

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

Base units with 4 slots for I/O modules

- ▶ PCD3.Mxx60 High Power CPU
- ▶ PCD3.M3x60 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.



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Saia PCD3.Txxx remote I/O stations RIOs

Remote peripheral nodes

- ▶ PCD3.T66x Smart Ethernet RIO



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Saia PCD3.Cxxx module holder for I/O expansion

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



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Saia PCD3 input/output modules in cassette design

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

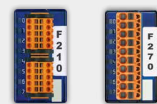


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Saia PCD3 interface modules

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



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Saia PCD3 memory modules

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



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Consumables and accessories for Saia PCD3 controllers

Batteries, terminals, system cables, labelling accessories...



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Design of Saia PCD3 controllers

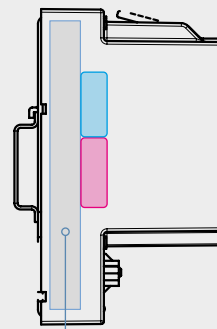
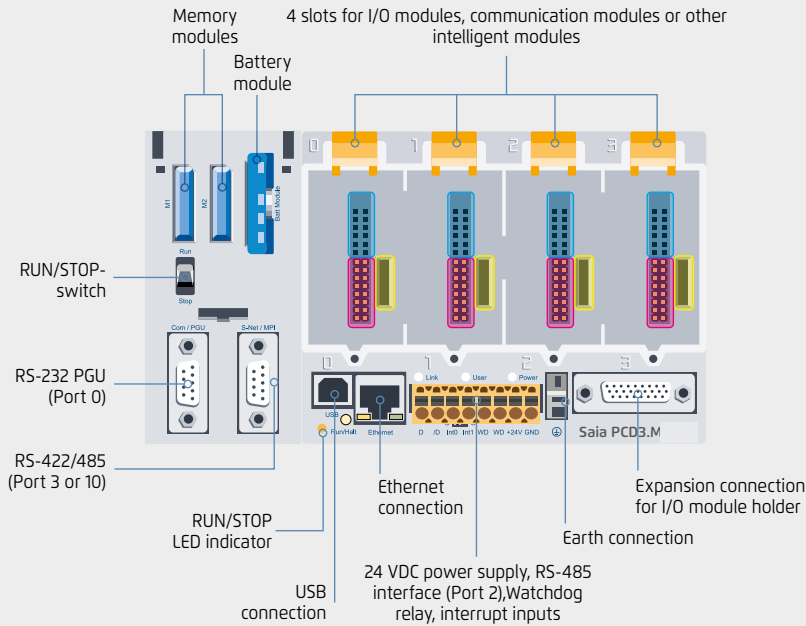
The CPU has been incorporated into the back panel of the device, unlike comparable systems. Its capacity can be increased individually with plug-in communication modules and/or intelligent I/O modules. These have a direct, very fast bus connection to the CPU.



PCD3.Mxxxx base unit

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

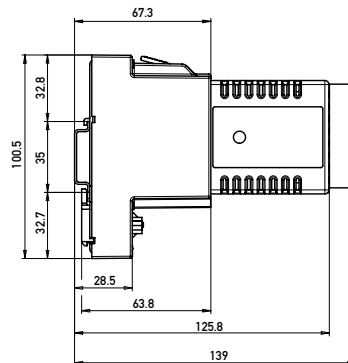
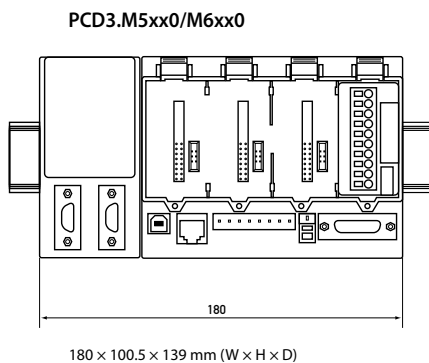
Device design



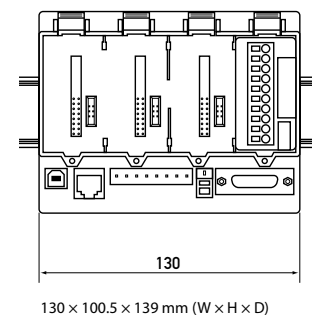
The CPU is incorporated into the back panel. An additional 4 I/O modules can therefore be inserted into the same area.

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.M3xx0 without left expansion



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

▲ 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

4 slots for I/O modules

- Ground connection for I/O modules
- I/O bus for standard modules

Terminal for CPU or I/O module holder

LED indicator for internal 5 V supply voltage

Ground connection

24 VDC power supply terminal

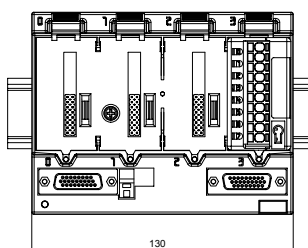
Expansion connection for I/O module holder

