room solutions, a range of room controller products with various communication protocols is available. Even without a bus connection, full, independent functionality is guaranteed.

3.1 PG5 freely programmable S-Bus/ Modbus room controllers for flexible and individual room solutions

3.1.1 Overview and advantages of the PCD7.LRxx-P5 system

Flexibility thanks to free programming capability

The freely programmable PCD7.LRxx-P5 room controller offers a high level of flexibility for scalable HVAC, lighting and shading solutions, allowing individual applications to be created. The programming is done via the Saia PG5 Controls Suite where the room controller can be teamed with other Saia PCD products and operated together. This means that a single software tool can be used to meet different requirements, from room management to building management, for efficient engineering.

Geared to individual customer requirements

With the help of the new room controller, HVAC, lighting and shading solutions become freely programmable. As a result, individual, cross-discipline plans, aimed at for example optimising energy consumption, can be drawn up for state-of-the-art hotel, hospital and office concepts. In order to create a tailored solution geared to the needs of customers and buildings, additional sensors and modules can be integrated – from programmable DALI modules and motion sensors to hotel-card reading devices. This high level of flexibility also allows special room and user experiences like those that play a role in the room concepts of hotels.

Efficient engineering

Via a USB connection, the room controller can be programmed in the Saia PG5 Controls Suite. Because SBC automation stations are compatible with this software, building management and room control can be done on a joint platform. This simplifies the programming process and increases its efficiency. Additional software solutions or hardware is not required.

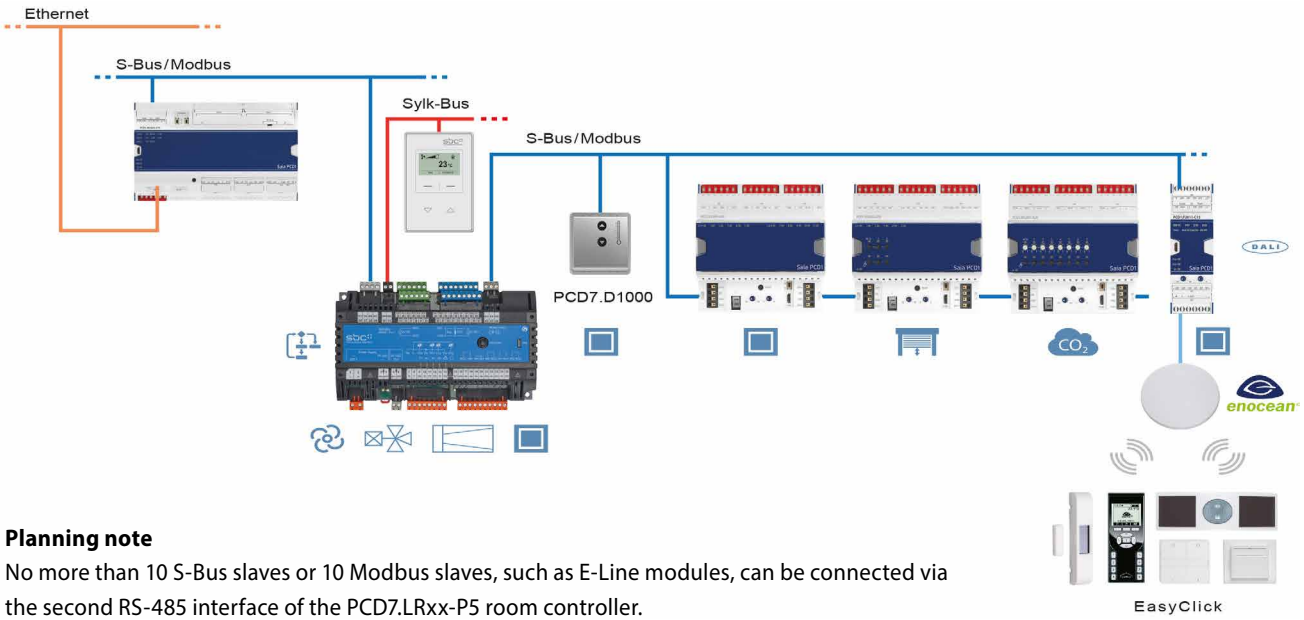
Advantages

- 2 × RS-485 interfaces for S-Bus or Modbus communication and option of I/O expansion with E-Line RIO modules
- Room and building management requirements can be jointly controlled and fulfilled via one software tool (PG5)
- Programmable DALI and expansion modules which can be used for lighting and shading can easily be integrated
- Battery and maintenance-free wireless EnOcean sensor integration
- Reliable products with straightforward installation and maintenance processes thanks to removable terminals
- Thanks to their form factor, they can be installed in an electrical sub-distribution system.

Easily retrofittable

Interfaces

Two interfaces that can be configured as S-Bus or Modbus allow connection to higher-level building automation control systems as well as the integration of digital room operating devices and expansion modules. As a result, the room controller can be combined with existing SBC E-Line RIO modules which can be used as an I/O expansion for HVAC, lighting or shading control. In addition, a Sylk bus interface allows the integration of corresponding room operating devices with integrated sensors.



Planning note

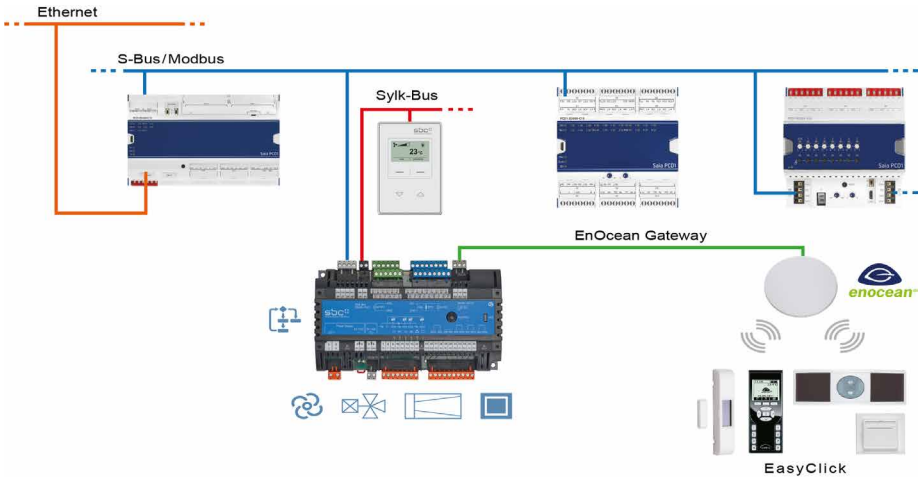
No more than 10 S-Bus slaves or 10 Modbus slaves, such as E-Line modules, can be connected via the second RS-485 interface of the PCD7.LRxx-P5 room controller.
The following points must be observed in order to determine the feasible number of S-Bus/Modbus slaves:

- Bus cycle time → Use only for HVAC or, alternatively, lighting or shading
- Application program resource requirement
- The more E-Line modules there are connected to the second RS-485 interface of the PCD7.LRxx-P5, the less memory space there is for the application program.
  Further information and calculation aids can be found in the manual.

EnOcean

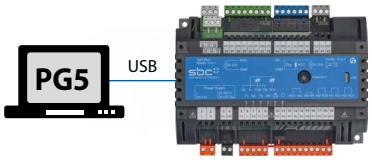
The RS-485 interface can also be used as an EnOcean gateway in order to connect a PEHA EnOcean antenna (PEHA ANT 450). As a result, battery and maintenance-free (PEHA Easyclick) EnOcean sensors (such as hotel-card switches, window contacts, movement sensors and operating devices) can be used.

In this system architecture, EnOcean switches should not be used for lighting or blinds via E-Line RIO modules connected to the primary RS-485 interface. If too many loads are connected to the RS-485 interface, the reaction time for a switching command could exceed 250 ms and would therefore be perceived as a disturbance.

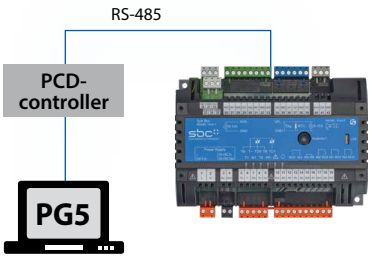


3.1.2 Programming

The modules are programmed with Saia PG5® using a master controller or directly via Micro-USB.



Programming directly via USB
PCD7.LRxx-P5 controllers have a Micro-USB port on the front of the module. Using a direct USB connection from the PC to the module, the user program can be loaded to the connected module or the firmware for the module can be updated. It is advisable to configure the S-Bus address prior to installation in the room controller to allow commissioning of the room controller and the downloading of the application program (and possibly a firmware update) via the RS-485 bus after installation.



Programming using a master controller (PCDx.Mxxxx)
The master controller, which is connected to the freely programmable PCD7.LRxx-P5 room controller, uses the RS-485 bus (S-Bus) to load the user program or a firmware update for example to the corresponding modules. The master controller is used as a gateway in this case.

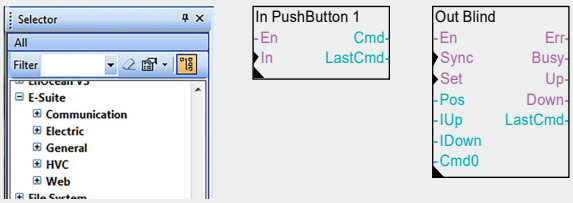
The modules are project-engineered with Saia PG5® using FBoxes or IL. A selection of FBoxes which make engineering easier is available for this purpose.

List of supported libraries:

PG5 standard FBox libraries

- Binary
- Blinker
- Block Control (no SB)
- Buffers
- Com.Text (not interpreted)
- Converter
- Counter
- DALI E-Line Driver (new)
- Data Block
- Data Buffer
- EIB Driver (partly)
- EnOcean (partly)
- Flip-Flop
- Floating Point (IEEE only)
- HVC (partly)
- Indirect
- Integer
- Ladder
- Move In/Out
- Modbus (E-Suite)
- Regulation (partly)
- Special, Sys Info (partly)
- Timer
- PHC

In addition to these libraries, a new library "E-Suite V2" is available for specific applications that can be implemented using the Saia PCD1 E-Line modules.
For electrical building services, for example: blind control, dimming of lighting etc.



In order to be able to use the PCD7.LRxx-P5 controller with E-Line devices, the E-Line library V1.3 (or higher) must be installed in PG5. The required PCD, IRM and E-Line firmware versions are described in the FBox «Library Help».
Further information can be found in the V1.3 library help.

Program
Flash memory

Program blocks	
COB	COB 0
XOB	XOB 10, 12, 13 and 16
PB / FB	100 with maximum hierarchy on 8 levels
Data types	
ROM text / DB	50
Memory	
Program memory	128 kB

Media
Volatile memory (RAM) without battery backup

Data types	
Registers	4000
Flag	4000
Timer / counter	400
Memory	
Memory (RAM) for 50 texts / DB	10 kB
Memory (EEPROM) for parameter (media) backup	256 bytes
Cyclical synchronisation with PCD controller	Real time clock (RTC)

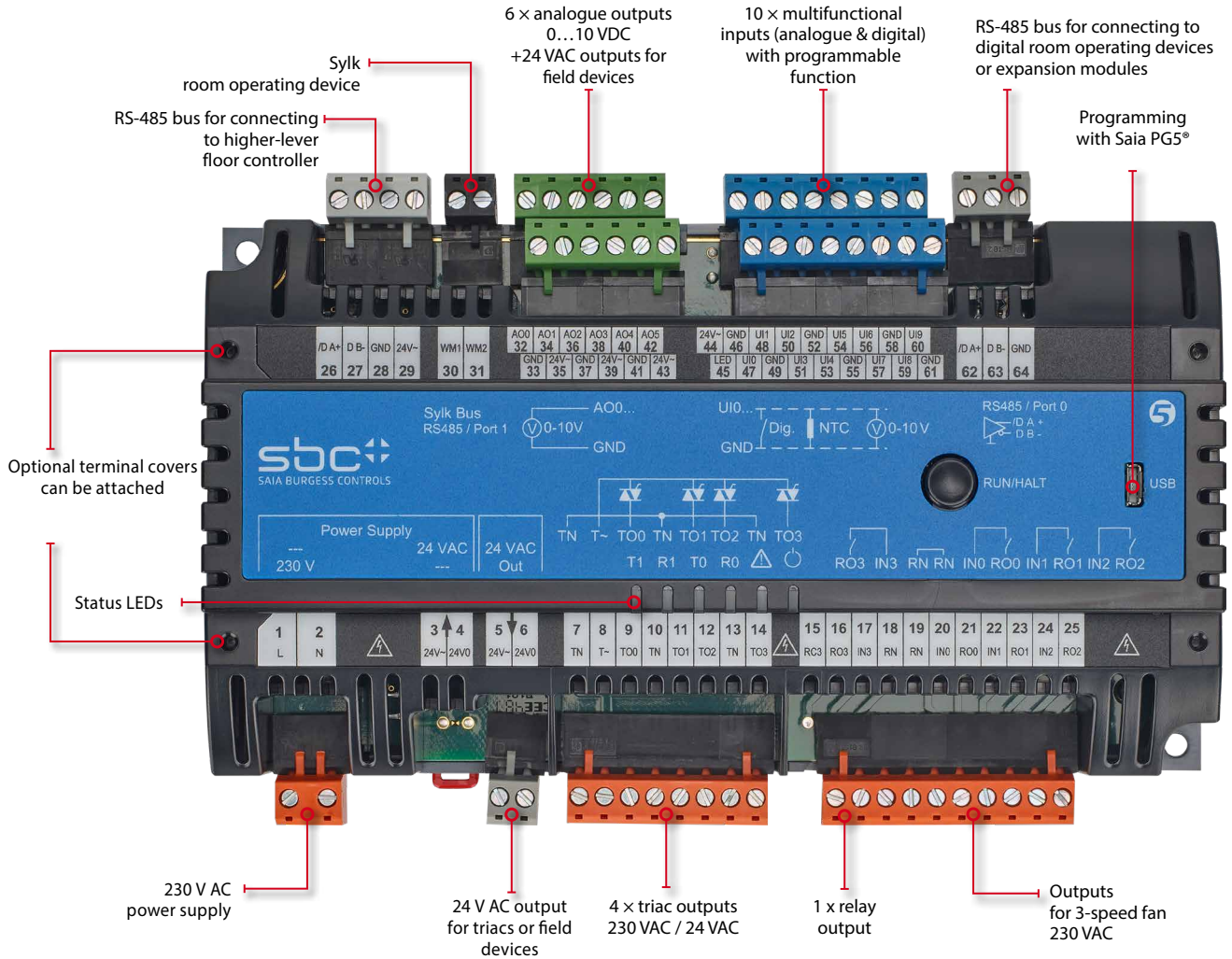
Compared to a PCDx.Mxxxx controller, not all functions are available. For example, these modules do not have an automation server.

Further information, including which FBoxes are supported can be found on our support page www.sbc-support.com.

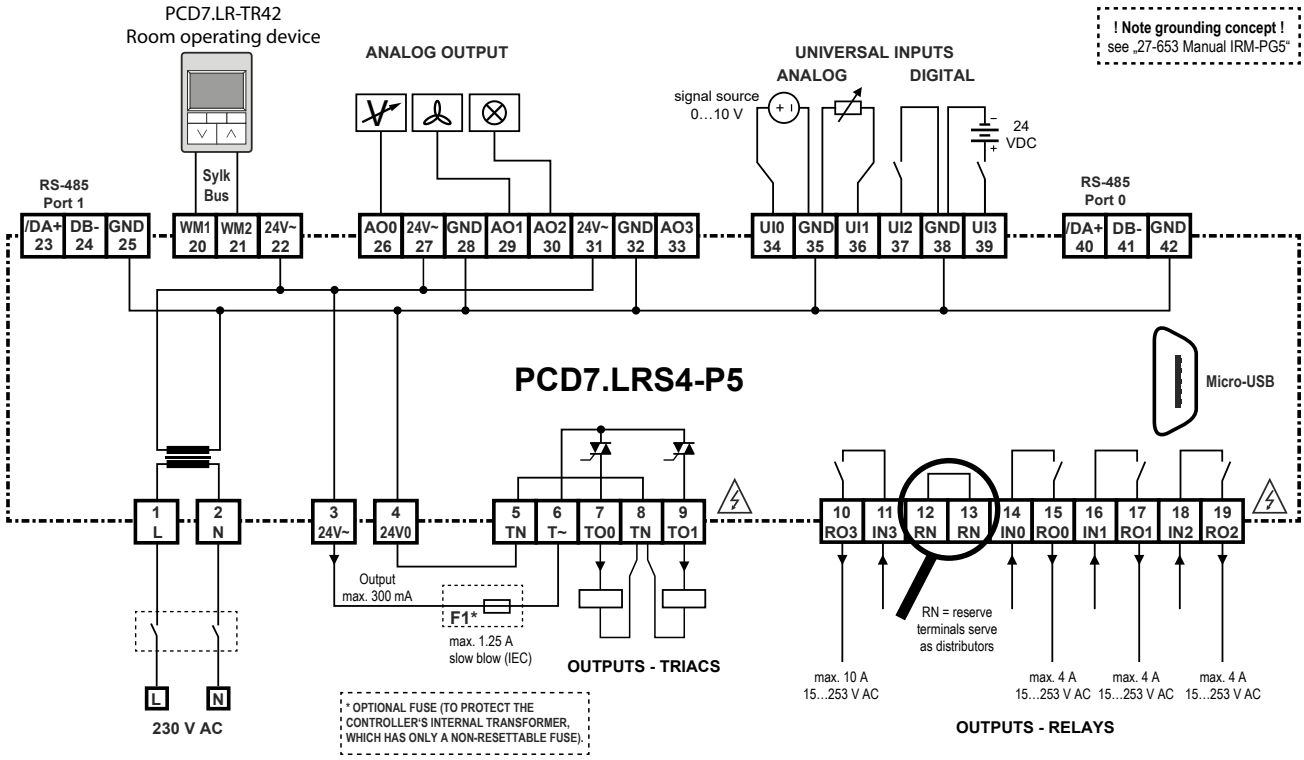
3.1.3 Product overview

	Order number	Power supply	Analogue outputs	Universal inputs	Relays	Triacs (24/230 VAC)	Total I/Os	LED output	24 VAC outputs for field devices	Sylk	USB	2nd RS-485	Gold Cap 72 hours	Terminals
Large room controller 198 × 110 × 59 mm	**PCD7.LRL2-P5**	230 VAC	2	6	4	4	16	1	300 mA	Yes	Yes	Yes	Yes	All terminals removable
	PCD7.LRL4-P5	230 VAC	6	10	4	4	24	0	300 mA	Yes	Yes	Yes	Yes	
	PCD7.LRL5-P5	24 VAC	6	10	4	4	24	0	600 mA	Yes	Yes	Yes	Yes	
	IRM-RLC	Package including 10 large terminal covers												
Small room controller 162 × 110 × 59 mm	**PCD7.LRS4-P5**	230 VAC	4	4	4	2	14	0	300 mA	Yes	Yes	Yes	Yes	
	PCD7.LRS5-P5	24 VAC	4	4	4	2	14	0	600 mA	Yes	Yes	Yes	Yes	
	IRM-RSC	Package including 10 small terminal covers												

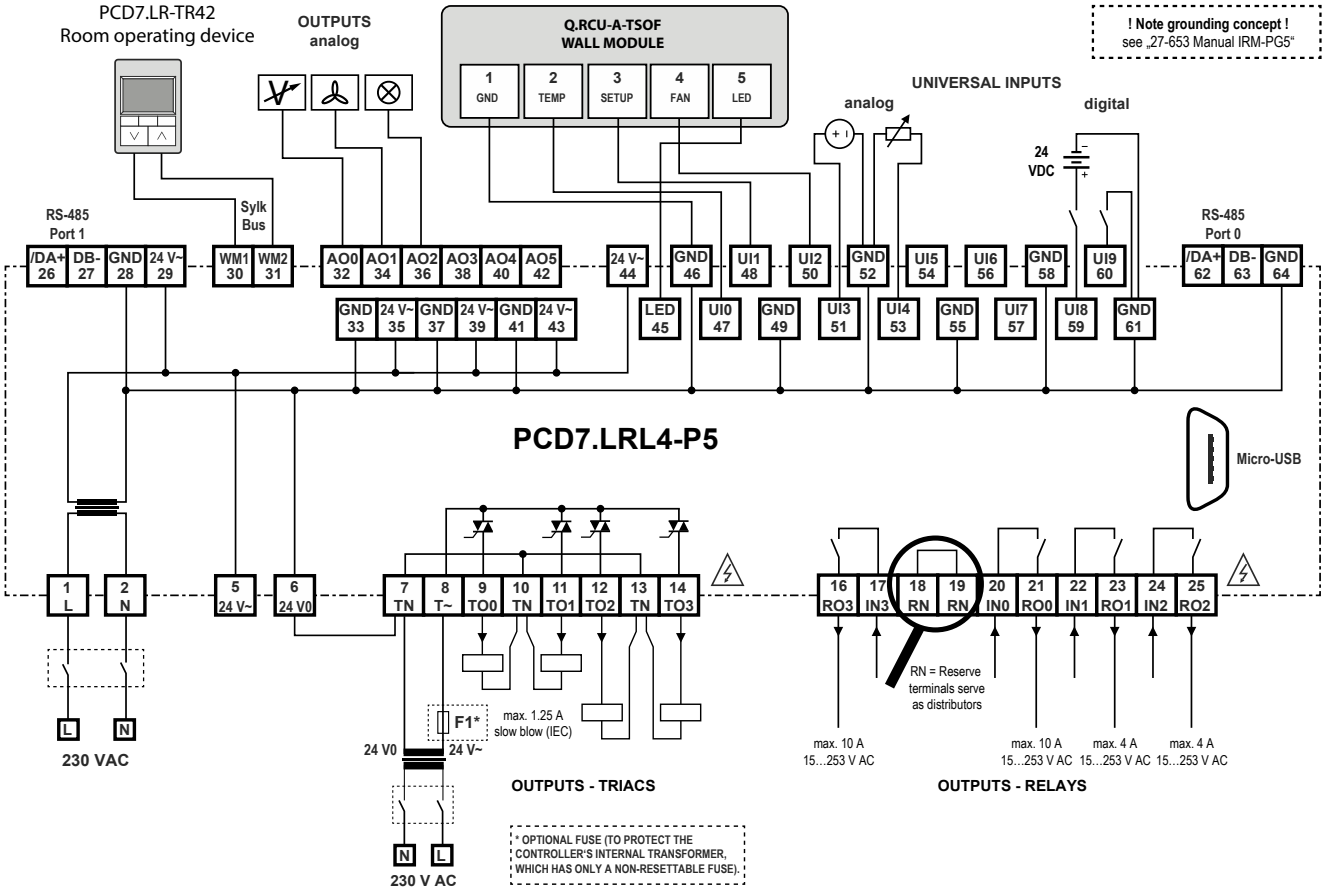
Controller example PCD7.LRL4-P5



3.1.4 Connection examples



PCD7.LRS4-P5 wiring example



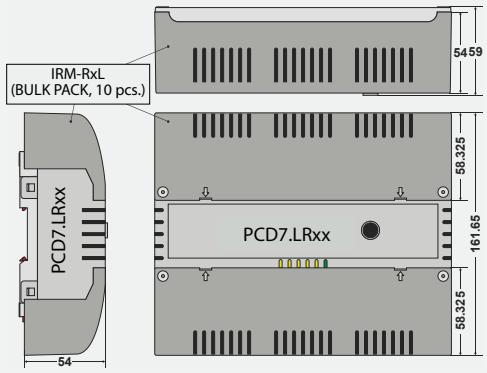
PCD7.LRL4-P5 wiring example

3.1.5 Accessories for PCD7.LRxx-P5

IRM-RSC/IRM-RLC
Terminal covers

Clip-on terminal covers (IP30 contact protection) for small or large controllers to prevent the user touching the 230 VAC terminals.

Optional for IP30



Compatible room operating devices

Wired room operating devices

PCD7.L63x

Room temperature sensor
+ setpoint setter
+ occupancy button

Order number:
PCD7.L630
PCD7.L631
PCD7.L632

Room operating devices connected to the inputs of the controller.
PCD7.L631 and PCD7.L632 both require a PCD7.L671 cable with an RJ11 plug.

Q.RCU-A-Txxx

Room temperature sensor
+ setpoint setter
+ occupancy button
+ fan speed adjuster

Order number:
Q.RCU-A-T
Q.RCU-A-TS
Q.RCU-A-TSO
Q.RCU-A-TSOF

Room operating devices with terminal connectors for connecting to controller inputs.

Compatible room operating devices

Sylk bus room operating devices

- Polarity-independent 2-wire bus with power and data transmission
- Types with integrated sensors for temperature, humidity and CO_2 sensor in one device
- Up to 4 room operating devices per PCD7.LRxx-P5 with a total cable length of up to 150 m

PCD7LR-TR42

Room temperature sensor
+ setting option for setpoint, presence and fan speed
+ LCD display
(+ humidity and CO_2 sensor)

Order number:
PCD7.LR-TR42
PCD7.LR-TR42-H
PCD7.LR-TR42-CO2
PCD7.LR-TR42-H-CO2

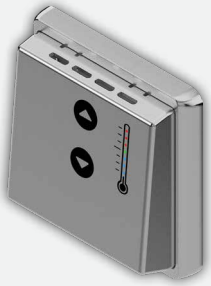
PCD7LR-TR40

Room temperature sensor
(+ humidity and CO2 sensor)
with Sylk bus connection
to the controller.

Order number:
PCD7.LR-TR40
PCD7.LR-TR40-H
PCD7.LR-TR40-CO2
PCD7.LR-TR40-H-CO2

PCD7.D1000

S-Bus / Modbus room operating device for room temperature measurement, setpoint offset setting



- Design in accordance with PEHA Dialog Aluminium
- Room temperature sensor 0…40 °C
- Setpoint offset control ± 3 K in 0.5 K steps
- 7 LEDs to indicate the setpoint offset
- 2 plug-in RJ9 connections for Daisy Chain and up to 6 room operating devices

3.2 PCD7.LRxx BACnet room controllers can be configured and commissioned via an Android app

3.2.1 Overview and advantages of the PCD7.LRxx system

BTL®-listed PCD7.LRxx BACnet room controller

A new, easy way to commission room applications – via an Android device and the RoomUp app

The new BACnet room controller in the PCD7.LRxx series allows efficient, quick commissioning and testing of the connected actuators and sensors.

The room controllers have universal inputs that can be configured for a variety of functions, and their form factors also allow them to be installed in electrical sub-distribution systems. They also have a Sylk bus interface for connecting digital room operating devices.

The following applications can be configured:

- Fan convectors, fans with 1–3 speeds or fans with a variable speed
- Inlet air flap control with combined air quality monitoring and temperature control
- Cooled ceiling
- Under-floor heating
- Radiator heating
- A combination of the aforementioned applications

Advantages

No programming needed

Applications can be created quickly and easily because the controller comes supplied with pre-installed applications which can be configured via the app.

Quick installation of applications across projects – as soon as an individual room is configured, the application configuration can be extended to other rooms via the RoomUp app ("template concept").

Easier installation

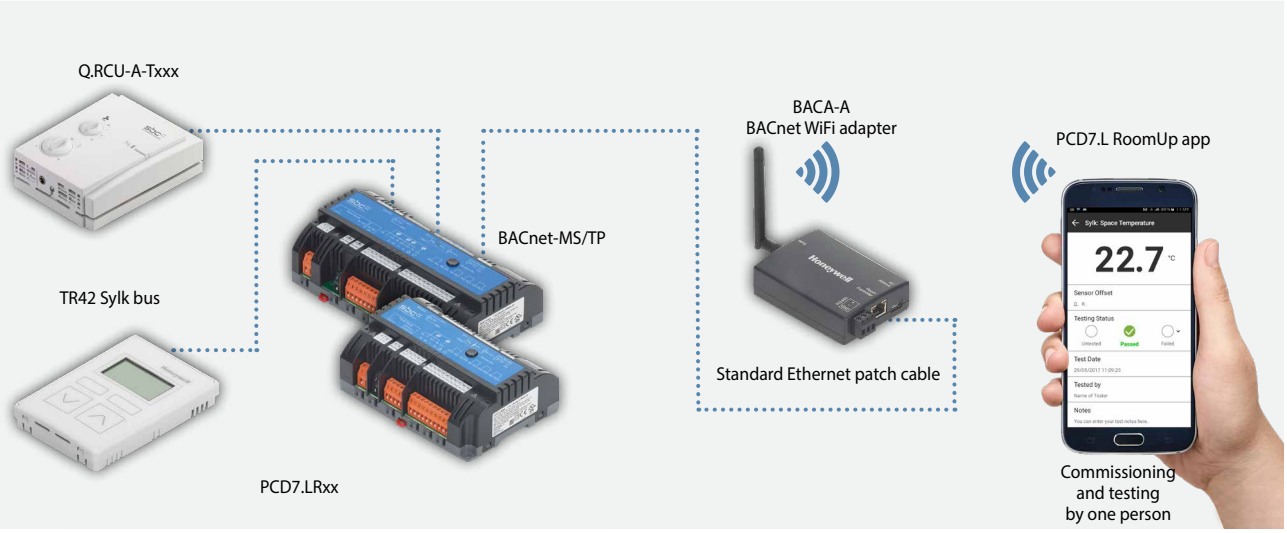
In order to cater for various installation requirements, the controller can be mounted universally on DIN top hat rails, in small installation housings and on walls (including optional terminal covers).

Triac outputs can be controlled with 24 VAC or 230 VAC.

Easier commissioning

The solutions allow very efficient "commissioning by one person" via the "RoomUp" app with quick, straightforward and reliable test procedures on location thanks to the "RoomUp" app's guided testing and reporting.

