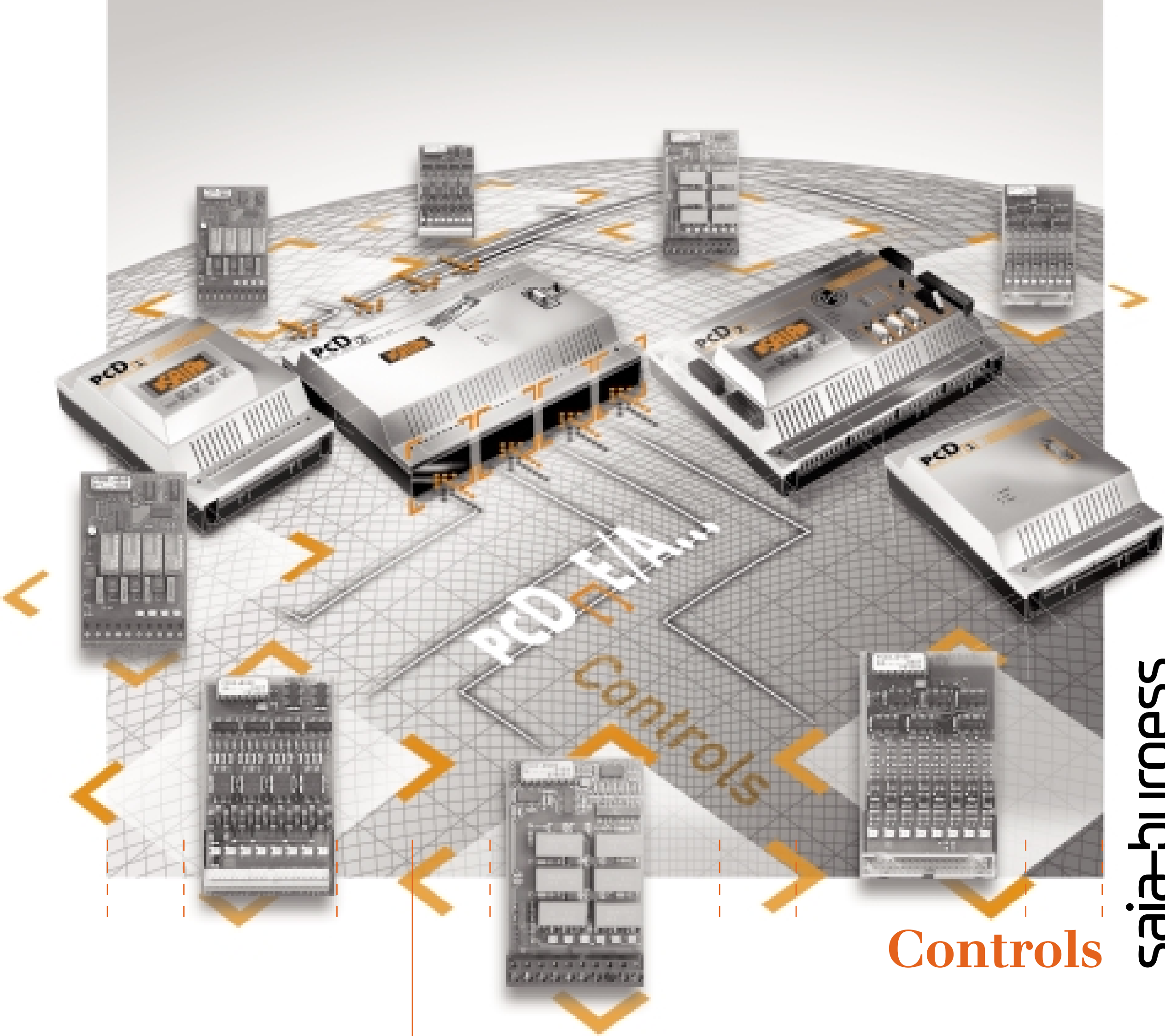


Controls

saia-burgess

Smart solutions for comfort and safety

The digital input/output modules

The economic interfaces to the process

The wide range of digital I/O modules offers optimum adaptability

- **Economic:** The modular structure means that it is only necessary to include (and pay for) those functions that are actually required for a specific application.
- **Flexible:** All modules of the I/O level can be plugged onto any preferred point on the bus and are easy to exchange.
- **Functional security:** Guaranteed by their robust design and excellent reliability (average field failure rate FFR >10^6 hours).
- **Time saved in electrical wiring:** Due to plug-in screw terminals, spring terminals or ready-made cable variants and ribbon terminal adapters.

