SAIA-Burgess Electronics

SWITCHES • MOTORS • CONTROLLERS

HARDWARE

PCD1 and PCD2 - Series xx7

The SIMATIC® S7 compatible programmable logic controller

SAIA®PCD Series xx7

SAIA

English edition 26/757 E1

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HARDWARE

PCD1 and PCD2 - Series xx7

SAIA® Process Control Devices

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Subject to technical changes

Updates

Manual: Hardware - PCD1 and PCD2 -Series xx7 - Edition E1

Date	Chapter	Page	Description

Contents

Page

Page

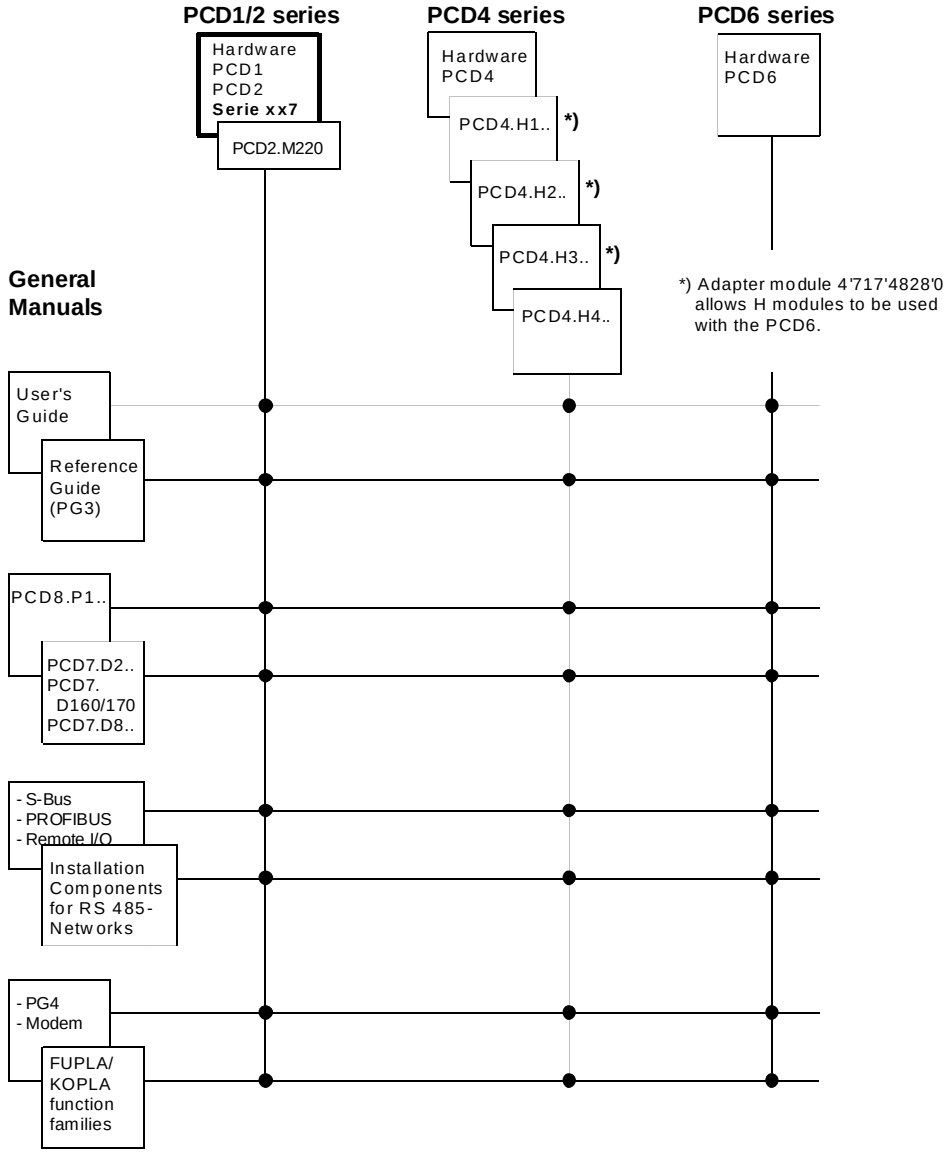
Please note:

A number of detailed manuals are available to aid installation and operation of the SAIA PCD. These are for use by technically qualified staff, who may also have successfully completed one of our "workshops".

To obtain the best performance from your SAIA PCD, closely follow the guidelines for assembly, wiring, programming and commissioning given in these manuals. In this way, you will also become one of the many enthusiastic SAIA PCD users.

If you have any technical suggestions or recommendations for improvements to the manuals, please let us know. A form is provided on the last page of this manual for your comments.

Summary



Reliability and safety of electronic controllers

SAIA-Burgess Electronics Ltd. is a company which devotes the greatest care to the design, development and manufacture of its products:

- state-of-the-art technology
- compliance with standards
- ISO 9001 certification
- international approvals: e.g. Germanischer Lloyd, UL, Det Norske Veritas, CE mark ...
- choice of high-quality componentry
- quality control checks at various stages of production
- in-circuit tests
- run-in (burn-in at 85°C for 48h)

Despite every care, the excellent quality which results from this does have its limits. It is therefore necessary, for example, to reckon with the natural failure of components. For this reason SAIA-Burgess Electronics Ltd. provides a guarantee according to the "General terms and conditions of supply".

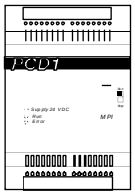
The plant engineer must in turn also contribute his share to the reliable operation of an installation. He is therefore responsible for ensuring that controller use conforms to the technical data and that no excessive stresses are placed on it, e.g. with regard to temperature ranges, overvoltages and noise fields or mechanical stresses.

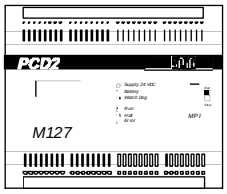
In addition, the plant engineer is also responsible for ensuring that a faulty product in no case leads to personal injury or even death, nor to the damage or destruction of property. The relevant safety regulations should always be observed. Dangerous faults must be recognized by additional measures and any consequences prevented. For example, outputs which are important for safety should lead back to inputs and be monitored from software. Consistent use should be made of the diagnostic elements of the PCD, such as the watchdog, exception organization blocks (XOB) and test or diagnostic instructions.

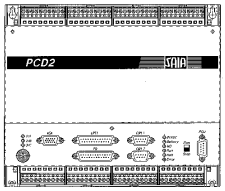
If all these points are taken into consideration, the SAIA PCD will provide you with a modern, safe programmable controller to control, regulate and monitor your installation with reliability for many years.

