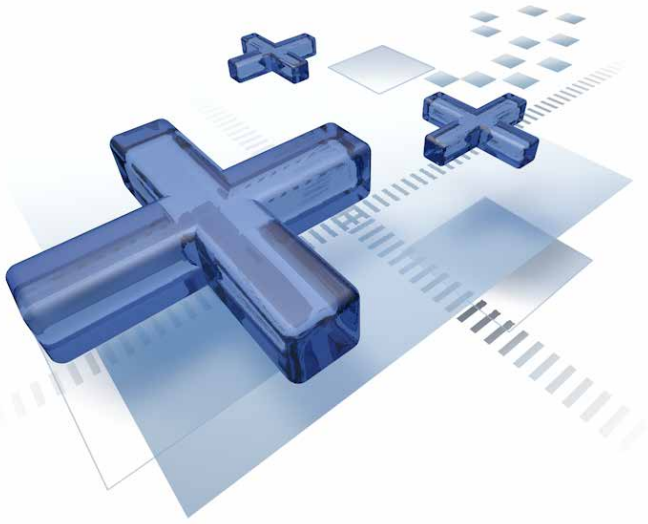
A5

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 5.12 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 CC single-phase 28 VAC/40 VDC
- Q.PS-AD1-2403 (3 A)
- Q.PS-AD1-2405 (5 A)

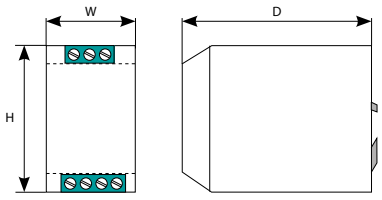
From left to right: Q.PS-ADB, Q.PS-AD2, Q.PS-AD1

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

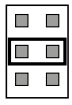
Input data	Q.PS-AD2-2402F	Q.PS-AD2-2405F	Q.PS-AD2-2410F
Input voltage	115…230 VAC		
Permitted voltage range:	90…264 VAC	90…135 / 180…264 VAC	
Inrush current (at V_n and I_n)	≤ 7 A ≤ 5 ms	≤ 11 A ≤ 5 ms	≤ 16 A ≤ 5 ms
Frequency range	47…63 Hz (± 6%)		
Input current (for operating voltage 110 / 230 VAC)	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		

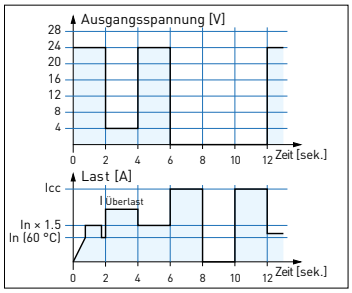
Overload protection

Mode | Jumper | Characteristics

Hiccup mode

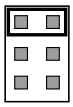
Automatic restart (default setting) Attempts to switch on the output voltage again every 2 seconds.

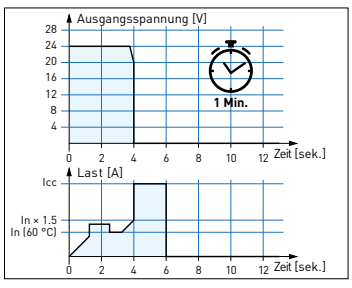




Manual reset mode

For a restart, it is necessary to switch off the input voltage for approx. 1 minute.

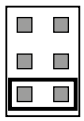


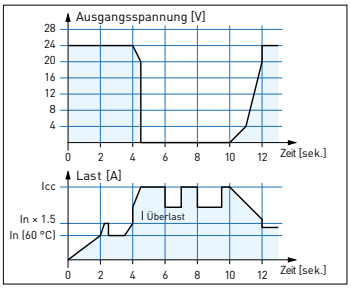


Mode | Jumper | Characteristics

Continuous out mode

The output current remains at a high value and the output voltage is almost 0 volts.



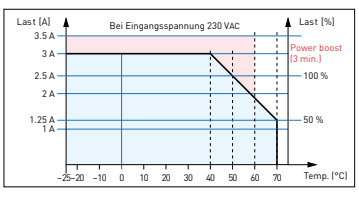


	Q.PS-AD3-2405F	Q.PS-ADB-2405-1 Battery type	Q.PS-AD1-2403	Q.PS-AD1-2405
	230 VAC / 400…500 VAC	115…230 VAC	28 VA / 40 VDC	
	187…264 VAC / 330…550 VAC	93…264 VAC	24…32 VAC / 33…45 VDC	
	≤ 17 A ≤ 5 ms	≤ 14 A ≤ 5 ms		
	47…63 Hz (±6%)			
	1.5 / 0.8 A	1.5 / 0.9 A		
	4 A		---	
	Fast-acting 10 A	Fast-acting 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			

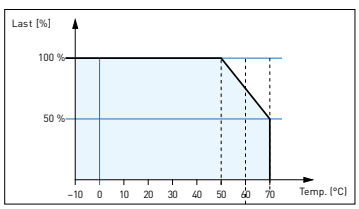
Battery output (battery type 3 … 50 Ah)	
Boost charge (25 °C) (at I_n)	28.8 VDC
Trickle charge (25 °C) (at I_n)	27.5 VDC
Output 2: Battery charging current max. I_{Batt}	5 A ±5%
Setting range of charging current	20…100% of I_n
Recovery charge after deep discharge	Yes
Configuration jumper: Battery type	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