Automatic MS/TP-MAC addressing by scanning a barcode.



3.2.2 Set-up information with RoomUp and integration with the PG5

RoomUp

A unique commissioning experience

RoomUp is used to configure, commission and test the application.

RoomUp offers an entirely new way of commissioning room systems and carrying out final tests:

- Quick and easy commissioning by one person via a smartphone or tablet
- Easier, reliable tests on location thanks to the wireless connection with guided testing and integrated reporting
- Efficient, automatic device addressing
- Wireless communication allows commissioning before bus installation is complete

A template concept helps the user to determine the standard room types used in the building (templates). The template is used on all controllers for the relevant room type. A change to the template can easily be applied to all controllers with the same template.

The RoomUp app can be downloaded from the Google Play Store.

In order to activate the downloaded RoomUp app, a RoomUp licensing key with the order number PCD7.L-ROOMUP is required.

RoomUp is an Android app for smartphones and tablets running Android 5.0 or higher.

See for yourself the advantages.

RoomUp video

http://sbc.do/Tc2kPraY

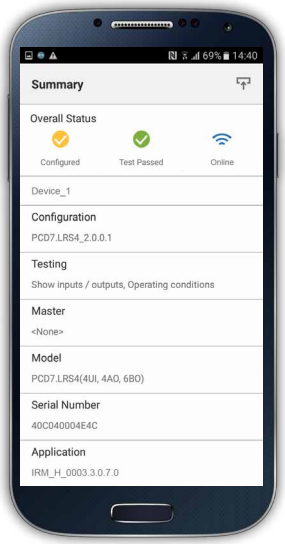
GET IT ON Google Play

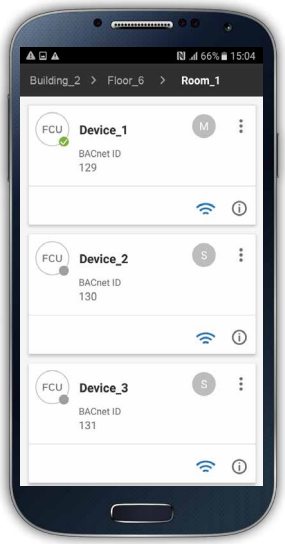
Addressing

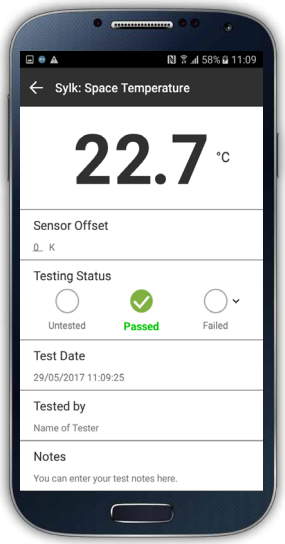
The person commissioning the system does not need to set addresses via address switches. PCD7.LRxx automatically uses an unused BACnet address (automatic MS/TP-MAC addressing). Assignment to a specific room is easily possible via the service button or by scanning the barcode label. 1 barcode label is placed on the controller and 1 barcode label can be removed and stuck to the layout.

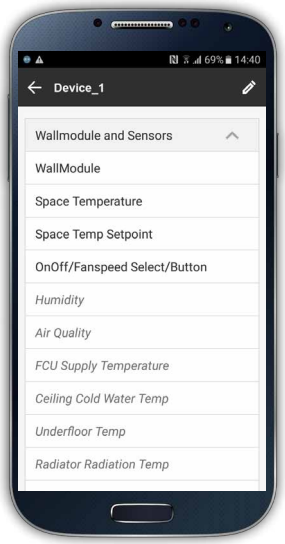
Recommended system size with RoomUp

- Buildings can be analysed on the basis of the layout in order to select suitable divisions with system controllers
- The project is subdivided into a number of BACnet MS/TP segments with a maximum of 30 devices per segment
- Large systems should be subdivided into a number of RoomUp projects with 300 devices per project (maximum permitted size)
- A RoomUp project should be commissioned by one person

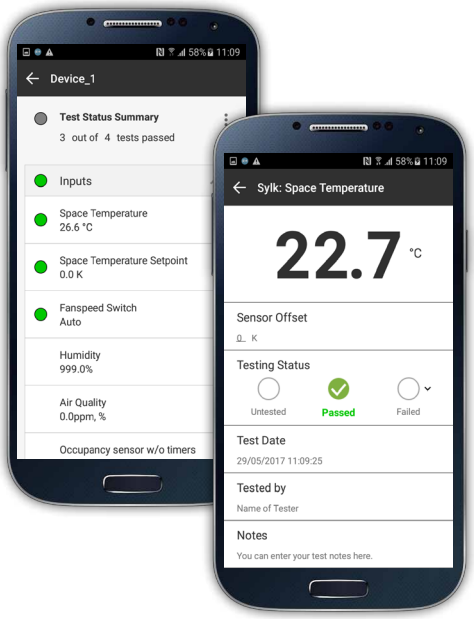








Wiring and device testing as well as an automatic test report for the project handover



I/O report

Port	Signal	Comment
3	24 V	24 VAC supply inp./ outp.
4	24 V0	24 VAC zero supply inp./outp.
5	TN	TN
6	T	T
7	TO1	RCU cooling
8	TN	Triacs N

Port	Signal	Comment
9	TO2	FCU heating
10	RO4	
11	IN4	Relay 4 L in
12	RN	Line N switched on/off
13	RN	Line N switched on/off
14	IN1	Relay 1 L in
15	RO1	1-speed fan
16	IN2	Relay 2 L in

Test report

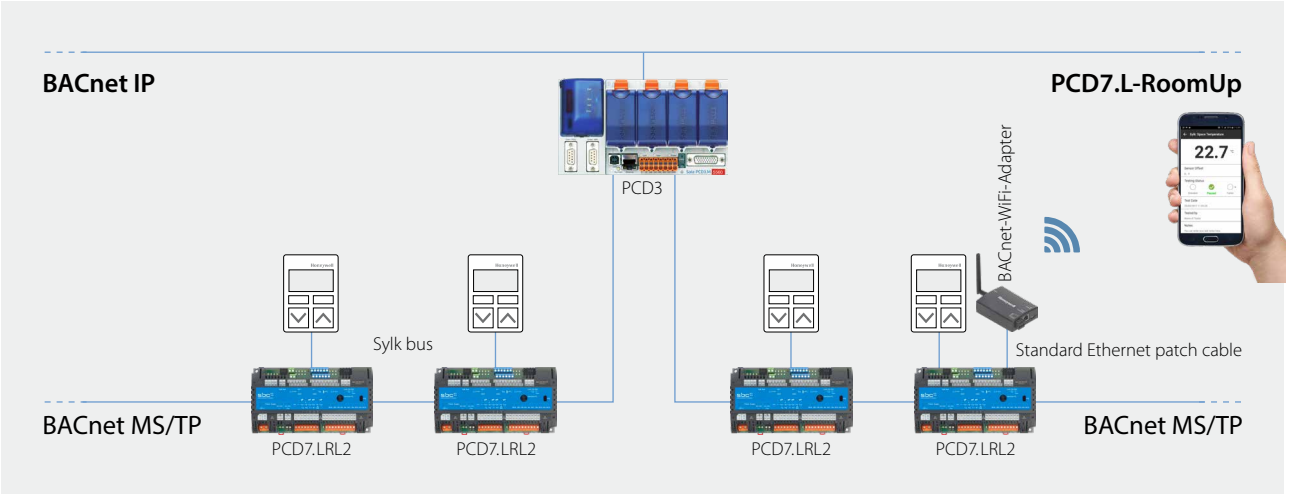
Connection point type	Connection name	Data point name	Last value	Units	Sensor offset	Test status	Tested by	Test date	Re-marks	Error message
Analogue input	Sylk	RmTemp	26.85674	°C		Passed	Johann Klempner	26.07.2016 16:24:48		
Analogue input	Sylk	RmTempSp	2.5	°C		Passed	Johann Klempner	26.07.2016 16:24:48		
Multi-level value	Sylk	WMFanManSwCmd	3				Johann Klempner	26.07.2016 16:24:48		
Analogue output	AOPWMTO1	FCUClgCtl	100	%		Passed	Johann Klempner	26.07.2016 16:24:48		
Analogue output	AOPWMTO2	FCUHtgCtl	0	%		Passed	Johann Klempner	26.07.2016 16:24:48		
Multi-level value		FCUFanStgCmd	2			Passed	Johann Klempner	26.07.2016 16:24:48		

If necessary, the reports generated can be sent straight to an e-mail address.

Typical system architecture

For BACnet MS/TP communication, the PCD requires the following modules (see chapter B2.6.1):

- BACnet MS/TP communication interface: PCD3.F215 or PCD2.F2150
  (and an additional PCD7.F110S for a second BACnet MS/TP interface)
- BACnet optional module for firmware expansion: PCD7.R562 or PCD3.R562



The following PCDs are compatible with the PCD7.LRxx controller:

PCD1
- PCD1.M2160
- PCD1.M2220-C15

PCD2
- PCD2.M4160, PCD2.M4560

PCD3
- PCD3.M3160, PCD3.M3360, PCD3.M5360
- PCD3.M5560
- PCD3.M6360, PCD3.M6560, PCD3.M6860, PCD3.M6880

Restrictions and performance

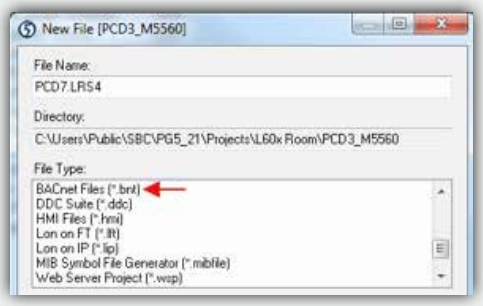
A maximum of 30 PCD7.LRxx controllers can be connected to an MS/TP line. Per PCD, up to 4 MS/TP lines can be used to connect the PCD7.LRxx controllers.

Performance of PCD3.M5560 at a communication speed of 38.4 kbits/s:
- Communication cycle time: With 30 PCD7.LRxx controllers on an MS/TP line, the token cycle time is 1.64 seconds
- With 30 PCD7.LRxx controllers, the maximum change of value per minute (COV/min) is 1,100 COV/min (this maximum value depends on the limits of the MS/TP network and the communication cycle time)

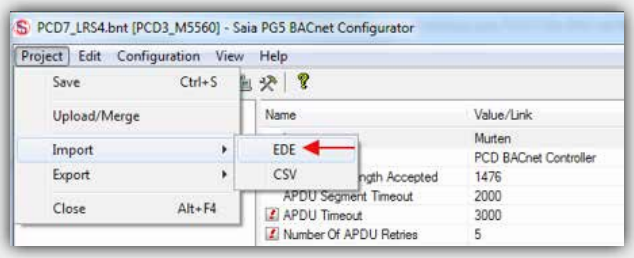
Importing application BACnet objects using the .ede file in PG5

Version PG5.2.2.200 or higher must be used. This version includes the BACnet Stack Rev. 14, the automatic assignment and creation of symbols and the BACShark tool for generating an .ede file.

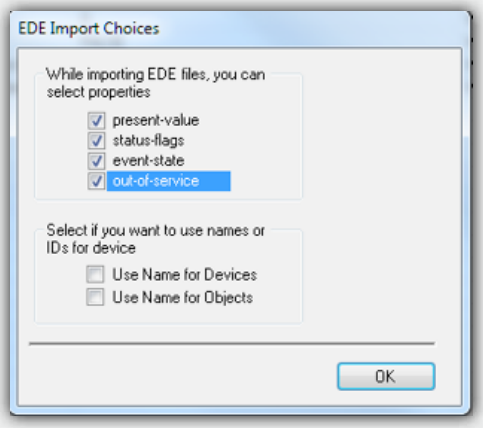
Creating a BACnet configurator page



Importing the .ede file created by BACShark or BACeye



You can select the properties which are automatically assigned to flags and registered.



Multiple .ede files to be imported together into the BACnet Configurator can be selected. This automatically creates the global symbols for all BACnet objects in the "BAC" folder with the following structure: BAC.Device Name.Object Name

3.2.3 Application overview

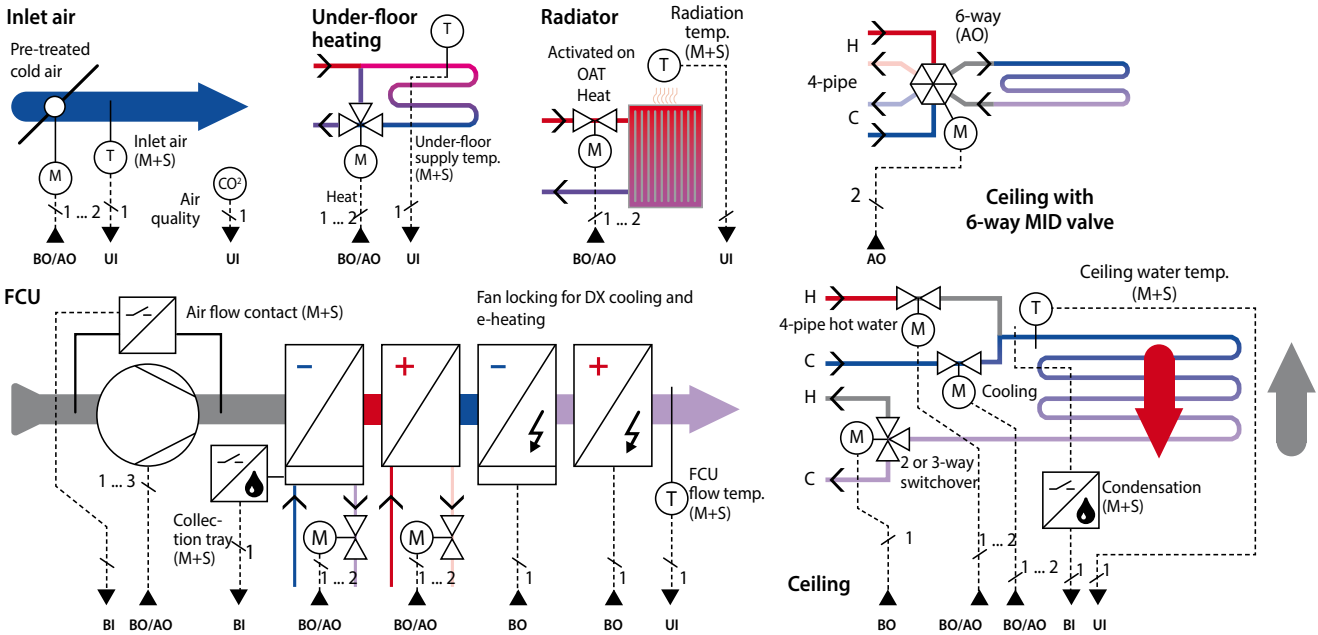
Configurable application

Fan convector	Ceiling	Inlet air	Radiator	Under-floor heating
Device configurations				
Cooling the coolant	Cooling	Cooling	Heating	Heating
DX cooling	Heating	Inlet air flap		
Hot water heating				
Electric heating				
2-pipe switching or 4-pipe system	2-pipe switching, 4-pipe system or 6-way MID valve			
Control strategy modes				
Room temperature control	Room temperature control	Room temperature control	Room temperature control	Room temperature control
Cascade temperature control		Room temperature control with cooling with lower limit value	Room temperature control with heating with lower limit value	Room temperature control with heating with lower limit value
Room temperature control with lower limit values for heating and cooling		Air quality and cooling control (optionally with cooling with lower limit value)		
Fan with 1, 2 or 3 speeds				
Fan with variable speed		Air quality monitoring only		

Straightforward system-wide application installation

After configuring an individual room, the application configuration can be extended to other rooms via the RoomUp app ("template concept"). This "template concept" also allows an automatic adjustment of the application configuration for a room in any room which is assigned the same template. This saves significant amounts of time when planning, especially in the case of projects where many rooms/zones are similar and the same application is used. Via master/slave configurations, applications can easily be adapted to changes in room design over the life of the building.

The following diagram provides an overview of the applications supported. Functions can be added by clicking on symbols.



3.2.4 Product overview and wiring examples

PCD7.LRxx system overview

	Order number	Power supply	Analogue outputs	Universal inputs	Relays	Triacs (24 V or 230 V)	Total I/Os	LED output	24 V AC for field devices
Large controller 198 × 110 × 59 mm	PCD7.LRL2	230 V AC	2	6	4	4	16	1	300 mA
	IRM-RLC	Package including 10 large terminal covers							
Small controller 162 × 110 × 59 mm)	PCD7.LRS4	230 V AC	4	4	4	2	14	0	300 mA
	PCD7.LRS5	24 V AC	4	4	4	2	14	0	600 mA
	IRM-RSC	Package including 10 small terminal covers							
Commissioning	BACA-A	Wi-Fi adapter and RJ45 cable							
	PCD7.L-RoomUp	SBC RoomUp licence							
	RoomUp	Smartphone app for PCD7.LRxx commissioning requires Android 5.0 or higher. The app is available via the Play Store							
Room operating devices	Sylk bus: TR40, TR40-CO2 without display / TR42, TR42-CO2 with display								
	Hard-wired to the controller's I/Os: PCD7.L63x, Q.RCU-A-Txxx, T7460x								

Dimensions:

PCD7.LRL2 (large housing):
W × L × H = 110 × 198 × 59 mm

PCD7.LRSx (small housing):
W × L × H = 110 × 162 × 59 mm

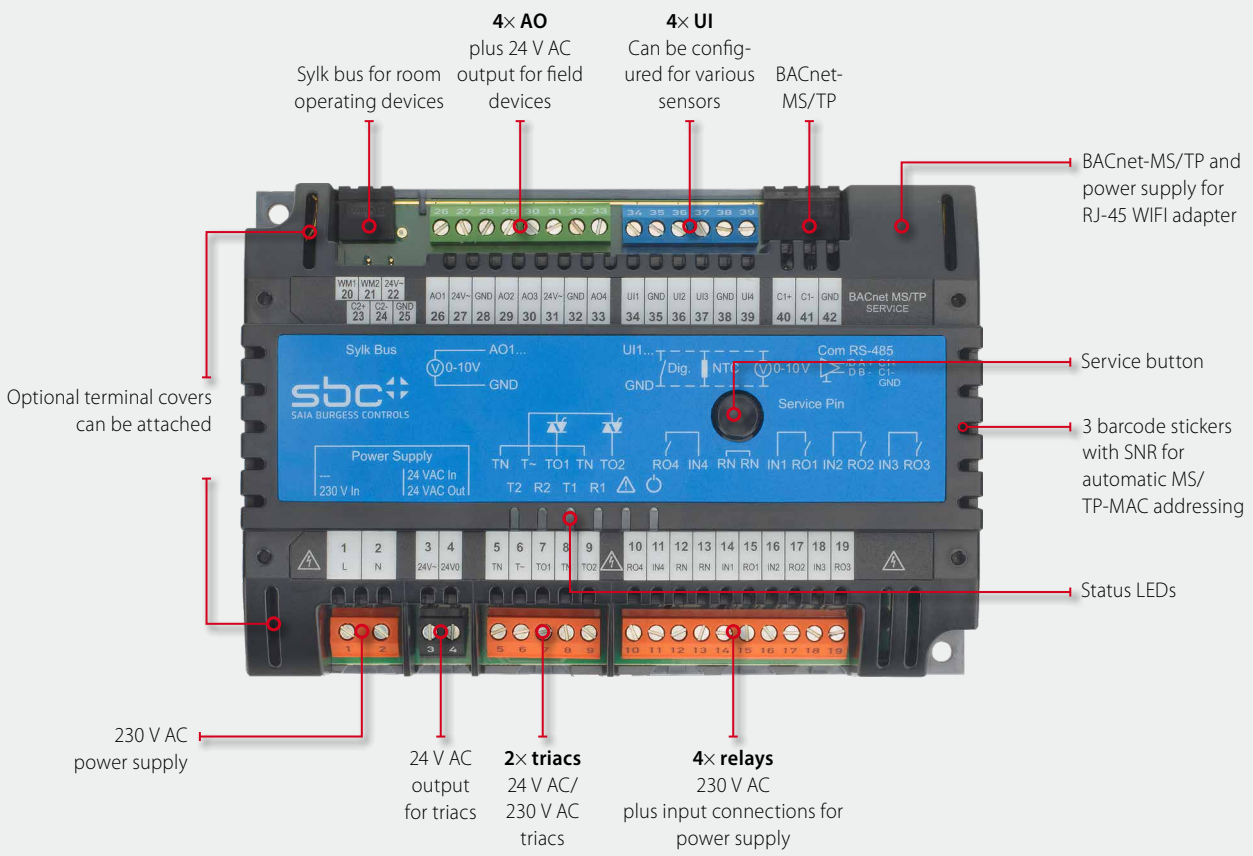
PCD7.LRS4
+2 × IRM-RSC

PCD7.LRS5
+2 × IRM-RSC

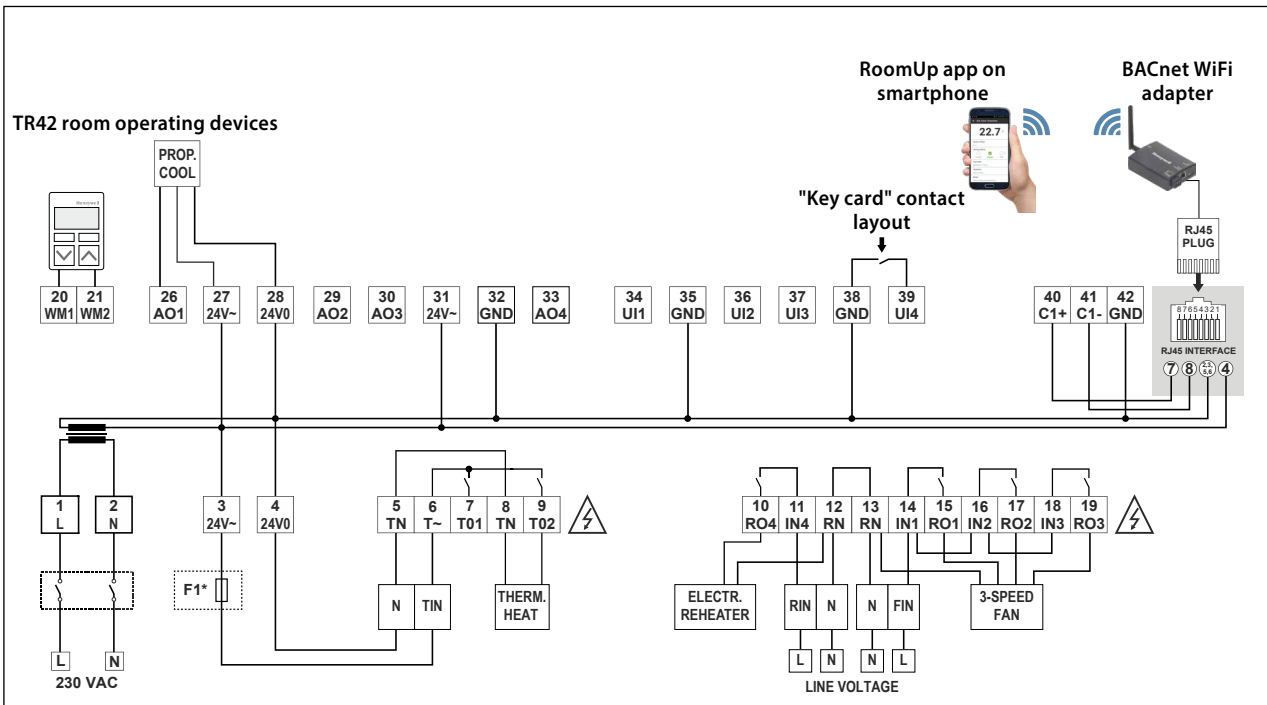
PCD7.LRL2
+2 × IRM-RLC

PCD7.LRxx with optional covers (covers are supplied in sets of 10)

Controller example: PCD7.LRS4



Wiring example for a PCD7.LRS4 controller



*Optional fuse (to protect the controller's internal transformer which only has a non-resettable fuse).

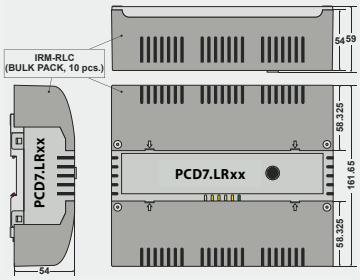
3.2.5 PCD7.LRxx accessories

IRM-RSC/IRM-RLC

Terminal covers

Clip-on terminal covers (IP30 contact protection) for small
or large controllers to prevent the user touching the 230 VAC terminals.

Optional for IP30



BACA-A

Mobile BACnet MS/TP access point for RoomUp

Straightforward one-cable connection to the PCD7.LRxx controller

Additional option for connecting MS/TP cables and power supply via mini-USB

Wi-Fi-protected setup (WPS) for quick device connection

Web interface for device configuration

Compatible room operating devices

Sylk bus room operating devices

- Types with integrated sensors for temperature, humidity and CO2 sensor in one device

PCD7LR-TR42
Room temperature sensor
+ setting option for setpoint, presence and fan speed
+ LCD display
(+ humidity and CO2 sensor)

Order number:
PCD7.LR-TR42
PCD7.LR-TR42-H
PCD7.LR-TR42-CO2
PCD7.LR-TR42-H-CO2

PCD7LR-TR40
Room temperature sensor
(+ humidity and CO2 sensor)
with Sylk bus connection to the controller.

Order number:
PCD7.LR-TR40
PCD7.LR-TR40-H
PCD7.LR-TR40-CO2
PCD7.LR-TR40-H-CO2

Wired room operating devices from Honeywell

T7460x
Room temperature sensor
+ setpoint setter
+ occupancy button
+ fan speed adjuster

Order number:
T7460A1001 T7460D1005
T7460B1009 T7460F1000
T7460C1007

Room operating devices with connectors for connecting to the controller inputs.

Wired room operating devices from SBC

PCD7.L63x
Room temperature sensor
+ setpoint setter
+ occupancy button

Order number:
PCD7.L630
PCD7.L631
PCD7.L632

Room operating devices connected to the inputs of the controller.
PCD7.L631 and PCD7.L632 both require a PCD7.L671 cable with an RJ11 plug.

Q.RCU-A-Txxx
Room temperature sensor
+ setpoint setter
+ occupancy button
+ fan speed adjuster

Order number:
Q.RCU-A-T
Q.RCU-A-TS
Q.RCU-A-TSO
Q.RCU-A-TSOF

Room operating devices with connectors for connecting to controller inputs.

3.3 S-Bus Room Controllers configurable via PG5 and LON Room Controllers configurable via LNS tools

Dedicated room controller

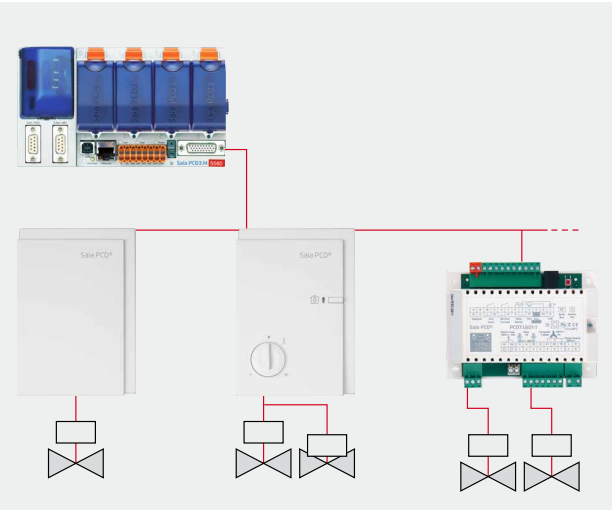
Room controllers with a preconfigured regulation and control program which can be comprehensively parameterised via network communication and tailored to meet individual needs. Fully independent functionality is guaranteed even without a bus connection.

3.3.1 Project planning and engineering

In addition to the freely programmable controllers, the range of products for room-specific applications also includes dedicated SBC room controllers.

Main features

- **Application software included on delivery**
  The room controllers can be parameterised via network communication and fully independent functionality is still guaranteed without a bus connection.
- **Efficient integration for suitable applications**
  Use of HVAC applications in zones and room automation systems which adjust the I/O mix and integrated applications precisely to the specific application. As the room controllers are not fully programmable, unsuitable applications should be implemented with a solution which includes the "E-Line".
- **S-Bus room controllers are integrated into the Saia world**
  The Saia FUPLA (FBoxes) enable engineering in the standard SBC environment and exploit the benefits of the Saia PG5 Controls Suite.



Parameterised via bus with Saia PG5 Controls Suite

Engineering information

Commissioning the SBC S-Bus and LON room controller

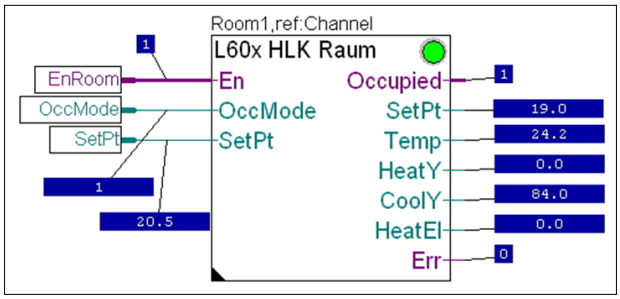
If the room controller is used as part of a SBC S-Bus network, addressing and configuration is carried out by the Saia PCD Master using the Saia PG5 Controls Suite. Practical FBoxes simplify commissioning.

The FBox setup and room controller service pin are used for the addressing process. It is recommended pre-addressing the room controller in the office.

If the room controller is used in an Lon network, the configuration is performed with a LONWORKS® tool such as the NL220 or LONMAKER®.