1. System structure

1.1 Compatibility PCD1 - PCD2







Serie	PCD1.M137	PCD2.M127	PCD2.M227
User memory			
• working memory (on board)	48 KBytes	132 KBytes	132 KBytes
• battery backup	Lithium	Lithium	Lithium
Peripherals			
Digital inputs/outputs			
• address space (bits)	4096 each	65 536 each	65 536 each
• process image (bits)	2048 each	2048 each	2048 each
Analogue inputs/outputs			
• address space	256 each	4096 each	4096 each
Flags (bits)	16 384 M0.0-M2047.7	16 384 M0.0-M2047.7	16 384 M0.0-M2047.7
Counters	256 Z0-Z255	256 Z0-Z255	256 Z0-Z255
Timers	256 T0-T255	256 T0-T255	256 T0-T255
Timing flags	8 (1 flag-byte)	8 (1 flag-byte)	8 (1 flag-byte)
Local data	4096 bytes	6144 bytes	6144 bytes
Data blocks			
• DB	511	511	511
Integrated interfaces			
MPI			
• baud rate	187.5 kbit/s	187.5 kbit/s	187.5 kbit/s
• number of stations	max. 32	max. 32	max. 32
• data quantity GD	32 bytes	64 bytes	64 bytes
• GD packages	max. 16	max. 16	max. 16
• active connections	max. 8	max. 32	max. 32
Serial ports			
• integral to CPU	1 RS232/RS422/ RS485/TTY	3 RS232/RS422/ RS485/TTY	3 RS232/RS422/ RS485/TTY
SSI interface			
• RS422 interface, 200 kHz		1	1

Integrated PC			
• PC/104 plug-in places	-	-	5
• Communications PCD ↔ PC	-	-	dual-port RAM
Integrated real-time clock	date/time	date/time	date/time
Fast interrupt inputs	-	2	2
Fast Counter (20 kHz)	-	1	1
Peripheral expansion			
• number of I/O modules in base unit	max. 4	max. 8	max. 8
• number of I/O-modules in expansion unit	-	max. 12 rsp. 16	max. 12 rsp. 16
Instruction set	S7-400 CPU412	S7-400 CPU414	S7-400 CPU414

1.2 System information of the PCD1 and PCD2 series

1.2.1 Fundamental differences between the PCD1 and PCD2

The PCD1 series is based on the PCD2 one. Apart from the size, both series are similar. The PCD1 differs from the PCD2 in the following ways :

- Only 4 I/O modules can be inserted.
- Less memory in the basic controller unit.
- Only one other interface in addition to the MPI interface.
- The supply connector does not have the same features and is wired differently.
- Instructionset/functionatlity according S7-400, CPU 412

1.2.2 Technical data of the PCD1.M137

Number of I/Os	4 I/O modules for 32 digital I/Os, or equivalent number of analogue I/O modules.
Prozessor	1 CPU with µC 68340
User memory	48 KBytes (integrated)
Battery	Lithium
Date/time	yes
Communication interfaces	MPI + 1 free serial user interface (optional) - PCD7.F110: RS422/485 - PCD7.F130: 20 mA current loop - PCD7.F150: RS485, electrically isolated
Bus coupling	MPI, PROFIBUS-DP, others on demand
Programming units	PC with MPI interface
Programming Software	STEP 7 programming software from Siemens and other third party programming software

1.2.3 Technical data of the PCD2.M127

Number of I/Os	8, 12 or 16 I/O modules for 64, 96 or 128 digital I/Os respectively, or equivalent number of analogues I/O modules.
Processor	1 CPU with µC 68340
User memory	132 KBytes (integrated)
Battery	Lithium
Flags (bit)	16 384 (M0.0 - M2047.7)
Local data	4096 bytes
Timers	256 (T0 - T255)
Counters	256 (Z0 - Z255)
Timing flags	8 (1 flag-byte)
Calculation ranges	+32'767 ... -32 768 (16 bit integer) +2'147'483'647 ... -2'147'483'648 (32 bit integer) $-3{,}402'823 \times 10^{+38}$ ... $-1{,}175'494 \times 10^{-38}$ ¦ normal- ± 0 ¦ ized floating $+1{,}175'494 \times 10^{-38}$ ... $+3{,}402'823 \times 10^{+38}$ ¦ point value
Date/time	yes
Communication interfaces	MPI + 3 free serial user interfaces (optional) - PCD7.F110: RS422/485 - PCD7.F120: RS232 - PCD7.F130: 20 mA current loop - PCD7.F150: RS485, electrically isolated for port no. 1, and - PCD7.F520/530 with interfaces no. 2 (RS232) and no. 3 (RS422/485).
SSI interface	RS 422, 200 kHz
Interrupts	2 fast interrupts
Fast counter	1 fast counter, 20 kHz
Bus coupling	MPI, PROFIBUS-DP, others on demand
Programming units	PC with MPI interface
Programming-software	STEP 7 programming software from Siemens and other third party programming software

1.2.4 Technical data of the PCD2.M227

Number of I/Os	8, 12 or 16 I/O modules for 64, 96 or 128 digital I/Os respectively, or equivalent number of analogue I/O modules.
Processor	1 CPU with µC 68340
User memory	132 KBytes (integrate)
Battery	Lithium
Flags (bit)	16 384 (M0.0 - M2047.7)
Local data	4096 bytes
Timers	256 (T0 - T255)
Counters	256 (Z0 - Z255)
Timing flags	8 (1 flag-byte)
Calculation ranges	+32'767 ... -32 768 (16 bit integer) +2'147'483'647 ... -2'147'483'648 (32 bit integer) $-3{,}402'823 \times 10^{+38}$ ... $-1{,}175'494 \times 10^{-38}$ ¦ normal- ± 0 ¦ized floating $+1{,}175'494 \times 10^{-38}$ ... $+3{,}402'823 \times 10^{+38}$ ¦ point value
Date/Time	yes
Communication Interfaces	MPI + 3 freie serielle Anwenderschnittstellen (optional) - PCD7.F110: RS422/485 - PCD7.F120: RS232 - PCD7.F130: 20 mA current loop - PCD7.F150: RS485, electrically isolated for port no. 1, and - PCD7.F520/530 with interfaces no. 2 (RS232) and no. 3 (RS422/485).
SSI interface	RS 422, 200 kHz
Interrupts	2 fast interrupts
Fast counter	1 fast counter, 20 kHz
Integrated PC	5 PC/104 plug-in places
Communication PCD ↔ PC	Dual-Port RAM
Bus coupling	MPI, PROFIBUS-DP, others on demand
Programming units	PC with MPI interface
Programming software	STEP 7 programming software from Siemens and other third party programming software

1.2.5 General technical data of the PCD1 and PCD2 series

Supply voltage	24 VDC ±20 % smoothed or 19 VAC ±15 % full wave rectified (18 VDC)	
Power consumption	PCD1 :	10 W with 32 I/O
	PCD2 :	15 W with 64 I/O 20 W with 128 I/O
Resistance to interference	Complies with "Recommended levels higher than minimum required" according to Standard for PLC EN 61131-2 (former IEC 1131-2) ESD complies to EN 61000-2, class 3 (former IEC 801-2) Burst complies to EN 61000-4 (former IEC 801-4) Power supply + digital I/O Level 4 = 4 kV Analogue I/O + serial interfaces Level 3 = 1 kV	
Ambient temperature	During operation :	0 .. +55°C resp. 0 .. +40°C (see "Mounting position")
	Storage temperature : -25 .. +70°C	
Air humidity	95 % r.F.	without condensation complies to DIN 40040, Class F
Mechanical resistance	Complies to EN 61131-2 (former IEC 1131)	
Mounting position	Standard :	wall mounting (screw terminals horizontal)
	Special :	on horizontal surface or wall mounting (screw terminals vertical)
	(Note : for the special mounting position, the operating temperature is max. 40°C.)	
Connections	I/O modules, additionnal modules and supply via plug-in screw terminals for wires of 1.5 mm² (AWG 16) or 2 x 0.5 mm² (2 x AWG 20)	
Plug-in screw terminals	The manufacturer guarantees that the screw terminal can be connected/disconnected up to 20 times without the quality of the contact being affected. Above this limit the srew terminal should be changed.	