Saia PCD3.C200

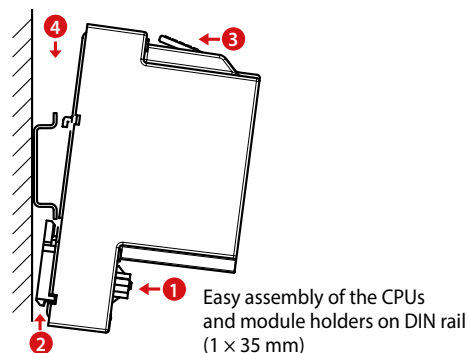
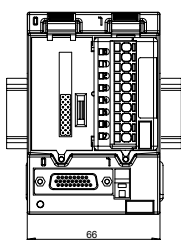
Available types

- ▶ 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



System expansion up to 1023 I/O

Single- and multiple-row mounting of the module holders

PCD3.Mxxxx CPU incl. 4 I/O slots

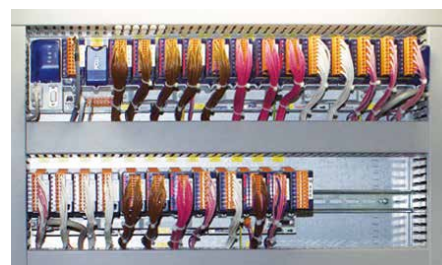
PCD3.C100 I/O module holder 4 slots

PCD3.K106 or PCD3.K116 Extension cable for multi-row mounting

PCD3.K1xx Extension cable for multiple-row mounting

PCD3.K010 Extension plug

PCD3.C100 I/O module holder 4 slots



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.



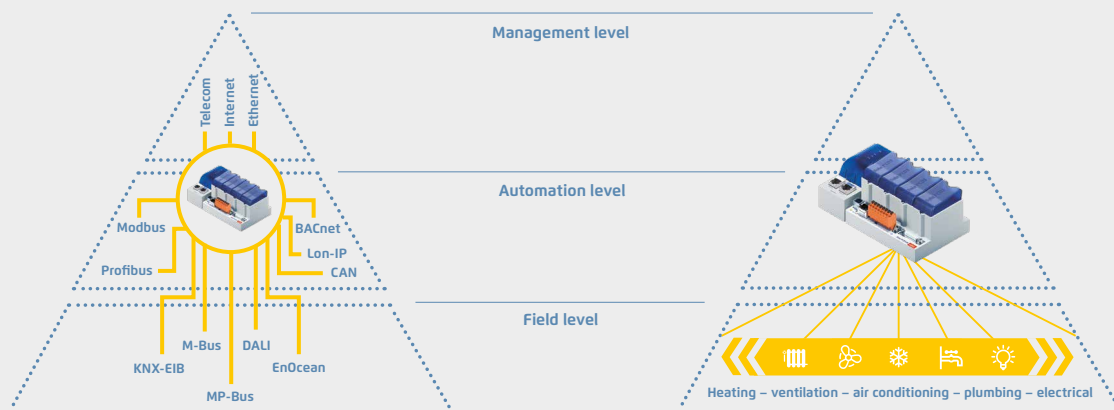
System properties

- ▶ 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 μ s 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.M6860** CPU basic module with 2 Ethernet TCP/IP, 2 MB of program memory

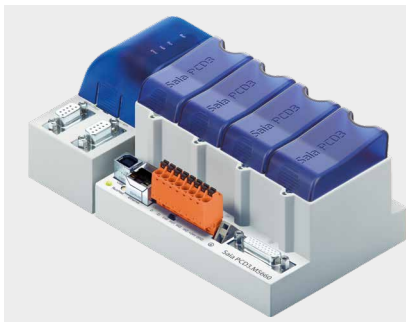


The Saia PCD3 Power CPU has sufficient system resources to operate up to 13 communication interfaces in the same device. Even the most demanding tasks, such as simultaneous communication via BACnet® and Lon IP, are handled reliably.

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



I/O	1023
File system	up to 4.2 GByte
Program	2 MByte
CPU Speed Basic Power	0.1/0.3 μ s bit/word

Technical Data	PCD3.M5360	PCD3.M5560	PCD3.M6860
	Power	Power DP Slave	Power 2 \times Ethernet
Number of inputs/outputs or I/O module slots	1023		
I/O expansion connection for PCD3.Cxxx module holder	Yes		
Processing time [μ s]	bit operation	0.1...0.8 μ s	
	word operation	0.3 μ s	
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 Mbps, full-duplex, auto-sensing/auto-crossing	Yes		2 \times
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	
RS-485 on D-Sub connector (Port 3)* or Profibus-DP Slave, Profi S-Net on D-Sub connector (Port 10)*	Up to 115 kbits ¹⁾ No	Up to 115 kbits ²⁾ Up to 1.5 Mbits ²⁾	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

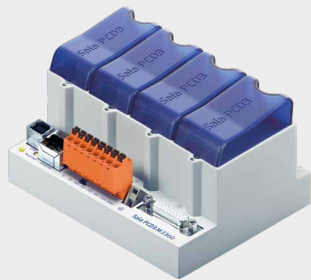
I/O slot 0	PCD3.F1xx modules for RS-232, RS-422, RS-485 and Belimo MP-Bus
I/O slot 0...3 up to 4 modules or 8 interfaces:	PCD3.F2xx modules for RS-232, RS-422, RS-485, BACnet [®] MS/TP, Belimo MP-Bus, DALI and M-Bus