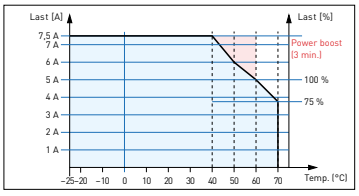
Output derating curve
Q.PS-AD2-2402F



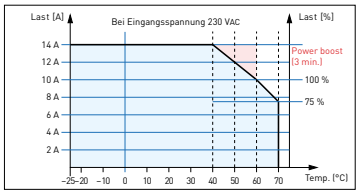
Output derating curve
Q.PS-ADB-2405-1



Output derating curve
Q.PS-AD2-2405F
Q.PS-AD3-2405F

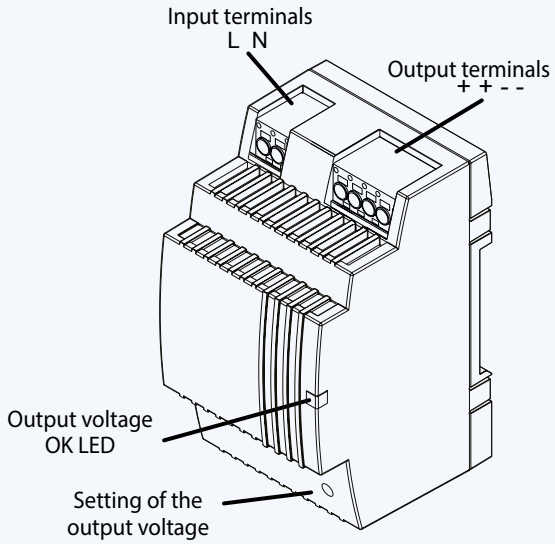


Output derating curve
Q.PS-AD2-2410F



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

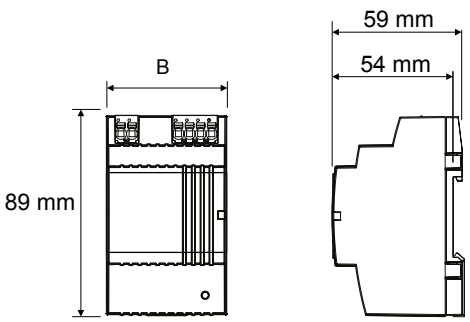
Electrical safety

- 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

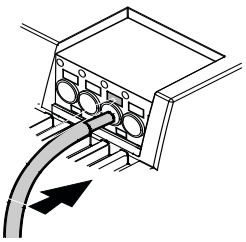
- Short-circuit protection and constant overload limiter
- Protection class II (in closed switch cabinet) -> dual isolation
- Power failure bypass up to 100 ms
- LED for output voltage OK display
- Stabilised and adjustable output voltage for the conductor resistance compensation
- Parallel operation 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

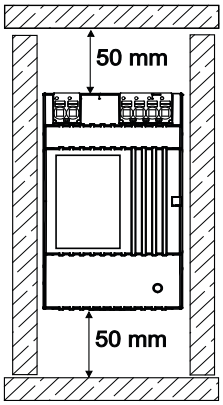
Terminal technology

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

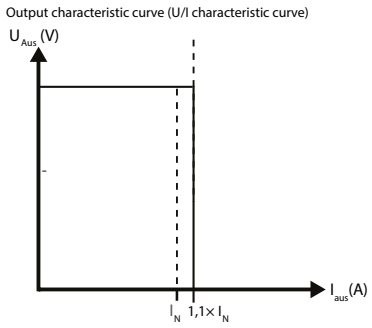


Technical data

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

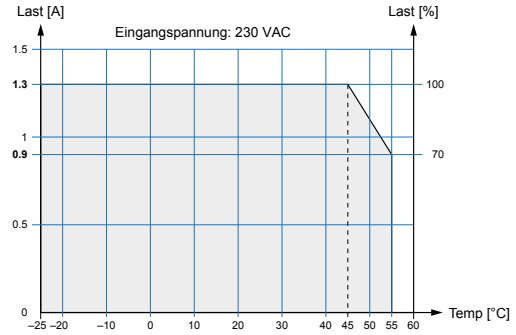
Voltage/current characteristic curve for short-circuit and overload protection



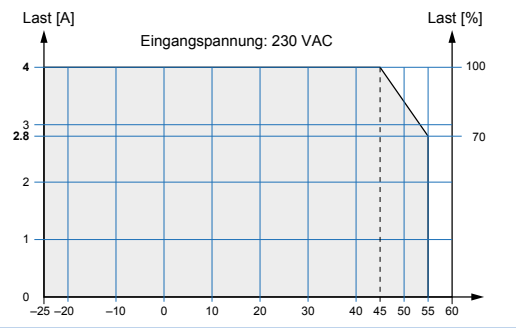
The current overload protection limits the current to a constant value of 1.1 × nominal current