Integrating the SBC S-Bus room control system with S-Engineering using function modules (FBoxes)

- Programming and debugging environments are combined in the same tool.
- Complex user programs are created by simply placing and linking FBoxes with no extensive programming knowledge required.
- Online visualisation of the process values and online parameter adjustment directly at the FBoxes simplify the commissioning process.



Online visualisation of the HVAC room FBox.

- The parameter windows of each FBox can be used to display online and directly adjust all setpoint values, actual values and statuses of the controller.
- Detailed, context-sensitive FBox information, clear descriptions and graphic representations in the function chart editor (FUPLA) provide clear, easy to read programs.
- It is possible to switch all control parameters to a control system using the PCD controller and thus reduce running costs.

Efficiency in project realisation

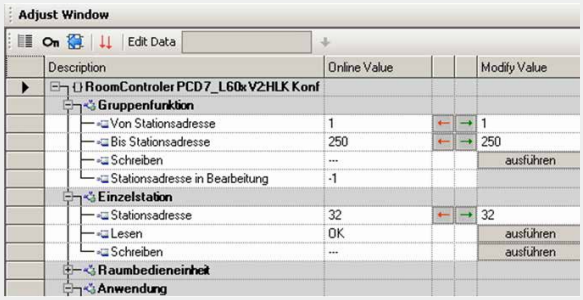
The FBoxes shorten the "Engineering time" and simplify the commissioning process, as the configuration data can be sent via the communication interface to up to 250 controllers in a single step. The automatic detection of the communication speed also simplifies the commissioning process.

Multiple application possibilities

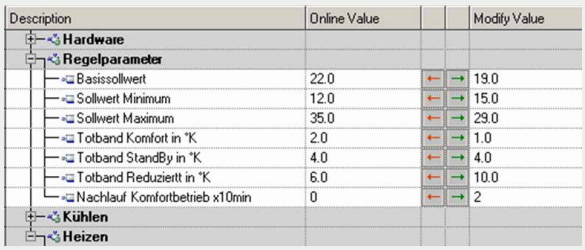
Application programs for various types of systems are already pre-programmed in the controller and can be activated using the parameterisation.

Parameterisable application program

If the application supplied does not match the project requirements, the application program for different system types can be activated and parameterised via PG5 FBoxes or S-Web.
The application software already contains several user programs for systems such as combined radiators/cooling ceiling systems.



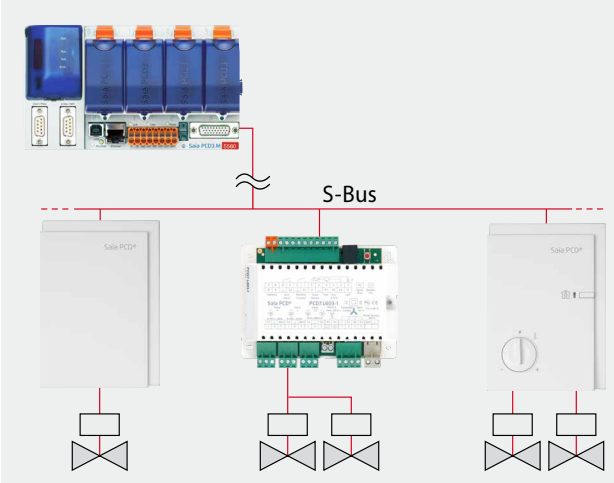
Configurable using the PG5 Controls Suite



The control parameters (PI) for the specific applications can be adjusted and optimised

Fully independent functionality guaranteed even with no bus connection

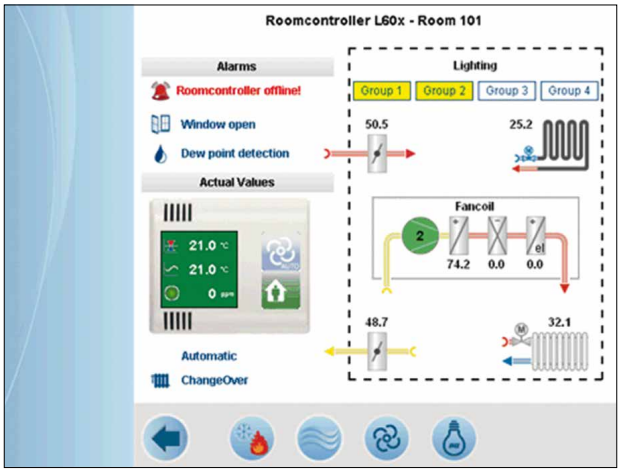
Once the application programs in the controller have been parameterised, it is possible to run a fully independent operation without a PCD.
The controller will therefore continue to operate uninterrupted even if communication with the Saia PCD automation station is disrupted. All the set configuration parameters are written to the EEPROM and remain stored there even with no operating voltage.



Functionality is also guaranteed in the event of a bus fault.

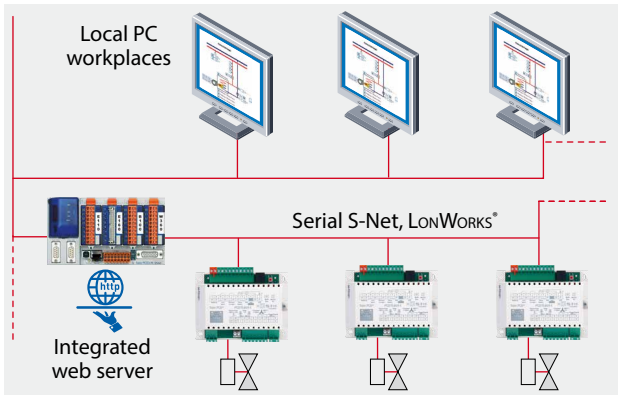
SBC S-Web

S-Web Editor macros simplify the efficient setup process of web-based commissioning, operation and service operating concepts.



Visualisation and operation of the room parameters using the web server

This makes local operation using a PC workstation possible. The password protected control screens are loaded direct from the web server integrated in the automation station and displayed.

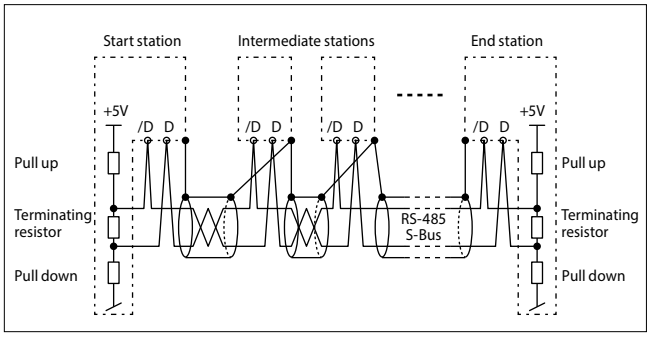


Local user prompts from PC workstation.

Project planning information

Bus terminating resistor and bus cable for serial S-Net (S-Bus/RS-485)

S-Bus cables must be installed as a line. Stub lines are not permitted and both ends of the cable must be terminated with a resistor (approx. 120 Ω) between the D and /D cables. The best signal quality is achieved using an active bus connection with a resistor to +5V and GND.



Schematic illustration of an S-Bus/ RS-485 bus

With S-Bus controllers, the 111 configuration register can be used to activate the integrated active bus terminating resistor or an external PCD7.T161/2 termination box can be used.
Bus cable: A 2-strand twisted and shielded bus cable with cable strands of at least 0.5 mm2 must be used.
Bus shielding: The shielding of each S-Bus segment may only be connected with the electrical system ground at one point.
To avoid problems with large potential differences between the room controllers, the shielding of the S-Bus cable should be connected with the GND of the room controller.
For more information, see S-Bus manual 26-739 (at www.sbc-support.com).

Maximum number of room controllers

The maximum number of room controllers that can be managed by a PCD system depends on the maximum electrical load of the serial S-Net, the bus system cycle time and the resources used by the functional objects.

PCD7.L79xN

Resources: approx. 2 kB (Program memory,) per controller, max. 40 registers per controller, max. 16 flags per controller
Bus cycle time per controller: approx. 15 ms

PCD7.L60x-1 (when using all FBoxes)

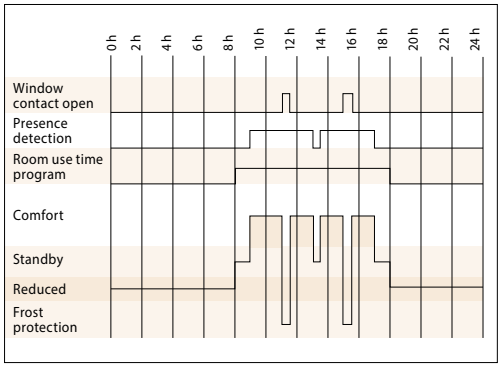
Resources: approx. 10 kB (Program memory,) per controller, max. 95 registers per controller, max. 36 flags per controller
Bus cycle time per controller: approx. 80 ms

At a communication speed of 38,400 baud, the communication time for a controller is approx. 15 ms or 80 ms. If the PCD program requires longer than 15 ms or 80 ms per PCD cycle, this value must be used as the basis of the calculation used to estimate the communication cycle. For additional information please refer to chapter 1.1.
Communication cycle = "15 ms or 80 ms per controller" × "Number of controllers".

Recommendation: max. 4 S-Bus interfaces with up to 25 room controllers per interface so that resources are sufficient in most cases and the communication cycle time remains < 2 seconds

Types of use and modes of operation

The function of the room controller is based on various types of use or modes of operation.
Each of the selectable modes of operation can be assigned different control parameters.



Example: Operating mode switchover

Safety mode/Frost protection

No heating or cooling energy is fed into the room. This state is desirable if a window is open. The room controller keeps the room temperature above the preset frost line of 8° C.

Non-use/reduced

Reduced operation mode which is used when the room is unoccupied for long periods. The specified setpoint value offset is not active in this operation mode.

Standby

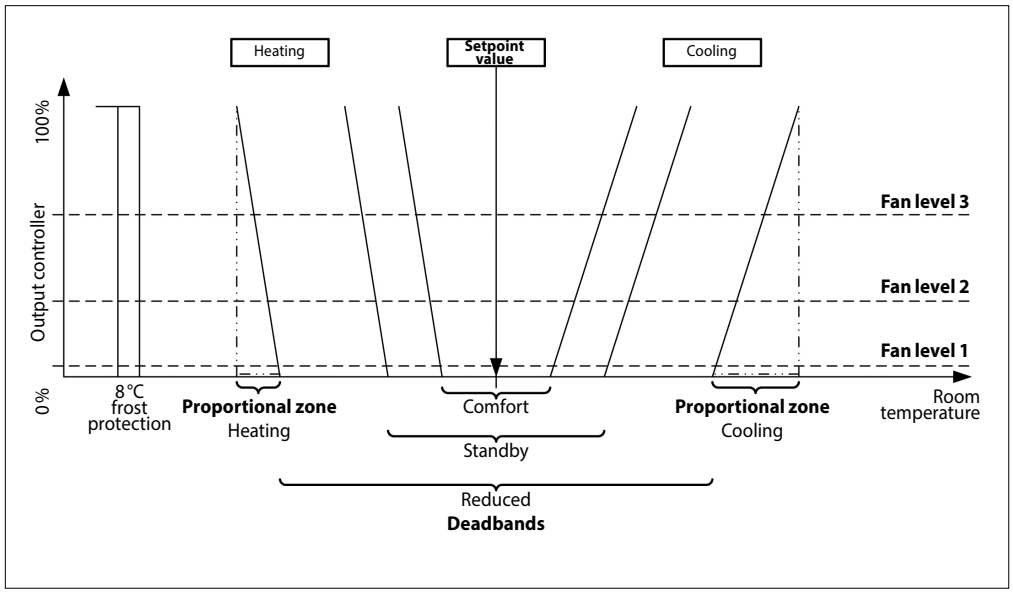
The room is prepared for use but no presence has yet been registered in the room. As long as the room is not classified as occupied by the presence function, the room controller maintains the room temperature within the specified limits at the standby temperature.

Use/comfort

The room is used and should be brought to the comfort temperature.
This state can be reached by pressing the presence button, reacting to an external presence detector or a parameter on the network side.

Control parameters

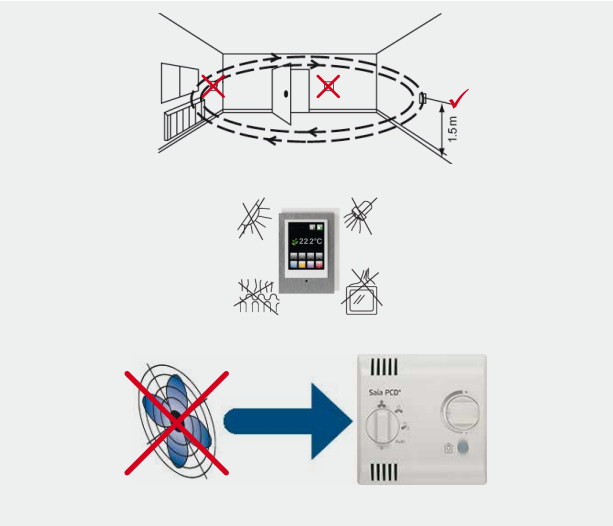
The adjacent illustration depicts a selection of the most important adjustable control parameters of a PCD7.L60x-1 controller. Additional parameters such as reset times, threshold values, etc. can also be adjusted.



Example Selection of control parameters PCD7.L60x-1

Control devices and compact room controller installation information

- Do not install the control device /compact room controller near windows or doors due to potential draughts. The recommended position is on an opposite wall at a height of approx. 1.5 m.
- Do not install it near to heat sources such as heating systems, fridges, lights, etc. Avoid direct sunlight or direct light from bright lighting.
- Do not locate the control device /compact room controller in draughts produced by air conditioning and ventilation systems.

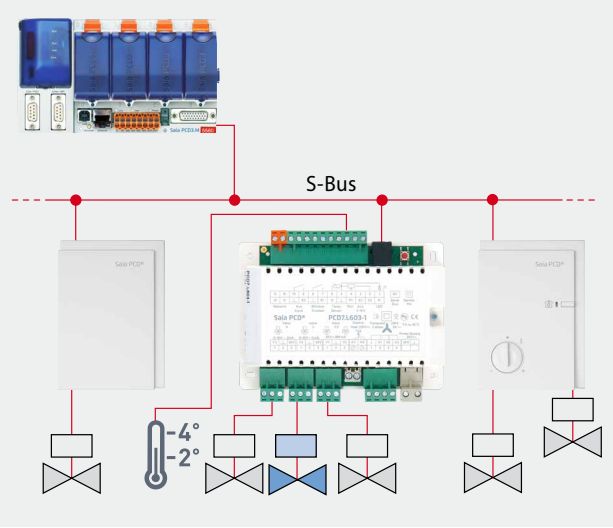


Planning reserves

If the predefined application is insufficient, free outputs can also be controlled for fully independent function directly via the Saia PCD program using the S-Bus.

The room controller can also be configured as a single RIO unit (Remote Input Output) by completely switching off the fully independent function. The Saia PCD station then controls all the inputs and outputs.

The resulting dependency of the availability of the S-Bus communication and the increase in the S-Bus cycle time should be taken into account during the planning stage.



Control of free outputs via Saia PCD®

3.3.2 Compact room controller PCD7.L79xN

The series of compact room controllers is particularly suitable for simple systems which involve heating and/or cooling.

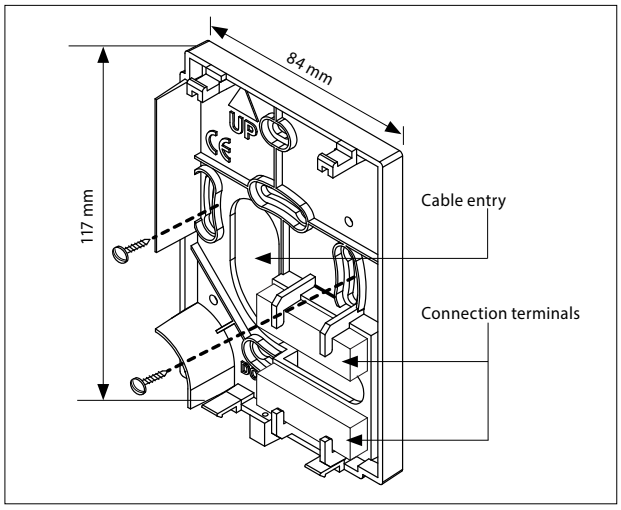
The PCD7.L79xN series room controllers include the control of presence and setpoint values, the room temperature sensor and the valve or flap control in a single housing. The preconfigured regulation and control program is part of the basic software and can be parameterised via the network communication and adjusted to the individual requirements.

Parameterised via bus with S-Engineering tools

Efficient installation

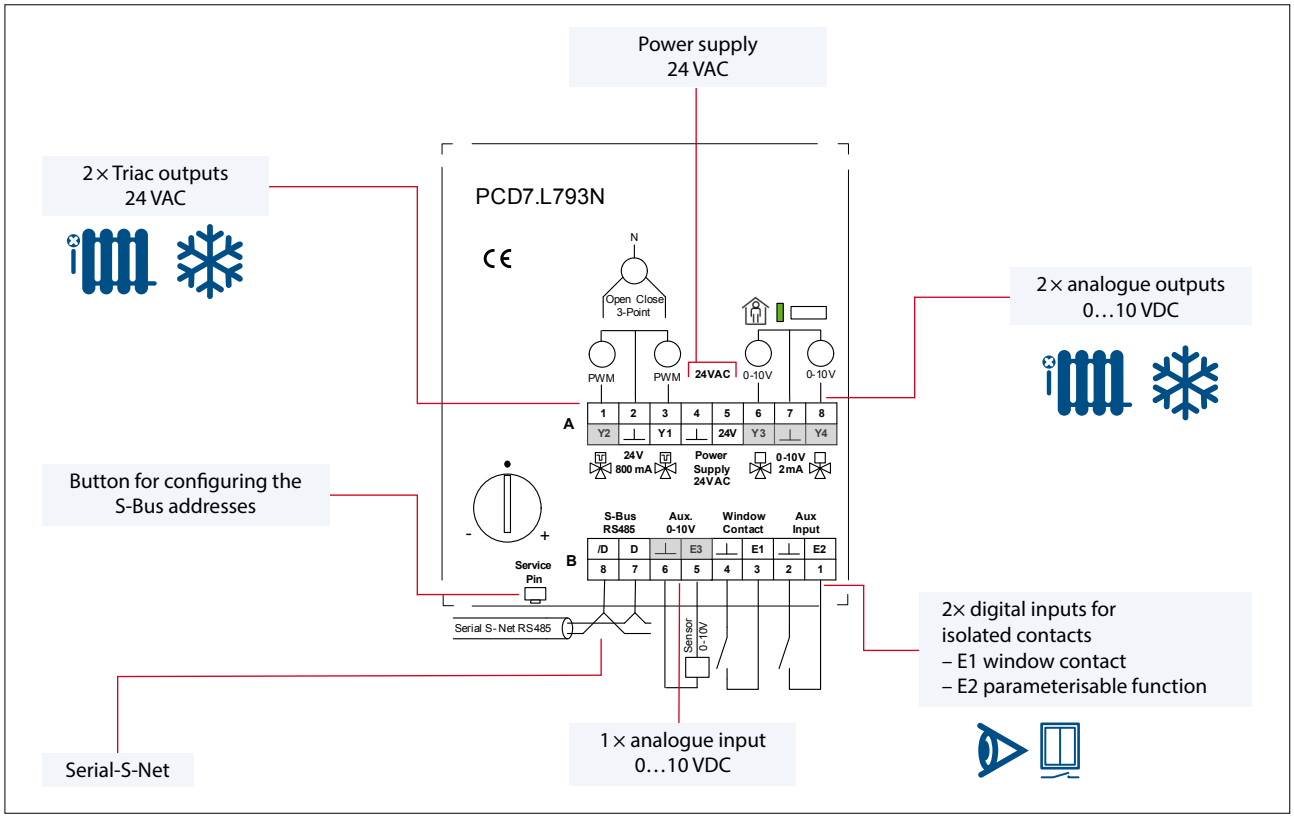
The compact room controller can be installed directly onto a wall or in a flush-mounted box. A junction box is not required, which also simplifies the installation process.

The plug-in housing (electronics) on the mounting plate with the terminals enables an easy exchange of the device with no complex and fault-prone rewiring required.



Mounting plate

Terminal assignment (example PCD7.L793N)



Product overview of the PCD7.L79xN series

I/O	PCD7.L790N	PCD7. L791N	PCD7. L792N	PCD7. L793N
				
Digital inputs	1× window contact and 1× multi-functional	1× window contact and 1× multi-functional	1× window contact and 1× multi-functional	1× window contact and 1× multi-functional
Digital outputs (PWM)	1 × Triac 24 VAC	2 × Triac 24 VAC	2 × Triac 24 VAC	2 × Triac 24 VAC
Analogue inputs	---	---	---	1 × 0…10 VDC
Analogue outputs	---	---	---	2 × 0…10 VDC
Integrated hardware				
Internal temperature sensor	NTC 10 kΩ	NTC 10 kΩ	NTC 10 kΩ	NTC 10 kΩ
Setpoint value setting	---	---	Yes	Yes
Presence button with LED	---	---	Yes	Yes
Actuated valve types and drives (Count independent)				
Digital output 24 VAC	1 × thermal valve	2 × thermal valve or 1 × 3-point valve	2 × thermal valve or 1 × 3-point valve	2 × thermal valve or 1 × 3-point valve
Analogue output 0…10 VDC	---	---	---	2 × 0…10 VDC valve or 1 × 6-way valve or 1 × VVS drive
Applications				
2 pipes for heating, cooling or changeover	Yes	Yes	Yes	Yes
2 × 2 pipes for heating, cooling or changeover	---	Yes	Yes	Yes
4 pipes for heating and cooling	---	Yes	Yes	Yes
RIO	Yes	Yes	Yes	Yes

Application examples:

Radiator/cooling ceiling, underfloor heating/cooling ceiling combination (or as individual units), changeover operation (e.g. for cooling/heating ceiling)

General specifications

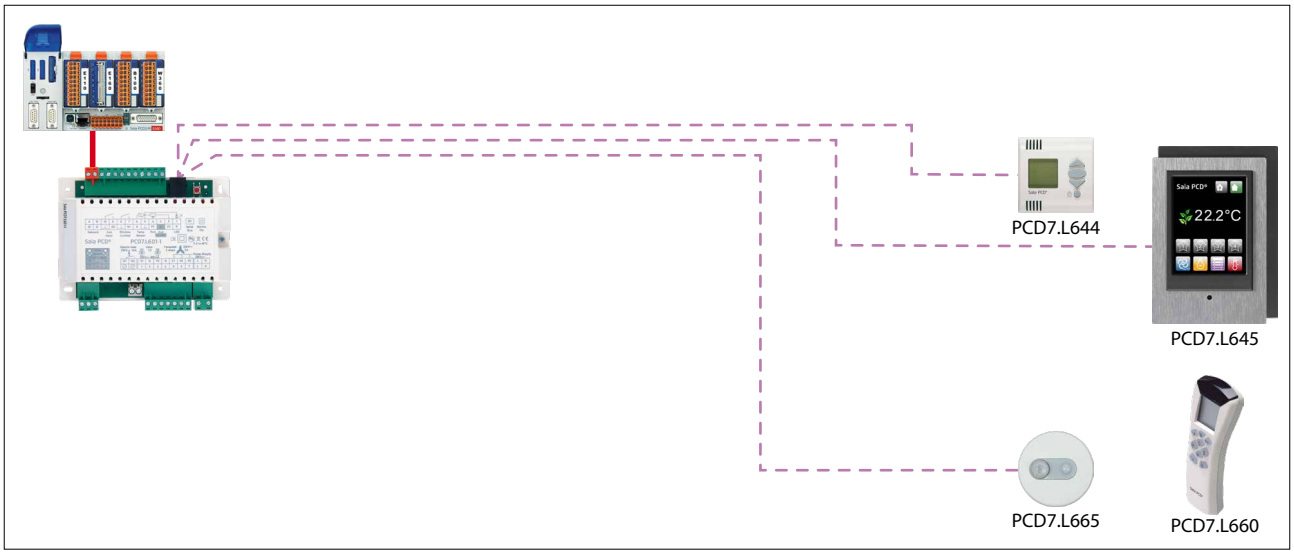
Power supply	24 VAC / requires an external electrical back-up fuse
Temperature detection internal sensor	NTC 10 kΩ / 0…40 °C
Type of control	P or PI control
Communications interfaces	SBC S-Bus / RS-485 interface / data mode / 4,800, 9,600, 19,200, 38,400, 115,200 bit/s with automatic detection on restart. Bus terminating resistors are installed by the customer - integrated into the PCD7.L79xN and activated by the software.
Power consumption	1.5 W without actuators
TRIAC output specification	24 VAC /800 mA maximum total current for both TRIAC
TRIAC direction of operation	Direction of action invertible / default setting: Normally open
Output specification 0…10 VDC	0…10 VDC / max. load 2 mA
Housing	Plastic, white, surface installation, protection class IP20
Dimensions	84 × 117 × 31 mm (W × H × D)
Temperature range	5…45 °C, 80 % r. H.

Manual and FBox library

http://sbc.do/jkgyJLt4

3.3.3 Combinable room control system with S-Bus and LonWorks® PCD7.L6xx

For room automation with combinable room control units and possibility of air quality control.



The PCD7.L6xx combinable room control system based on serial S-Net or LonWorks® networks is used for HVAC applications primarily in fan coil devices, radiator/cooing ceiling combinations and variable air volume systems (VAV). The various room control unit options enable users to create individual operating concepts.

Features

- Comprehensive range of applications possible using parameterisable application programs
- Room controller for communication via serial S-Net or LonWorks®
- Can be combined with various room control unit options
- The Lon room controllers fulfil the "Fan Coil Unit Object (8020)" application profile of LonMark®.