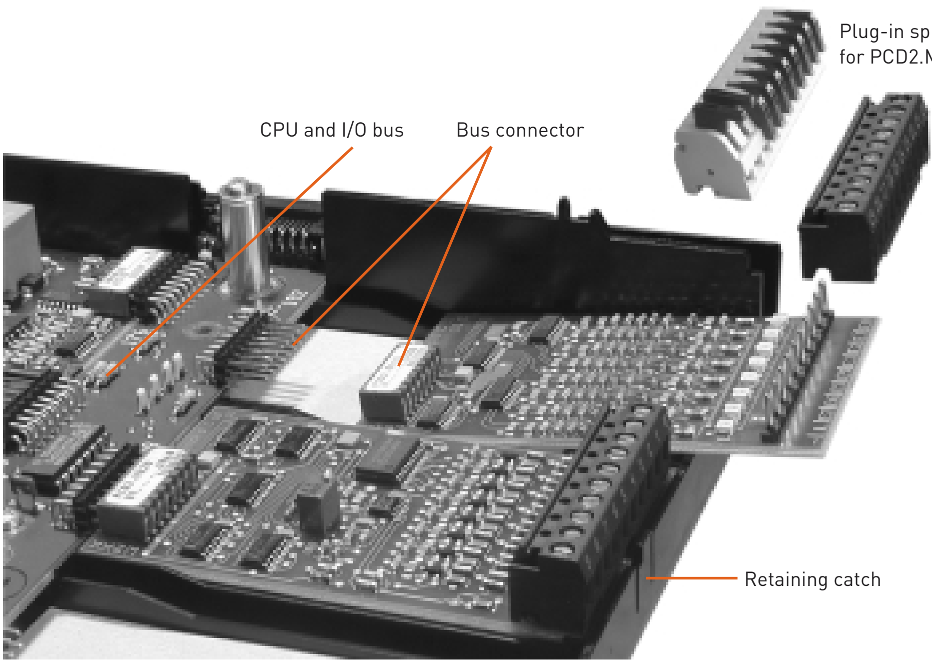
Edition 26/358 E3

Overview of digital input/output modules

Type	Total I/Os		Input voltage	Breaking capacity DC	AC	Input filter	Electrical isolation	Current draw [1]
PCD2.E110	8 I		15…30 VDC [2]			8 ms	no	typ. 12 mA
PCD2.E111	8 I		15…30 VDC [2]			0.2 ms	no	typ. 12 mA
PCD2.E160/..5	16 I		15…30 VDC			8 ms	no	typ. 50 mA
PCD2.E161/..6	16 I		15…30 VDC			0.2 ms	no	typ. 50 mA
PCD2.E610	8 I		15…30 VDC [3]			10 ms	yes	typ. 12 mA
PCD2.E611	8 I		15…30 VDC [3]			1 ms	yes	typ. 12 mA
PCD2.E500	6 I		115…230 VAC			20 ms	yes	typ. 1 mA
PCD2.B100	2 I + 2 O + 4 I/O	I:	15…32 VDC			8 ms	no	typ. 15 mA
		O:		0.5 A/5…32 VDC			no	
PCD2.A400	8 O, transistor			0.5 A/5…32 VDC			no	typ. 15 mA
PCD2.A410	8 O, transistor			0.5 A/5…32 VDC			yes	typ. 15 mA
PCD2.A460/..5	16 O, transistor			0.5 A/10…32 VDC			no [4]	typ. 50 mA
PCD2.A300	6 O, transistor			2 A/10…32 VDC			no	typ. 12 mA
PCD2.A200	4 O, relay (make)			2 A/50 VDC	2 A/250 VAC		yes [5]	typ. 10 mA
PCD2.A210	4 O, relay (break)			2 A/50 VDC	2 A/250 VAC		yes [5]	typ. 10 mA
PCD2.A220	6 O, relay (make)			2 A/50 VDC	2 A/250 VAC		yes	typ. 12 mA
PCD2.A250	8 O, relay (make)			2 A/50 VDC	2 A/48 VAC		yes	typ. 15 mA

[1] Current draw from internal 5 V bus (depending on number of active input or output channels), loading capacity max. 750 mA for PCD1 and max. 1600 mA for PCD2
[2] Special: 5 VDC, 12 VDC [3] Special: 5 VDC, 48 VDC [4] with short-circuit protection [5] with contact protection

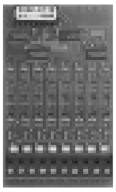
Mechanical refinement of I/O level concept



Insertion of the I/O modules is simple and elegant: Push the module into the side opening until it reaches the end stop, then lock the retaining catch in place – the module is fixed rigidly in position.