Output derating curve

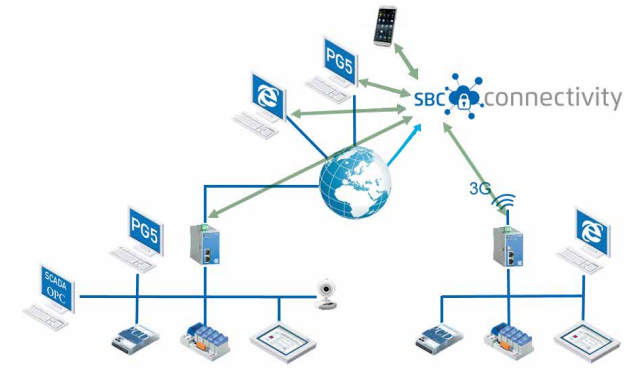
Q.PS-PEL-2401



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 and SMA connector

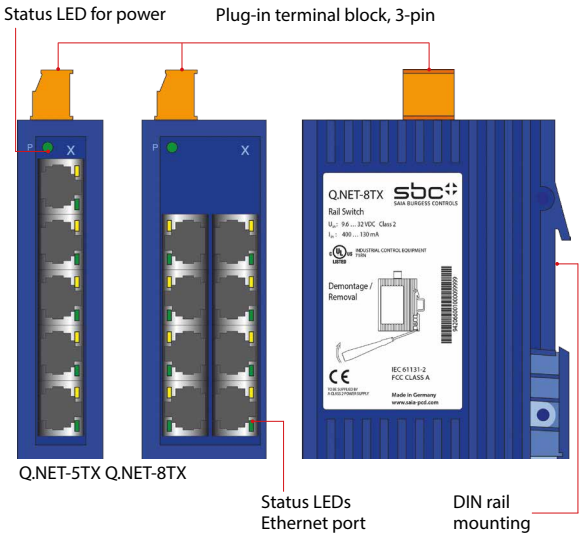
*In preparation, see Chapter C1 "Status: Product launch and availability"

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

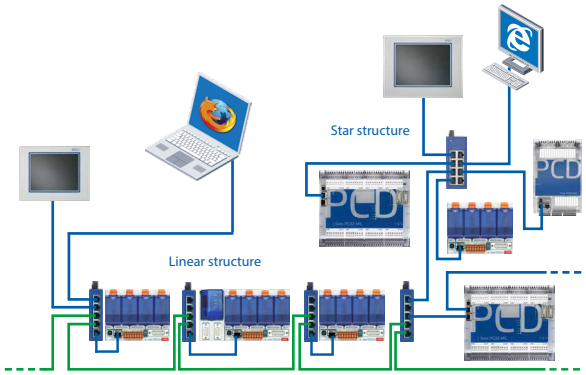
- DIN rail mounting and 24 VDC supply for flawless operation in infrastructure automation and in harsh industrial environments
- Fast network diagnosis, due to integral LEDs at TCP ports
- Entry level industrial Ethernet rail switch, with store-and-forward switching mode
- Allows construction of Ethernet 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



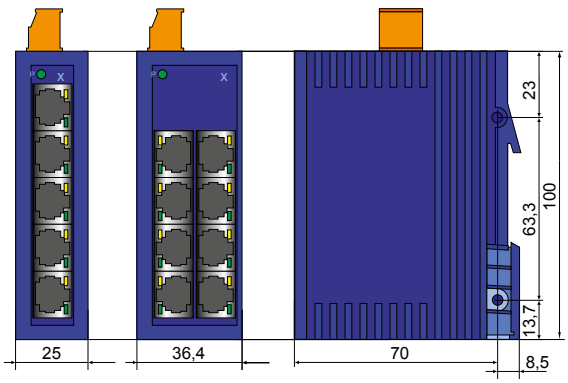
Technical data Q.NET-5TX and Q.NET-8TX

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

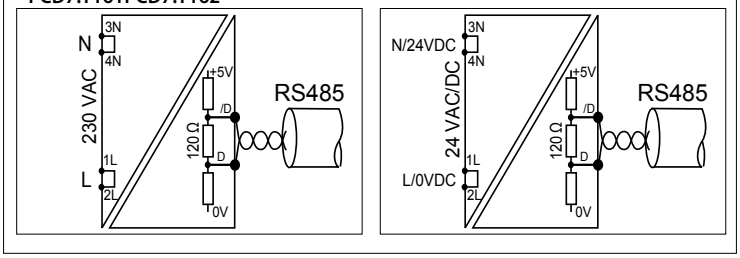
The PCD7.T16x termination boxes are used for RS-485 network termination. Each RS-485 network segment must be terminated at the end of the network. The PCD7.T16x termination boxes ensure that the RS-485 signals are set at the correct signal level and the integrated 120 Ohm resistor prevents signal reflection 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

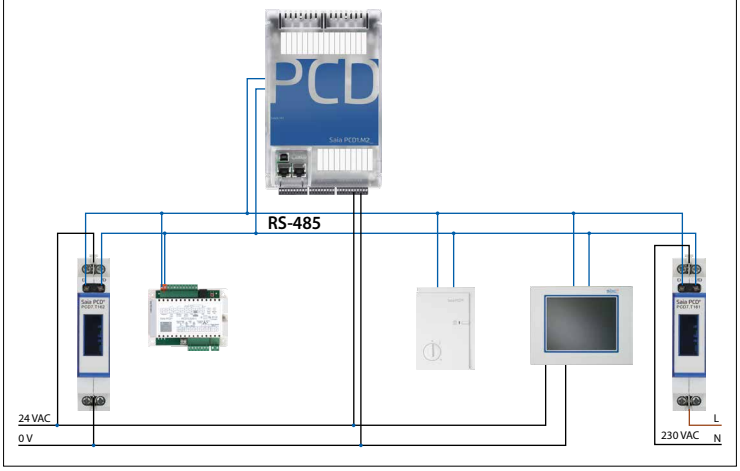
- 35 mm DIN rail mounting
- 17.5 mm wide housing
- 230 VAC +15% /–20% for PDC7.T161
- 24 VAC / DC –15% /+15% for PDC7.T162
- Current consumption of 0.4 W
- Electrically isolated power supply
- Fixed-line terminator resistance of 120 Ω
- LED operating indicator