General specifications

Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC, -20/+25% max. incl. 5% ripple or 19 VAC \pm 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



I/O	1023
File system	Up to 4 GB
Program	512 kByte
CPU Speed	0.3/0.9 μ s
CPU Speed Basic Power	0.1/0.3 μ s Bit/Word



Types

- ▶ PCD3.M3160 CPU basic module with Ethernet TCP/IP, 64 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.M3160	PCD3.M3360
	Basic Power	Basic Power
Number of inputs/outputs or I/O module slots	64	1023
I/O expansion connection for PCD3.Cxxx module holder	No	Yes
Processing times [μ s]	0.1...0.8 μ s 0.3 μ s	
Real-time clock (RTC)	Yes	

Onboard memory

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

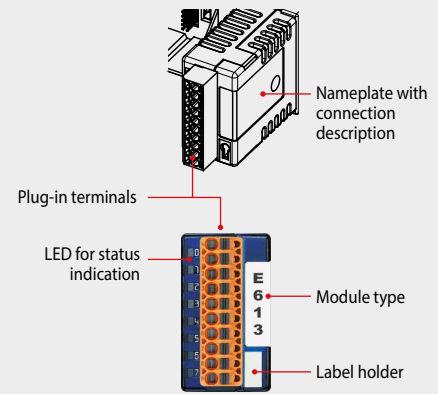
Supply voltage (in accordance with EN/IEC 61131-2)	24 VDC, -20/+25% max. incl. 5% ripple or 19 VAC \pm 15% two-way rectified (18 VDC)
Power consumption	typically 15 W for 64 I/Os
Capacity 5 V/+V (24 V) internal	max. 600 mA/100 mA

Saia PCD3 input and output modules in cassette design

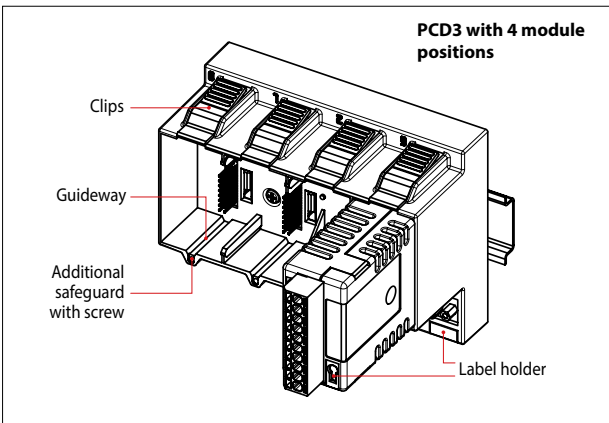
The functions of the Saia PCD3 can be expanded as required using a wide range of plug-in I/O modules and can be adapted to specific requirements. This not only ensures that a project can be implemented quickly, but also provides the option of expanding or modifying the system at any time.

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



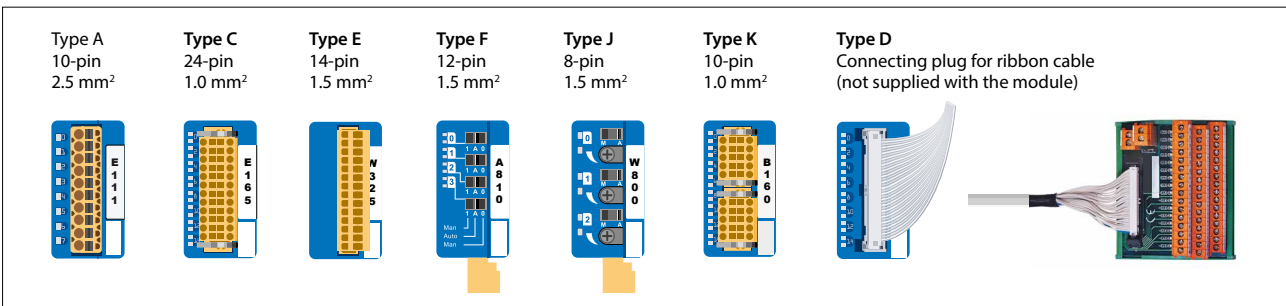
▲ Simple exchange of I/O modules

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



▲ Spare terminals, ribbon connectors with system cables and separate terminals are ordered as accessories (see pages 33 and 150).

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		Input delay	Electrical isolation	Internal current draw		I/O connector type ³⁾
			DC	AC			5 V-Bus ¹⁾ + V-Bus ²⁾		
PCD3.E110	8	15...30 VDC	---	---	8 ms	---	24 mA	---	A
PCD3.E111	8	15...30 VDC	---	---	0.2 ms	---	24 mA	---	A
PCD3.E160	16	15...30 VDC	---	---	8 ms	---	10 mA	---	D
PCD3.E161	16	15...30 VDC	---	---	0.2 ms	---	10 mA	---	D
PCD3.E165	16	15...30 VDC	---	---	8 ms	---	10 mA	---	C
PCD3.E166	16	15...30 VDC	---	---	0.2 ms	---	10 mA	---	C
PCD3.E610	8	15...30 VDC	---	---	10 ms	●	24 mA	---	A