Product overview S-Bus and LonWorks® room controller

System catalogue product families PCD7	S-Bus				LonWorks®				
									
Power supply	**230 VAC** +10%/–15%	**230 VAC** +10%/–15%	**24 VAC** +10%/–10%	**230 VAC** +10%/–15%	**230 VAC** +10%/–15%	**230 VAC** +10%/–15%	**230 VAC** +10%/–15%	**230 VAC** +10%/–15%	**230 VAC** +10%/–15%
Inputs	**L600-1**	**L601-1**	**L603-1**	**L604-1**	**L610**	**L611**	**L614***	**L615***	**L616***
Digital inputs	1× window contact and 1× multi-functional	1× window contact and 1× multi-functional	1× window contact and 1× multi-functional	1× window contact and 1× multi-functional	4× multi-functional	1× window contact and 1× multi-functional	4× multi-functional	4× multi-functional	4× multi-functional
Operating state response	Yes	Yes	Yes	Yes	Yes	Yes	Yes	---	Yes
Analogue inputs 0…10 VDC	---	1× 0…10 VDC	1× 0…10 VDC	1× 0…10 VDC	---	---	1× 0…10 VDC	2× 0…10 VDC	1× 0…10 VDC
Temperature sensor	1× NTC 10 kOhm	1× NTC 10 kOhm	1× NTC 10 kOhm	1× NTC 10 kOhm	1× NTC 10 kOhm	1× NTC 10 kOhm	1× NTC 10 kOhm	2× NTC 10 kOhm	1× NTC 10 kOhm
Setpoint value adjuster (10 kOhm potentiometer)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	---	Yes
Outputs	**L600-1**	**L601-1**	**L603-1**	**L604-1**	**L610**	**L611**	**L614***	**L615***	**L616***
Digital outputs TRIAC	2× 230 VAC (total max. 800 mA)	2× 230 VAC (total max. 800 mA)	2× 24 VAC (total max. 800 mA)	2× 24 VAC [1]	2× 230 VAC (total max. 800 mA)	2× 230 VAC (total max. 800 mA)	2× 24 VAC [1]	4× 230 VAC (total max. 800 mA)	2× 230 VAC (total max. 800 mA)
Relay outputs 3-level	1× 230 VAC (3 A)	1× 230 VAC (3 A)	1× 230 VAC (3 A)	1× 230 VAC (3 A)	1× 230 VAC (3 A)	1× 230 VAC (3 A)	1× 230 VAC (3 A)	---	1× 230 VAC (3 A)
Relay outputs 1-level	1× 230 VAC (10 A)	1× 230 VAC (10 A)	1× 230 VAC (10 A)	1× 230 VAC (10 A)	1× 230 VAC (10 A)	1× 230 VAC (10 A)	1× 230 VAC (10 A)	2× 230 VAC (10 A)	1× 230 VAC (10 A)
Analogue outputs (total max. 2 mA)	---	2× 0…10 VDC	2× 0…10 VDC	2× 0…10 VDC	---	2× 0…10 VDC	2× 0…10 VDC	2× 0…10 VDC	2× 0…10 VDC
Analogue outputs with additional 24 VAC power supply	---	---	Yes	Yes [1]	---	---	Yes [1]	---	---
Extension modules	**L600-1**	**L601-1**	**L603-1**	**L604-1**	**L610**	**L611**	**L614***	**L615***	**L616***
Light modules	Yes	Yes	Yes	Yes	---	Ja [4]	---	Ja [2]	---
Shade modules	Yes	Yes	Yes	Yes	---	Ja [3]	---	---	---
Possible applications	**L600-1**	**L601-1**	**L603-1**	**L604-1**	**L610**	**L611**	**L614***	**L615***	**L616***
Electrical heating only	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 pipes for heating or "changeover"	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 pipes for cooling or "changeover" with electric heating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4 pipes for heating and cooling	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4 pipes for heating and cooling and electric heating (secondary)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4 pipes for heating and cooling and electric heating (primary)	---	---	---	---	Yes	Yes	Yes	Yes	v
2 × 2 pipes for heating, cooling or "changeover"	Yes	Yes	Yes	Yes	---	---	---	---	---
RIO	Yes	Yes	Yes	Yes	---	---	---	---	---
Direct control of outputs	---	---	---	---	Yes	---	Yes	---	Yes
Special functions	**L600-1**	**L601-1**	**L603-1**	**L604-1**	**L610**	**L611**	**L614***	**L615***	**L616***
Air quality control (CO_2)	---	Yes	Yes	Yes	---	---	Yes	---	Ja
Master / Slave	Yes	Yes	Yes	Yes	---	---	---	---	---

Controlled valves and required I/O

Thermal valve: 1 digital output (TRIAC PWM)
0…10 V valve: 1 analogue output (0…10 VDC)
3-point valve: 2 digital outputs (TRIAC PWM)
6-way valve: 1 analogue output (0…10 VDC) ➞ can only be connected to one 6-way valve

Controlled drives and required I/O

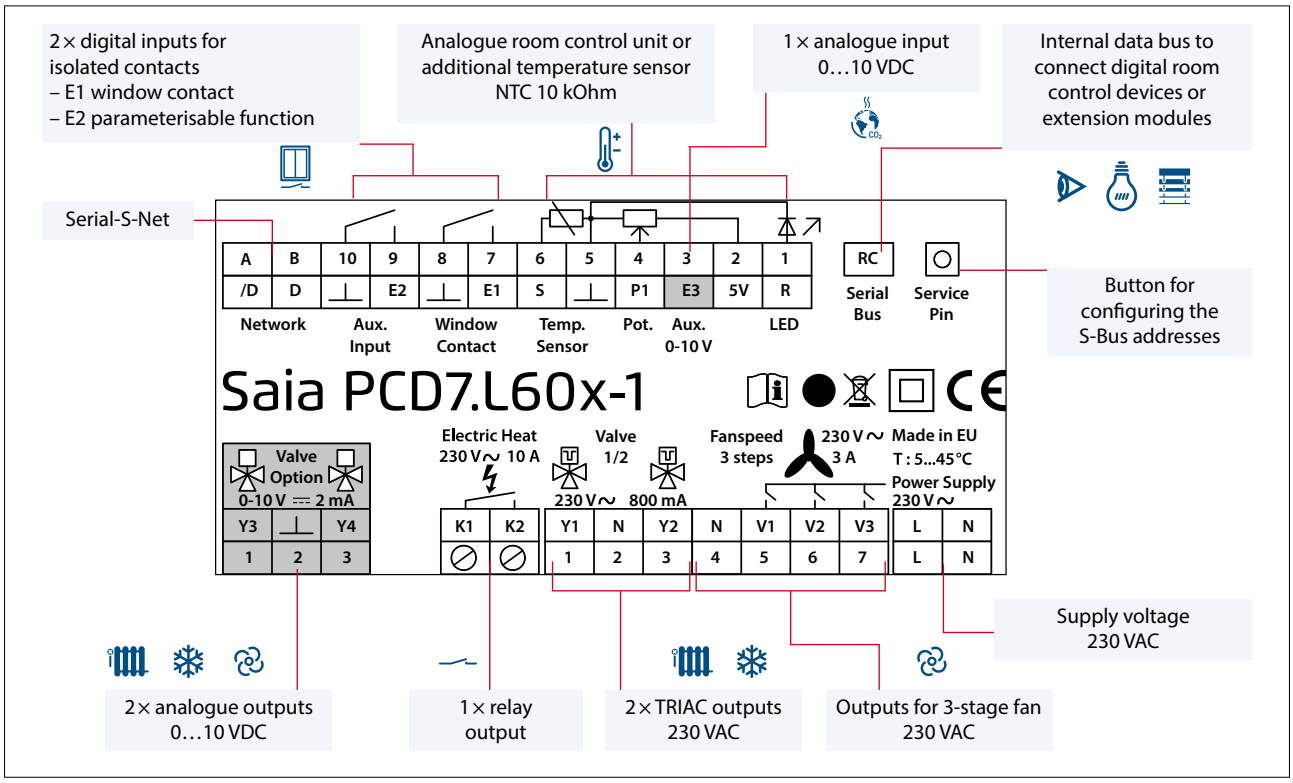
VAV-drive: 1 analogue output (0…10 VDC)
3-stage fan: 1 relay output 3-stage
Fan with variable speed: 1 analogue output (0…10 VDC) ➞ PCD7.L601-1…L604-1 and PCD7.L614…L616 devices only
Electric heating: 1 relay output 1-stage

Application examples: Fan coil, chilled beam, air quality control (combined with heating and second level cooling (radiator/cooling ceiling-, underfloor heating/cooling ceiling combination, changeover operation (e.g. for cooing/heating ceiling), VAV

[1] PCD7.L6x4-1: The total power consumption of valves may not exceed max. 7W, output voltage: 24 VAC; –15% / +35%.
[2] Without automatic function [3] Without blind slats rotation [4] Without dimmers

*In preparation, see Chapter C1 "Product status"

Terminal assignment (example PCD7.L601-1)



Technical Data

TRIAC output specification	10 mA…800 mA, maximum total current of both TRIACs
Current draw	Without actuator approx. 10 mA to 100 mA requires an external electrical back-up fuse
Protection	The module has to be installed in a locked box with aerations – minimum size: 240 × 145 × 100 mm
Dimensions W × H × D	132 × 95 × 45 mm
Temperature range	5…45 °C, 80 % RH
Communication with S-Bus	
Interface	RS-485, max. cable length of bus cable depends on baud rate, under ideal conditions up to max. 1200 m
Transmission rate	4800, 9600, 19'200, 38'400, 115'200 bit/s with automatic detection on restart
Log	SBC S-Bus data mode (slave) Bus terminating resistors must be installed by the customer – with integrated L60x these can be activated by software.

Communication with LonWorks®

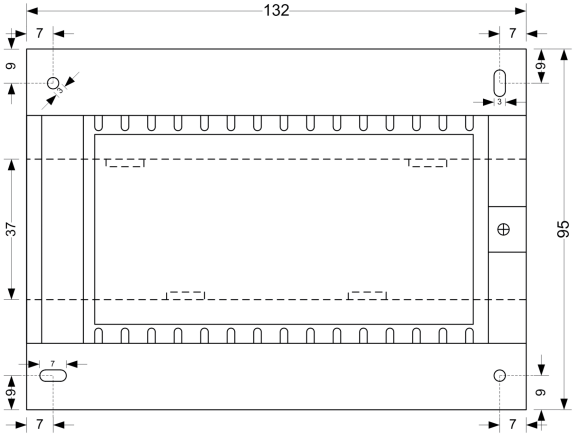
Interface	FTT 10a
Transmission rate	78 kBit/s
Topology	Free topology max. 500 m, bus topology max. 2700 m
Number of Lon nodes	Max. 64 per segment, over 32,000 in one domain / in accordance with LonMark® 8020 profile

Dimensions for

- PCD7.L60x-1
- PCD7.L61x

Mounting

- On 35 mm DIN rail
- Or with min. 2 × Ø 3 mm screws on an even surface

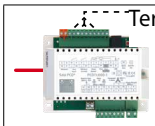


Manuals and FBox library
http://sbc.do/xmfBWij9

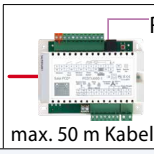
3.3.4 Operation systems for combinable room control system PCD7.L6xx

Individual operating concepts can be implemented using the combination room control system:

- Simple connection via the internal RC-Bus to the RJ-9 connector
- LonWorks® room control unit of external manufacturers via Lon-Bus
- Web-based room control units via HTTP



Analogue room control units	PCD7. **L630**	PCD7. **L631**	PCD7. **L632**
Temperature sensor	NTC 10 kΩ		
Setpoint value adjuster	---	Poti 10 kΩ | linear	
Presence sensor	---	---	Contact to GND
Response	---	---	LED

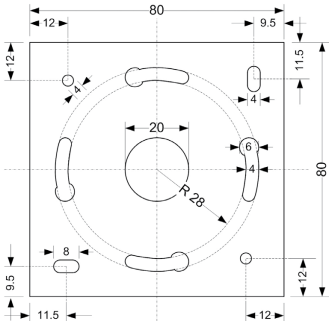


Digital room devices	PCD7. **L640**	PCD7. **L641**	PCD7. **L642**	PCD7. **L644**
Temperature sensor	•	•	•	•
Setpoint value adjuster	•	•	•	•
Presence sensor	---	•	•	•
Response	---	•	•	•
Fan control	---	---	•	•
Display menu for: HVAC functions	---	---	---	Parameterisable

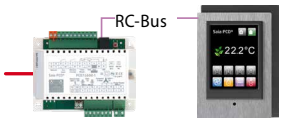
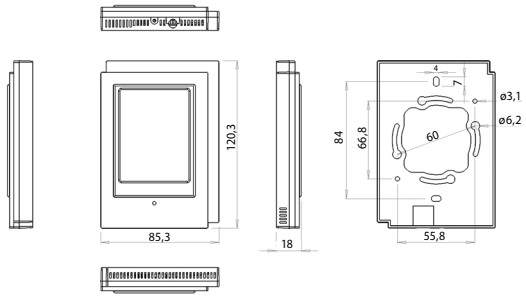
Dimensions and installation options

PCD7.L63x, PCD7.L64x, PCD7.L651, PCD7.L663

Housing colour: RAL 9016



Mounting plate

3.2" touch screen room control unit PCD7. L645W/B	**PCD7.L645W/B**	**Dimensions and installation options**
	 max. 10 m cable length	
Control for: setpoint value, fan and presence		
If, for example, a function is no longer to be displayed, access to specific menus can be prohibited with a password and hidden.		

- Automatic adjustment of the dimmable backlight depending on the actual brightness in the room ensures optimum reading comfort
- Screen standby timer for setting the time after which the screen will dim following the last action
- Star keys to define user settings and to call them up at a push of a button if required (up to 4 predefined scenarios can be saved)

PCD7.L645W: White housing (Pantone Q 716-3-5), 1 white and 1 aluminium front panel

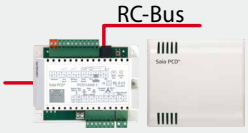
PCD7.L645B: Black housing (RAL 9011), 1 black and 1 aluminium front panel

Some projects require individual design in terms of shape and colour. The PCD7.L645W/B offers the option of replacing the front panel. The scale drawing for production on page 8-1 of the 27-605 manual is provided for manufacturing customised front panels.

Portable room control units with display and function keys

Control devices	PCD7. **L660**	PCD7. **L662**	
			
Receivers	PCD7. **L661**	PCD7. **L663**	PCD7. **L665***
 max. 50 m cable length			
Wall mounted control device	Including for fixed installation		—
Communication / IR (infrared)	Unidirectional		•
Communication / radio		Bidirectional	—
Temperature sensor	•	•	—
Setpoint value adjustment	•	•	•
Presence control	•	•	Movement sensor
Fan control	•	•	•
Brightness sensor	—		•
Supply voltage control device	2 × AAA 1.5 V Micro		—
Temperature range	+5…45 °C, 80 % r. H.		

EnOcean radio receiver PCD7.L651* for connecting Thermokon room control devices and EnOcean wireless switches



max. 50 m cable length

Example of EnOcean wireless switch for controlling lights and Venetian blinds (compatible with various control programs of various manufacturers)

Example of EnOcean room control devices for controlling HVAC

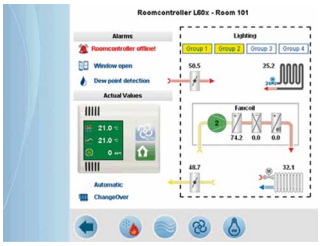
More detailed information on the compatibility of the EnOcean receivers can be found in the PCD7.L651 manual

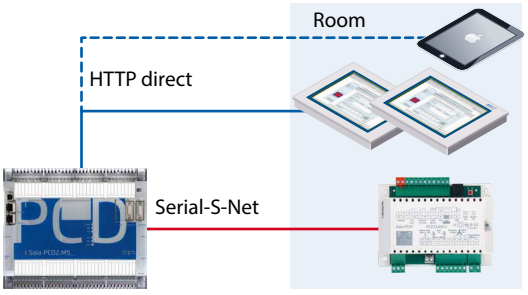
Communicative room control units

Individual solutions using web-based room control units

System requirements:

- Room controller with communication to PCD via S-Net, LonWorks® for HVAC control.
- PCD with corresponding interface and interface for connecting to the desired control device, e.g. web panel, PC, iPhone, etc.

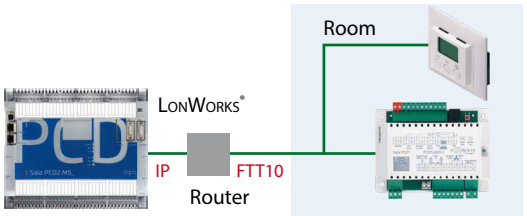




Direct connection of the room control units from the external supplier via LonWorks®

System requirements:

- Room controller with LonWorks® interface.
- For making additional connections to the automation station, the
  – PCD3.M
  – PCD2.M5
  – PCD1.M2 can be connected via the Lon over IP or via an external FTT10/IP router..



*In preparation, see Chapter C1 “Status: Product launch and availability”

A4

Collect, visualise and process consumption data

With the field devices of the S-Monitoring system, electrical energy is measured and signals from water, gas and heating meters are captured. The S-Monitoring application processes and visualises data automatically in a clearly arranged manner. Thus, the system generates a high degree of transparency regarding resource consumption. This functions from just a few measuring points up to thousands of measuring points in distributed properties.

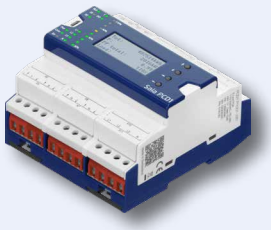
4.1 System overview

S-Monitoring

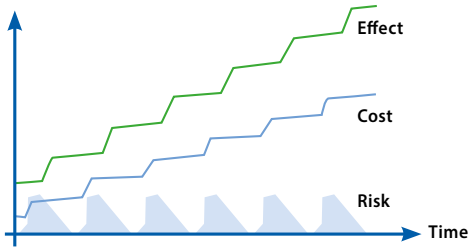
S-Monitoring makes it easy to manage energy and consumption. Ready-to-use directly from the packaging and it does not require any complicated configuration and programming. It can also be customised to meet your specific requirements – it is a system, that grows with you.
The system includes devices and components for capturing, recording and displaying consumption. With the Web Panel installed on-site, analysis can be carried out on the office PC or remotely via the Internet web browser. The open IT interfaces make it possible to connect the system to a superordinate data management system at any time. There is no need to replace the hardware to do this.

Example of external software

Ready for use immediately on delivery



Continuous optimisation in calculable steps:
Sustainable resource management means a continuous gain in knowledge in a changing environment. The optimum solution is different for each business, and must be developed with careful consideration. S-Monitoring supports a cautious approach in small, controllable steps and starts with the basics. It is possible to start resource management without external help using cost-effective, easy-to-install components. Even after just a few days, initial results are set and point the way for further optimisation steps. The investment risk is negligible and remains limited to each individual development step.



With step-by-step introduction, findings from the learning curve are incorporated and lead to optimum results

Remote visualisation and evaluation of consumption

- **Reading and operating via LAN/Internet with web browser and mobile devices**
- **Integration into other systems via standard interfaces**

If the Web Panel and controller are connected to a network (LAN), meter readings and operation can be carried out using commercially available PCs with standard browsers. Special software installations are not required and apps are available for mobile devices. This can even be carried out across locations if there is an Internet connection.
Databases, energy management software or control systems can be connected via standard interfaces (e.g. FTP, CGI, HTTP, etc.).

Logging consumption

- **Historical consumption readings (Day / Week / Month / Year)**
- **Logging in Excel-readable files**

The Web Panel and controllers read consumption values of the connected meters and display them in the form of a web visualisation. This can be called up either directly on the Web Panel or via the controller's web server with a web browser. Consumption and costs can be called up in meaningful diagrams via an intuitive user interface. In addition, the Web Panel and controllers record captured values in Excel-readable CSV files, which can be easily transferred to a PC via FTP. The function can be activated on any new controller.

Record consumption

- **Wide range of single and 3-phase energy meters and network analyzers**
- **S0 interface for the integration of commercially available meters for gas, water, oil, etc.**

Saia PCD® energy meters and network analyzers follow established installation technology and are suitable for DIN rails of commercially available distribution boxes. Integrated into a bus system covering a distance of up to 1 km, the measured values are transmitted to the Web Panel and controllers for the purpose of analysis and logging.
Via pulse counters with an interface, commercial available meters with S0 output can be connected to the bus system.

4.2 Energy meters ALD, ALE and AWD

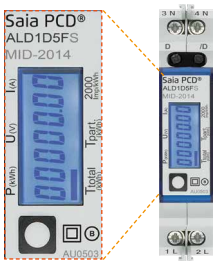
small, robust, reliable and accurate

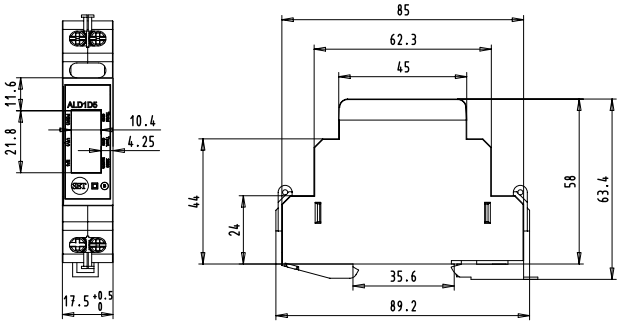
The very compact design makes the SBC energy meters ideally suited to accommodate a large number of measuring instruments in the smallest space. The small size means the meters can also be fitted in existing switch cabinets without having to install new switch cabinets. The robust design has certainly proven itself under tough industrial conditions. The design of the energy meters is specifically designed for such applications, as is shown by a high level of reliability and durability. Production at the Swiss site in Murten means the high quality of the energy meters is guaranteed. The display shows energy, current, voltage and active output.

Many energy meters in the smallest space ▶

Single-phase Saia PCD® energy meters

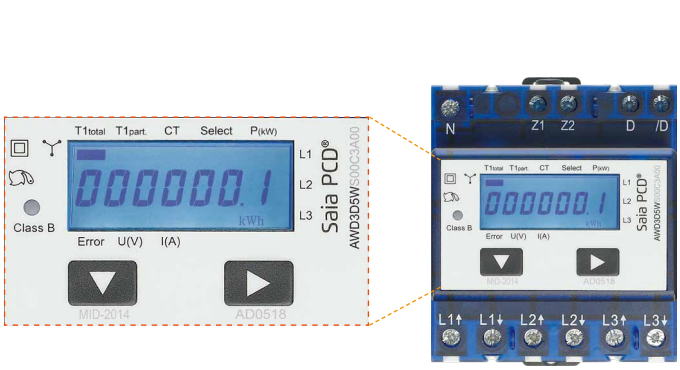
	Single-phase	
	Direct measurement 0.25…32 A	
Interface	**Unidirectional**	**Bidirectional**
M-Bus	ALD1D5FM00A3A00	–
Modbus	ALD1D5FD00A3A00	ALD1B5FD00A3A00
S-Bus	ALD1D5FS00A3A00	ALD1B5FS00A3A00
S0 interface	ALD1D5F10KA3A00 EMD1L5F1KA00	ALD1B5F10KA3A00

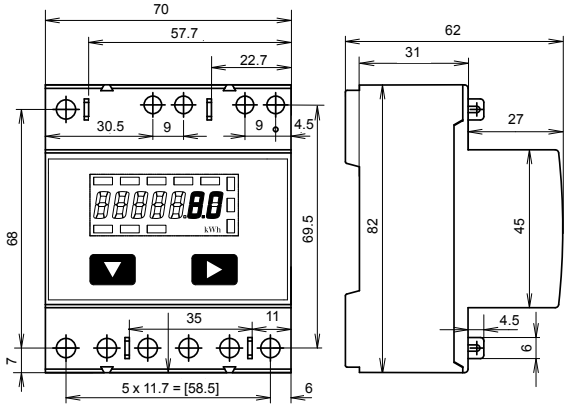




3-phase Saia PCD® energy meters

	3-phase			
	Direct measurement 0.5…65 A		Converter connection up to 1500:5 A	
Interface	**Unidirectional**	**Bidirectional**	**Unidirectional**	**Bidirectional**
M-Bus	ALE3D5FM10C3A00	ALE3B5FM00C3A00	AWD3D5WM00C3A00	–
Modbus	ALE3D5FD10C3A00	ALE3B5FD00C3A00	AWD3D5WD00C3A00	–
S-Bus	ALE3D5FS10C3A00	ALE3B5FS00C3A00	AWD3D5WS00C3A00	AWD3B5WS00C3A00
S0 interface	ALE3D5F11KC3A00	ALE3B5F10KC3A00	AWD3D5W10MC3A00	AWD3B5W10MC3A00

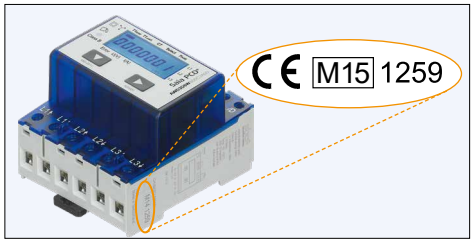




4.2.1 General information on energy meters

Reliable directly from the factory. The design and production of energy meters in Murten are such that the meters also exhibit high levels of reliability and durability even under extreme industrial conditions. The high quality standards of the Swiss production site guarantee high accuracy and enable the production of MID-approved energy meters, which have a guaranteed accuracy immediately following delivery and for their entire calibration period. This approval means that the measured values are considered totally accurate and can be used throughout Europe for billing purposes.

▲ Energy meters in tough industrial environment



▲ Marking on an MID meter

▲ Production cell for energy meters in Murten

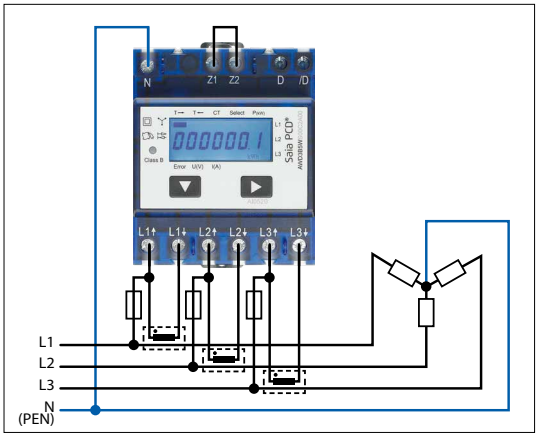
Meters for converter connection

The use of current converters makes costly shutdowns of entire machines for meter installation a thing of the past. The replacement of an energy meter or current converter while the system is running is possible with the consistent use of flap current converters, since the faulty parts can be replaced easily without disconnecting the entire system from the power supply.

Available converter ratios in Saia PCD® energy meters

Three-phase energy meters – secondary current 5 A			
5:5	50:5	100:5	150:5
200:5	250:5	300:5	400:5
500:5	600:5	750:5	1000:5
1250:5	1500:5	---	---

▲ Current converter in switch cabinet



▲ Connected converters

▲ Built-in current converter directly in the cable duct

MTBF values for Saia PCD® energy meters

The quality, robustness and reliability of the energy meters is also shown by the MTBF values, which have been calculated in accordance with the Siemens standard SN 29500.

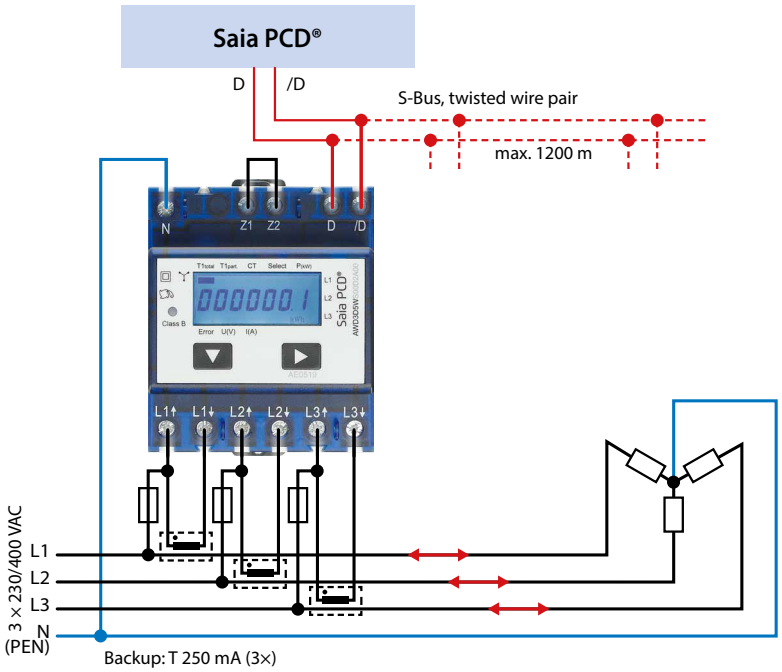
MTBF values at 25 °C

Energy meters without communication interface: 410 years

Energy meters with communication interface: 200 years

Measuring energy in both directions

With the bidirectional energy meters, energy can be measured in both directions of flow. The energy counters work in a balancing out fashion (mode 2), which means that they form the sum of all measured phase outputs analogue to the old Ferraris meters with a rotating disc.
The main area of use of bidirectional meters is wherever both energy flow directions occur (energy consumption and feed), such as in photovoltaic systems. FBoxes are installed for connection to the PCD world to capture the measured values.



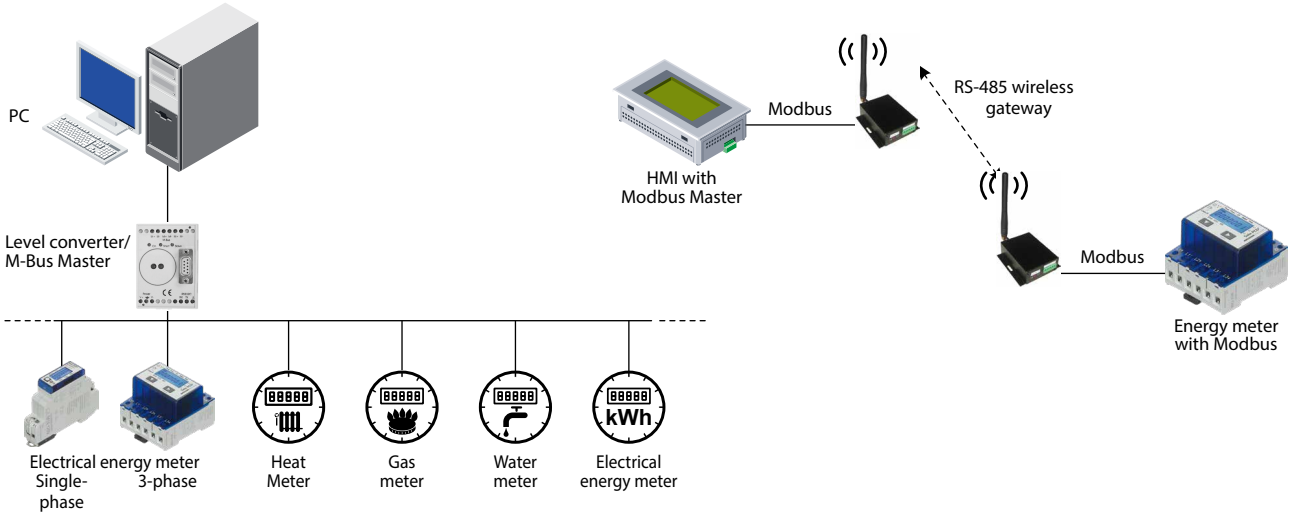
▲ Energy measurement of both current directions with one Saia PCD® for further processing of the measured values

EPLAN macros are available for project planning and engineering

The eplan® electric P8 macros are available on the support page.
The macros and article data are also provided on the eplan® data portal.

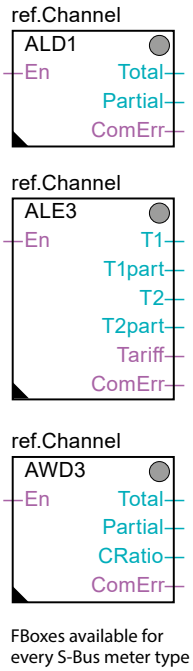
Integrating the energy meter as a component in an existing, external system

The M-Bus energy meters can be integrated into any M-Bus system and can be read out with any M-Bus Master. This enables use in existing systems with an existing M-Bus infrastructure or even in new projects with various other M-Bus components.
The energy meters with integrated serial Modbus RTU interface enable fast and secure communication with superordinate systems. The market offers many components for data transfer, backup and visualiation of the measured data. Simple integration via various transmission channels is possible owing to the wide variety. With Modbus, existing equipment can be used without making costly new acquisitions.