Connection diagram

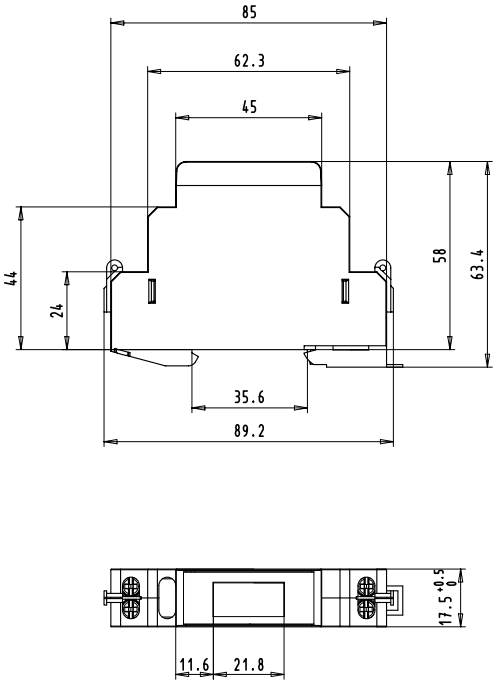
PCD7.T161PCD7.T162



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 4.4.6 (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

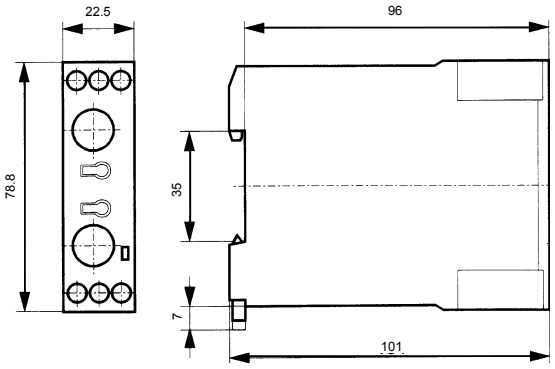
Input ranges [1] KFD11	0…10 VDC, input impedance 200 kΩ or 0…20 mA, load 47 Ω [2]
KFD12	0…75 VDC, input current 0…20 mA or 0…60 mV, input current 0… 60 µA [3]
Output ranges [1]	0…10 VDC, load (≥3 kΩ); 0…20 mA, load (≤500 Ω)
Input/output	electrically isolated with optical isolating amplifier
Conversion 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

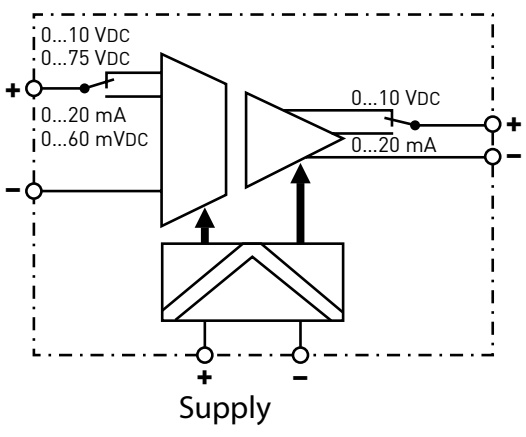
Ordering information for isolating amplifiers DC/DC KFD11 and KFD12

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

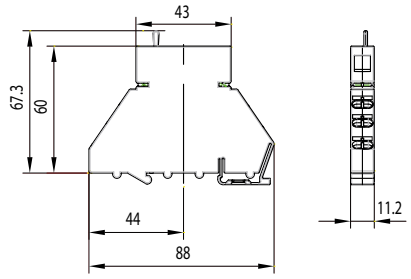


5.7 Interface modules with local override

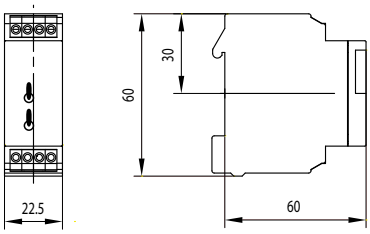
to control drives, valves or flap systems

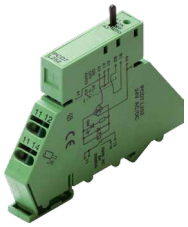
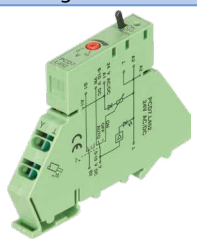
Dimensions

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 S-Bus RIO modules

The RAIL module is easy to install and uninstall. The bridge quickly and easily plugs the connect bus and supply voltage between the modules. Their compact construction allows small units to be built up on site to create an optimum system. Thus these devices save much work and space while being more useful and efficient. These small field bus modules are very well suited for being built into switch cabinets, sub-distributors and surface-mounted housings.

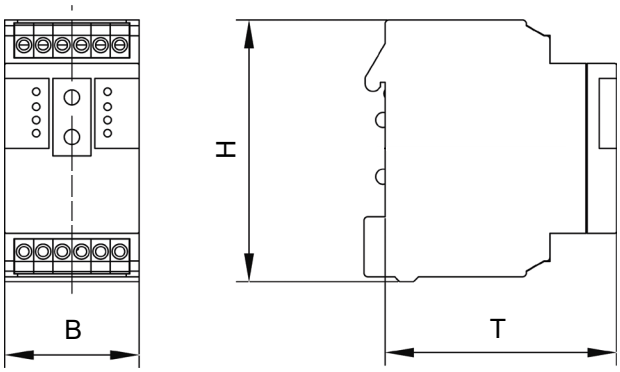
RAIL module

SAFE module

System properties

- S-Bus connection via simple two-wire bus line
- Autom. recognition of operating mode/baud rate Bit rates: 1,200, 2,400, 4,800, 9,600, 19,200, 38,400 bps
- RAIL modules: Switch cabinet design for mounting on 35 mm DIN rail
- SAFE modules: Protected model for surface mounting with protection class IP 65
- Manual operating level with status feedback via the bus
- Status indication using an LED
- Simple setting of the S-Bus address using a rotary switch

Dimensions:



Serial S-Net RAIL (DIN rail mounting)