Digital output modules

Type	Number of outputs	Input voltage	Output switching capacity		Input delay	Electrical isolation	Internal current draw		I/O connector type ³⁾
			DC	AC			5 V-Bus ¹⁾ + V-Bus ²⁾		
PCD3.A200	4, relay (make)*	---	2 A/50 VDC	2 A/250 VAC	---	●	15 mA	---	A
PCD3.A210	4, relay (break)*	---	2 A/50 VDC	2 A/250 VAC	---	●	15 mA	---	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	16, transistor	---	0.5 A/10...32 VDC	---	---	---	10 mA	---	D
PCD3.A465	16, transistor	---	0.5 A/10...32 VDC	---	---	---	10 mA	---	C
PCD3.A810	4, relay	---	2 A/50 VDC	5 A/250 VAC	---	●	55 mA	---	F
Manual operation	(2 changeover + 2 make)	---	2 A/50 VDC	6 A/250 VAC	---	●	---	---	F

* with contact protection

Digital input/output modules

Type	Number of I/Os	Input voltage	Output switching capacity		Input delay	Electrical isolation	Internal current draw		I/O connector type ³⁾
			DC	AC			5 V-Bus ¹⁾ + V-Bus ²⁾		
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	---	2x 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	2x K

Overview of the internal bus capacity of the module holders

Capacity	PCD3.Mxx60	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 33 and 150).

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		I/O connector type ³⁾
					5 V-Bus ¹⁾ + V-Bus ²⁾		
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.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	Pt1000: -50°C...+600°C/Ni1000: -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	2x K
PCD3.W305	7 In	0...+10 V	12 Bit	•	60 mA	0 mA	E
PCD3.W315	7 In	0...20 mA ⁴⁾	12 Bit	•	60 mA	0 mA	E
PCD3.W325	7 In	-10 V...+10 V	12 Bit	•	60 mA	0 mA	E
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		I/O connector type ³⁾
					5 V-Bus ¹⁾ + V-Bus ²⁾		
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	E
PCD3.W615	4 Out	0...20 mA/4...20 mA parameters can be set	10 Bit	•	55 mA	0 mA	E
PCD3.W625	6 Out	-10 V...+10 V	10 Bit	•	110 mA	0 mA	E
PCD3.W800	4 Out, 3 of which are manually operated	0...+10 V, short circuit-protected	10 Bit	---	55 mA	35 mA ⁵⁾	J

Analogue input/output modules

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

Manual control modules

PCD3.A810
Relay outputs,
2 changeover and
2 make



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



Overview of the internal bus capacity of the module holders

Capacity	PCD3.Mxx60	PCD3.T66x	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 33 and 150).

⁴⁾ 4...20 mA via user program

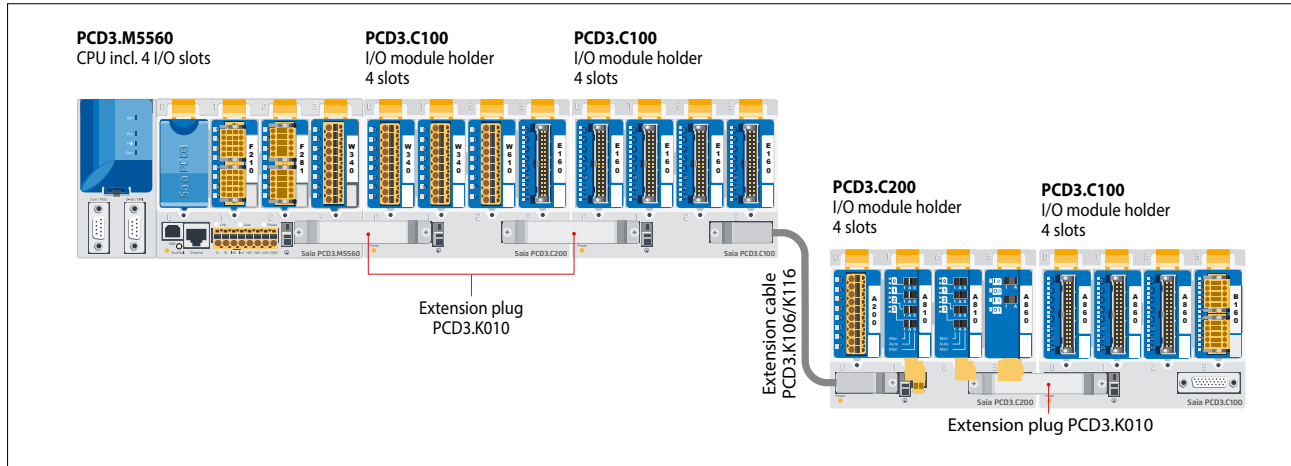
⁵⁾ At 100% output value and 3 kΩ load

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 M5560 + C100 + C100

Module	Internal 5V	Internal +V (24V)
Not used		
F210	110 mA	
F281	90 mA	15 mA
W340	8 mA	20 mA
Total M5560	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 M5560	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.M5560 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 (24V) bus for the I/O modules is automatically calculated in the PG5 2.x Device Configurator.