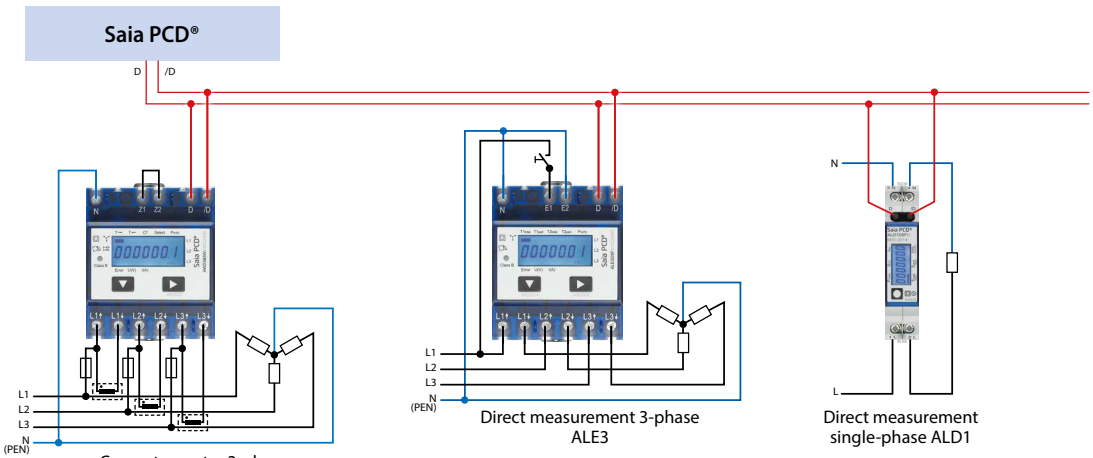
4.2.2 Energy meters with SBC S-Bus interface

The energy meters with integrated S-Bus interface offer all relevant data such as energy, current, voltage, output (active and reactive) and cosφ, which can be read out through the bus connection. The serial S-Bus interface (based on RS-485) can be connected directly to the Saia PCD® range of devices. There are ready-made FBoxes for every meter type for this connection, which are available free of charge. The S-Bus energy meters are also available in a 2-way design (bidirectional). The bus address can be set on the display and the energy, current, voltage and active output can be read directly.



FBoxes available for every S-Bus meter type

Connection diagram for M-Bus energy meters



Converter meter 3-phase AWD3

Direct measurement 3-phase ALE3

Direct measurement single-phase ALD1

Technical Data

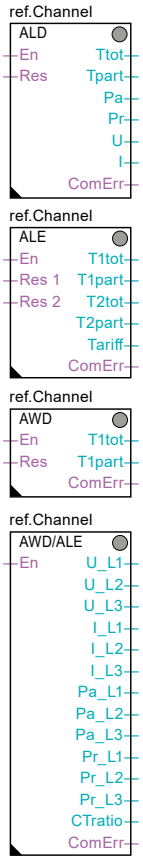
SBC S-Bus

Bus system	Serial RS-485 interface
Log	S-Bus data mode
Transmission rate	4,800, 9,600, 19,200, 38,400, 57,600, 115,200 baud. The transmission rate is detected automatically.
Bus cable	Twisted, shielded, 2 × 0.5 mm², max. 1200 m
Response time	Write: up to 60 ms Read: up to 60 ms

		ALD1		ALE3		AWD3	
		ALD1D5FS00A3A00	ALD1B5FS00A3A00	ALE3D5FS10C3A00	ALE3B5FS00C3A00	AWD3D5WS00C3A00	AWD3B5WS00C3A00
Tariff	1 tariff	•	•	–	•	•	•
	2 tariffs	–	–	•	–	–	–
Meter type	Unidirectional design	•	–	•	–	•	–
	Bidirectional design	–	•	–	•	–	•
Approvals	With MID	•	•	•	•	•	•
Rated/max. current Current	I_{min} = 0.05 A, I_N = 5 A, I_{max} = 6 A	–	–	–	–	•	•
	I_{min} = 0.25 A, I_N = 5 A, I_{max} = 32 A	•	•	–	–	–	–
	I_{min} = 0.5 A, I_N = 10 A, I_{max} = 65 A	–	–	•	•	–	–
Measurement type	Direct measurement	•	•	•	•	–	–
	Conversion up to 1500 A	–	–	–	–	•	•
Operating voltage	230 VAC, 50 Hz	•	•	–	–	–	–
	3 × 230/400 VAC, 50 Hz	–	–	•	•	•	•
Partial meter	Resettable	•	–	•	•	•	–

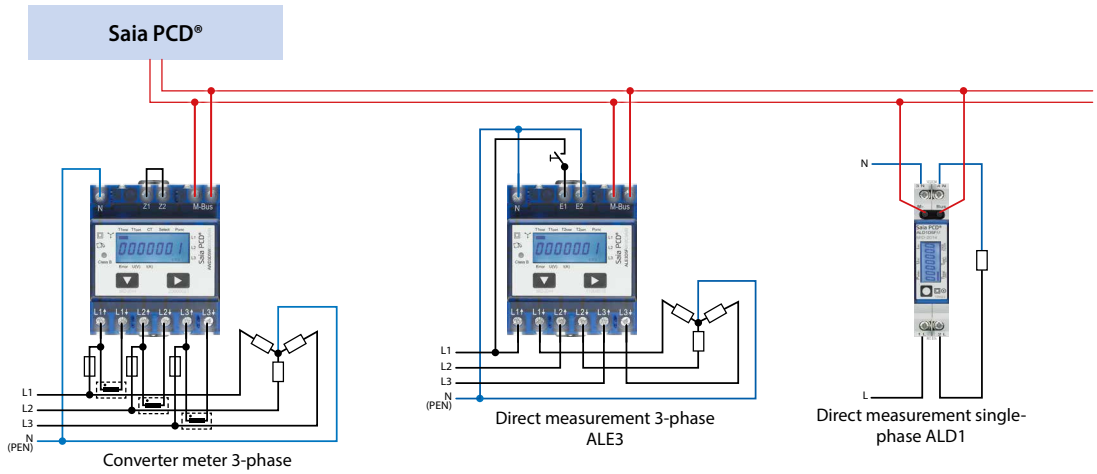
4.2.3 Energy meter with M-Bus interface

The M-Bus interface enables the connection and reading of measured data through any Saia PCD® or any M-Bus Master. The meters correspond to M-Bus standard EN 13757. For connection to Saia PCD® systems, prefabricated FBoxes are available free of charge for Saia PCD® energy meters. The relevant measurement data, such as energy, current, voltage and output (active and reactive) can be read out via the M-Bus interface. On the display, the bus primary address can be set and the energy, current, voltage and active output can be read directly.



FBoxes available for every M-Bus meter type

Connection diagram for M-Bus energy meters



Technical Data

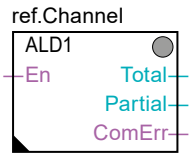
M-Bus	
Bus system	M-Bus
Transmission rates	300, 2,400, 9,600 Baud. The transmission rate is detected automatically
Addressing	Primary and secondary
Bus length (max.)	In accordance with M-Bus specifications
Response time	Write: up to 60 ms Read: up to 60 ms

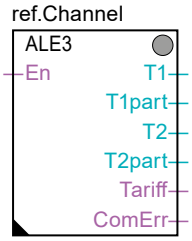


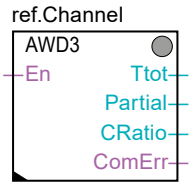
		ALD1	ALE3		AWD3
		ALD1D5FM00A3A00	ALE3D5FM10C3A00	ALE3B5FM00C3A00	AWD3D5WM00C3A00
Tariff	1 tariff	•	–	•	•
	2 tariffs	–	•	–	–
Meter type	Unidirectional design	•	•	–	•
	Bidirectional design	–	–	•	–
Approvals	With MID	•	•	•	•
Rated/max. current Current	I_{min} = 0.05 A, I_N = 5 A, I_{max} = 6 A	–	–	–	•
	I_{min} = 0.25 A, I_N = 5 A, I_{max} = 32 A	•	–	–	–
	I_{min} = 0.5 A, I_N = 10 A, I_{max} = 65 A	–	•	•	–
Measurement type	Direct measurement	•	•	•	–
	Conversion up to 1500 A	–	–	–	•
Operating voltage	230 VAC, 50 Hz	•	–	–	–
	3 × 230/400 VAC, 50 Hz	–	•	•	•
Partial meter	Resettable	•	•	•	•

4.2.4 Energy meter with Modbus interface

The integrated Modbus RTU interface complies with the IDA specification and is based on an RS-485 interface. The measurement data from the energy meter can be connected to any Modbus Master to read out the measured values. The relevant measurement data, such as energy, current, voltage, output (active and reactive) and cosφ can be read out via the interface. The bus address can be set and the energy, current, voltage and active output can be read direct on the display. Prefabricated FBoxes are available to connect the energy meters to Saia PCD® systems, which are supplied free of charge.

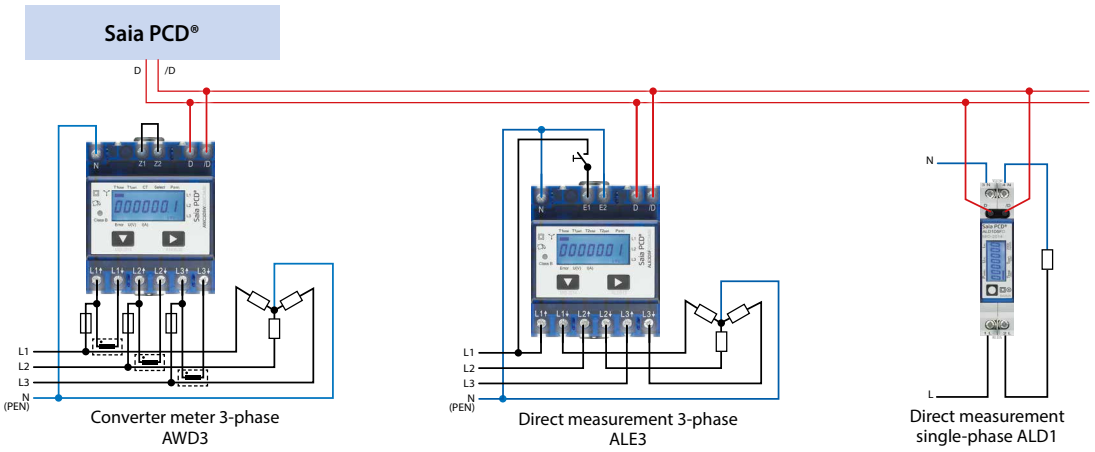






FBoxes available for every M-Bus meter type

Connection diagram for Modbus energy meters



Technical Data

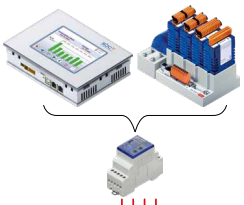
Modbus	
Bus system	Serial RS-485 interface
Log	Modbus RTU as per IDA specification
Transmission rates	4,800, 9,600, 19,200, 38,400, 57,600, 115,200 baud. The transmission rate is detected automatically
Bit settings	▶ 8 databit, even parity, 1 stop bit ▶ 8 databit, odd parity, 1 stop bit ▶ 8 databit, no parity, 2 stop bit The parity is automatically detected
Bus cable	Twisted, shielded, 2 × 0.5 mm², max. 1200 m
Response time	Write: up to 60 ms Read: up to 60 ms

The following devices are available for Modbus parity 8N1:
ALD1D5FD00A3A44
ALD3D5FD10C3A44
AWD3D5WD00C3A44

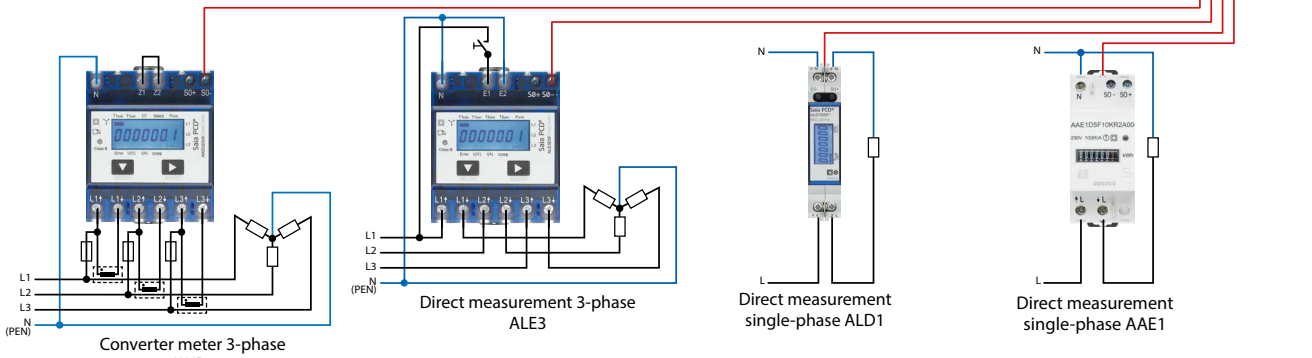
		ALD1		ALE3		AWD3
		ALD1D5FD00A3A00	ALD1B5FD00A3A00	ALE3D5FD10C3A00	ALE3B5FD00C3A00	AWD3D5WD00C3A00
Tariff	1 tariff	•	•	–	•	•
	2 tariffs	–	–	•	–	–
Meter type	Unidirectional design	•	–	•	–	•
	Bidirectional design	–	•	–	•	–
Approvals	With MID	•	•	•	•	•
Rated/max. current Current	I_{min} = 0.05 A, I_N = 5 A, I_{max} = 6 A	–	–	–	–	•
	I_{min} = 0.25 A, I_N = 5 A, I_{max} = 32 A	•	•	–	–	–
	I_{min} = 0.5 A, I_N = 10 A, I_{max} = 65 A	–	–	•	•	–
Measurement type	Direct measurement	•	•	•	•	–
	Conversion up to 1500 A	–	–	–	–	•
Operating voltage	230 VAC, 50 Hz	•	•	–	–	–
	3 × 230/400 VAC, 50 Hz	–	–	•	•	•
Partial meter	Resettable	•	–	•	•	•

4.2.5 Energy meter with S0 pulse output

Energy meters with integrated S0 interface enable the transfer of measured energy to the devices of the Saia PCD® family via pulses. With the S0 pulse counter PCD7.H104, the pulses can be requested via the RS-485 interface (S-Bus or Modbus).

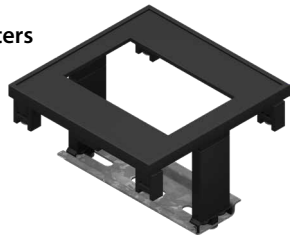


Connection diagram of S0 pulse energy meters, with S-Bus connection via PCD7.H104SE



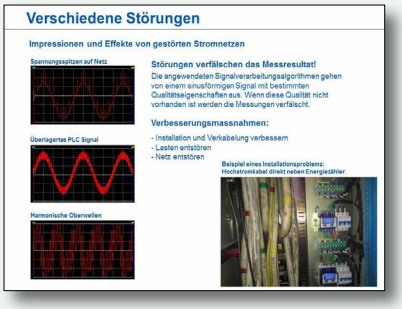
		EMD1	ALD1		AAE1	ALE3		AWD3	
		EMD1L5F1KA00	ALD1D5F10KA3A00	ALD1B5F10KA3A00	AAE1D5F10KR3A00	ALE3D5F11KC3A00	ALE3B5F10KC3A00	AWD3D5W10MC3A00	AWD3B5W10MC3A00
Tariff	1 tariff	•	•	•	•		•	•	•
	2 tariffs	–	–	–	–	•	–	–	–
Meter type	Unidirectional design	•	•	–	•	•	–	•	–
	Bidirectional design	–	–	•	–	–	•	–	•
Approvals	With MID	–	•	•	•	•	•	•	•
	Without MID	•	–	–	–	–	–	–	–
Rated/max. current Current	I_{min} = 0.05 A, I_N = 5 A, I_{max} = 6 A	–	–	–	–	–	–	•	•
	I_{min} = 0.25 A, I_N = 5 A, I_{max} = 32 A	•	•	•	–	–	–	–	–
	I_{min} = 0.5 A, I_N = 10 A, I_{max} = 65 A	–	–	–	•	•	•	–	–
Measurement type	Direct measurement	•	•	•	•	•	•	–	–
	Conversion up to 1500 A	–	–	–	–	–	–	•	•
Operating voltage	230 VAC, 50 Hz	•	•	•	•	–	–	–	–
	3 × 230/400 VAC, 50 Hz	–	–	–	–	•	•	•	•
S0 output	1000 Imp./kWh	•	•	•	•	•	•	–	–
	10 Imp./kWh	–	–	–	–	–	–	•	•
Partial meter	Resettable	–	•	–	–	•	•	•	–

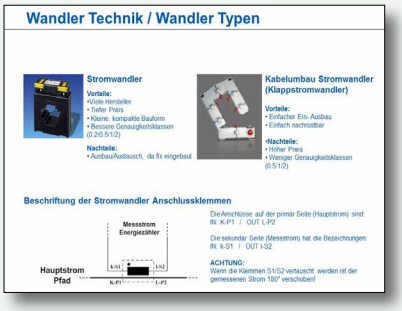
4.2.6 Energy meter – sealing cover

Accessories	Order no.	
Sealing cover for single-phase Saia PCD® energy meter EMD1 and ALD1 2 units are recommended for contact protection. (Also for termination boxes PCD7.T161 and PCD7.T162, see Section 5.5)	4 104 7420 0	  ALD1 with assembled sealing cover
Sealing cover for **– Single-phase Saia PCD® energy meter AAE1** **– 3-phase Saia PCD® energy meter ALE3, and AWD3** 2 units are recommended for contact protection on AAE1. 4 units are recommended for contact protection on ALE3 and AWD3.	4 104 7485 0	  ALE3 or AWD3 with sealing cover
Mounting frame for 3-ph energy meters of the families ALE3/AWD3	PMK-EEM400	  ALE3 or AWD3 mounted in panel kit

4.2.7 Application notes

Application notes on the subject of "energy" can be found on the support page (www.sbc-support.com) under the section "energy meters".

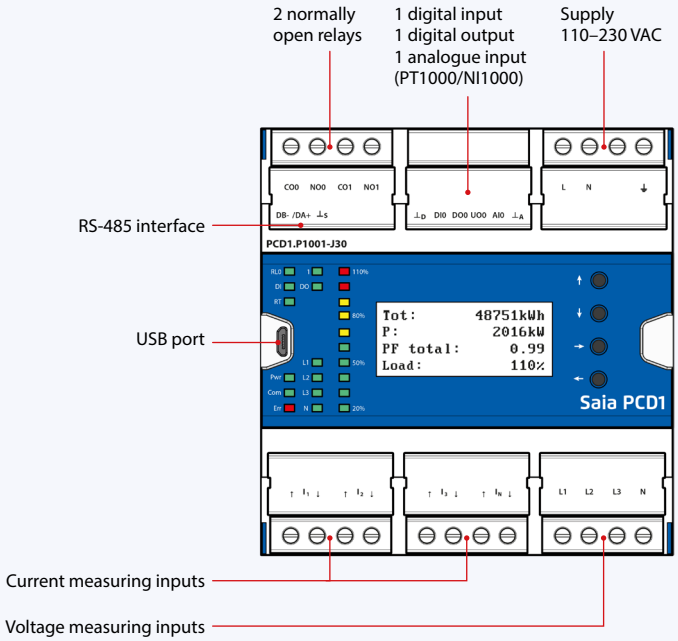




4.3 Power Quality Analyzer PCD1.P1001-J30

The Power Quality Analyser (PQA) is a device to measure and check the quality of the power supply and is manufactured as an industrial grade DIN rail device. The compact E-Line design enables installation in restricted spaces in electrical distributor boxes. The extensive measurement options enable an analysis of any disturbances with cyclic/event-oriented data capture and automatic messaging if a measured variable is outside the tolerance limits. The integrated RS-485 interface is available in the S-Bus/Modbus and enables communication with a Saia PCD® controller or other master devices. Programming is also very efficient and fast using a comprehensive FBox library with web templates.

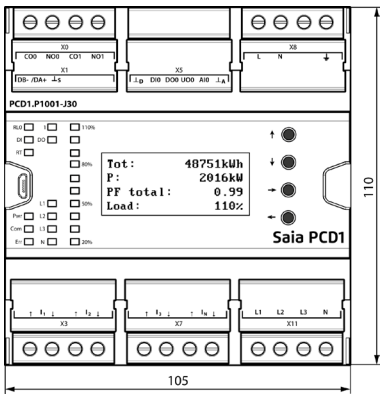
Device design

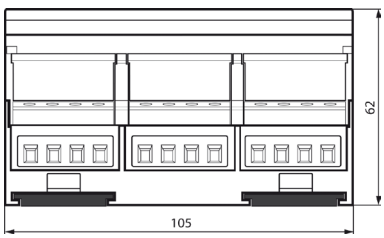


System properties

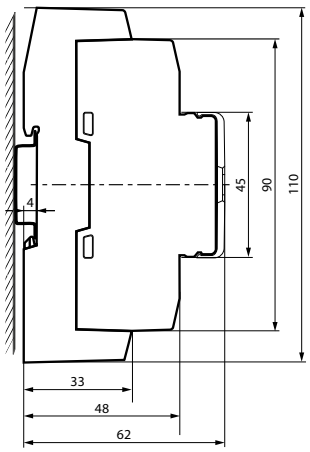
- Network analyser with 0.5% measurement accuracy
- Measurement of the 3 phases and neutral conductor
- Current measurement inputs for current converter connection
- Measurement data storage (event/cyclic) in internal memory
- 1.9 inch LCD
- Electrically isolated measuring inputs
- Temperature measuring input
- Electrically isolated RS-485 interface for S-Bus/Modbus (switchable)
- 105 mm wide DIN rail devices (6 modules)

Dimensions and installation



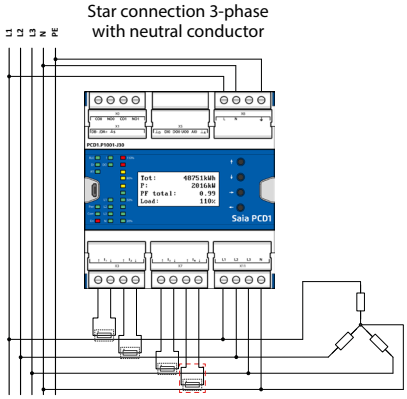


Housing width 6 modules (105 mm)
Compatible with electrical control cabinets (in accordance with DIN 43880, size 2 × 55 mm)



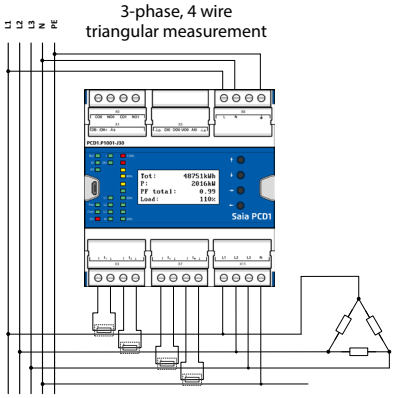
Mounting on a 35 mm top-hat rail
(in accordance with DIN EN 60715 TH35)

Star connection 3-phase with neutral conductor

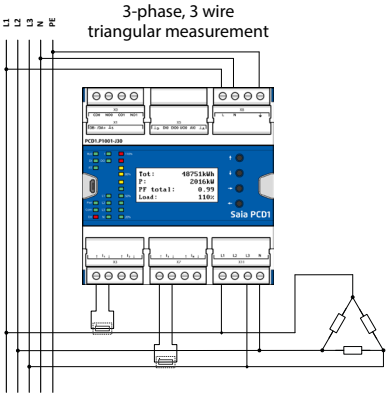


*optional for N-measurement

3-phase, 4 wire triangular measurement



3-phase, 3 wire triangular measurement



General technical data

Power supply	
Supply voltage	110–230 VAC, +15% –20%, 50/60 Hz
Electrically isolated	4,000 VAC between power supply and RS-485
Power consumption	Max.: 6 W typically: 1.5 W
Interface	
Communications interface	RS-485 with electrical isolation Baud rate: 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 bps
Bus protocol	S-Bus or Modbus interface: Selectable via LCD
Configuration	Parity: Selectable via LCD
Address	Address range: S-Bus: 0 … 255 Modbus: 1 … 253 Selectable via LCD
Terminating resistor	Integrated, can be activated via the display and interface
General data	
Ambient temperature	Operation: –25°C … +55°C Storage: –30°C … +70°C
Mounting type	Top-hat rail pursuant to DIN EN 60715 TH35 (1 × 35 mm)
Measurement accuracy	
Active energy/power	Resistive load: ± 0.5% (5 A CT); ± 1.0% (1 A CT) Inductive load: ± 0.6% (5 A CT); ± 1.0% (1 A CT)
Reactive energy/power	Resistive load: ± 1.0% (5 A CT); ± 1.0% (1 A CT) Inductive load: ± 1.0% (5 A CT); ± 1.0% (1 A CT)

Inputs/outputs

Measured values	
Voltage, current, effective power, reactive power, apparent power, real energy, reactive energy and apparent energy, THD, TDD, harmonics (1–40 order), frequency, low, high and peak detection for voltage and current, power factor, phase sequence, phase angle	
Voltage measuring inputs	
Number	4 (L1, L2, L3, N)
Input voltage	L-N: Nom. 285 VAC, max. 700 VAC L-L: Nom. 480 VAC, max. 1,200 VAC
Input impedance	2 MOhm per input
Measurement frequency	45 … 65 Hz
Isolation	4,000 VAC
Current measuring inputs	
Number	8 (each 2 per phase and neutral conductor)
Input current	1 A / 5 A (switchable)
Current range	Max. 6 A
Input impedance	15 mΩ
Isolation	4,000 VAC
Inputs	
1 digital input	5 … 30 VDC, source operation (positive switching)
1 analogue input	Pt1000: –50°C … +400°C Ni1000: –50°C … +210°C
Outputs	
1 digital output	5 … 30 VDC; max. 500 mA
2 relays	Make contact; 250 VAC / 24 VDC; 5 A / 1.5 A, 250 VAC (AC15) / 1 A, 24 VDC (DC13) pursuant to IEC60947-5-1

4.4 Basic functions of the S-Monitoring application

Function for automatic capturing and saving of energy meter values – integrated into the operating system of the Saia PCD®

The S-Monitoring application works on all controllers ending in xx60 and on the pWeb Panels. The application consists of a COSinus function and an associated Web Editor project. This makes it possible to capture, save and visualise data without significant programming effort. With S-Bus meters, this works without any program in the controller.

S-Monitoring COSinus function

S-Monitoring is an integral part of the COSinus operating system and is integrated into all Saia PCD® controllers ending with xx60 and having the pWeb Panel MB. It is activated in the PG5 Device Configurator and it scans connected meters automatically. The data is saved on the file system. In addition to connected S-Bus meters, any meter values available in the program can also be integrated.

The S-Monitoring function can read three different types of meters:

- Connected S-Bus energy meters and S0pulse counters (PCD7.H104SE)
- Other incremental meter values (M-Bus, Modbus, etc. are referred to as "custom meters" and captured via FBoxes in the Fupla program)
- Groups of meters

The S-Monitoring COSinus function comprises the following three parts:

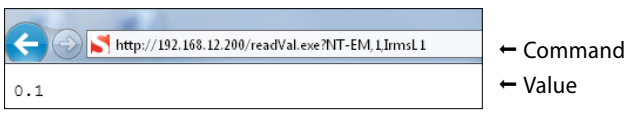
1. Autoscan of S-Bus energy meters and pulse counters

If the S-Bus Autoscan is activated, meters connected to the RS-485 interface are automatically detected and read. By permanently requesting the meter data, remote diagnosis of the S-Bus meters and bus connection is possible.

2. Provision of meter values via NT-EM tags (CGI interface)

All data and basic functions can be called up via CGI tags. These functions can therefore be accessed via the web interface or by other programs (e.g. Excel). The controller does not need a Fupla or IL program (see document 27-623).

NT-EM tag (CGI command) in the web browser:



Excel Report Tool
When the COSinus function is activated, the data can simply be imported into Excel without programming.
Download: www.sbc-support.com

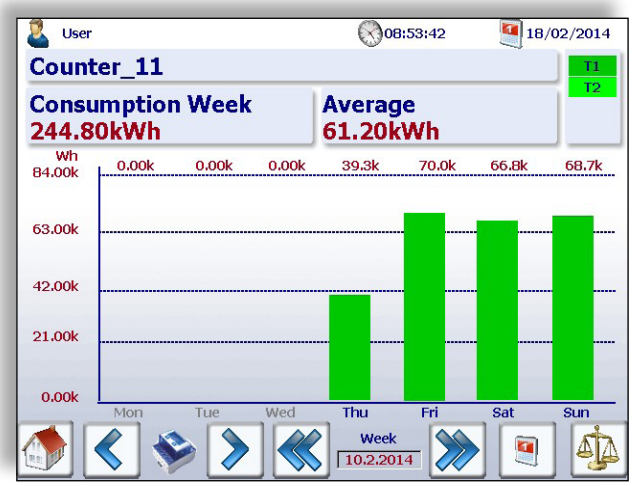
3. Saving the meter values in CSV files

The values of the energy meters connected are saved once a day at midnight in a CSV file on the internal file system of the PCD. The daily, weekly and monthly consumption can be calculated from this data. If an additional memory card is inserted, the values can be saved at 5-60 minute intervals. This makes it possible to visualise consumption over a day.