Type	Description	W × H × D [mm]
PCD7.L100	Input module with 4 digital inputs 24 VDC/VAC, with local override	35 × 68 × 60
PCD7.L110	Input module with 4 digital inputs 24 VDC/VAC, without local override	35 × 68 × 60
PCD7.L120	Input/output module with 2 relays 250 VAC and 4 digital inputs 24 VDC/VAC, with local override and integrated functionality for lighting and shade	50 × 68 × 60
PCD7.L130	Input module with 10 digital inputs 24 VDC/VAC	35 × 68 × 60
PCD7.L200	Output module with 4 relays 250 VAC, 6 A, with local override	35 × 68 × 60
PCD7.L210	Output module with 4 Triacs 24…250 VAC, 0.8 A, with local override	35 × 68 × 60
PCD7.L320	Analog input module with 8 universally individually via software configurable inputs for 0... 10 VDC or various passive and active temperature sensors such as E.g. Pt1000, Ni1000, NTC10K, and 10 additional temperature sensor characteristics. In addition, other types of sensors can be connected using an interpolation table	35 × 68 × 60
PCD7.L410	Analogue output module with 4 outputs 0…10 VDC, with local override	35 × 68 × 60

Serial S-Net RAIL (DIN rail mounting)

Serial S-Net SAFE (surface mounted)

Type	Description	W × H × D [mm]
PCD7.L121	Input/output module with 2 relays 250 VAC and 4 digital inputs 24 VDC/VAC. Range of uses: Light and shade applications.	159 × 41.5 × 120

Serial S-Net SAFE (surface mounted)

Power supply 230 VAC/24 VDC

Type	Description	W × H × D [mm]
PCD7.L500	For supply of all RAIL and SAFE modules, 240 VAC | 24 VDC/700 mA, max. 15 modules	50 × 68 × 60

Power supply 230 VAC/24 VDC

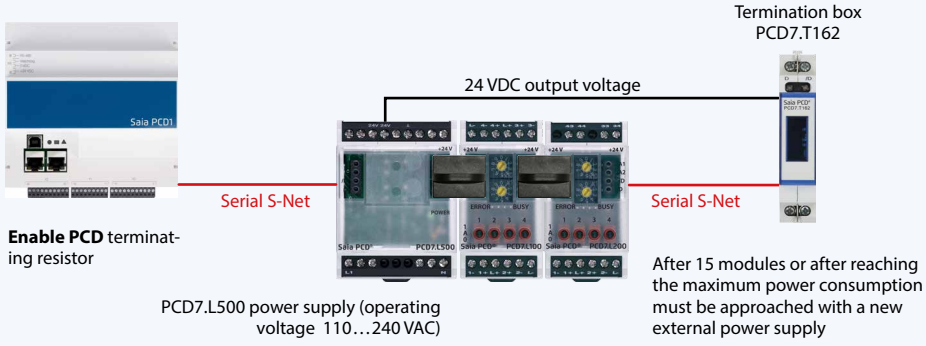
Bus termination

Type	Description	W × H × D [mm]
PCD7.T161	Termination box RS-485 (line terminating resistor), electrically isolated, 230 VAC	17.5 × 89.2 × 63.4
PCD7.T162	Termination box RS-485 (line terminating resistor), electrically isolated, 24 VAC/DC	17.5 × 89.2 × 63.4

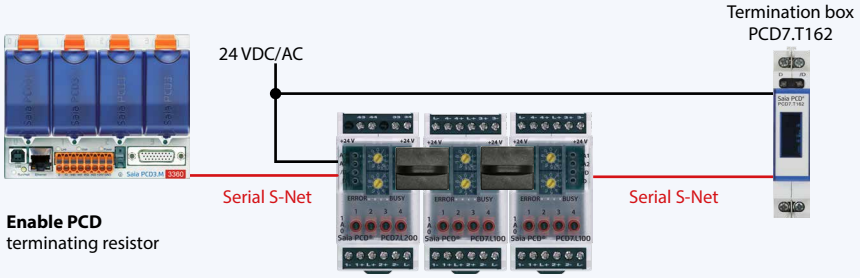
Bus termination

Example system design

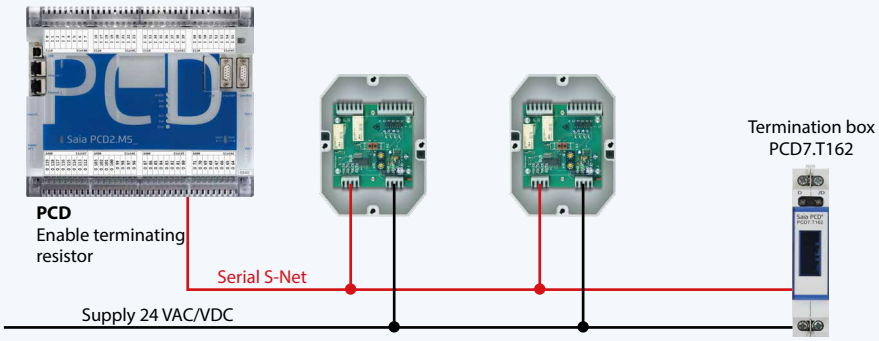
RAIL modules with Serial S-Net connection, power pack PCD7.L500 and termination box PCD7.T162



RAIL modules with Serial S-Net connection, separate module supply and termination box PCD7.T162



SAFE modules with Serial S-Net connection and separate module supply and termination box PCD7.T162



The RAIL modules can also be mounted in series in an IP 66 housing for decentralised field assembly. Further information can be obtained from the manufacturer Spelsberg, for example.