<u>Ul and C-UL requirements :</u>

Wire data	Temperature :	60/75°C
	Copper wire only	
	Tightening torque :	0.5 Nm.

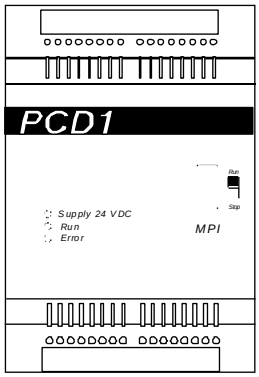
1.2.6 Software resources

	PCD1	PCD2
Cyclic Organization Block	OB 1	OB 1
Time-Of-Day interrupts	OB 10, 11	OB 10 - 13
Cyclic interrupts	OB 32, 35	OB 32 - 35
Time-Delay interrupts	OB 20, 21	OB 20 - 23
Hardware interrupts	OB 40, 41	OB 40 - 44
Restart	OB 100	OB 100
Error handling		
Synchronous alarms	OB 120, 121	OB 120, 121
Asynchronous alarms	OB 80 - 87	OB 80 - 87
Function Blocks FB	256	256
Functions FC	256	256
Data Blocks DB	511	511
Instruction set	S7-400 CPU 412	S7-400 CPU 414
Local data	4096 bytes	6144 bytes

Flags (bit)	16 384 (M0.0 - M2047.7)	
Timers	256 (T0 - T255)	
Counters	256 (Z0 - Z255)	
Timing flags	8 (1 flag-byte)	
Calculation ranges	+32'767 ... -32 768	(16 bit integer)
	+2'147'483'647 ... -2'147'483'648	(32 bit integer)
	$-3{,}402'823 \times 10^{+38}$ ... $-1{,}175'494 \times 10^{-38}$	¦ normal-
	± 0	¦ ized floating
	$+1{,}175'494 \times 10^{-38}$ ... $+3{,}402'823 \times 10^{+38}$	¦ point value

1.3 Base unit PCD1.M137

1.3.1 Summary



The PCD1 is composed of :

- lower part with I/O bus and main printed circuit board
- cover with LED labels

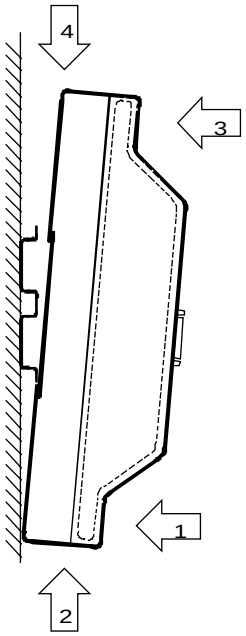
Two I/O modules can be easily inserted onto the I/O bus along both sides.
The following models are available :

Functions		M137
User memory		48 KBytes
Digital inputs/outputs:	address space (bits)	4096 each
	process image (bits)	2048 each
Analogue inputs/outputs	address space	256 each
Flags (bits)		16 384 M0.0 - M2047.7
Counters		256 Z0 - Z255
Timers		256 T0 - T255
Timing flags		8 (1 flag-byte)
Local data		4096 bytes
Data Blocks (DB)		511
for more data see chapter 1.1		

1.3.2 Assembly and dimensions

The PCD1 base unit can be snapped onto the same DIN-type double rail (2 x 35 mm) as the PCD2. Alternatively, the PCD1 can be fastened using 4 x M4 screws.

The normal assembly layout is to mount on a vertical surface with I/O connection terminals running horizontally. In this position, ambient temperature up to 55°C are permissible. In all other positions convection acts less favourably, so that the ambient temperature should not exceed 40°C.



Hanging the PCD1 on a DIN-type double rail

1 Press lower part of housing against mounting surface

2 Push firmly upwards to locate on projecting part of rail

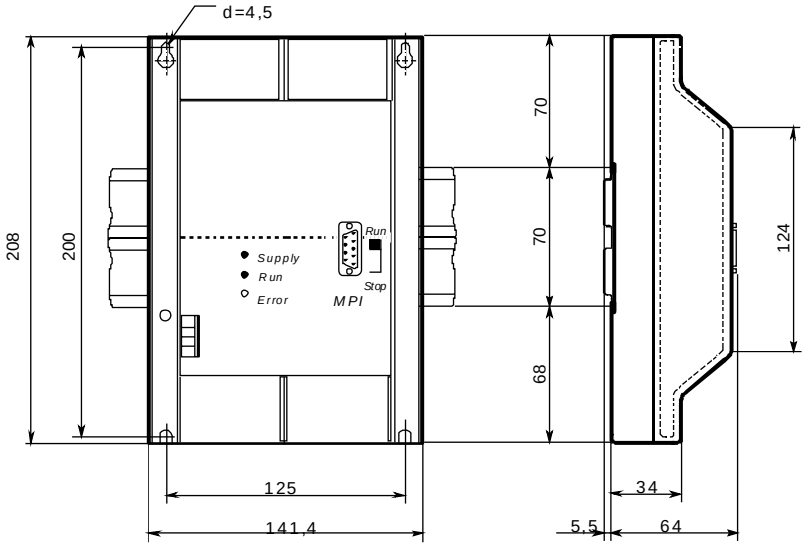
3 Press upper part against mounting surface