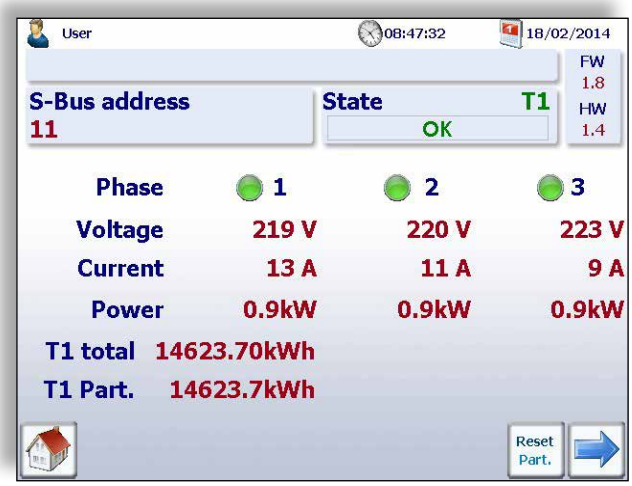
	A	B	C	D	E	F	G	H	I
1	Date	Energy1	Energy2	Tariff1	Tariff2	Energy3	Energy4	Tariff3	Tariff4
2	10.6.2013	206.10	0.00	0.1600	0.1300	160.00	13.23	0.1500	0.0800
3	11.6.2013	208.70	0.00	0.1600	0.1300	164.10	13.76	0.1500	0.0800
4	12.6.2013	214.43	0.00	0.1600	0.1300	168.13	14.82	0.1500	0.0800

S-Monitoring web project

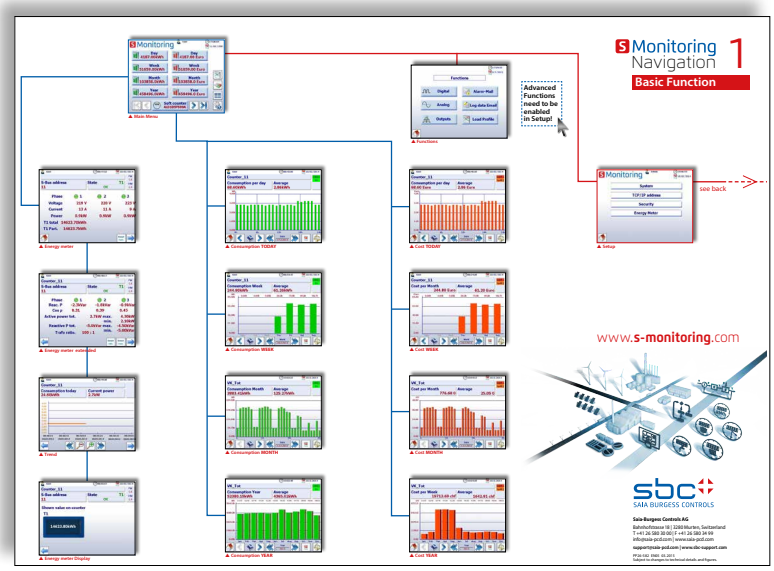
SBC delivers a PG5 project, which also includes a web visualisation. The project is based on the COSinus functions and enables saved data to be visualised on the PC immediately. As only the S-Monitoring COSinus function is accessed in the web project, it does not need a PG5 program. It can therefore be easily integrated into existing projects. In addition, the most important websites are available as macros in Web Editor 8.



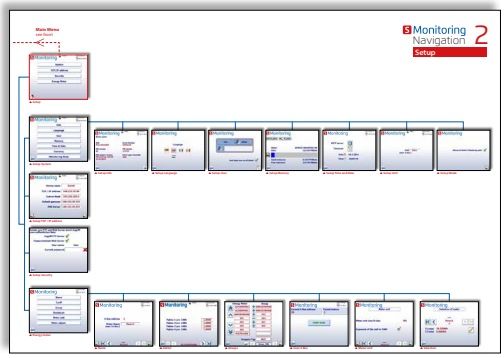
▲ Representation of historical energy consumption



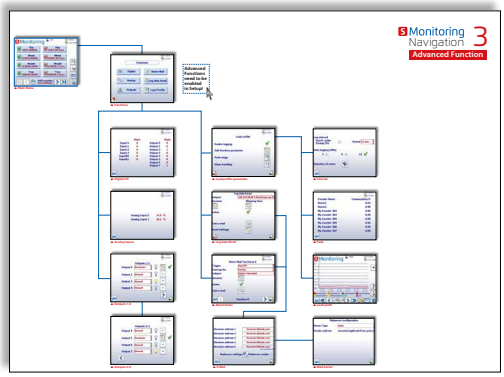
▲ Overview of the live values



▲ Complete overview of the basic application



▲ Setup

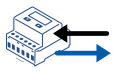


▲ Advanced

S-Monitoring is also supported by pWeb Panel PCD7.DxxxxT5F, PCD1.M2160 and PCD3.Mxx60

In the PG5 application for the E-Controller products supplied ready for use on delivery from the factory, additional "Advanced" functions are programmed in PG5. These cannot therefore be used without the program.

Basic functions of the S-Monitoring application

Recording of energy values			
	Automatic detection of connected energy meters		Display of the energy meter status
	Grouping of energy meters		Comparison between meter and periods
	Connection of bidirectional meters		Connection PCD7.H104SE S0 impulse counter (for S0 meters)
Display and analysis of energy values			
	Current meter values such as consumption, voltage, current, active and reactive power and cosφ		Evaluation and presentation of the costs
	Visualisation in bar charts and trend charts		Consumption and costs presentation per day/week/month/year1)
	Data storage in Excel-readable CSV files		
Remote access via network and Internet			
	Operation at the PC with standard browser (IE, Chrome, Firefox)		Operation via smartphone and tablet
	Access to log data and web project with FTP		Integrated USB port for update and maintenance
User support			
	User administration		Control interface in several languages

[1] Daily view only available if memory extension is plugged in

Technical data for SBC S-Monitoring

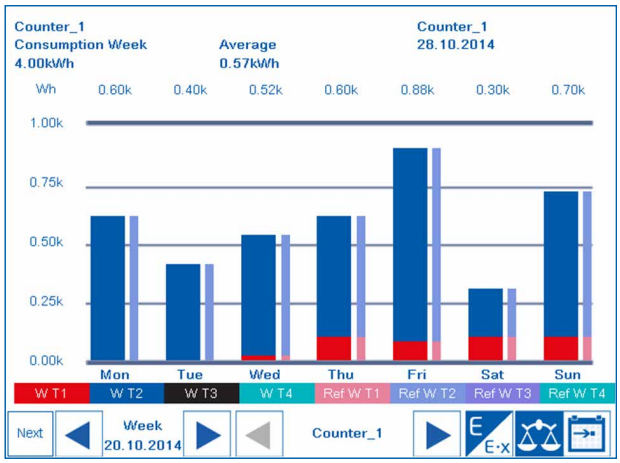
SBC S-Monitoring COSinus function integrated in	PCD1.M0160E0 (E-Controller) PCD1.M2160	PCD3.Mxx60 PCD7.DxxxxT5F (pWeb Panel MB)
Supported meters	– Saia PCD®S-Bus energy meters, PCD7.H104SE S0 pulse counters – Incremental meter values (M-Bus, Modbus, etc. are referred to as "custom meters" and captured via FBoxes in the Fupla program) – Meter groups	
Maximum number of meters	128 Saia PCD® S-Bus meters* / 256 custom meters* / 32 groups*	*in total max. 256
Data storage time	4 years maximum; a recording per day	
saved data	max. 4 meter values with 4 tariffs per meter are saved once a day (at midnight)	

4.4.1 S-Monitoring Web Editor 8 Templates

High initial costs for energy management are one of the largest barriers against investment, and the S-Monitoring application was developed as a door-opener to minimise these costs as far as possible. The basic functions of this S-Monitoring application were integrated in Web Editor 8. The programmer can therefore extend his project in accordance with individual requirements with energy monitoring functions. Improved and faster engineering enables added value that delivers a significant competitive advantage. For system integrators who want to visualise the energy consumption, the free S-Monitoring templates provide a saving of up to 2 weeks of engineering time.

Name of the library in Web Editor 8: S-Monitoring

▲
Monthly consumption

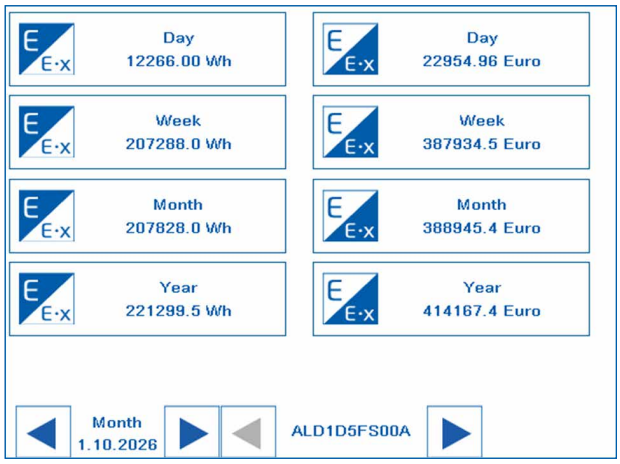


▲
Comparison of weekly consumption

Name	ALD1D5FS00A
State	Connected
Address	300
Counter Type	Soft Counter
User Type	ALD1D5FS00A
ASN	Not available
Serial number	Not available
Hardware version	Not available
Firmware version	Not available
Unit	Wh
Unit Exponent	0
Direction	UC
Raw counter value	2392.00

WT 1 WT 2 WT 3 WT 4

▲
Counter information



▲
Overview of energy consumption

Available templates:

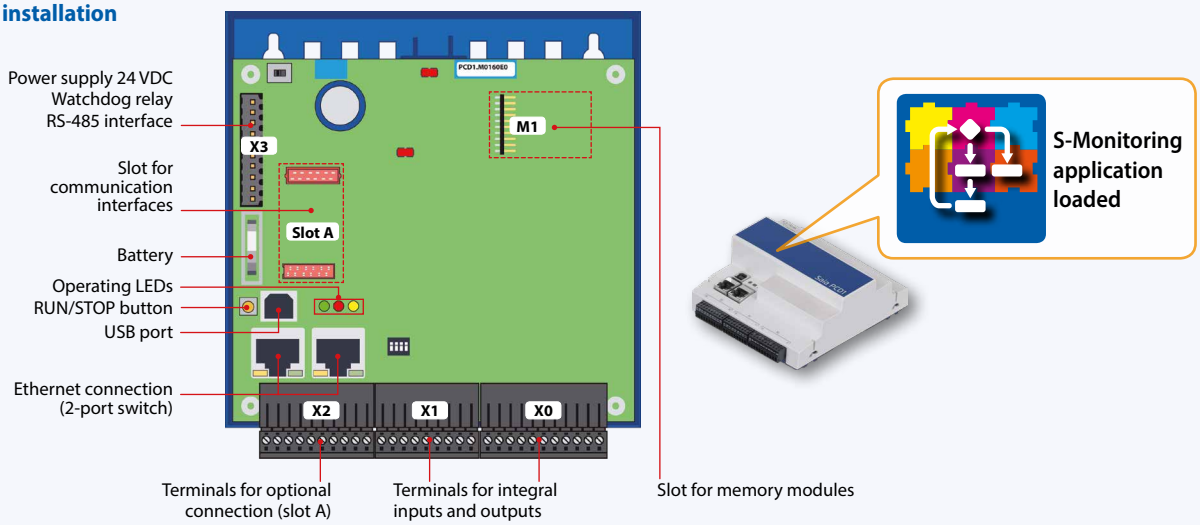
- Barograph day, week, month, year
- Navigation counter and period
- Live values of the energy counter
- Setup configuration

4.5 Saia PCD® E-Controller

Operational on delivery with local IOs

The E-Controller is an SBC functions PCD, which can be used immediately on delivery with no additional programming. It combines data capture, decentralised visualisation and logging in one compact device. Energy meters and pulse counters connected via the S-Bus interface are automatically detected and read. Historical data and the web visualisation can be accessed from anywhere via the integrated automation server using FTP and HTTP. This is also possible with mobile devices using SBC apps. In addition to the basic functions described in Section 4.6, simple control functions are already realised on the E-Controller. These include sending alarm emails and the parameterisation of outputs according to the meter values. The pre-installed S-Monitoring application can be adjusted, extended or replaced as required using PG5 and Web Editor. Additional protocols and data (e.g. from an M-Bus meter) can therefore be integrated using the optional communication interfaces. The design of the controller is suitable for installation in the distribution board next to the energy meters.

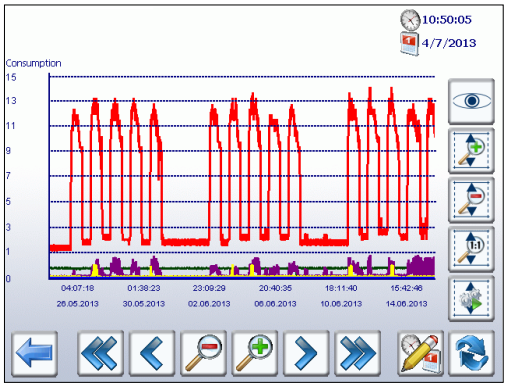
Device installation



Advanced functions

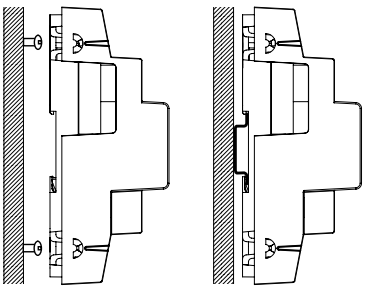
In addition to the basic functions of the web application (4.6), the E-Controller includes the following functions, which are programmed with Saia PG5®:

- Load profile measurement of 8 consumption values
- Sending of alarm and data emails to up to 5 email addresses
- Parameterisation of outputs via min. and max. values



Load profile measurement

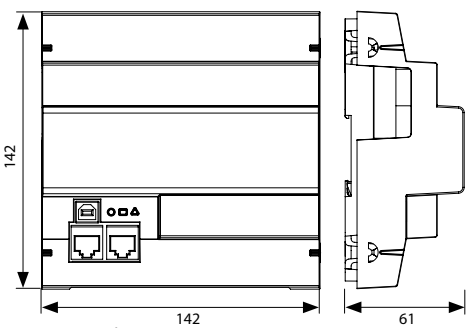
Mounting



on a level surface

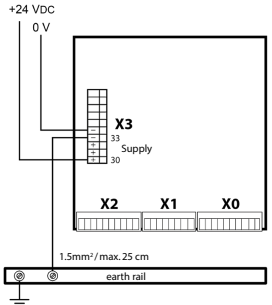
on a 35-mm top-hat rail (in accordance with DIN EN 60715 TH35)

Dimensions



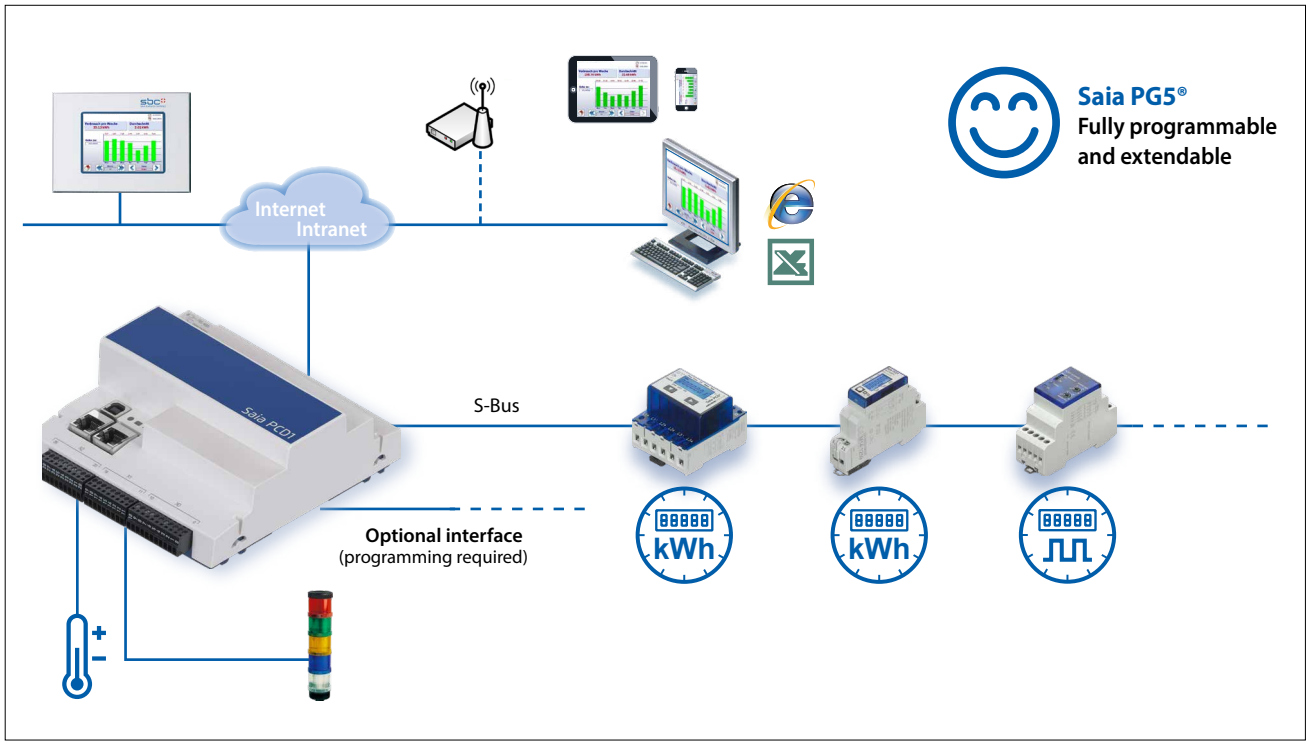
compact dimensions: 142 × 142 × 61 mm

Power supply and connection plan



For more information, please see Chapter 1.2.1 Saia PCD3 power supply and connection plan, and in Manual 26-875.

Summary of E-Controller functions



Both the automatic detection of the meters and the E-Monitoring functionality can be switched off in the PG5 Device Configurator for unrestricted use of PCD1.M0160E0.

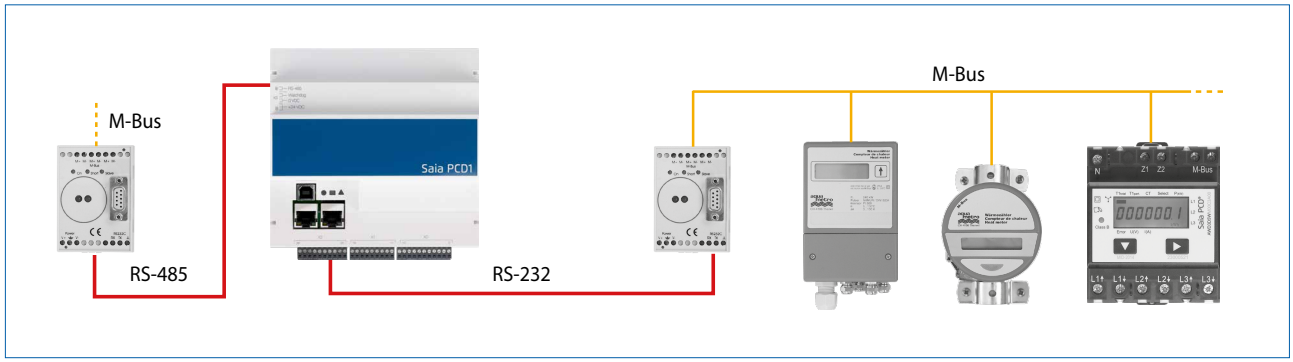
SBC MB App
Operation and monitoring on iPhone, iPad and Android

Additional memory
Enables logs in 5–60 min. Interval and daily figures are illustrated for all meters in a bar chart.

PCD7.R610
Holder module for microSD card

PCD7.R-MSD1024
MicroSD memory card 1 GB, PCD formatted

Connection example of M-Bus with external interface[1)]



[1)] programming required

Overview of Saia PCD® E-Controller

Technical Data	PCD1.M0160E0
Memory and file system	
Program memory, DB/text (Flash)	1 Mbyte
User memory, DB/text (RAM)	1 Mbyte
User flash file system onboard	128 Mbyte
Integrated communication	
Ethernet connection (2-port switch) 10/100 Mbit/s, full-duplex, auto-sensing, auto-crossing	Yes
USB connection USB 1.1 device, 12 Mbit/s	Yes
RS-485 (terminal X3), up to 115 kbit/s	Yes

General specifications

Operating voltage	24 VDC, –20/+25% max. incl. 5% ripple (as defined by EN/IEC 61131-2)
Battery for data backup (replaceable)	Lithium battery with a service life of 1 to 3 years
Operating temperature:	0…55 °C
Dimensions (W x H × D)	142 × 142 × 60 mm
Mounting type	Top-hat rail in accordance with DIN EN 60715 TH35 (1 x 35 mm) or on a level surface
Protection type	IP 20
Capacity 5 V/+V (24 V) internal	max. 500 mA/200 mA
Power consumption	typically 12 W
Automation server	Flash memory, file system, FTP and web server, email, SNMP

Onboard inputs/outputs

Inputs:			
6	Digital inputs (4 + 2 interrupts)	15…30 VDC, 8 ms / 0.2 ms input filter	Terminal X1
2	Analogue inputs, selectable via DIP switch, preconfigured for Ni1000 in the default setup	–10…+10 VDC, 0…±20 mA, Pt1000, Ni1000, Ni1000 L&S, 0…2.5 kΩ, 12 bit resolution	Terminal X1
Outputs:			
4	digital outputs	24 VDC / 0.5 A	Terminal X0
1	PWM output	24 VDC / 0.2 A	Terminal X0
selectable/configurable via PG5			
4	Digital inputs or outputs, preconfigured for digital inputs in the default setup	24 VDC/data such as digital inputs or digital outputs	Terminal X0
1	Watchdog relay or as a make contact	48 VAC or VDC, 1 A mount a freewheeling diode over the load when switching DC tension	Terminal X3

Installation notes and recommendations

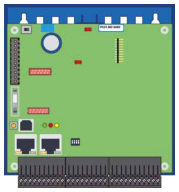
Assembly in the distribution board

The Saia PCD1.M0160E0 has the dimensions 142 x 142 × 60 mm excluding terminals and connections.
For easy assembly, a gap of 55 mm above the DIN rail and 75 mm below it is recommended.

Ethernet cable

For installation in the sub-distributor, an angled or flexible network cable (e.g. SlimWire PRO) is recommended.
The installation of a conventional network cable cannot guarantee the assembly of the sub-distributor cover.

Interface options Saia PCD® E-Controller (PCD1.M0160E0)



In addition to the onboard interfaces, modular expansion of interface functions is possible using slot A. For this purpose, the Saia PCD1.M0160E0 supports numerous protocols. A detailed list of all protocols is contained in Chapter B2 "Communication & Interaction".

Communication		Current consumption at 5V bus	Current consumption at +V bus (24 V)	
PCD7.F110S	RS-422 avec RTS/CTS ou RS-485 1)	40 mA	---	Slot A
PCD7.F121S	RS-232 with RTC/CTS, DTR/DSR, DCD, suitable for modem, EIB or , DALI connection	15 mA	---	Slot A
PCD7.F150S	RS-485 1)	130 mA	---	Slot A
PCD7.F180S	Belimo MP-Bus, for connecting up to 8 drives on one line	15 mA	15 mA	Slot A

1) with line termination resistors that can be activated.

Analogue output module Saia PCD7.W600

This module has 4 analogue outputs 0 to +10 V with a 12-bit resolution and has been specifically developed to use with the new PCD1 CPUs (PCD1.M2xxx, PCD1.M0160E0, PCD1.M2110R1). It can be plugged into slot A of the PCD1 CPU like the PCD7.F1xxS communication module.

Memory modules

The onboard memory can be expanded with a PCD7.Rxxx module in slot M1. The E-Controller can also be expanded with BACnet® or Lon IP.

For more information on memory management and structure, see the Chapter Saia PCD® System Description.

Memory expansion and communication

PCD7.R550M04	Flash memory module with a 4 MB file system (for user program backup, web pages, etc.)	M1
PCD7.R562	Flash memory module for BACnet® firmware with 128 MB file system	M1
PCD7.R582	Flash memory module for Lon IP firmware with a 128 MB file system	M1
PCD7.R610	Basic module for Micro SD flash card	M1
PCD7.R-MSD1024	Micro SD flash card 1024 MB, PCD formatted	PCD7.R610

PCD7.R550M04

PCD7.R610

For the parallel operation of S-Monitoring and BACnet® or Lon IP, please note the instructions on the support site (www.sbc-support.com).

Accessories and consumables

EPLAN macros

EPLAN macros are available for project planning and engineering

The EPLAN® electric P8 macros are available on the support site.

The macros and article data are also provided on the EPLAN® data portal.

Battery for data backup

Type	Description
4 507 4817 0	Lithium battery for PCD processor unit (RENATA button battery type CR 2032)

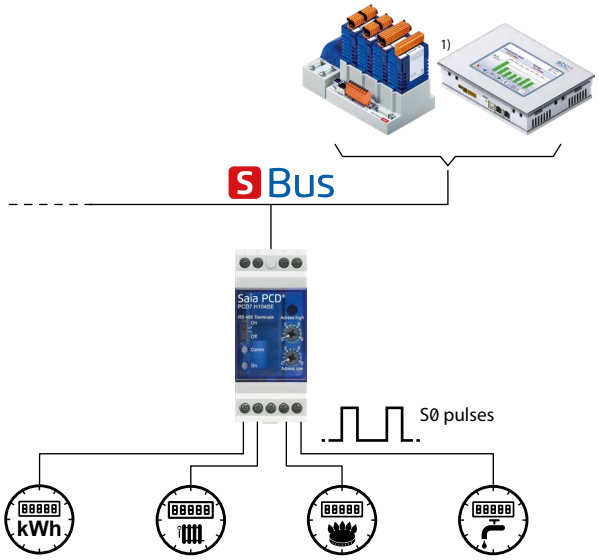
Plug-in screw terminal block

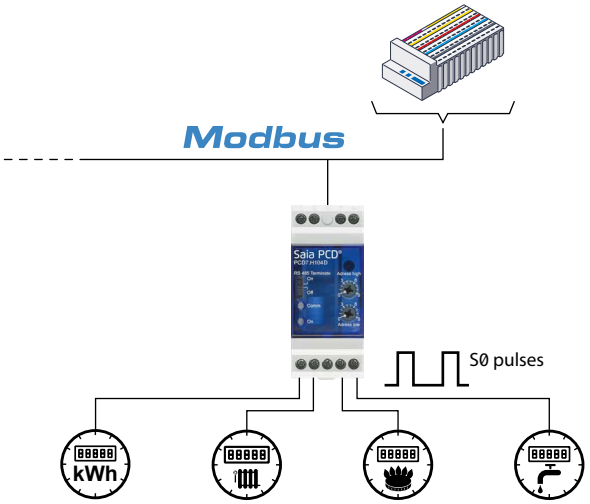
4 405 5089 0	Plug-in screw terminal block, 11-pin, labelling 0…10	Terminal X0
4 405 5087 0	Plug-in screw terminal block, 9-pin, labelling 11…19	Terminal X1
4 405 5088 0	Plug-in screw terminal block, 10-pin, labelling 20…29	Terminal X2
4 405 4919 0	Plug-in screw terminal block, 10-pin, labelling 30…39	Terminal X3

4.6 S0 impulse counter PCD7.H104

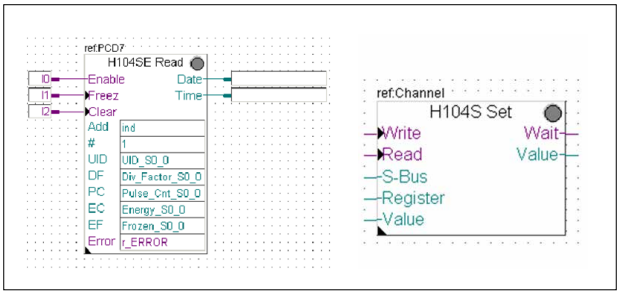
S0 Collect, convert and transmit pulses

If already installed meters, which are not bus-capable, are to be integrated into an automation system, the Saia PCD7.H104 S0 pulse counter is the easiest way. This is the case for refurbishments, for example, if the existing meter infrastructure has to be made bus-capable and there is no question of buying new meters. With this S0 pulse counter, meters (electricity, water, heat, etc.) with an S0 pulse output from any manufacturer can be connected directly using a serial RS-485 S-Bus or Modbus connection to the Saia PCD or any controller. This enables efficient transfer, evaluation and forwarding of energy data without additional complicated coupler modules. For connection to Saia PCD® systems, there are ready-made FBoxes. Via the interfaces, the number or valence of pulses can be transmitted.





FBoxes for integration into FUPLA



General technical data

Operating voltage	230 VAC (–20/+15 %)
Current draw	< 12 mA
Power consumption	< 3 W
Number of S0 inputs	4, in accordance with S0 IEC 62053-31
Frequency	max. 17 Hz
Pulse low/high	Min. 30 ms

S-Bus version

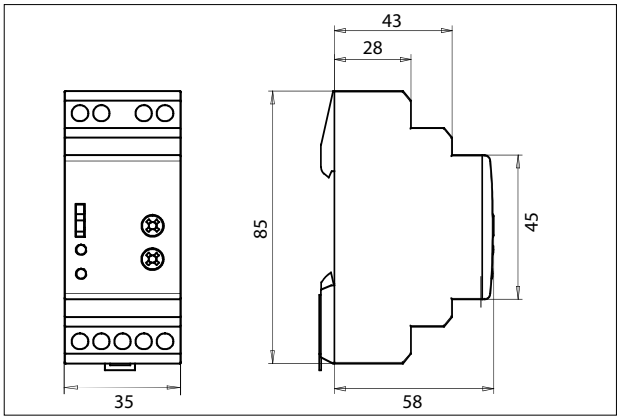
Order number	PCD7.H104SE
Log	S-Bus data mode
Bus system	Serial RS-485 interface
Transmission rate	2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 The transmission rate is detected automatically
Bus length (max.)	1,200 m (without amplifier)
Response time	Write: 30 ms
System response time	Read: 20 ms

Modbus version

Order number	PCD7.H104D
Log	Modbus RTU as per IDA specification
Bus system	Serial RS-485 interface
Transmission rate (bit/s)	2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 The transmission rate is detected automatically
Bit settings	8 databit, even parity, 1 stop bit 8 databit, odd parity, 1 stop bit 8 databit, no parity, 2 stop bit
Maximum bus length	1,200 m (without amplifier)
Response time	Type 5 characters
System response time	max. 60 ms

Device PCD7.H104DZ44 must be used for parity 8N1!