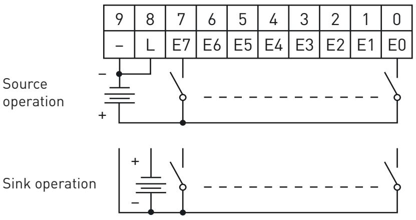
Digital input modules

Input modules with 8 inputs, 24 VDC



Number of inputs	8, electrically connected
Input voltage	24 VDC (special: 5 VDC, 12 VDC)
Input signal	low –30…+5 V high 15…30 V
Input current	6 mA per input at 24 VDC
Current draw internally from 5 V bus	typ. 12 mA (max. 24 mA)

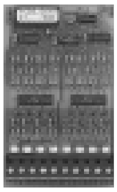
Connection diagram



Source operation: switch open = signal state low, LED off
Sink operation: switch open = signal state high, LED on

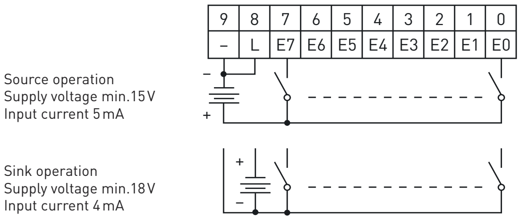
PCD2.E110	Input delay	typ. 8 ms (pulsed voltage possible)
PCD2.E111	Input delay	typ. 0.2 ms (smoothed voltage required)

Input modules with 8 inputs, 24 VDC, electrically isolated



Number of inputs	8, electrically isolated
Input voltage	24 VDC (special: 5 VDC, 48 VDC)
Input signal	low –30…+5 V high 15…30 V
Input current	5 mA or 4 mA per input at 24 VDC
Current draw internally from 5 V bus	typ. 12 mA (max. 24 mA)

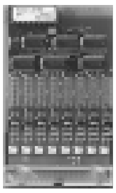
Connection diagram



Source operation: switch open = signal state low, LED off
Sink operation: switch open = signal state high, LED on

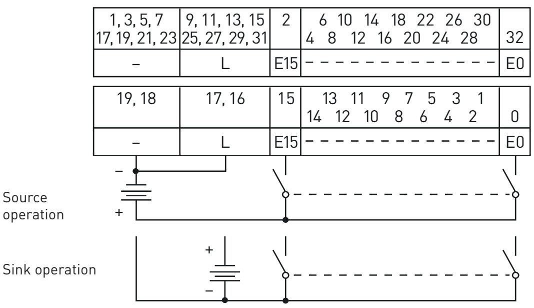
PCD2.E610	Input delay	typ. 10 ms (pulsed voltage possible)
PCD2.E611	Input delay	typ. 1 ms (smoothed voltage required)

Input modules with 16 inputs, 24 VDC



Number of inputs	16, electrically connected
Input voltage	24 VDC
Input signal	low –30…+5 V high 15…30 V
Input current	4 mA per input at 24 VDC
Current draw internally from 5 V bus	typ. 50 mA (max. 72 mA)

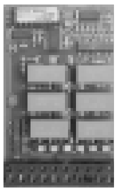
Connection diagram (ribbon cable/spring terminal block)



Source operation: switch open = signal state low, LED off
Sink operation: switch open = signal state high, LED on

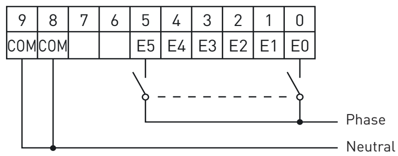
	Connection via 34-pole ribbon cable:	
PCD2.E160	Input delay	typ. 8 ms (pulsed voltage possible)
PCD2.E161	Input delay	typ. 0.2 ms (smoothed voltage required)
	Connection via 20-pole spring terminal block:	
PCD2.E165	Input delay	typ. 8 ms (pulsed voltage possible)
PCD2.E166	Input delay	typ. 0.2 ms (smoothed voltage required)