4 For safety, press down from above onto rail

Removal the PCD1

2 Push housing upwards and pull top forwards

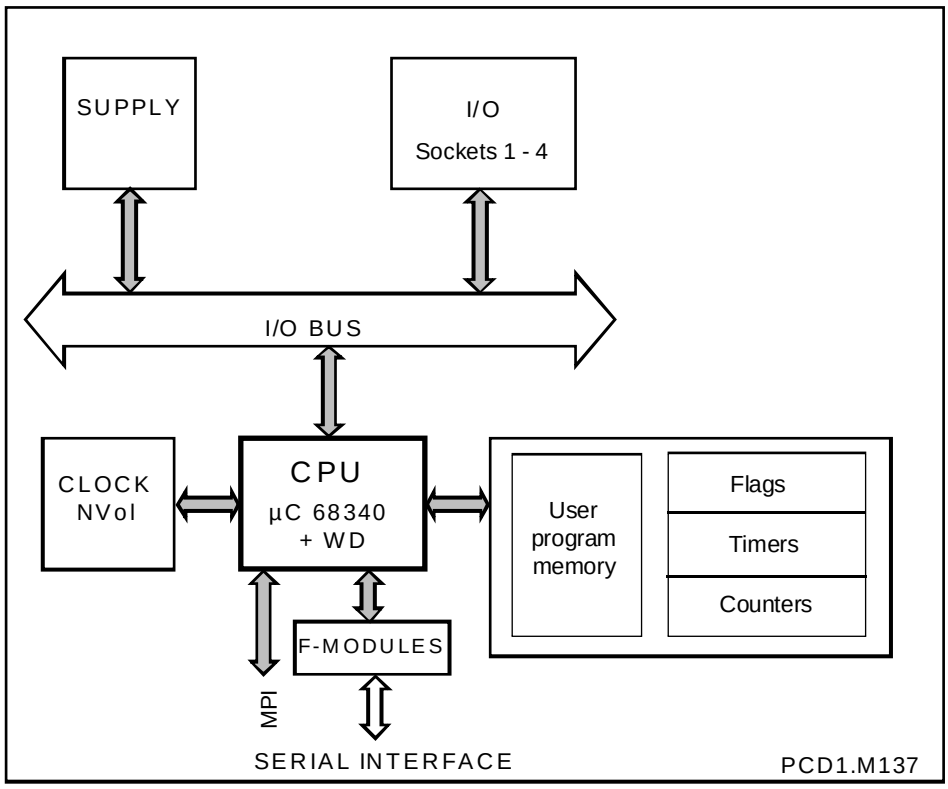
Dimensions:



without cover with cover

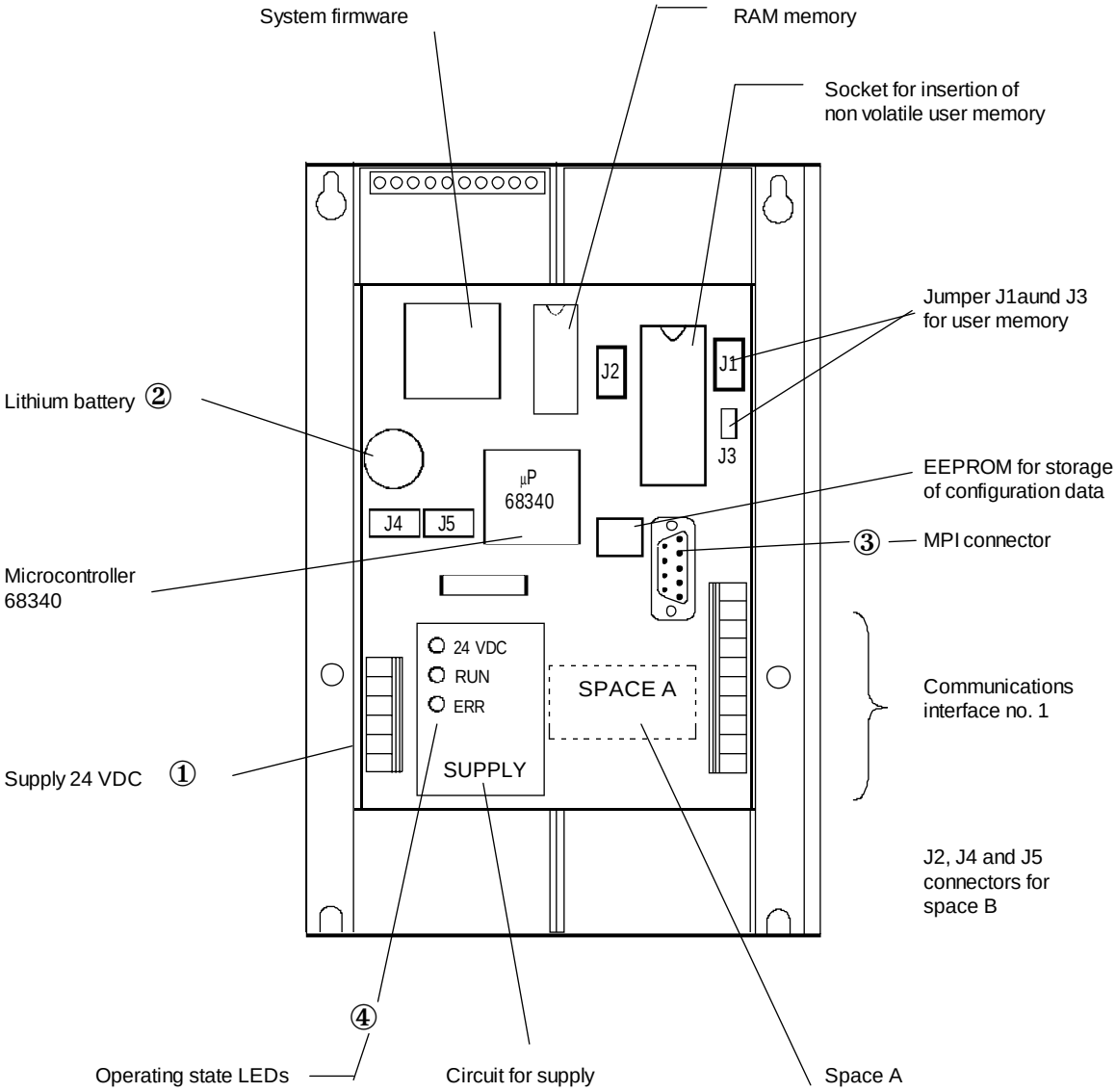
1.3.3 Architecture of the PCD1 main board

The following block diagram shows the clear layout of the entire PCD1.



1.3.4 Layout of the PCD1 main board

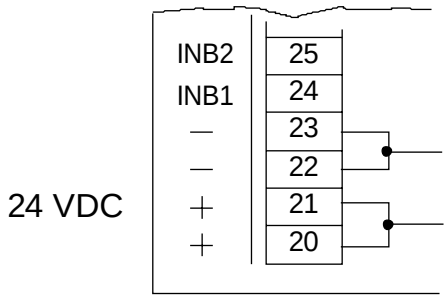
The drawing below shows the PCD1.M120 main board (maximum equipment) with cover removed.



With its cover removed, the PCD1 shows all active components apart from the I/O bus printed circuit board. This is located below the main board on a level with the I/O modules.

Caution : When the cover has been removed, exposed components are sensitive to electrostatic discharges.
When the device is switched on, do not change the jumpers, insert or remove I/O modules, or perform any similar manipulations.

① Connection of supply, electronic fuse and interference protection



Connection is made at terminals 20 to 23 with wires of maximum 1.5 mm^2 (with cable end bush).

Smoothed or pulsed direct current can be used (see technical data).

The "24 VDC" LED indicates when the supply voltage is present.

Reverse voltage protection prevents the destruction of the circuit by incorrect connection.

The 24V circuit is protected against damage in case of too high current by an electronic fuse (PTC resistor).