The following aspects should be considered when planning PCD3 applications:

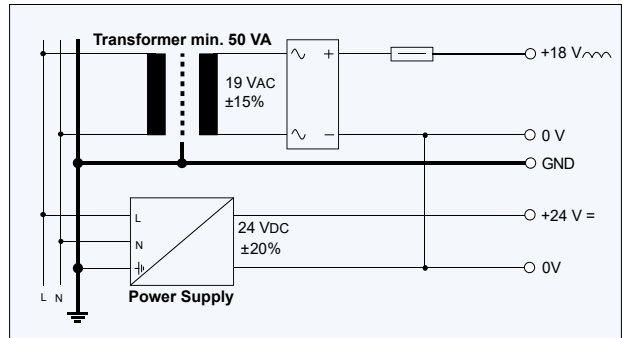
- ▶ In keeping with lean automation, it is recommended to leave the first slot in the CPU basic module free for any subsequent expansions. Both single I/O modules and communication modules can be used in this slot.
 - ▶ The total length of the I/O bus is limited by technical factors; the shorter, the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

Saia PCD3 power supply and connection concept

External power supply

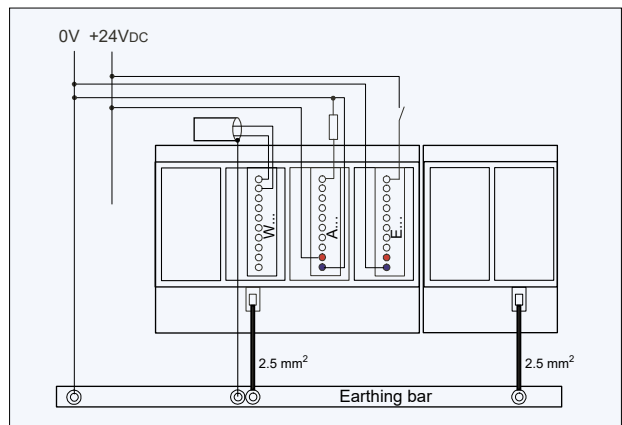
A two-way rectified supply can be used for most modules. The following modules must be connected to smoothed 24 VDC: PCD3.H1xx

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.

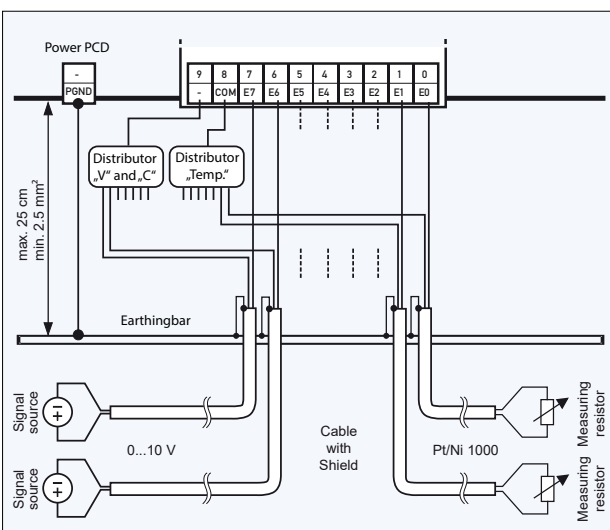


Grounding and connection concept analogue inputs that are not electrically isolated (PCD3.W2x0, PCD3.W3x0)

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

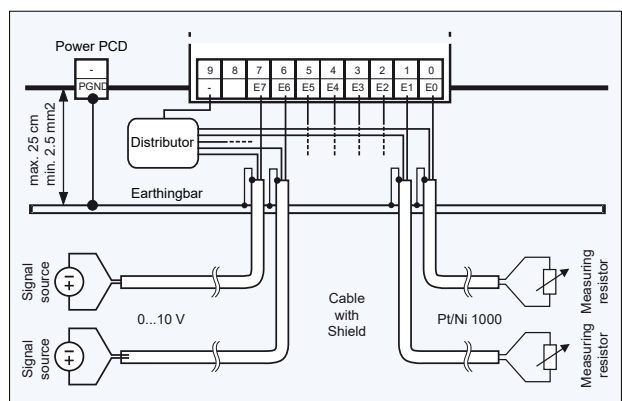
To obtain optimum measurement results, avoid connection to a ground bar. Additional external GND connections to the sensor signals may result in equalising currents which distort the measurement.

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

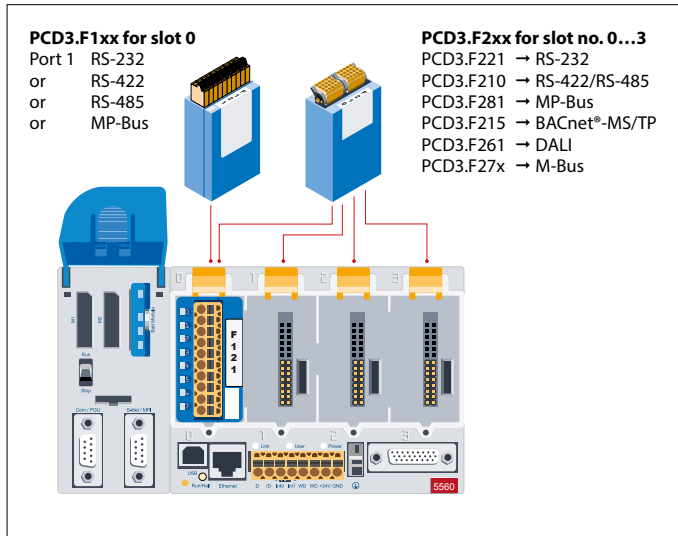
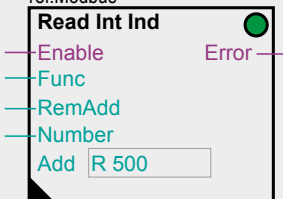
Communication interfaces of Saia PCD3.Mxxxx controllers