Input module with 6 inputs, 115…230 VAC, electrically isolated



Number of inputs	6, electrically isolated, source operation
Input voltage	80…250 VAC sine
Input signal	low 0…40 VAC high 80…250 VAC
Input current (wattless current)	6 mA at 115 VAC 12 mA at 230 VAC
Input delay	typ. 20 ms
Current draw internally from 5 V bus	max. 1 mA

Connection diagram (source operation)

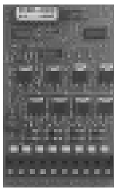


Switch open = signal state low, LED off

PCD2.E500 Input module with 6 inputs 115…230 VAC

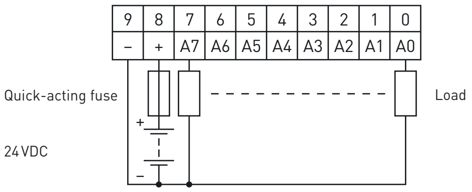
Transistor output modules

Transistor output module with 8 outputs, 0.5 A/24 VDC



Number of outputs	8, electrically connected
Output current I_a	5…500 mA
Overall power	4 A at continuous duty (per module)
Voltage range U_a	5…32 VDC smoothed 10…25 VDC pulsed
Voltage drop	max. 0.5 V at 0.5 A
Output delay	typ. 10 µs (on) typ. 50 µs (off)
Current draw internally from 5 V bus	typ. 15 mA (max. 25 mA)

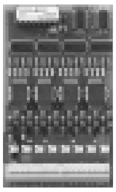
Connection diagram (source operation)



Output transmitting (set) = LED on

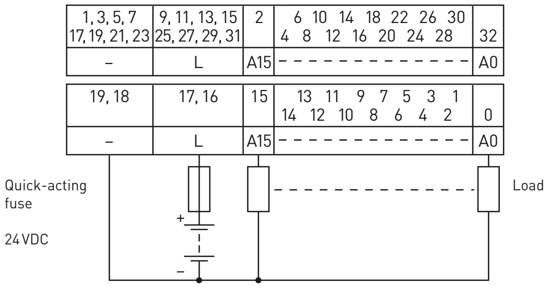
PCD2.A400 Transistor output module with 8 outputs, 24 VDC/0.5 A, electrically isolated

Transistor output modules with 16 outputs, 0.5 A/24 VDC



Number of outputs	16, electrically connected
Output current I_a	5…500 mA
Short-circuit protection	yes
Overall power	8 A at continuous duty (per module)
Voltage range U_a	10…32 VDC smoothed
Voltage drop	max. 0.3 V at 0.5 A
Output delay	typ. 50 µs, max. 100 µs
Current draw internally from 5 V bus	typ. 50 mA (max. 72 mA)

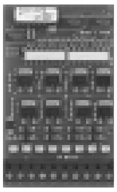
Connection diagram with ribbon connector and spring terminal block (source operation)



Output state indicated by trichromatic LED

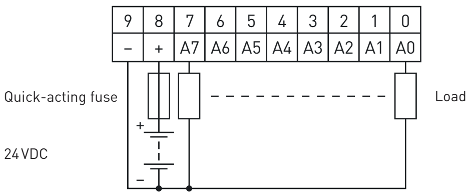
PCD2.A460 Connection via 34-pole ribbon connector
PCD2.A465 Connection via 20-pole spring terminal block

Transistor output module with 8 outputs, 0.5 A/24 VDC, electrically isolated



Number of outputs	8, electrically isolated
Output current I_a	5…500 mA
Overall power	4 A at continuous duty (per module)
Voltage range U_a	5…32 VDC smoothed 10…25 VDC pulsed
Voltage drop	max. 0.4 V at 0.5 A
Output delay	max. 10 µs (on) max. 500 µs (off)
Current draw internally from 5 V bus	typ. 15 mA (max. 24 mA)

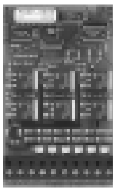
Connection diagram (source operation)



Output transmitting (set) = LED on

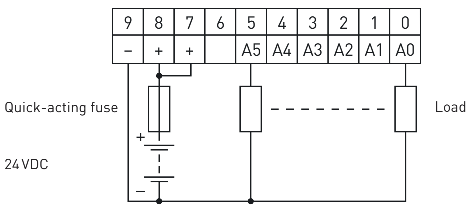
PCD2.A410 Transistor output module with 8 outputs, 24 VDC/0.5 A, electrically isolated