② Data protection

The **CPUs PCD1.M137 and PCD2.M127/227** are equipped with a non recharchable Lithium battery for data protection for 1 to 3 years.

Battery type:	LI - 3V
Recommended product	RENATA
Order number by SBE	4 507 4817 0

Recognition of battery capacity: with Error OB

A **battery exchange** can become without problems in every operating state without data loss if the PCD is on tension.

③ MPI interface for the connection of the program unit

The following functions can be carried out via the MPI interface:

- Programming
- Data exchange with other controllers
- Connection of operator terminals and observation devices

The pin assignment of the MPI interface is the following:

Pin no.		Meaning
7	P24V	+ 24V
2	M24V	0V of the 24V supply
6	P5V	+ 5V
5	M5V	0V of the 5V supply
4	RTSAS	RTS of the AS
9	RTSPG	RTS of the PG
8	LTG_A	Data conductor A
3	LTG_B	Data conductor B

Warning: **No** PCD8.K111 cable may be employed

④ Operating states of the processor

The states are displayed by 3 LEDs on the front panel :

- SUPPLY 24 VDC Yellow LED
- RUN Yellow LED
- ERROR Red LED

The SUPPLY 24VDC LED indicates the presence of the external power supply. The RUN and ERROR LEDs indicate the operating state of the CPU.

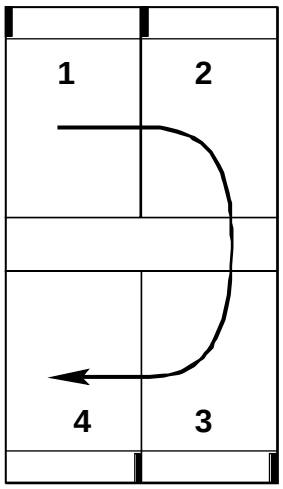
The CPU can have the following operating states :

POST, STOP, START, RUN

State	LED	Meaning
POST (Power On Self Test)	RUN on/off ERROR on/off SUPPLY on	Self-check for approx. ½ sec by switching on Coded signals
STOP	RUN off ERROR off	PCD is in STOP state. The outputs are switches off, the user program is not executed
START	RUN flashing ERROR off	State between STOP and RUN. The Start OB is executed (if programmed)
RUN	RUN on ERROR off	Normal processing of the user program
	ERROR on/off	User programmable

1.3.5 Addressing I/O modules

The PCD1 consists of a non-expandable base unit into which up to 4 I/O modules from the PCD2 series can be inserted. Addressing is clockwise in steps of 16, from 0 to 63.



Base unit PCD1.M137

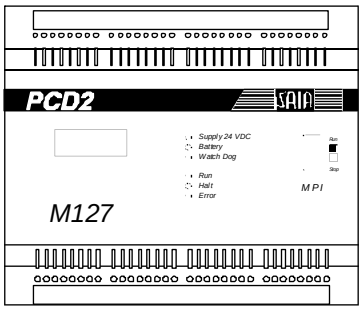
Numbering of the 4 plug-in places

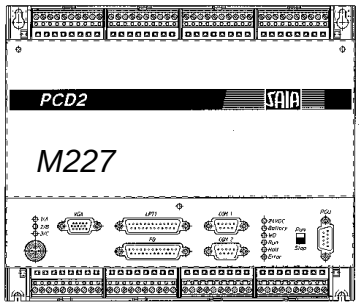
Address and terminal labelling

See explanations in the following chapter 1.4.5 (PCD2).

1.4 Base units PCD2.M127 and PCD2.M227 as well as expansion units PCD2.C107 and PCD2.C157

1.4.1 Summary





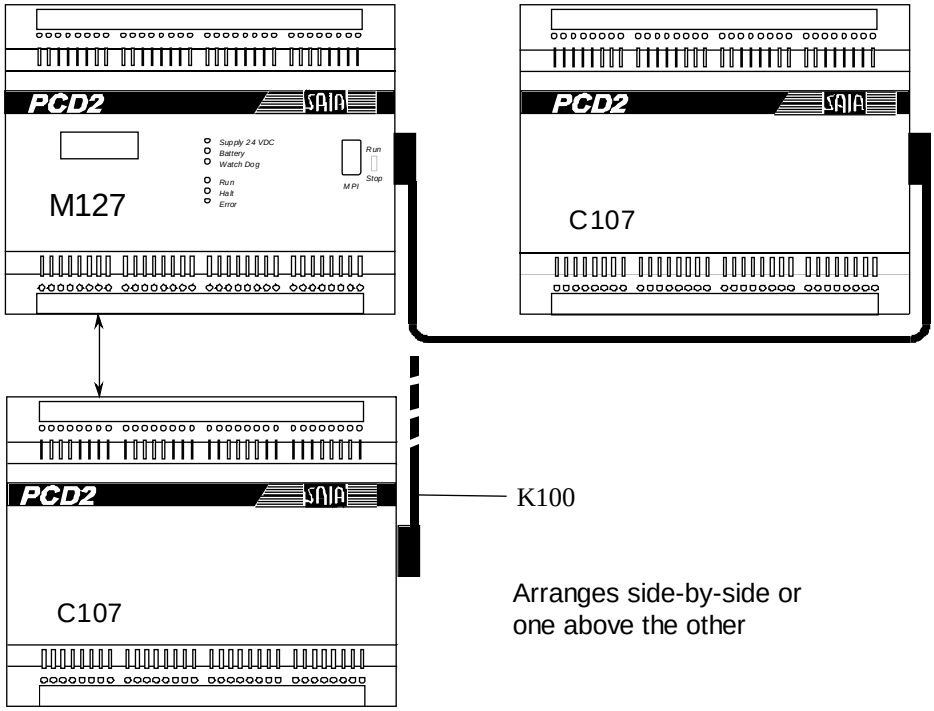
The base units PCD2.M127 and **M227** are composed of:

- lower part with I/O bus and main printed circuit board
- cover with LED labels

Four I/O modules can be easily inserted onto the I/O bus along both sides. The following models are available :

Functions		PCD2.M127 and PCD2.M227
User memory		132 KBytes
Digital inputs/outputs:	address space (bits)	65 536 each
	process image (bits)	2048 each
Analogue inputs/outputs	address space	4096 each
Flags (bits)		16 384 M0.0 - M2047.7
Counters		256 Z0 - Z255
Timers		256 T0 - T255
Timing flags		8 (1 flag byte)
Local data		6144 bytes
Data Blocks (DB)		511
for more data see chapter 1.1		

PCD2.C107 and PCD2.C157 expansion units



The ..C107 expansion unit has the same dimensions as the base unit PCD2 and takes 8 additional I/O modules.

The ..C157 expansion unit has the same dimensions as the base unit PCD1 and takes 4 additional I/O modules..

Connection to the PCD2.M127 rsp. PCD2.M227 is via the 26-core extension cable PCD2.K100 (for vertical mounting position) or PCD2.K110 (for horizontal mounting position).