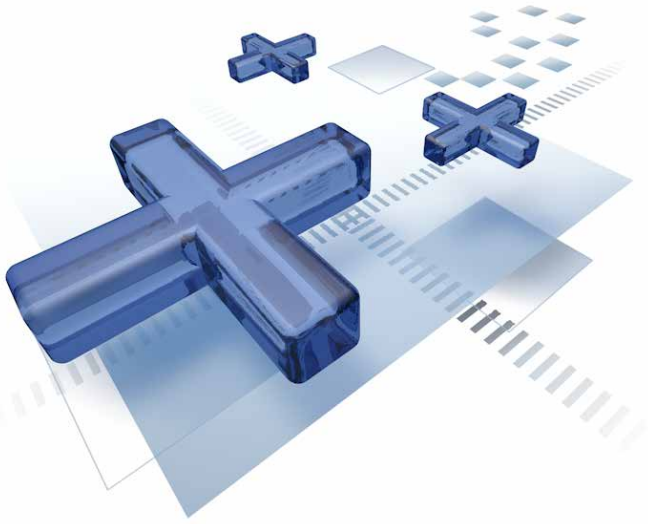
Size



A5

Switch cabinet components

The comprehensive range of accessories for automation technology from Saia Burgess Controls (SBC) ensures a reliable operation of the systems. Modules such as S-Bus RIO modules, isolating amplifiers, coupler modules and relays are available in addition to power supplies and Ethernet switches.



Overview of section 5.7 to 5.10 see following page

5.1 Power units for installation in control cabinets

SBC power units with 24 VDC output provide an ideal power supply for automation solutions owing to their high level of resistance to interference. They can also be used to operate high-output loads, as they can be heavily overloaded for short periods. The full extent of their flexibility is demonstrated by the option to connect multiple devices in parallel to increase the maximum output current or to connect them in series to achieve different voltage levels.

Power unit overview

SBC Power Flex single-phase 110/230 VAC
- Q.PS-AD2-2402F (up to 3 A)
- Q.PS-AD2-2405F (up to 7.5 A)
- Q.PS-AD2-2410F (up to 14 A)

SBC Power Flex single-phase or double-phase 230/400 VAC
- Q.PS-AD3-2405F (up to 7.5 A)

Uninterruptible power unit single-phase 110/230 VAC with intelligent battery charger
- Q.PS-ADB-2405-1 (5 A)

SBC single-phase 24 VAC/40 VDC
- Q.PS-AD1-2403 (3 A)
- Q.PS-AD1-2405 (5 A)

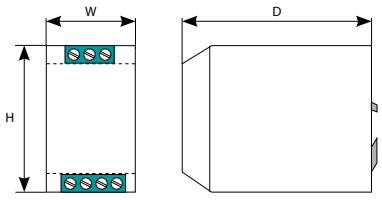
From left to right: Q.PS-ADB, Q.PS-AD2, Q.PS-AD1

System properties in general

- Short-circuit protection
- Overload protection
- IP 20 housing for mounting on DIN rail

Properties of Flex types 24xxF

- Power boost: +40% additional output current up to 60 °C for at least 3 minutes
- With AD2/3-2405F and 2410F, a range of short-circuit modes available
- "Power good" relay for status display
- With 2410F, simple parallel connection (via jumper) to increase max. output current
- Output voltage up to 150 VDC possible in serial mode
- Extremely compact
- AD3-2405F can be used as either a single-phase or double-phase power unit



Properties of the uninterruptible power unit

- 3-stage automatic charging curve to compensate the self-discharge of the battery
- Automatic real-time diagnostics of the battery status and test function for the battery service life
- Any battery fault can be easily identified via blinking codes of the diagnostics LED
- Option of status and battery fault reporting in the control system via 2 potential-free contacts
- Adjustable charging current 1…5 A

Standards and certifications

- In accordance with
  - CE
  - cULus Listed 508 Industrial Control Equipment

Electrical safety:
For the assembly devices in accordance with IEC/EN 60950 (VDE 0805) and EN 50178 (VDE0160). The unit must be installed in accordance with IEC/EN 60950.

EMC Generic
Immunity in accordance with EN 61000-6-2
Noise emission in accordance with EN 61000-6-4

Dimensions	Q.PS-AD2-2402F	Q.PS-AD2-2405F	Q.PS-AD2-2410F	Q.PS-AD3-2405F	Q.PS-ADB-2405-1	Q.PS-AD1-2403	Q.PS-AD1-2405
Width (W)	50 mm	55 mm	72 mm	55 mm	65 mm	50 mm	50 mm
Height (H)	120 mm	110 mm	115 mm	110 mm	115 mm	95 mm	95 mm
Depth (D)	50 mm	105 mm	135 mm	105 mm	135 mm	61 mm	61 mm
Weight	0.3 kg	0.6 kg	0.6 kg	0.6 kg	0.6 kg	0.2 kg	0.2 kg

Technical Data

Input data	Q.PS-AD2-2402F	Q.PS-AD2-2405F	Q.PS-AD2-2410F
Input voltage	115…230 VAC		
Permitted voltage range:	90…264 VAC	90…135 / 180…264 VAC	
Inrush current (at V_n and I_n)	≤ 7 A ≤ 5 ms	≤ 11 A ≤ 5 ms	≤ 16 A ≤ 5 ms
Frequency range	47…63 Hz (± 6%)		
Input current (for operating voltage 110 / 230 VAC)	1.0 / 0.7 A	2.8 / 1.0 A	3.3 / 2.2 A
Internal input fuse	4 A		6.3 A
External preliminary fuse recommended	Fast-acting 6 A	Fast-acting 10 A	Fast-acting 14 A

Output data			
Output voltage (V_n) / nominal current (I_n)	24 VDC ± 3% / 2.5 A	24 VDC ± 3% / 5 A	24 VDC ± 3% / 10 A
Adjustment range (V_{adj})	22…27 VDC		
Switch-on delay	2 s (max.)	1 s (max.)	
Startup with capacitive load	≤ 50,000 µF		
Continuous running at ≤ 40 °C	3 A (230 VAC)/2 A (115 VAC)	7.5 A	14 A
Continuous running at ≤ 50 °C	2.5 A (230 VAC)/1.5 A (115 VAC)	6.0 A	12 A
Continuous running at ≤ 60 °C	---	5.0 A	10 A
Maximum continuous current	---	---	---
Reserve out current (within 3 minutes at ≤60 °C)	3.5 A	7.5 A	14 A
Short-circuit current (I_{cc})	7 A	16 A	30 A
Residual ripple	≤ 80 mVpp		
Efficiency (at 50% I_n)	≥ 88%	≥ 91%	
Short-circuit protection	Yes	Yes + 3 modes	
Overload protection	Yes		
Overvoltage output protection	Yes (max. 35 VDC)		
Parallel connection	Yes		Yes – simple

Signal output (floating switch contacts)			
Switching capacity	---	1 A / 30 VDC	
Voltage drop > 10%	---	Yes	

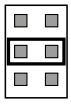
Climate data			
Ambient temperature (operation)	–25…+70 °C (load reduction >50 °C, 2.5%/°C)	–25…+70 °C (load reduction >60 °C, 2.5%/°C)	
Ambient temperature (storage)	–40…+85 °C		
Permissible humidity	95% at +25 °C; no moisture condensation permitted		

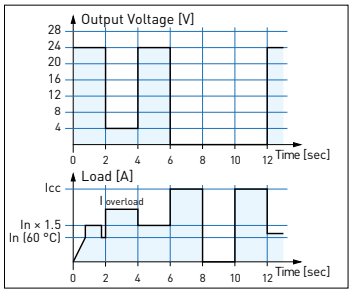
Overload protection

Mode | Jumper | Characteristics

Hiccup mode

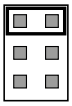
Automatic restart (default setting) Attempts to switch on the output voltage again every 2 seconds.

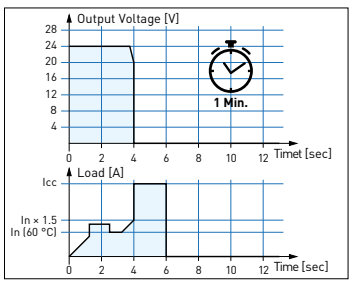




Manual reset mode

For a restart, it is necessary to switch off the input voltage for approx. 1 minute.

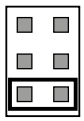


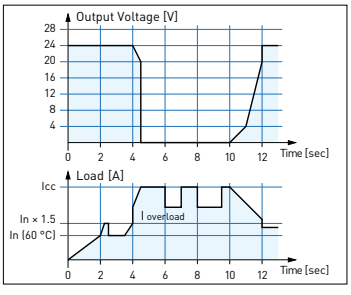


Mode | Jumper | Characteristics

Continuous out mode

The output current remains at a high value and the output voltage is almost 0 volts.





	Q.PS-AD3-2405F	Q.PS-ADB-2405-1 Battery type	Q.PS-AD1-2403	Q.PS-AD1-2405
	230 VAC / 400…500 VAC	115…230 VAC	24 VAC / 40 VDC	
	187…264 VAC / 330…550 VAC	93…264 VAC	24…32 VAC / 33…45 VDC	
	≤ 17 A ≤ 5 ms	≤ 14 A ≤ 5 ms		
	47…63 Hz (±6%)			
	1.5 / 0.8 A	1.5 / 0.9 A		
	4 A		---	
	Fast-acting 10 A	Fast-acting 6 A	Fast-acting 4 A	Fast-acting 6 A

	24 VDC ±3% / 5 A	24 VDC / 5 A	24 VDC ±2% / 3 A	24 VDC ±2% / 5 A
	22…27 VDC		---	
	1 s (max.)	2.5 s (max.)	≤ 100 ms	
	≤ 50,000 µF	≤ 30,000 µF	≤ 30,000 µF / 1.5 A	≤ 30,000 µF / 2 A
	7.5 A		---	
	6.0 A	---	3 A	3.5 A
	5.0 A		---	
	---	1.1 × I_n ±5%	1.05 × I_n ±7%	
	7.5 A		---	
	16 A		---	
	≤ 80 mVpp		≤ 60 mVpp	
	≥ 91%	≥ 81%	≥ 88%	
	Yes + 3 modes		Yes	
	Yes			
	Yes (max. 35 VDC)	Yes	---	
	Yes		---	

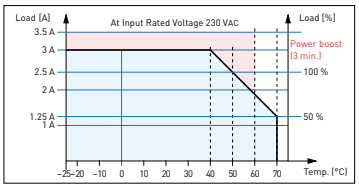
	1 A / 30 VDC	1 A / 30 VDC	
	Yes		---

	–25…+70 °C (load reduction >60 °C, 2.5%/°C)	–25…+70 °C (load reduction >50 °C, 2.5%/°C)	–0…+50 °C
	–40…+85 °C		–25…+85 °C
	95% at +25 °C; no moisture condensation permitted		

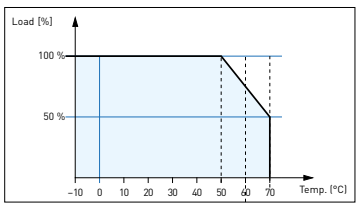
Battery output (battery type 3 … 50 Ah)	
Boost charge (25 °C) (at I_n)	28.8 VDC
Trickle charge (25 °C) (at I_n)	27.5 VDC
Output 2: Battery charging current max. I_{Batt}	5 A ±5%
Setting range of charging current	20…100% of I_n
Recovery charge after deep discharge	Yes
Configuration jumper: Battery type	Yes
Reverse polarity protection	Yes
Monitoring of the sulfation of the battery cells	Yes
Detection of an element in short-circuit	Yes
Load output	
Output voltage (at I_n)	22…28.8 VDC
Max. nominal current I_n= I_{load} + I_{batt} (120 W)	1.1 × 5 A ±5%
Output 1: Load current (main) I_{load}	15 A max.
Output 1: Load current (backup) I_{load}	10 A max.
Signal output (floating switch contacts)	
Switching capacity	1 A / 30 VDC
Main or backup power unit	Yes
Defective battery/low battery	Yes

Output characteristics

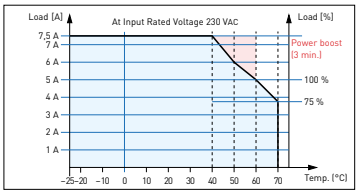
Output derating curve
Q.PS-AD2-2402F



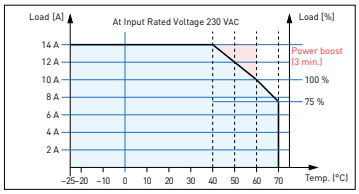
Output derating curve
Q.PS-ADB-2405-1



Output derating curve
Q.PS-AD2-2405F
Q.PS-AD3-2405F

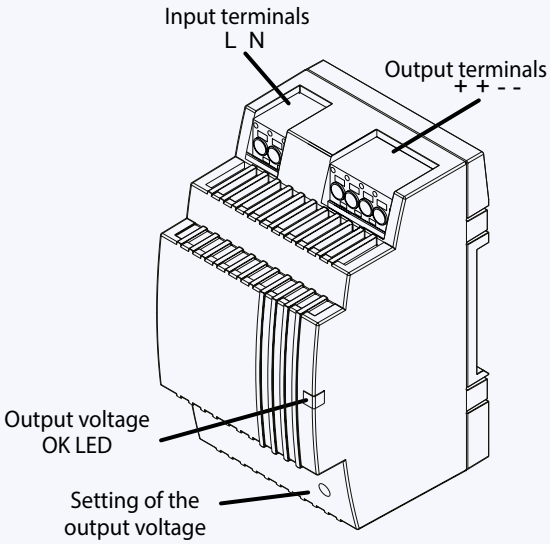


Output derating curve
Q.PS-AD2-2410F



5.2 Power units for installation in electrical distributor boxes

The compact Q.PS-PEL-240x power units with 24 VDC output voltage can be installed in a very restricted space and therefore the installation in cost-effective electrical distributor boxes in accordance with DIN 43880 is possible. They are therefore ideally suited for combining with the E-Line family. Modern push-in terminals enable efficient and fast wiring without the use of tools.



Power unit overview

Single phase 110/230 VAC

- Q.PS-PEL-2401: 24 VDC / up to 1.3 A
- Q.PS-PEL-2403: 24 VDC / up to 4.0 A

Standards and certifications

Compliant certifications

- CE
- DNV GL (shipping approval)
- UL (cURus, cULus)
- EAC

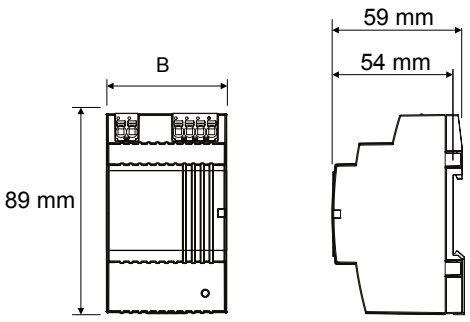
Electrical safety

- EN61558
- EN60950 (SELV)

EMC

- EN61204-3
- Immunity pursuant to EN61000-6-2 (for the industrial sector)
- Emitted interference in accordance with EN61000-6-4 (for the domestic sector)

Dimensions



Model	Q.PS-PEL-2401	Q.PS-PEL-2403
Width (W)	54 mm	90 mm

System properties

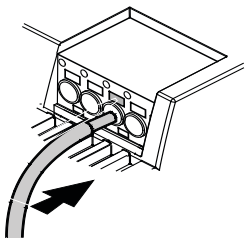
- Short-circuit protection and constant overload limiter
- Protection class II (in closed switch cabinet) -> dual isolation
- Power failure bypass up to 100 ms
- LED for output voltage OK display
- Stabilised and adjustable output voltage for the conductor resistance compensation
- Parallel operation possible to increase max. output current
- IP20 housing for mounting on DIN rail

Mounting in the sub-distributor

The design of the Q.PS-PEL2-40x power units complies with the required standard dimensions according to DIN 43880. The power units can therefore be easily integrated in electrical distribution boxes and are ideally suited to supply the components of the E-Line family with voltage

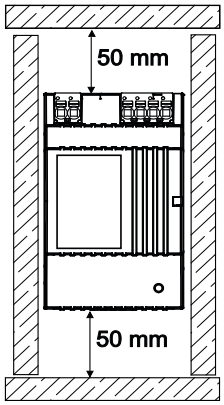
Terminal technology

Push-in terminals for efficient and fast wiring without tools for single wire conductors with a cross section of up to 2.5 mm² or fine wire ferrules up to 1.5 mm². However fine wire conductors up to 2.5 mm² can also be connected directly by simply applying pressure (screwdriver).



Installation information

Distance to adjacent parts:
Right/left: no minimum distance required
Top/bottom: min. 50 mm

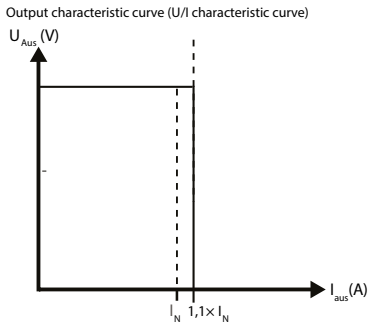


Technical data

Input data	Q.PS-PEL-2401	Q.PS-PEL-2403
Input voltage	100…240 VAC	
Permitted input voltage range	85…264 VAC	
Nominal frequency range	44…66 Hz	
Nominal input current for nominal load (110 / 230 VAC)	0.7 / 0.5 A	1.6 / 0.9 A
Internal input fuse	2 AT	4 AT
Recommended external pre-fuse	6 A, 10 A, 16 A, characteristics B, C	
Power failure bypass for nominal load (110 / 230 VAC)	10 / 80 ms	15 / 100 ms
Output data		
Output voltage (V_N)	24 VDC ±2%	
Output voltage range (V_{ADJ})	22.8…26.4 VDC	
Output current (I_N) at ≤45°C	1.3 A	4 A
Output current (I_N) at ≤55°C	0.9 A	2.8 A
Current load rating for any installation system	max. 0.9 A	max. 2.4 A
Efficiency	typical 82%	typical 88%
Residual ripple (for nominal load)	≤100 mVpp	
Overload behaviour	Constant current (U/I characteristic curve)	
Short-circuit protection	Yes	
Overvoltage output protection	Yes (max. 30 VDC)	
Parallel connection	Yes	
Status		
Operating indicator	LED green	
Environment		
Ambient temperature (operation)	–25°C to +55°C (load reduction >45°C, 3%/°C)	
Storage temperature	–25°C to +80°C	
Permitted humidity	30–85% relative humidity, no condensation permitted	
Areas of use	Use in areas with contamination level 2	
Connection terminals		
Connections	Push-in	
Input/output terminals	Single wire and fine wire conductors up to max. 2.5 mm² / conductors with wire ferrules up to max. 1.5 mm²	

Output characteristics

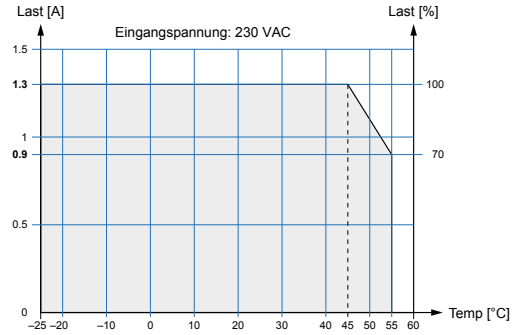
Voltage/current characteristic curve for short-circuit and overload protection



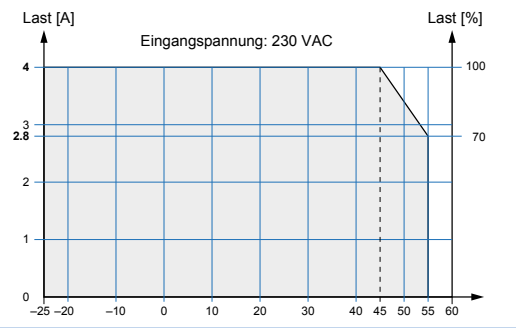
The current overload protection limits the current to a constant value of 1.1 × nominal current

Output derating curve

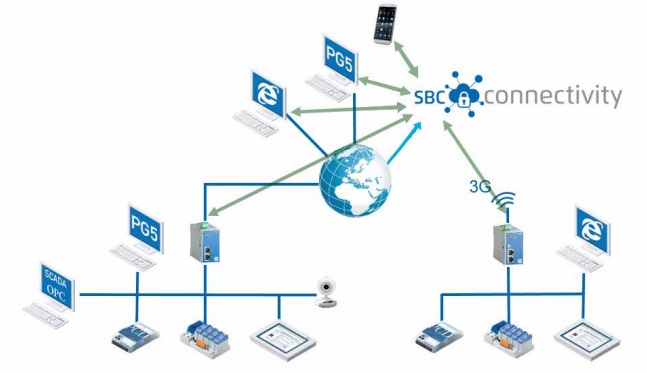
Q.PS-PEL-2401



Q.PS-PEL-2403



5.3 Industrial VPN Routers



The EBW industrial routers allows you an easy, reliable and secure connection of different applications located on different sites.
Using the quick start wizard, the EBW routers can be quickly and easily integrated in the "SBC Connectivity service" VPN network.

Theses industrial routers enable professional IP routing and provide highest-possible IT security.

5.3.1 Industrial 3G/HSPA router for VPN connection

The industrial high speed router EBW-H100 combines a modem and a router in one device. It connects to the internet over mobile networks (3G/HSPA, GPRS/EDGE).
The dial-in and dial-out functionality enables remote maintenance and operation of devices in an Ethernet network.
A firewall and integrated VPNs (openVPN, IPsec) care about data security.

Typical applications

- Access to control network with PLC, HMI, data logger
- Modem substitute for devices with Ethernet interface
- Remote desktop
- Video monitoring
- Displays

Features

- Broadband 3G/HSPA
- Dial-in and dial-out router
- VPN security
- Two local Ethernet ports
- Prepared for INSYS Connectivity Service

Technical data EBW-H100*

Mobile Communication	
Networks	2G: 900/1 800 MHz; CSD, GPRS/EDGE Class 12 3G: 850/800, 900, 1 900, 2 100 MHz; UMTS, HSDPA, HSUPA
Antenna	SMA connection
SIM	1 slot for Mini-SIM card
Router	
Function	Dial-In, dial-out, callback, connection management, DHCP server and client, full NAT (port forwarding, netmapping), DNS relay, dynDNS support, SNMP, NTP client and server, buffered real-time clock
Security	OpenVPN (client and server), IPsec, PPTP, MAC firewall, 10 user for dial-in, authentication over PAP/CHAP/MS-CHAP/MS-CHAP 2, dial fi lter for dial-out, linkloss detection, failed login detection, GRE
Redundancy	2 dial-out targets, 2 OpenVPN server targets
LAN	
Ports	2 × RJ45
Operating mode	10 / 100 MBit/s for full and half duplex operation
Function	Automatic detection of patch cable / cross-over cable, Automatic speed adjustment; MDI/MDI-X
Messages	
	Hardware watchdog, system messages via e-mail, SNMP traps, SNMP V1 / V2c / V3
Additional features	
	Update of firmware and configuration (local and remote), daily auto update
Supply	
Connections	10 … 48 V DC (± 20 %)
Input/output terminals	Approx. 2 W (logged in), max. 5 W (during communication)
Physical features	
Dimensions (L × W × H)	110 × 45 × 70 mm
Operating temperature	–30 … +70 °C –30 … +85 °C under limited conditions (refer to www.insys-icom.com/restricted)
Humidity	0 … 95 % (non-condensing)

*In preparation, see Chapter C1 "Status: Product launch and availability"

SBC connectivity

5.3.2 Industrial LAN router for VPN connection

The industrial high-speed router EBW-E100 allows secure connections between local and remote networks.
EBW-E100 decouples manufacturing cells with remote access from the surrounding company IT for example. Also many subnetworks with identical local IP addresses can be distinguished and addressed targeted.
The firewall and VPN via OpenVPN and IPsec provide data security.

Typical applications

- Manufacturing cell decoupling
- Secure remote maintenance in customer network
- Access to a control network from PLC, HMI, data logger
- Remote desktop
- Video monitoring
- Displays

Features

- LAN-to-LAN industrial router (1× LAN int., 1× LAN ext.)
- Professional IP routing
- Comprehensive security: Firewall, VPN, SNMP
- Easy consistent concept of operation
- Quick start for SBC Connectivity Service (VPN service

Technical data EBW-E100*

Router	
Function	Connection management, DHCP server and client, full NAT (port forwarding, netmapping), DNS relay, dynDNS support, PPPoE client for ADSL, SNMP, NTP client and server, buffered real-time clock
Security	OpenVPN (client and server), IPsec, PPTP, MAC firewall, linkloss detection, failed login detection, GRE
Redundancy	2 OpenVPN server targets

LAN	
Ports	2×RJ45
Operating mode	10 / 100 MBit/s for full and half duplex operation
Function	Automatic detection of patch cable / cross-over cable, Automatic speed adjustment; MDI/MDI-X
Messages	
	Hardware watchdog, system messages via e-mail, SNMP traps, SNMP V1 / V2c / V3
Additional features	
	Update of firmware and configuration (local and remote), daily auto update

Supply	
Connections	10 … 48 V DC (±20 %)
Input/output terminals	Approx. 2 W

Physical features	
Dimensions (L×W×H)	110×45×70 mm
Operating temperature	–30 … +70 °C –30 … +85 °C under limited conditions (refer to www.insys-icom.com/restricted)
Humidity	0 … 95 % (non-condensing)

Order details

Q.NET-EBW-E100*	Industrial LAN router for VPN connection
Q.NET-EBW-H100*	Industrial 3G/HSPA router for VPN connection
Q.NET-CON	Annual license for the "SBC Connectivity Service" portal
PCD7.K840	GSM/UMTS (850/900/1800/1900/2100 MHz) antenna with magnetic foot, 3 m cable and SMA (m) connector

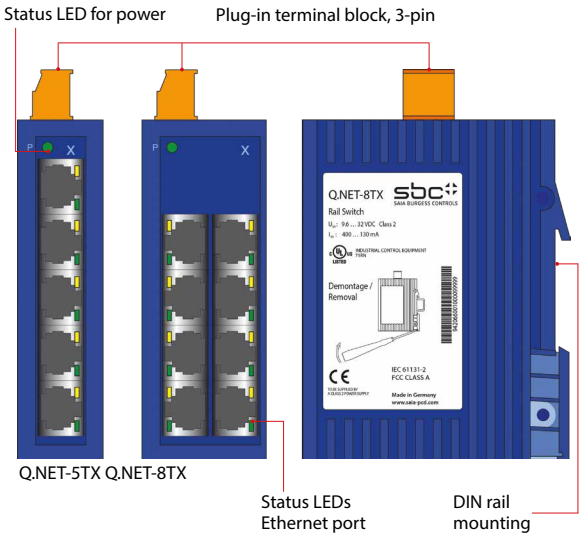
*In preparation, see Chapter C1 "Status: Product launch and availability"

5.4 Industrial Ethernet switchs

This compact, unmanaged switch operates based on the plug-and-work principle. The mounted switch is equal in height to Saia PCD3 systems, which saves space when it is snapped onto the DIN rail. The PCD controller is connected with the patch cable provided. With its robust construction, this switch is suitable for use in harsh industrial environments and in infrastructure automation.

System properties

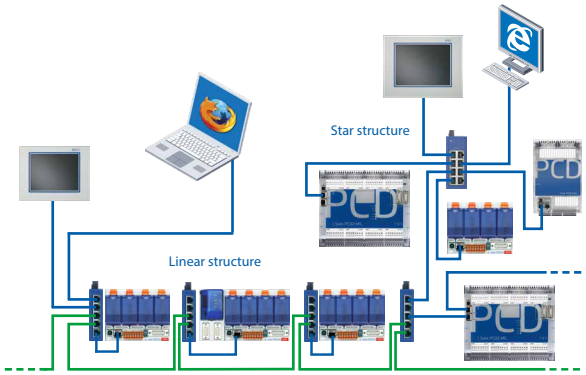
- DIN rail mounting and 24 VDC supply for flawless operation in infrastructure automation and in harsh industrial environments
- Fast network diagnosis, due to integral LEDs at TCP ports
- Entry level industrial Ethernet rail switch, with store-and-forward switching mode
- Allows construction of Ethernet networks in accordance with IEEE 802.3 with copper technology
- The device has five or eight 10/100 Mbit/s twisted pair ports (RJ45 connections)
- Up to five or eight end devices or additional TCP segments can be connected to the TCP ports using twisted pair
- Extremely light, compact construction with IP 30 protection level
- Simple commissioning with 'plug-and-work' via auto-negotiation, auto-polarity and auto-crossing



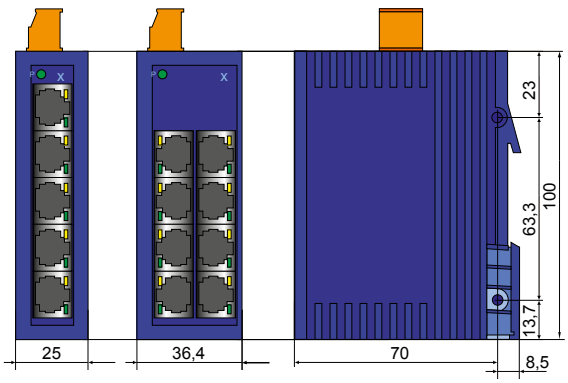
Technical data Q.NET-5TX and Q.NET-8TX

Operation	
Port type and number	Ethernet 10/100 MBit/s, 5× RJ45 (Q.NET-5TX) or 8× RJ45 (Q.NET-8TX)
Network line lengths	Twisted pair (TP), 0…100 m
Network cascade depth	Linear/star structure – any depth
Operating voltage	9.6 VDC…32.0 VDC
Current draw at 24 VDC	max. 100 mA
Displays/diagnostics	1× green LED; power 5× / 8× yellow LED; data rate 5× / 8× green LED; data, link status
Environmental conditions	
Operating temperature	0 °C … +60 °C
Storage temperature	–40 °C … +70 °C
Humidity	up to 95% (non-condensing)
Standards/approvals	
EMC noise immunity:	EN 61000-4
EMC noise emission:	EN 55022 Class A, FCC CFR47 Part 15 Class A
Safety for Industrial Control Equipment	cUL508, CSA22.2 No. 142, E 175531
Mechanical stability	IEC 60068-2 (shock, vibration)
Protection type	IP30
Order details	
Q.NET-5TX	5-port rail switch, terminal block, patch cable and operating instructions
Q.NET-8TX	8-port rail switch, terminal block, patch cable and operating instructions

Connection options



Dimensions

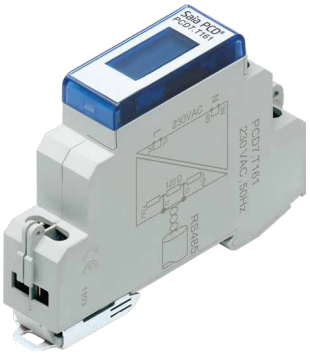


5.5 RS-485 bus termination box PCD7.T16x

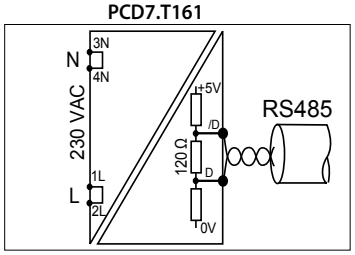
The PCD7.T16x termination boxes are used for RS-485 network termination. Each RS-485 network segment must be terminated at the end of the network. The PCD7.T16x termination boxes ensure that the RS-485 signals are set at the correct signal level and the integrated 120 Ohm resistor prevents signal reflection in the RS-485 cable. With their robust and compact construction and electrically isolated power supply with either 230 VAC or 24 VAC/DC, the PCD7.T16x termination boxes are suitable for use in harsh industrial environments and in infrastructure automation. An LED indicates the presence of the supply voltage of the PCD7.T16x termination box.