Transistor output module with 6 outputs, 2 A/24 VDC



Number of outputs	6, electrically connected
Output current I_a	5 mA…2 A
Overall power	12 A at continuous duty (per module)
Voltage range U_a	10…32 VDC smoothed 10…25 VDC pulsed
Voltage drop	max. 0.2 V at 2 A
Output delay	max. 1 µs (on) max. 200 µs (off)
Current draw internally from 5 V bus	typ. 12 mA (max. 20 mA)

Connection diagram (source operation)

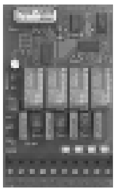


Output transmitting (set) = LED on

PCD2.A300 Transistor output module with 6 outputs, 24 VDC/2 A

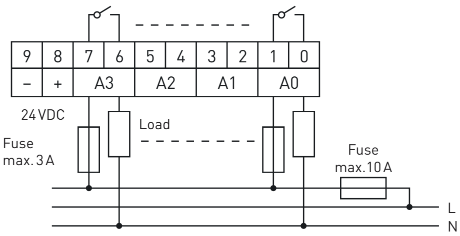
Relay output modules

Relay output module with 4 "make" contacts, 2 A/250 VAC or 2 A/50 VDC



Number of outputs	4, electrically isolated "make" contacts, protected
Rupturing capacity	2 A, 250 VAC AC1 1 A, 250 VAC AC11 2 A, 50 VDC DC1 1 A, 24 VDC DC11
Contact protection	VDR and RC
Supply voltage	24 VDC, smoothed or pulsed
Output delay	typ. 5 ms at 24 VDC
Current draw	
internally from 5 V bus	typ. 10 mA (max. 15 mA)
externally	8 mA per relay

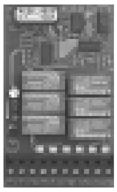
Connection diagram



Relay excited (contact closed) = LED on

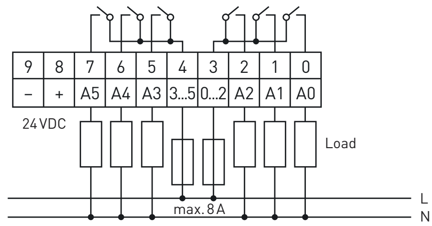
PCD2.A200 Relay output module with 4 "make" contacts, 2 A/250 VAC or 2 A/50 VDC

Relay output module with 6 "make" contacts, 2 A/250 VAC or 2 A/50 VDC



Number of outputs	6 "make" contacts in 2 groups
Rupturing capacity	2 A, 250 VAC AC1 1 A, 250 VAC AC11 2 A, 50 VDC DC1 1 A, 24 VDC DC11
Supply voltage	24 VDC, smoothed or pulsed
Output delay	typ. 5 ms at 24 VDC
Current draw	
internally from 5 V bus	typ. 12 mA (max. 20 mA)
externally	8 mA per relay

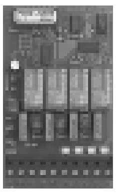
Connection diagram



Relay excited (contact closed) = LED on

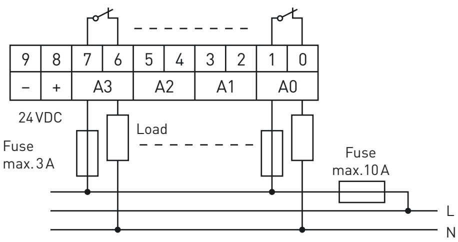
PCD2.A220 Relay output module with 6 "make" contacts, 2 A/250 VAC or 2 A/50 VDC

Relay output module with 4 "break" contacts, 2 A/250 VAC or 2 A/50 VDC



Number of outputs	4, electrically isolated "break" contacts, protected
Rupturing capacity	2 A, 250 VAC AC1 1 A, 250 VAC AC11 2 A, 50 VDC DC1 1 A, 24 VDC DC11
Contact protection	VDR and RC
Supply voltage	24 VDC, smoothed or pulsed
Output delay	typ. 5 ms at 24 VDC
Current draw	
internally from 5 V bus	typ. 10 mA (max. 15 mA)
externally	9 mA per relay

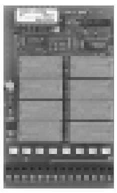
Connection diagram



Relay excited (contact closed) = LED on

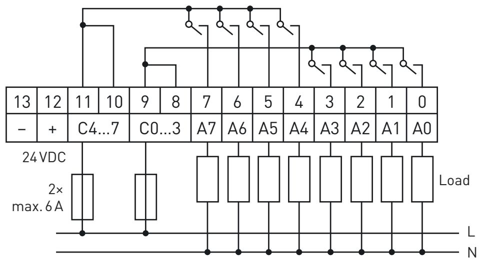
PCD2.A210 Relay output module with 4 "break" contacts, 2 A/250 VAC or 2 A/50 VDC