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)

ref.Modbus



Fully programmable physical interfaces

Module	Specifications	Slot	Electrical isolation	Internal current draw 5V +V (24 V)		I/O connector type ¹⁾
				mA	mA	
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	---	2x K
PCD3.F221	RS-232 plus PCD7.F1xxS as option	I/O 0...3	---	90 mA	---	2x K

Physical interfaces for specific protocols

Module	Specifications	Slot	Electrical isolation	Internal current draw 5V +V (24 V)		I/O connector type ¹⁾
				mA	mA	
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	---	2x K
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	2x 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 33 and 150).

²⁾ with termination resistors that can be activated.

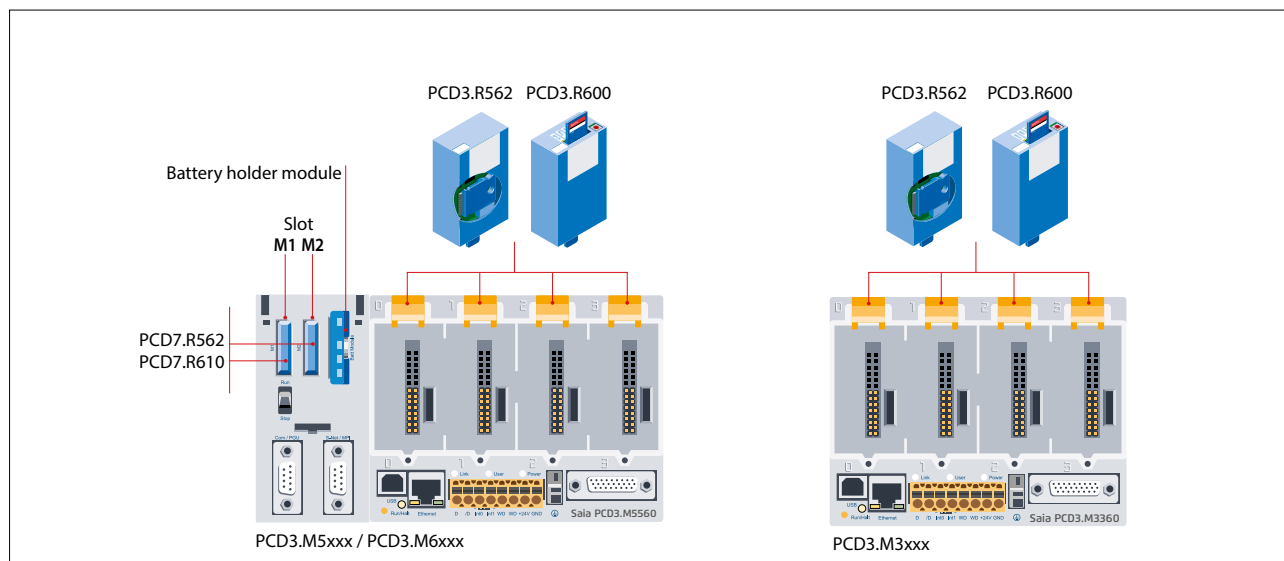
Memory modules of Saia PCD3.Mxxxx controllers

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.R562



PCD7.R610

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

Type	Description	Slot
PCD7.R562	Flash card with BACnet® 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 169).

Consumables and accessories for Saia PCD3 controllers

Labelling accessories



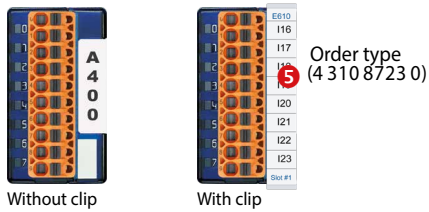
Addressing and labelling of I/O modules and module holders

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

The provided inscription labels **1** can either be used for additional labelling of the I/O modules. They are blank and, depending on requirements, may either be labelled by hand.

The circuit diagram **2** printed on the side of each I/O module makes wiring easier and also helps during commissioning.

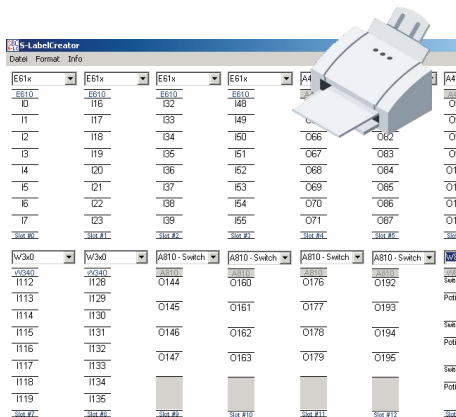
Sufficient space **3** is available on the other side of the cassette for the user to add customised labelling with the self-adhesive labels supplied.