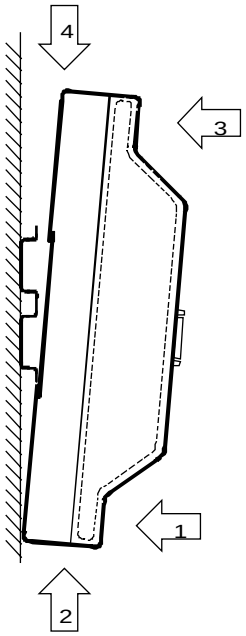
Power for the expansion unit is also provided via this cable.

Caution : The extension cable **must never be** connected or disconnected while the unit is powered on !

1.4.2 Assembly and dimensions

The PCD1 base unit can be snapped onto the same DIN-type double rail (2 x 35 mm) as the PCD2. Alternatively, the PCD2 can be fastened using 4 x M4 screws.

The normal assembly layout is to mount on a vertical surface with I/O connection terminals running horizontally. In this position, ambient temperature up to 55°C are permissible. In all other positions convection acts less favourably, so that the ambient temperature should not exceed 40°C.



Hanging the PCD2 on a DIN-type double rail

1 Press lower part of housing against mounting surface

2 Push firmly upwards to locate on projecting part of rail

3 Press upper part against mounting surface

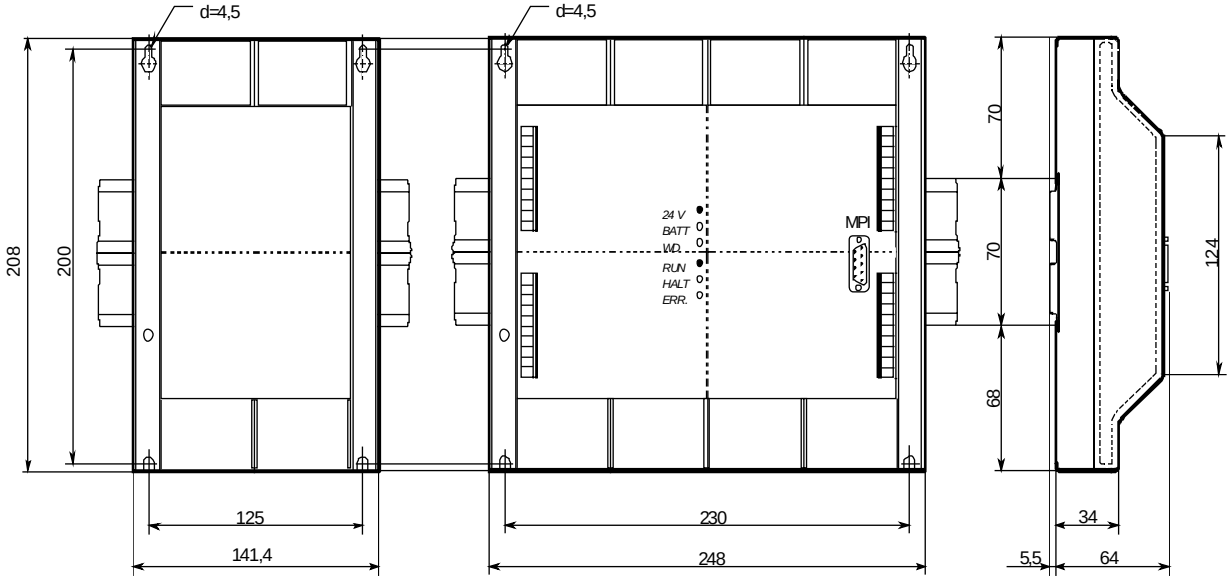
4 For safety, press down from above onto rail

Removal the PCD2

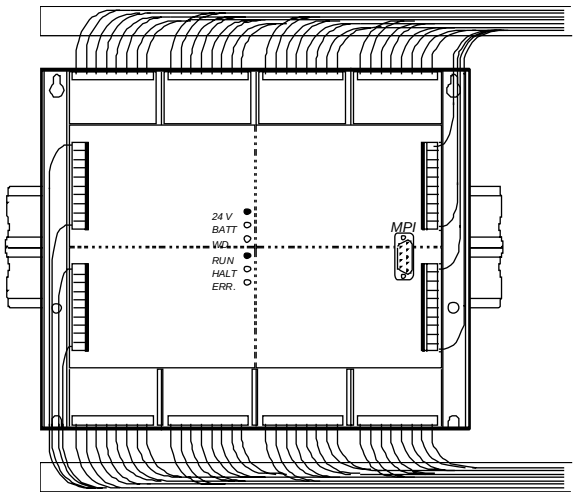
2 Push housing upwards and pull top forwards

Dimensions

PCD1.M137/PCD2.C157 PCD2.M127/PCD2.C107



without cover without cover with cover

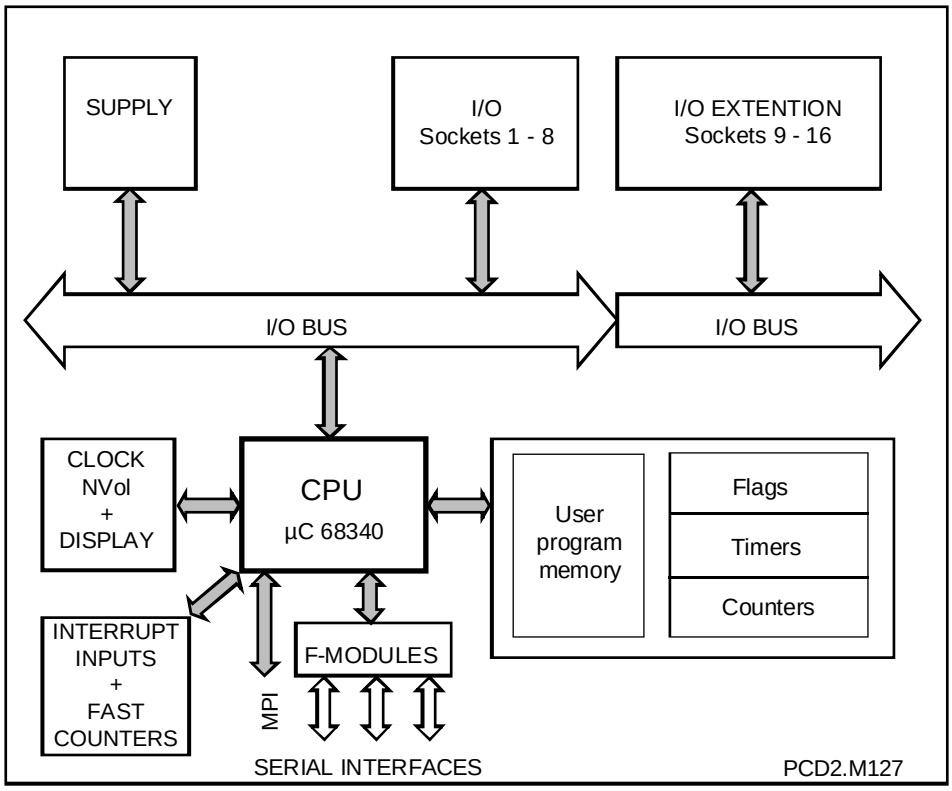


Cable layout

The I/O modules can be wired up on both sides using the corresponding cable channels. Cables to terminals on the main board are routed through both lateral channels, from below or above.