Relay output module with 8 "make" contacts, 2 A/48 VAC or 2 A/50 VDC



Number of outputs	8 "make" contacts in 2 groups
Rupturing capacity	2 A, 48 VAC AC1 1 A, 48 VAC AC11 2 A, 50 VDC DC1 1 A, 24 VDC DC11
Supply voltage	24 VDC, smoothed or pulsed
Output delay	typ. 5 ms at 24 VDC
Current draw	
internally from 5 V bus	typ. 15 mA (max. 25 mA)
externally	8 mA per relay

Connection diagram



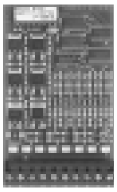
Relay excited (contact closed) = LED on
The compact construction does not allow safety distances for 230 VAC to be maintained.

PCD2.A250 Relay output module with 8 "make" contacts, 2 A/48 VAC or 2 A/50 VDC

Combined input/output module
Counting and measuring module

Combined input/output module

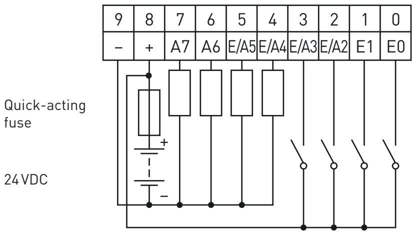
with 2 inputs, 24 V/8 ms for source operation, electrically connected, and 2 transistor outputs 0.5 A/5…32 VDC, electrically connected, not short-circuit proof, plus 4 combined input/outputs 24 V/8 ms or 0.5 A/5…32 VDC on common I/O terminals.



Number of inputs	2 + max. 4, electrically connected
Input voltage	24 VDC
Input signal	
E0 and E1	low –30…+5 V high 15…32 V
E/A2…E/A5	low –0.5…+5 V high 15…32 V
Input current	7 mA per input at 24 VDC
Input delay	typ. 8 ms (pulsed voltage possible)
Number of outputs	2 + max. 4, electrically connected
Output current I_a	5…500 mA
Overall power	3 A at continuous duty (per module)
Voltage range U_a	5…32 VDC smoothed
Voltage drop	
for A6 and A7	max. 0.3 V at 0.5 A
for E/A2…E/A5	max. 0.7 V at 0.5 A
Output delay	typ. 50 µs or max. 100 µs (off)

Current draw
internally from 5 V bus typ. 15 mA (max. 25 mA)

Connection diagram (source operation)

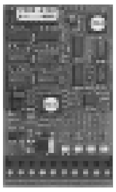


Regarding inputs:
Switch open = signal state low, LED off

Regarding outputs:
Output transmitting (set) = LED on

PCD2.B100 Combined input/output module with 2 inputs, 2 transistor outputs and 4 selectable inputs or outputs

PCD2.H100: Counting module up to 20 kHz

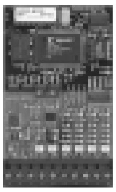


Its two counting inputs A and B, plus the fast CCO (counter controlled output), simplify the capture and control of revolutions, distances, volumes, etc.

Technical data

Counting frequency	max. 20 kHz (impulse/pause ratio 50 %)
Counting range	0…65 535 (16 bit), series connection possible with CPU counters
Inputs	IN-A and IN-B with recognition of rotational direction
Input signals	24 VDC (L = –30…+5 V, H = +15…30 V), in source operation
Input current	typ. 7.5 mA
Output	CCO (Counter Controlled Output)
Switching capacity	5…500 mA at 5…32 VDC
Circuit type	galvanically connected, not short-circuit protected, positive switching
Voltage drop	typ. 2 V at 500 mA

PCD2.H110: Counting and measuring module up to 100 kHz



for counting and measurement of frequencies and period or pulse length.

The ..H110 counting and measuring module uses a modern FPGA component (field programmable gate array), which can also be programmed for other specific OEM tasks by means of plug-in PROM. For this purpose, 4 inputs, 4 outputs and 2 × 4 LEDs are provided to the outside.

Main characteristics

- Up to 12 PCD2.H110 modules in parallel operation can be inserted in one PCD2, or up to 4 in one PCD1.
- Counting and measuring functions can be utilized simultaneously in the same module.