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.



Consumables and accessories for Saia PCD3.Mxxx0 controllers



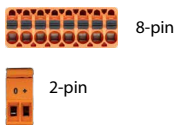
Saia PCD3 battery and battery holder module

Type	Description
PCD3.R010	Battery kit for PCD3.M3x60 Basic CPU (battery module for slot #3 incl. lithium battery CR2032)
463948980	Battery holder module (for PCD3.M5x60 and PCD3.M6xx0)
450748170	Lithium battery for PCD Base CPU



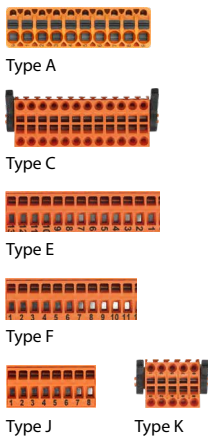
Saia PCD3 housing covers

Type	Description
410474930	Cover for PCD3.M5x60 and PCD3.M6xx0
PCD3.E009	Empty module housing for unused PCD3 I/O slots
410475150	Slot cover for unused PCD3 I/O slots



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

Type	Description
440549950	8-pin spring terminal block for power supply to PCD3.Mxxx0
440549520	Screw terminal 2-pin for supply PCD3.C200

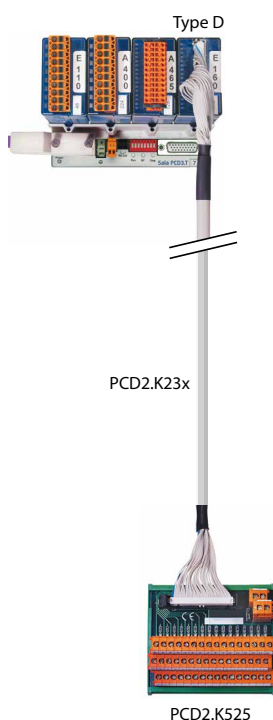


Saia PCD3 plug-in terminal blocks and labelling for I/O modules

Type	Description		
440549540	Plug-in I/O spring terminal block	10 - pin for wires up to 2.5 mm ²	type A
440549560	Plug-in I/O spring terminal block	24 - pin for wires up to 1.0 mm ²	type C
440549980	Plug-in I/O spring terminal block	14 - pin for wires up to 1.5 mm ²	type E
440549360	Plug-in I/O spring terminal block	12 - pin for PCD3.A810 for wires up to 1.5 mm ²	type F
440549340	Plug-in I/O spring terminal block	8 - pin for PCD3.W800 for wires up to 1.5 mm ²	type J
440550480	Plug-in I/O spring terminal block	10 - pin for wires up to 1.0 mm ²	type K
431087230	Set of 10 units: Transparent snap-on label holder including neutral inscription labels (2x DIN A4)		

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 mm ² , 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 mm ² , 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 mm ² , 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 mm ² , 2.0 m long, 34-pin ribbon connector at both ends type D
System cables for 2 relay interfaces PCD2.K551/K552	
PCD2.K241	Sheathed, half-round cable with 34 strands, each 0.09 mm ² , 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 mm ² , 2.0 m long, PCD side 34-pin ribbon connector type D, process side two 16-pin ribbon connectors



"Ribbon/screw terminal" adapters

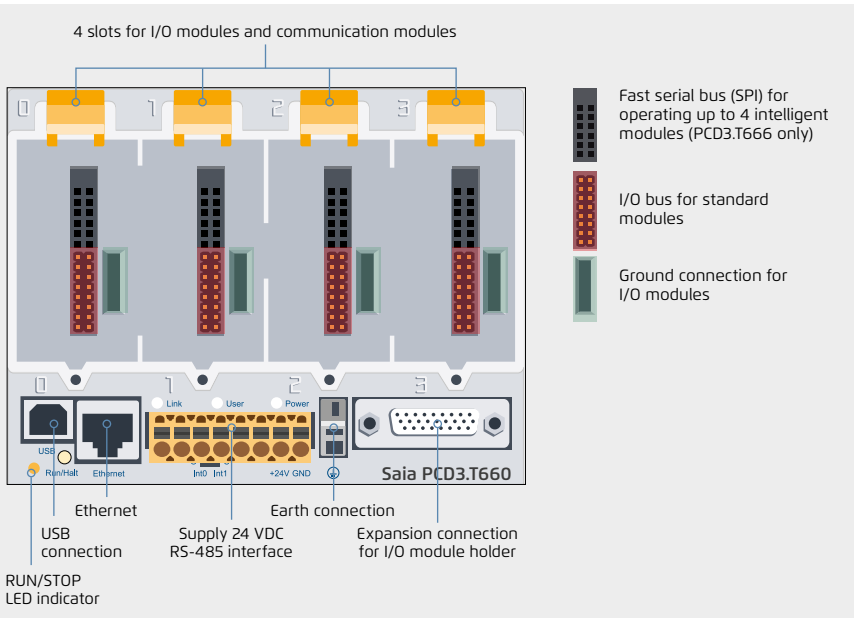
Type	Description
PCD2.K520	for 16 inputs/outputs, with 20 screw terminals without LED
PCD2.K521	for 16 inputs/outputs, with 20 screw terminals and LED (for source operation only)
PCD2.K525	for 16 inputs/outputs, with 3 x 16 screw terminals and LED (for source operation only)
PCD2.K551	Relay interface 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