Use of slaves in the serial S-Net

Slaves can be decentralised input/output modules (RIO = Remote Inputs and Outputs), external devices (e.g. electronic power meters) or PCD stations. Bear in mind here the electrical load of the Serial S-Net. RAIL and SAFE remote input/output modules have high impedance and load the Serial S-Net only slightly. Up to 100 slaves can therefore be used in one segment.

If the bus cycle time is critical, fewer than 30 slaves should be operated in one segment.

Limitation owing to the electrical load on the Serial S-Net:
Total PCD systems (incl. master PCD) and RIOs on one serial S-Net branch

Number PCD	Number RIO	Number PCD	Number RIO	Number PCD	Number RIO	Number PCD	Number RIO
0…7	100	14	72	21	44	28	16
8	96	15	68	22	40	29	12
9	92	16	64	23	36	30	8
10	88	17	60	24	32	31	4
11	84	18	56	25	28	32	0
12	80	19	52	26	24		
13	76	20	48	27	20		

5.9 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...

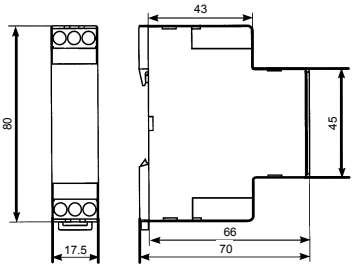

KOP170J...


KOP219K...

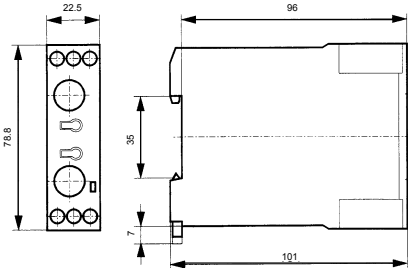

KOP560K...

Dimensions

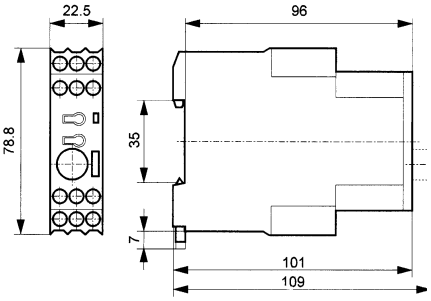
KOL251 and KOL260



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	---	---	---	---	---	•

5.10 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

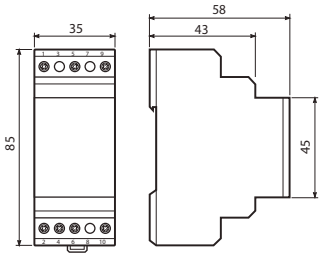
- Motor monitoring by PTC
- PTC short-circuit monitoring
- PTC cable-break monitoring with memory function (KFT200)
- 230 VAC
- 1 relay (NO contact, KFT100)
- 2 relays (changeover contact, KFT200)

KFE102 KFE300 KFE302

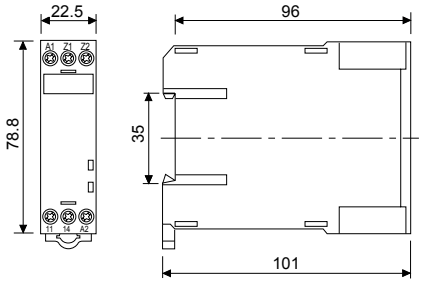
KFT100 KFT200

Dimensions

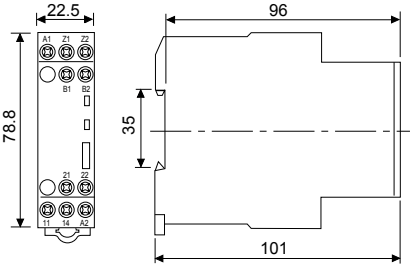
KFE



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	•	•	•	•		•	•

5.11 I/O module integration into switch cabinet

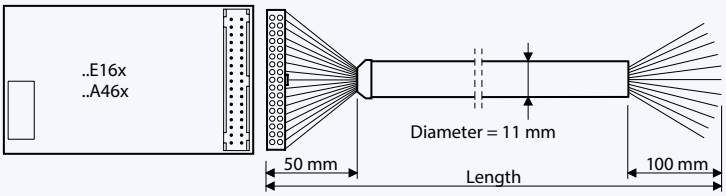
Pre-assembled system cables and terminal adapter modules support the fast integration of the integration of the Saia PCD® I/O modules into the switch cabinet. I/O modules with ribbon connections, in particular, can be installed quickly and easily in the switch cabinet. The modules with terminals can 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

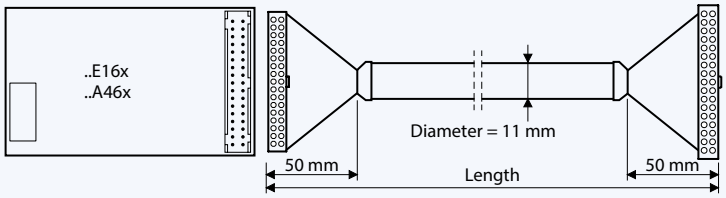
Sheathed, round cable with 32 strands of 0.25 mm² (AWG 24), 34-pin ribbon connector at the PCD end

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

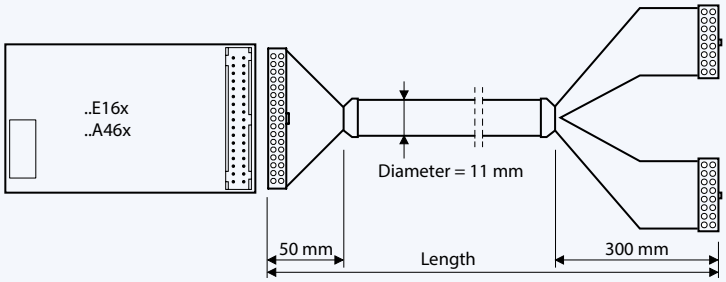
Terminal adapter for digital inputs/outputs