■ **As a counting module**
- Counting frequency up to 100 kHz
- Counting range 0…16 777 215 (24 bit)
- Preset value 0…16 777 215 (24 bit)
- Up or down counting to preset value
- 2 digital inputs A and B with recognition of rotational direction
- 1 direct counter output CCO
- Selectable counting modes ×1, ×2, ×4

■ **For frequency measurement**
- Frequency range 500 Hz to 100 kHz
- Measurement range 0…65 535 (16 bit)
- Accuracy ≥1‰ (depending on measurement time)
- The fast TCO output can be used at the end of a measurement, e.g. to trigger an interrupt.

■ **To measure period or pulse length**
- Frequency range 0.27 mHz to 500 Hz
- Period or pulse lengths from 2 ms to 1 h
- The fast TCO output can be used at the end of a measurement, e.g. to trigger an interrupt.

■ **Special OEM versions** allow use of up to 4 digital inputs and 4 digital outputs.

Electrical connection of I/O modules

All I/O modules have plug-in terminal connection blocks as standard. These allow modules to be exchanged without undoing the connections. Other types of connection are also available.

Standard connection via screw terminals

The majority of I/O modules have screw terminal blocks for connecting wires up to 1.5 mm² or 2× 0.5 mm².

Standard connection of modules with 16 I/Os

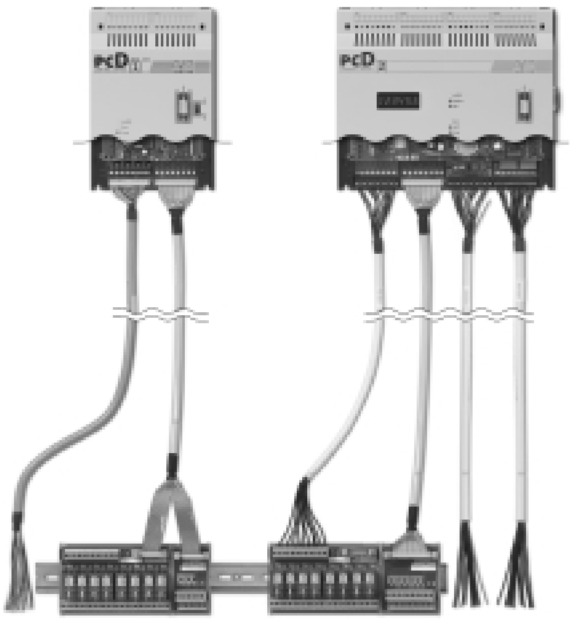
Types with a spring terminal block take max. 1× 0.5 mm² connection wires. Standard, 34-pole ribbon cable connectors will fit on types with a ribbon connector.

Spring terminals as an option for PCD2.M170/..M177

A spring terminal block (item number: 4'405'4914'0), which can be attached in place of the screw terminal block, is available for all 10-pole I/O modules. The terminals take connecting wires of 1.5 mm² solid or 1 mm² fine-strand. On request, the relevant modules can also be supplied ready assembled (Indicate on order: "with spring terminal block").

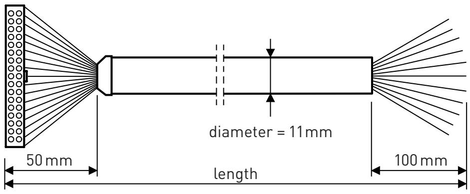
Plug-on system cable with connector at PCD end

The route to quick, convenient connection includes this pre-assembled cable. At the PCD end of the cable the connector is ready mounted, so connection is just a matter of plugging it in. More information can be obtained from documentation 26/326.



PCD2.K221, length 1.5 m / PCD2.K223, length 3.0 m

For digital I/O modules with 16 inputs or 16 outputs and 34-pole ribbon connector

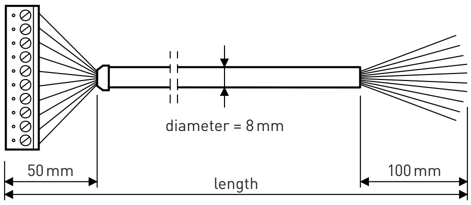


Sheathed, round cable with 32 strands of 0.25 mm² (AWG 24)

34-pole ribbon connector at PCD end, free ends on process side, 100 mm, unsheathed, strands with colour code

PCD2.K261, length 1.5 m / PCD2.K263, length 3.0 m

For digital I/O modules with 10-pole, plug-in screw terminal blocks (remove existing terminal block)