System properties

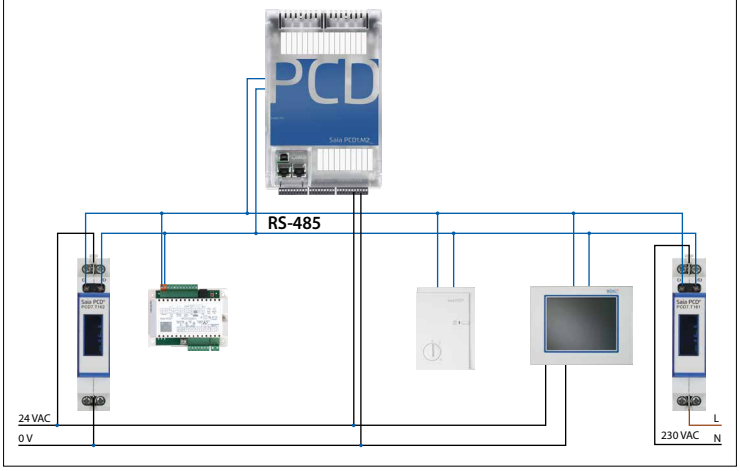
- 35 mm DIN rail mounting
- 17.5 mm wide housing
- 230 VAC +15% /–20% for PDC7.T161
- 24 VAC / DC –15% /+15% for PDC7.T162
- Current consumption of 0.4 W
- Electrically isolated power supply
- Fixed-line terminator resistance of 120 Ω
- LED operating indicator



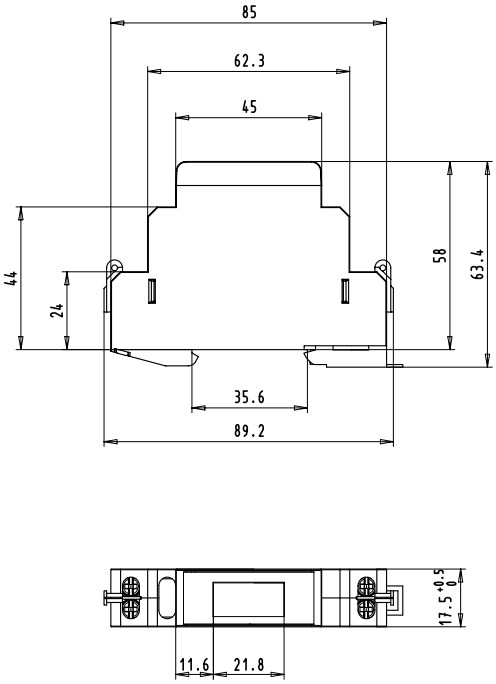
Connection diagram



Connection example



Dimensions



	PCD7.T161	PCD7.T162	Comments
Power supply	230 VAC	24 VAC / DC	
Housing	17.5 × 85 × 64 mm	17.5 × 85 × 64 mm	PCD7.T161 and PCD7.T162 comply with the standards for switch cabinets
Terminating resistor	Fixed 120 Ω	Fixed 120 Ω	
Display	LED for 230 VAC	LED for 24 V	
Lead sealing cap as an accessory, see section 4.2.6 (ALD1)			

5.6 Isolating amplifiers DC/DC KFD1

The SBC isolating amplifiers KFD1x isolate individual analogue channels not only from input to output, but also from the supply and frame ground potential. This electrical separation is particularly recommended for long lines in large installations. However, the SBC KFD1x can also be used to amplify a weak signal and convert it into a noise-proof current signal.

System properties

- Available in two versions with different input ranges
- Conversion time 20 ms
- 0.5% accuracy at full scale
- Output electrically isolated from input with optical isolating amplifier

Technical data for isolating amplifiers DC/DC KFD11 and KFD12

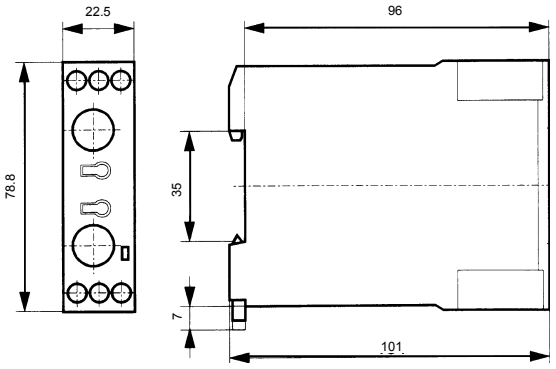
Input ranges [1] KFD11	0…10 VDC, input impedance 200 kΩ or 0…20 mA, load 47 Ω [2]
KFD12	0…75 VDC, input current 0…20 mA or 0…60 mV, input current 0… 60 µA [3]
Output ranges [1]	0…10 VDC, load (≥3 kΩ); 0…20 mA, load (≤500 Ω)
Input/output	electrically isolated with optical isolating amplifier
Conversion time	20 ms
Short-circuit proof	Yes, 1 minute, short-circuit current < 100 mA
Status display	LED green: supply voltage present
Isolating characteristics	800 VDC between supply, input and output
Precision	0.5% of final value
Supply voltage	19…70 VDC or 24 V ±20% full-wave rectified
Power consumption	1.0…2.4 W depending on voltage and load
Duty cycle	100%
Connections	screw terminals for 1 × 0.5 mm² to 2 × 2.5 mm²
Mounting	surface mounting; snap-on mounting onto DIN rail in accordance with DIN EN60715 TH35 (formerly DIN EN50022) (1 × 35mm) or screw fixing with adapter (accessory) and 2 screws M4
Ambient temperature **Operation** **Storage**	 0…50 °C –25…+70 °C
Humidity	95% RH with no condensation
EMC/interference immunity	EN 61000-4-4 (2 kV) at input and output EN 61000-4-4 (4 kV) at supply
EMC / Emission	EN 55022, class B

[1] 2 input ranges/2 output ranges selectable with 2 slide switches on front panel
[2] Overvoltage protection by stress limiter, 27 V max.
[3] Overcurrent or overvoltage protection by stress limiter

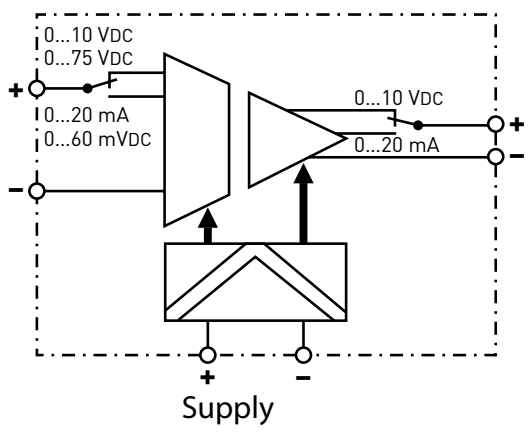
Ordering information for isolating amplifiers DC/DC KFD11 and KFD12

KFD11JVTN	Isolating amplifier DC/DC with input and output ranges 0…10 VDC or 0…20 mA
KFD12JVTN	Isolating amplifier DC/DC with input ranges 0…75 VDC or 0…60 mA and output ranges 0…10 VDC or 0…20 mA

Dimensions



Block diagram

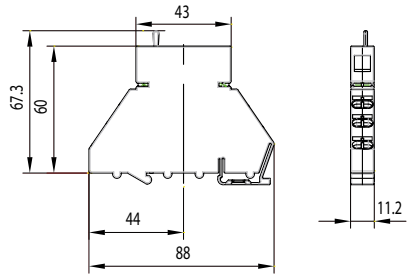


5.7 Interface modules with local override

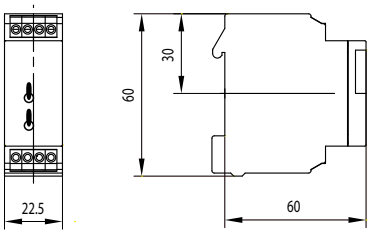
to control drives, valves or flap systems

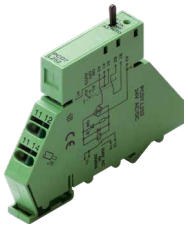
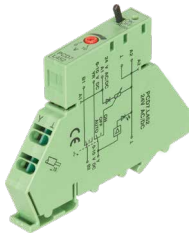
Dimensions

PCD7.L252/452



PCD7.L260



PCD7.L252: Coupler modules with manual operating level Auto/OFF/ON	**PCD7.L452:** Analogue value transmitter for manual correcting variables	**PCD7.L260:** Coupler module for two-stage motor control
		
▸ 1 changeover contact ▸ Local override operation ▸ Auto acknowledge ▸ LED display ▸ Test contacts for each terminal ▸ Spring terminals (push-in)	▸ Potentiometer 0…10 V ▸ Local override operation ▸ Auto acknowledge ▸ LED brightness in proportion to control variable ▸ Test contacts for each terminal ▸ Spring terminals (push-in)	▸ Interlocked relay ▸ Local override operation ▸ Auto acknowledge ▸ LED display ▸ Screw terminals
Single-stage coupler component with local override operation, acknowledgement of switch position and an LED for status indication. Coupler modules are used for safe potential isolation between logic and load. Spring terminals allow for quick and easy wire connection. The supply voltage can be connected across jumpers using additional terminals with no wiring or additional time required.	The analogue data encoder is used as a variable encoder for manual variable specification, e. g. mixing valves, valve positions, temperature values, etc. It has three operating modes: ON, OFF and AUTO. In switch position AUTO, the control variable will be looped unchanged via the YR terminal to the control variable output Y. In switch position ON, the control variable can be set using the potentiometer on the front of the device. The output signal will be available at terminal Y.	This coupler module is used for switching units, pumps, fans, etc. When switching back from stage 2 to stage 1, stage 2 is first switched off and stage 1 is switched on after a delay of < 60 ms. A manual control level has been integrated for service purposes. The time function is operational here too.

Input side	**PCD7.L252**	**PCD7.L452**	**PCD7.L260**
Supply voltage	24 VDC/VAC, –15%/+10%	24 VDC/VAC, –15%/+20%	24 VDC/VAC, ±10%
Current draw	13 mA, protection wiring with recovery diode	19 mA at 24 VDC 30 mA at 24 VAC	30 mA
Input current	---	2 mA at 10 VDC (input YR)	max. 4 mA, terminal B1/B2
Response / release time	10 ms/5 ms	---/---	20 ms/20 ms
Input voltage	24 VDC/VAC	0…10 VDC	24 VDC/VAC
Operating indicator	Green LED to indicate relay state	Red LED (brightness in proportion to control variable)	Two red LEDs to indicate relay state
Output side			
Output contact	1 changeover	---	1 changeover with 0 position
Turn-on voltage	max. 250 VDC/VAC	---	Max. 250 VDC/VAC
On/off switching current	max. 8 A	---/---	Max. 6 A
Output voltage	---	0…10 VDC, 10 mA, output Y in switch position Auto/ON	---
Continuous current	8 A	---	4 A
Breaking capacity (ohmic load)	24 VDC/180 W 50 VDC/65 W 230 VDC/50 W 250 VAC/2000 VA	--- --- --- —	24 VDC/150 W 50 VDC/25 W 230 VDC/50 W 230 VAC/1500 VA
Breaking capacity min.	24 VDC/20 mA	—	24 VDC/20 mA
Service life **mechanical** **electrical (at maximum switching load)**	 2×10^7 switch cycles 1×10^5 hystereses	 --- ---	 1×10^7 switch cycles 1×10^5 hystereses
Switching frequency	MAX: 300 hystereses / h at max. current	---	MAX: 1,200 hystereses / h at max. current

Accessories

PCD7.L291	Jumper for connection of the supply voltage of up to 10 PCD7.L252 and PCD7.L452 modules
PCD7.L490	Labelling plate for PCD7.L452 (in packs of 10)
PCD7.L290	Labelling plate for PCD7.L252 (in packs of 10)

PCD7.L291

PCD7.L490 / PCD7.L290

5.8 Timer delay relays KOL/KOP

KOL2 and KOL3

- Multi-function or mono function
- 4 time ranges (KOL 251)
- 6 time ranges (KOL 3)
- 17.5 mm width for DIN rail
- 24…48 VDC and 24…240 VAC
- 2 make contacts (KOL 251)
- 1 changeover (KOL 3)

KOP.J

- Multi-function or mono function
- 10 time ranges
- 22.5 mm width for DIN rail
- 24…48 VDC and 24…240 VAC
- 1 changeover contact

KOP.K

- Multi-function or mono function
- Up to 10 time ranges
- 22.5 mm width for DIN rail
- 24…48 VDC and 24…240 VAC, 50/60 Hz
- 24…240 VAC/DC
- 1 or 2 changeover contacts, instantaneous and/or timed contacts


KOL251H...


KOL360H...


KOP160J...

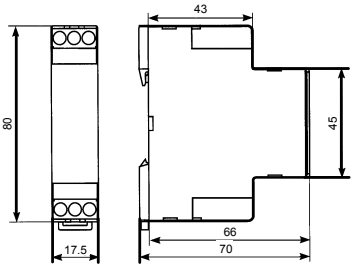

KOP170J...


KOP219K...

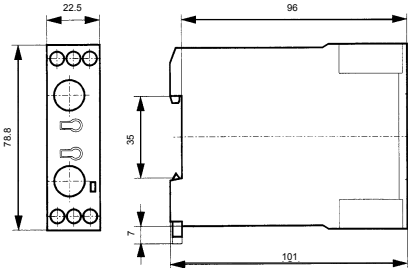

KOP560K...

Dimensions

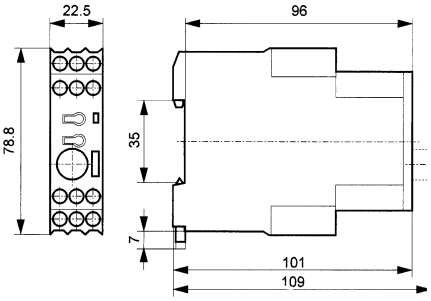
KOL251 and KOL260



KOP160 and KOP170



KOP219 and KOPP560



Series	KOL2	KOL3xxH...	KOP1xx.J...		KOPxxx.K...	
Order number	KOL251H7MKVPN00	KOL360H7MRVPN00	KOP160J7MWVPN00	KOP170J7MWVPN00	KOP219K7MWVAN00	KOP560K7MWVPN00
Functions						
Delayed operation	---	•	•	---	---	•
Delayed release	---	•	•	---	---	•
Power off delayed release	---	---	---	---	•	---
Delayed operation and release	---	---	•	---	---	•
Fleeting-on delay timer	---	•	•	---	---	•
Fleeting-off delay timer	---	---	•	---	---	•
Flasher relay	---	•	---	---	---	---
Star delta timer	•	---	---	---	---	---
Pulse converter	---	---	•	---	---	•
Pulse generator	---	---	•	---	---	•
Flasher relay with pulse starting	---	---	•	---	---	•
Asymmetrical pulse generator	---	---	---	•	---	---
On/off function for startup and maintenance	---	---	•	---	---	•
Time ranges						
0.15 s…10 min	•	---	---	---	•	---
0.05 s…10 h	---	•	---	---	---	---
0.05 s…60 h	---	---	•	•	---	•
Operating voltage						
24…48 VDC and 24…240 VAC	•	•	•	•	---	•
24…240 VDC or 24…240 VAC	---	---	---	---	•	---
Contacts						
2 make contacts with a joint connection	•	---	---	---	---	---
1 changeover	---	•	•	•	---	---
2 changeovers	---	---	---	---	•	---
2 changeovers, instantaneous and/or timed contacts	---	---	---	---	---	•

5.9 Monitoring relays KFE/KFT

KFE102 / 103 / 300 / 302

- Voltage and current monitoring, 3-phase asymmetry monitoring
- Phase order, phase failure
- 3-phase voltage monitoring
- 230 VAC, 3 × 400 VAC 50/60 Hz
- 1 changeover contact

KFT100 / 200

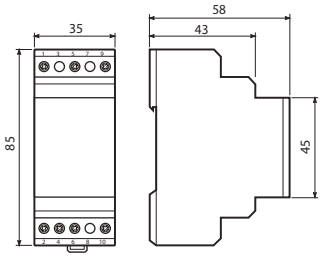
- Motor monitoring by PTC
- PTC short-circuit monitoring
- PTC cable-break monitoring with memory function (KFT200)
- 230 VAC
- 1 relay (NO contact, KFT100)
- 2 relays (changeover contact, KFT200)

KFE102 KFE300 KFE302

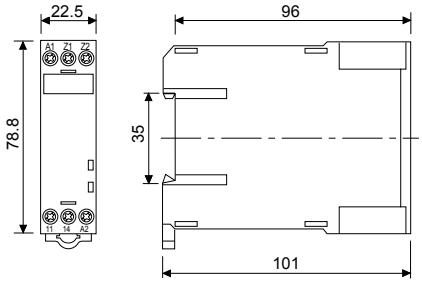
KFT100 KFT200

Dimensions

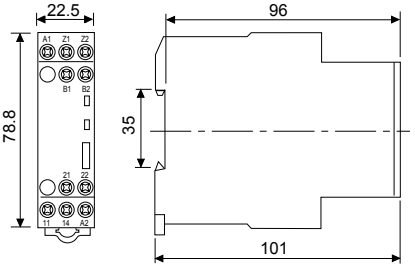
KFE



KFT100



KFT200



Series	KFE102 / 103 / 300 / 302					KFT100 / 200	
Order number	KFE102NE1N	KFE103NE1N	KFE300NE9N	KFE302NE9N		KFT100JE1N	KFT200KE1N
Functions KFE102 / 103 / 300 / 302							
Voltage monitoring	•	---	---	---		---	---
Current monitoring	---	•	---	---		---	---
Monitors phase loss, order, asymmetry and under-voltage	---	---	•	---		---	---
3-phase voltage monitoring (AC)	---	---	---	•		---	---
Memory function	•	•	---	•		---	---
Setting KFE102 / 103 / 300 / 302							
Parameterisable, LCD display	•	•	---	---		---	---
Analogue	---	---	•	•		---	---
Functions KFT100/200							
Motor monitoring by PTC	---	---	---	---		•	•
Short-circuit monitoring in the PTC measuring circuit	---	---	---	---		•	•
Cable-break monitoring in the PTC measuring circuit	---	---	---	---		•	•
Memory function	---	---	---	---		---	•
Reset KFT100/200							
Automatic	---	---	---	---		•	---
manual or automatic	---	---	---	---		---	•
Operating voltage							
230 VAC	•	•	---	---		•	•
3 × 400 VAC	---	---	•	•		---	---
Output							
1 relay (NO contact)	---	---	---	---		•	---
1 relay (changeover contact)	•	•	•	•		---	---
2 relays (changeover contact)	---	---	---	---		---	•
Function control							
LED display	•	•	•	•		•	•

5.10 I/O module integration into switch cabinet

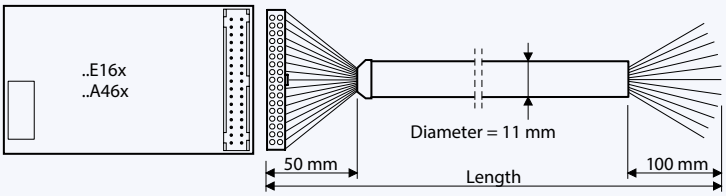
Pre-assembled system cables and terminal adapter modules support the fast integration of the integration of the Saia PCD® I/O modules into the switch cabinet. I/O modules with ribbon connections, in particular, can be installed quickly and easily in the switch cabinet. The modules with terminals can also be connected to the adapters using traditional stranded wires. The adapters either are available for galvanic separation of the outputs with relays or as simple I/O adapters with voltage distribution.

System properties

- Available as I/O terminal adapter or relay interface
- Relay interface with manual mode
- Compatible with Saia PCD2 and PCD3 systems
- For connection with system cable or stranded wire
- For DIN rail mounting

Pluggable ribbon cables with connector at the Saia PCD® end

Cable for the digital modules with 16 inputs/outputs



PCD2.K221/K223 cable

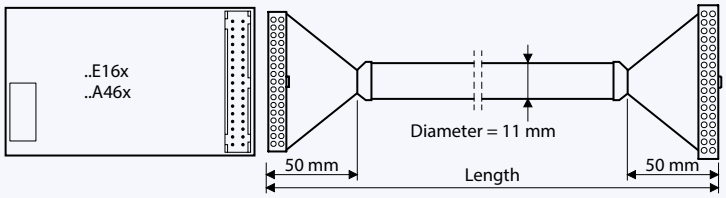
Sheathed, round cable with 32 strands of 0.25 mm² (AWG 24), 34-pin ribbon connector at the PCD end

Free, unsheathed 100 mm ends at the process end

Stranded wires, colour-coded

Cable length PCD2.K221 = 1.5 m
PCD2.K223 = 3.0 m

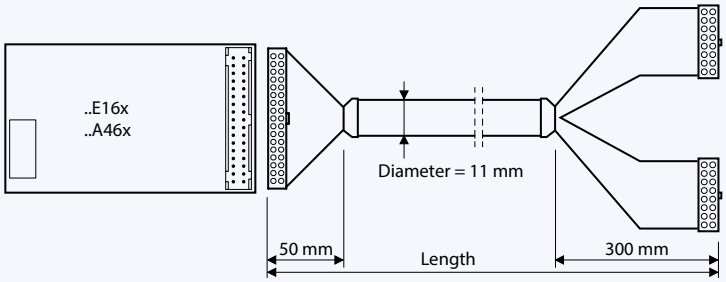
Terminal adapter for digital inputs/outputs



PCD2.K231/K232 cable

Sheathed, round ribbon cable with 34 strands of 0.09 mm², 34-pin ribbon connector at both ends

Cable length PCD2.K231 = 1.0 m
PCD2.K232 = 2.0 m



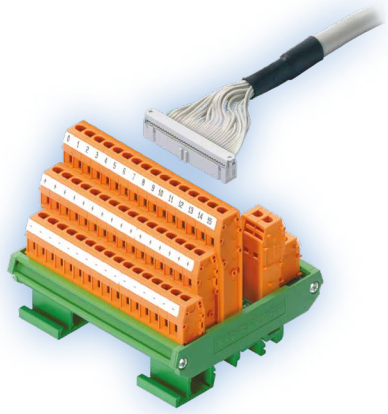
PCD2.K241/K242 cable

Sheathed, round ribbon cable with 34 strands of 0.09 mm², 34-pin ribbon connector at the PCD end

Process end divided into 2 branches, each 300 mm in length, leading to 16-pin ribbon connectors

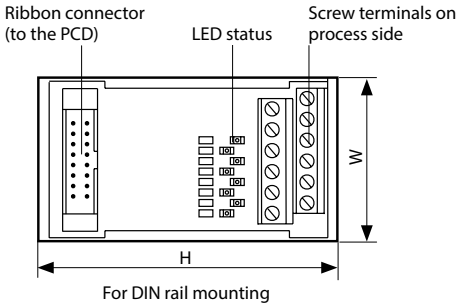
Cable length PCD2.K241 = 1.0 m
PCD2.K242 = 2.0 m

To facilitate and speed up the installation of controllers, various adapters are available that can be connected direct to the Saia PCD® I/O modules via system cables. Apart from terminal adapters, there are also relay interfaces available which enable simple galvanic separation. The relay interfaces can be connected with ribbon cables or with stranded wires.

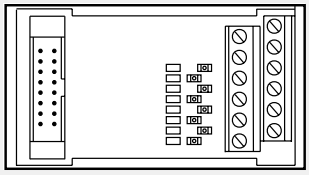


Terminator adapter for I/O modules with ribbon connection

Mechanical design



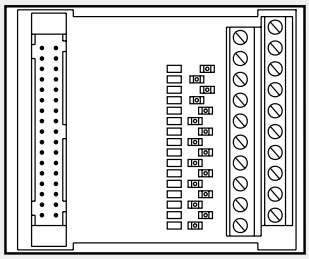
Terminal adapter for 8 inputs/outputs



Terminal adapter PCD2.K51x
16-pin ribbon connector
at the PCD end
Process end 2×6
Screw terminals 0.5…1.5 mm²
PCD2.K510 without
LEDs PCD2.K511 with LEDs
(source operation)

Dimensions: 42 × 82 × 60 mm (W × H × D)

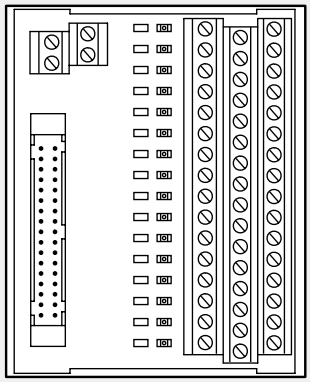
Terminal adapter for 16 inputs/outputs



Terminal adapter
PCD2.K520/K521
34-pin ribbon connector
at the PCD end
Process end 2×10 screw terminals 0.5…1.5 mm²
PCD2.K520 without LEDs
PCD2.K521 with LEDs
(source operation)

Dimensions: 65 × 82 × 60 mm (W × H × D)

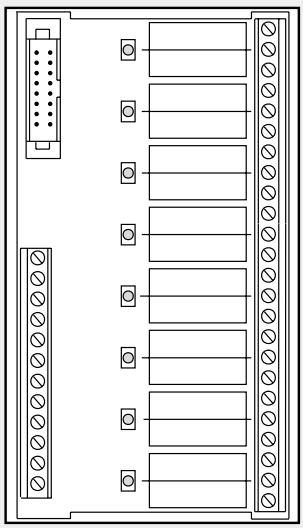
Terminal adapter for 16 inputs/outputs



Terminal adapter PCD2.K525
34-pin ribbon connector
at the PCD end
Process end 3 × 16
Screw terminals 0.5…1.5 mm²
with LEDs
(source operation)

Dimensions: 94 × 82 × 72 mm (W × H × D)

Adapter relay interface

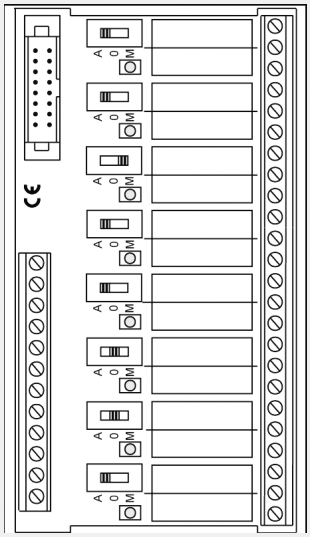


Relay interface PCD2.K551
for 8 PCD transistor outputs
with 24 screw terminals and
LED
Switching capacity of
the changeover contacts
10 A/250 VAC or 10 A/24 VDC
(ohmic), 24 VDC spool
16-pin ribbon connector or
screw terminals at the PCD end
24 screw terminals
0.5…1.5 mm² at the process
end

Mechanical data
Diameter of the screw terminals:
M 2.6 mm
Starting torque: 0.4 Nm

Dimensions: 128 × 82 × 55 mm (W × H × D)

Adapter relay interface with manual operation



Relay interface PCD2.K552
for 8 PCD transistor outputs
with 24 screw terminals, LED
and manual operation mode
(switch on-off-auto) and 1 output as feedback for the manual
mode
Switching capacity of the
changeover contacts 10 A/250
VAC or 10 A/24 VDC (ohmic),
24 VDC spool
16-pin ribbon connector or
screw terminals at the PCD end
24 screw terminals
0.5…1.5 mm² at the process
end

Mechanical data
Diameter of the screw terminals:
M 2.6 mm
Starting torque: 0.4 Nm

Dimensions: 128 × 82 × 44 mm (W × H × D)