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



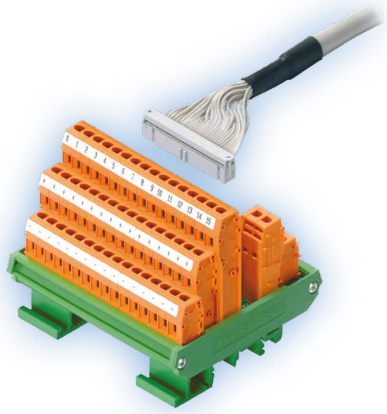
PCD2.K241/K242 cable

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

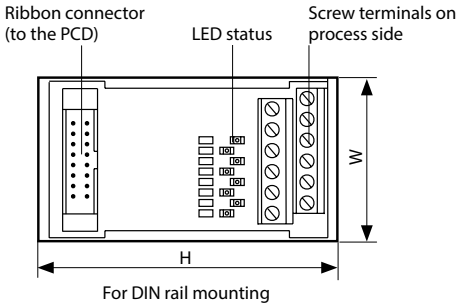
Cable length PCD2.K241 = 1.0 m
PCD2.K242 = 2.0 m

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.

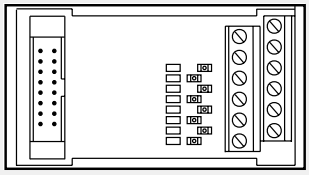


Terminator adapter for I/O modules with ribbon connection

Mechanical design



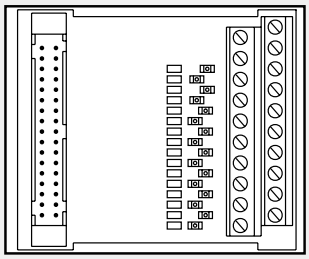
Terminal adapter for 8 inputs/outputs



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.
K511with LEDs
(source operation)

Dimensions: 42 × 82 × 60 mm (W × H × D)

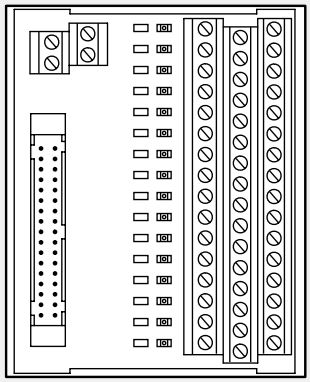
Terminal adapter for 16 inputs/outputs



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)

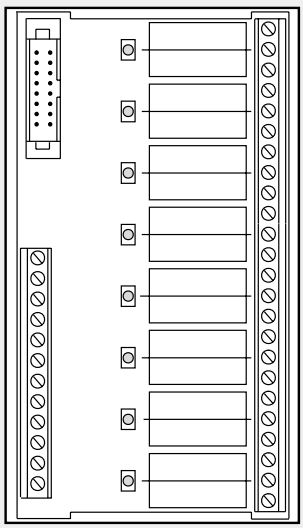
Terminal adapter for 16 inputs/outputs



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

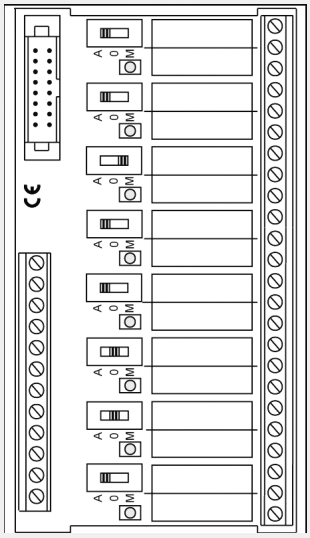


Relay interface PCD2.K551
for 8 PCD transistor outputs
with 24 screw terminals and
LED
Switching capacity of the
changeover contacts 10 A/250
VAC or 10 A/24 VDC (ohmic), 24
VDC spool
16-pin ribbon connector or
screw terminals at the PCD end
24 screw terminals 0.5…1.5
mm² at the process end

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 out-
put 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

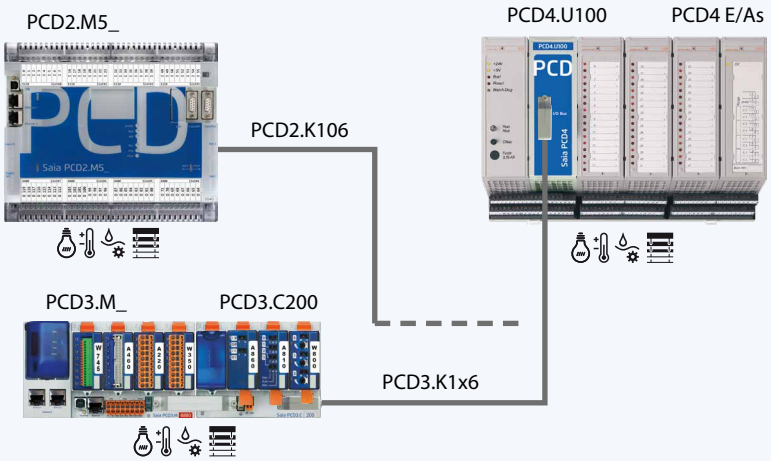
Mechanical data
Diameter of the screw terminals:
M 2.6 mm Starting torque:
0.4 Nm

Dimensions: 128 × 82 × 44 mm (W × H × D)

5.12 Upgrade kit PCD4.U100

The Saia PCD4.U100 module makes it possible to connect existing Saia PCD4 I/O modules to the latest Saia PCD3 and PCD2.M5 systems. By upgrading to the latest Saia PCD® system, you can increase the availability and reliability of the system. It is also possible to enhance systems with Automation Server functions and thus prepare them for the future. Installation is easy: Replace Saia PCD4 CPU with PCD4.U100, install Saia PCD3 or PCD2 CPU, connect new or existing PCD4 I/Os and you're ready to go.
Regardless of whether IL or FUPLA programming is used, the user programs can be directly transferred to new CPUs with small program adjustments in PG5, i.e., with minimum programming effort.