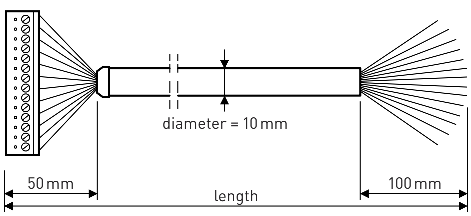


Sheathed, round cable with 10 strands of 0.5 mm²

10-pole, plug-in screw terminal block at PCD end, free ends on process side, unsheathed for 100 mm, with numbered strands

PCD2.K281, length 1.5 m / PCD2.K283, length 3.0 m

For ..A250 relay output module with 8 relays and 14-pole, plug-in screw terminal block (remove existing terminal block)



Sheathed, round cable with 14 strands of 0.5 mm²

14-pole, plug-in screw terminal block at PCD end, free ends on process side, unsheathed for 100 mm, with numbered strands

Ordering information

Type	Description	Weight
	Digital input modules	
	with 8 inputs, 24 VDC	
PCD2.E110	Input delay typ. 8 ms (pulsed voltage possible)	35 g
PCD2.E111	Input delay typ. 0.2 ms (smoothed voltage required)	35 g
	with 16 inputs, 24 VDC	
	Connection via 34-pole ribbon connector:	
PCD2.E160	Input delay typ. 8 ms (pulsed voltage possible)	25 g
PCD2.E161	Input delay typ. 0.2 ms (smoothed voltage required)	25 g
	Connection via 20-pole spring terminal block:	
PCD2.E165	Input delay typ. 8 ms (pulsed voltage possible)	30 g
PCD2.E166	Input delay typ. 0.2 ms (smoothed voltage required)	30 g
	with 8 inputs, 24 VDC, electrically isolated	
PCD2.E610	Input delay typ. 10 ms (pulsed voltage possible)	40 g
PCD2.E611	Input delay typ. 1 ms (smoothed voltage required)	40 g
PCD2.E500	**with 6 inputs, 115...230 VAC**	55 g
	Transistor output modules	
PCD2.A400	**with 8 outputs, 24 VDC/0.5 A**	40 g
PCD2.A410	**with 8 outputs, 24 VDC/0.5 A, electrically isolated**	40 g
	with 16 outputs, 0.5 A/24 VDC	
PCD2.A460	Connection via 34-pole ribbon connector	30 g
PCD2.A465	Connection via 20-pole spring terminal block	35 g
PCD2.A300	**with 6 outputs, 24 VDC/2 A**	45 g
	Relay output modules	
PCD2.A200	**with 4 "make" contacts, 2 A/250 VAC or 2 A/50 VDC**	60 g
PCD2.A210	**with 4 "break" contacts, 2 A/250 VAC or 2 A/50 VDC**	60 g
PCD2.A220	**with 6 "make" contacts, 2 A/250 VAC or 2 A/50 VDC**	65 g
PCD2.A250	**with 8 "make" contacts, 2 A/48 VAC or 2 A/50 VDC**	65 g
PCD2.B100	**Combined input/output module** with 2 inputs, 2 transistor outputs and 4 selectable inputs or outputs	45 g
PCD2.H100	**Counting module** up to 20 kHz	45 g
PCD2.H110	**Counting and measuring module** up to 100 kHz	45 g
	Spring terminal block as accessory	
4'405'4914'0	with 10 terminals, only for use on PCD2.M170/..M177 base units, can be inserted in place of standard screw terminal blocks [1])	12 g
	Plug-in screw terminal blocks (replacement)	
4'405'4847'0	with 10 terminals (standard)	17 g
4'405'4869'0	with 14 terminals (for ..A250)	9 g

[1]) On request, the relevant modules can also be supplied ready assembled (Indicate on order: "with spring terminal block").

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Smart solutions for comfort and safety

Saia-Burgess Controls Ltd.
Bahnhofstrasse 18
CH-3280 Murten / Switzerland

Telephone ++41 26 672 71 11
Telefax ++41 26 670 44 43

E-mail: pcd@saia-burgess.com
Homepage: www.saia-burgess.com
Support: www.sbc-support.ch

Saia-Burgess Controls Kft.
Liget utca 1
H–2040 Budaörs

Telephone 023 / 501 170
Telefax 023 / 501 180

E-mail: office@saia-burgess.hu
Homepage: www.saia-burgess.hu
Support: www.sbc-support.ch

Your local contact:

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