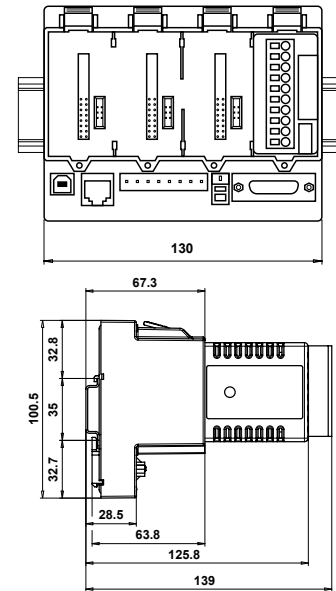
The Smart RIOs are more than just another Ethernet remote I/O system. They can be programmed like a PLC and are therefore the ideal solution for distributed automation in line with the lean philosophy. Smart RIOs can be equipped with PCD3 I/O modules and expanded with PCD3 I/O module holders up to 256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



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



Dimensions

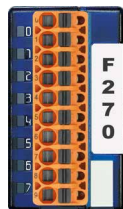


System properties

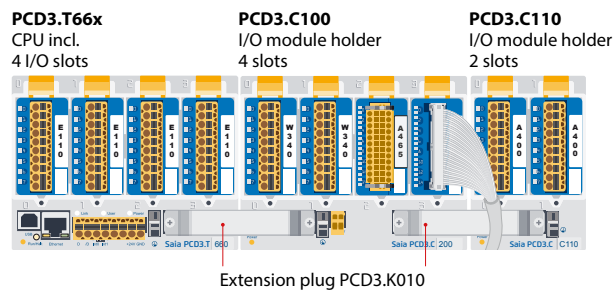
- ▶ Can be used as a simple remote I/O station or an intelligent programmable I/O station.
- ▶ Can be programmed with PG5. Important or time-critical tasks can be processed direct in the RIO.
- ▶ The RIO user programs are managed centrally in the Smart RIO Manager (PCD) and distributed to the RIOs automatically.
- ▶ 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 25.



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



Order details

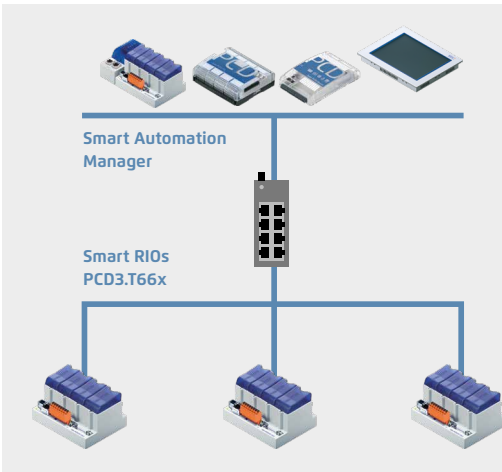
Smart RIO

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



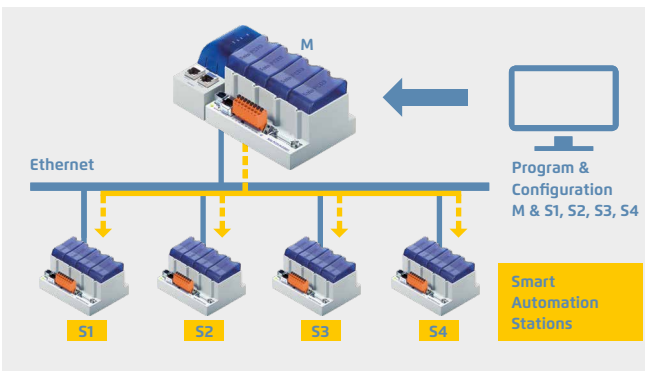
As Smart Automation Managers, PCD1.M21x0, PCD2.M5, PCD3.M3/5/6 CPUs and the programmable micro browser panel PCD7.D4xxxT5F can be used

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

The screenshot shows the 'SBC RIO Network Configurator - All' software interface. It displays a table for configuring data transfer between RIO stations. The table includes columns for RIO Name, IP Address, RIO Type, Description, Program, Enabled, RIO #, RIO ID, Diag ID, and Device File Path. Below the table, there are sections for 'Media Mapping' and 'Master M1' configuration.

Simple configuration of the data transfer in the RIO network configurator

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.

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

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-I/O		
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®	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 counter	PCD3.H1xx counter
		---	PCD3.F261 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. 32 RIO stations	PCD1.M212x, PCD3.M3160, PCD3.M3360
max. 64 RIO stations	PCD1.M2160, PCD2.M4160, PCD7.D410VT5F, PCD7.D412DT5F
max. 128 RIO stations	PCD2.M4560, PCD3.M5360, PCD3.M5560, PCD3.M6860

General data

Supply voltage	24 VDC $\pm 20\%$ smoothed or 19 VAC $\pm 15\%$ 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.