System overview



System properties

- Supports Saia PCD3.Mxxx0 and Saia PCD2.M5xx0
- Program can be easily transferred
- Existing I/Os can still be used

Features

- **Increase system availability with a minimum of effort:** Replace old PCD4 CPUs that are no longer available with the latest Saia PCD® CPUs. The reliability and availability of an existing system or controller can be increased in a time-saving manner and cost-efficiently by using a new CPU.
- **Benefits of the automation server functions:** New Web/IT functions can also be made available in existing systems with PCD4 systems. Existing program structures can be copied across with small program adjustments and can still be used.
  Expand PCD4 systems with new PCD2/3 I/O modules. Up to 8 additional PCD2/3 I/O modules can be integrated into existing systems by replacing the CPUs.
- **Retaining the wiring:** The system can be upgraded without costly rewiring of the I/Os.
- **Short upgrade period:** The CPU is replaced quickly and the system is available again in a very short period of time.
  This way the wiring effort can be delayed to a later point in time.

Technical overview

Supported PCD types	PCD3.Mxxx0 All PCDs with I/O bus connection PCD2.M5xx0 (no extension PCD2.C1000/C2000)
Supported PCD4 I/O modules	All PCD4 I/O modules except PCD4.Hx are supported
Number of PCD4 I/O modules	See technical documentation of the PCD4 systems
Max. number of PCD2/3 I/O modules	8 (only PCD3.C200 module carriers can be used in combination with the PCD3.M system)

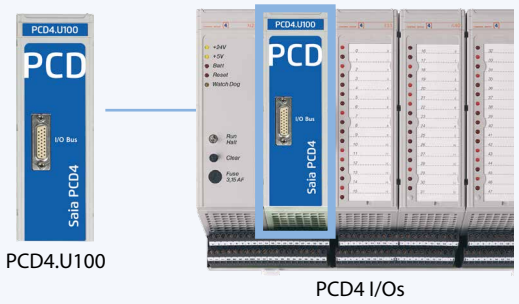
Order details

Type	Description
PCD4.U100	PCD4 upgrade kit basic module (without I/O bus cable)
PCD3.K106	I/O bus extension cable for Saia PCD3
PCD2.K106	I/O bus extension cable for Saia PCD2

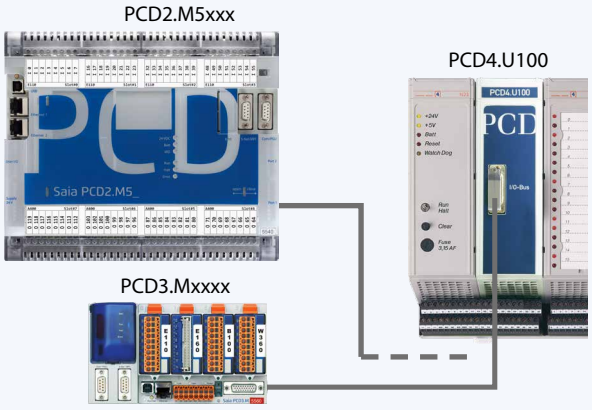
Saia PCD4.U100 upgrade kit

Once it has been clarified whether all I/O modules are suitable for upgrading, installation is really easy: Replace Saia PCD4 CPU with PCD4.U100, install Saia PCD3 or PCD2 CPU, connect existing PCD4 I/Os.

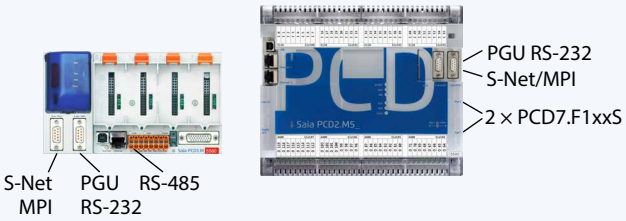
1. Insert PCD4.U100 module
The existing PCD4 CPU is completely removed. To continue to ensure I/O bus supply, the PCD4 supply module is still used. The new PCD4.U100 module is used instead of the PCD4 CPU. The existing power supply module PCD4.N2x0 must have at least the hardware version "B".



2. Connect PCD2.M5_ or PCD3.M_
The new PCD CPU is connected to the PCD4.U100 module with the I/O bus cable. For PCD2.M5xxx: PCD2.K106. For PCD3.Mxxxx: PCD3.K116 or PCD3.K106.



3. Serial interfaces
None of the PCD4 serial interfaces are supported. They must all be replaced with new PCD2/3 interfaces. Maximum of 3 integrated serial interfaces on the PCD3. Maximum of 4 integrated serial interfaces on the PCD2. Additional expansion option with PCD3.F1xx or PCD3.F2xx/PCD2.F2xxx*.



4. Programming with PG5
Transfer user program to PG5, adjust programs, download and you're done. Detailed descriptions of the individual steps are listed in the PCD4.U100 manual.

* Additional serial interfaces can be implemented via SPI I/O slots. However, the I/O address range will shift as a result. See the manual 26-888 for further details.