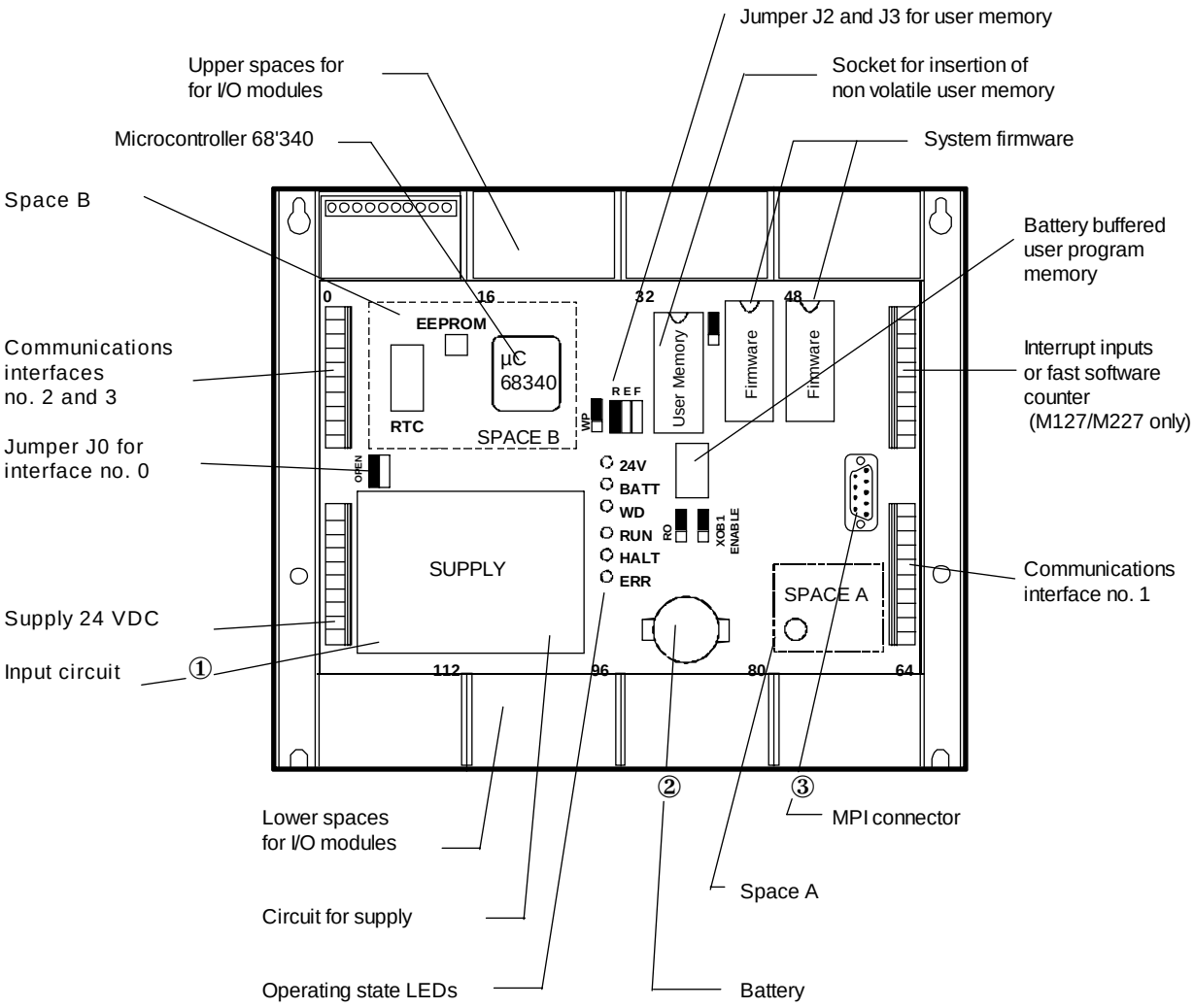
1.4.3 Architecture of the PCD2 main board

The following block diagram shows the clear layout of the entire PCD2.



1.4.4 Layout of the PCD2 main board

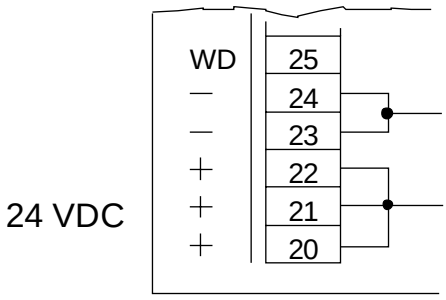
The drawing below shows the PCD2.M127 main board (maximum equipment) with cover removed.



With its cover removed, the PCD2 shows all active components apart from the I/O bus printed circuit board. This is located below the main board on a level with the I/O modules.

Caution : When the cover has been removed, exposed components are sensitive to electrostatic discharges.
When the device is switched on, do not change the jumpers, insert or remove I/O modules, or perform any similar manipulations.

① Connection of supply, fuse and interference protection



Connection is made at terminals 20 to 24 with wires of maximum 1.5 mm^2 (with cable end bush).

Smoothed or pulsed direct current can be used (see technical data).

The "24 VDC" LED indicates when the supply voltage is present.

Reverse voltage protection prevents the destruction of the circuit by incorrect connection.

The 24V circuit is protected against damage in case of too high current by an electronic fuse (PTC resistor).

② Data protection

The **CPUs PCD1.M137 and PCD2.M127/227** are equipped with a non recharchable Lithium battery for data protection for 1 to 3 years.

Battery type:	LI - 3V
Recommended product	RENATA
Order number by SBE	4 507 4817 0

Recognition of battery capacity: with Error OB

A **battery exchange** can become without problems in every operating state without data loss if the PCD is on tension.

③ MPI interface for the connection of the program unit

The following functions can be carried out via the MPI interface:

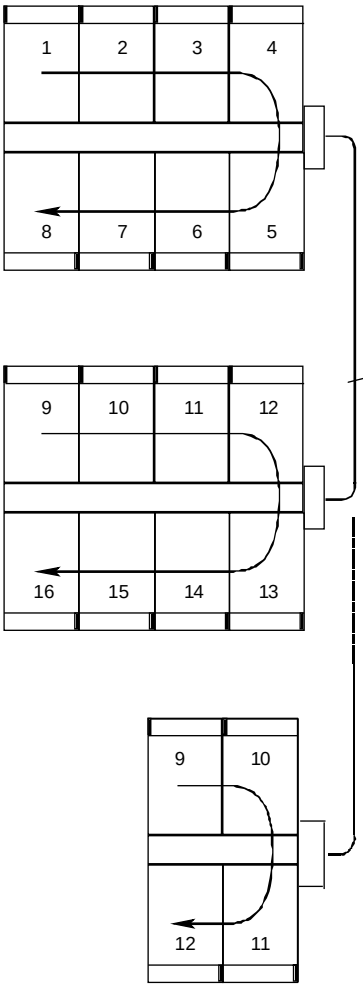
- Programming
- Data exchange with other controllers
- Connection of operator terminals and observation devices

The pin assignment of the MPI interface is the following:

Pin no.		Meaning
7	P24V	+ 24V
2	M24V	0V of the 24V supply
6	P5V	+ 5V
5	M5V	0V of the 5V supply
4	RTSAS	RTS of the AS
9	RTSPG	RTS of the PG
8	LTG_A	Data conductor A
3	LTG_B	Data conductor B

Warning: **No** PCD8.K111 cable may be employed

1.4.5 Addressing I/O modules



PCD2.M127/M227 base unit

All modules of types E, A, W and H can be used if desired.

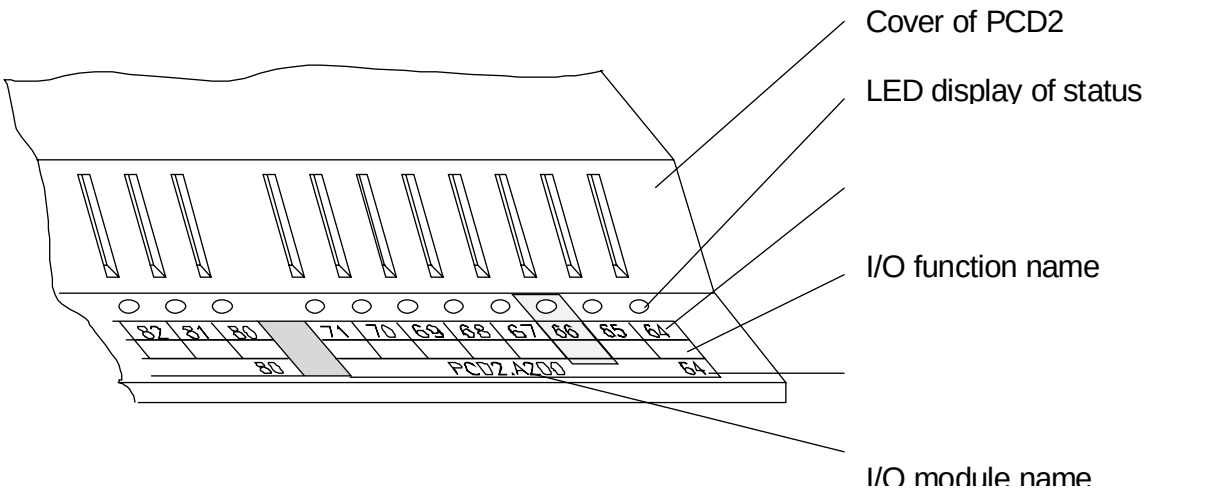
Bus extension cable
PCD2.K100 or K110

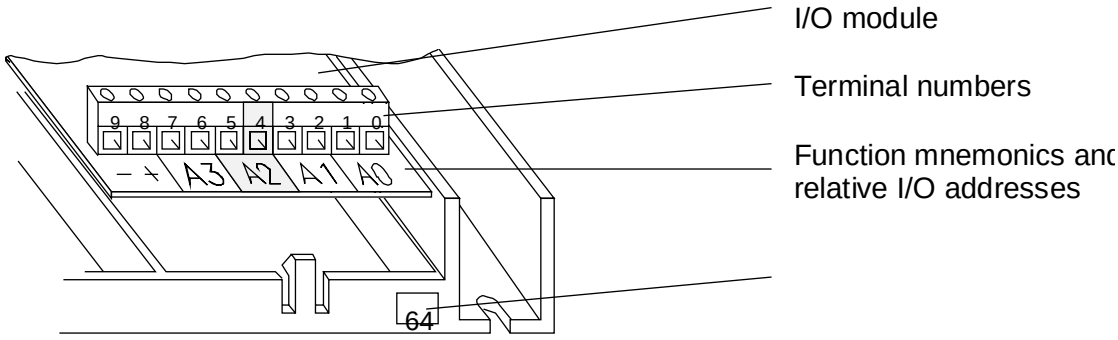
PCD2.C107 expansion unit

PCD2.C157 expansion unit

.

Address and terminal labelling



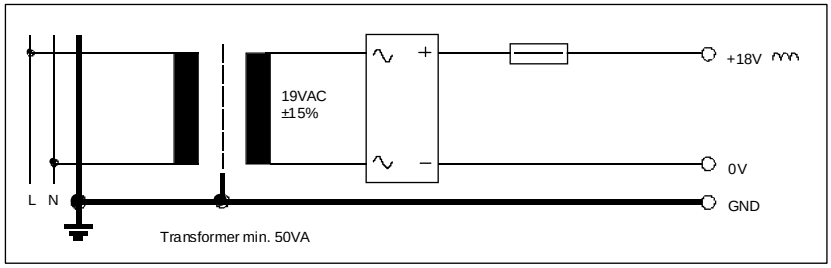


- When the cover is in position (during operation) the logical state of each digital I/O is displayed by an LED.
- When the cover is removed, the terminals are accessible.

2. Power supply and connection plan

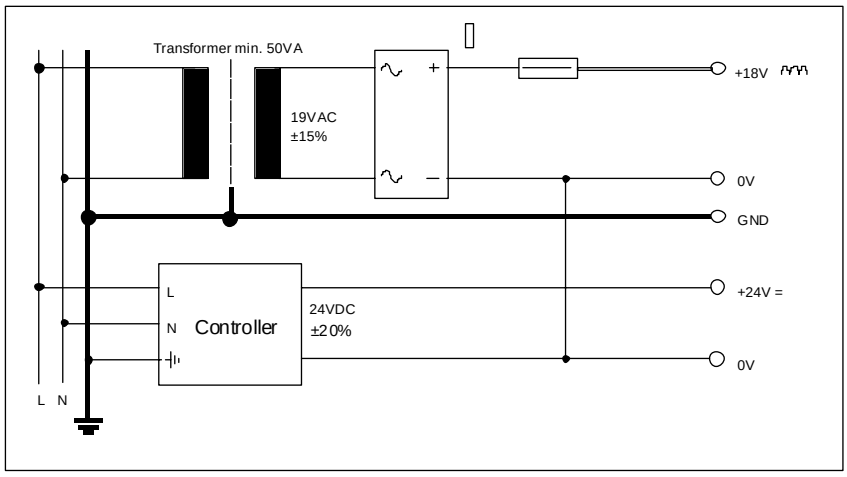
2.1 External power supply

2.1.1 Application: simple and small installations



- Sensors — Electromechanical switches
- Actuators — Relays, lamps and small valves with < 0.5 A switching current
- For modules — PCD1.M1.., PCD2.M1.., PCD2.C1..
  PCD2.E1.., E5.., E6.., A2.., A4.., B1.., G4..
  PCD2.W1.., W2.., W4.., W5..

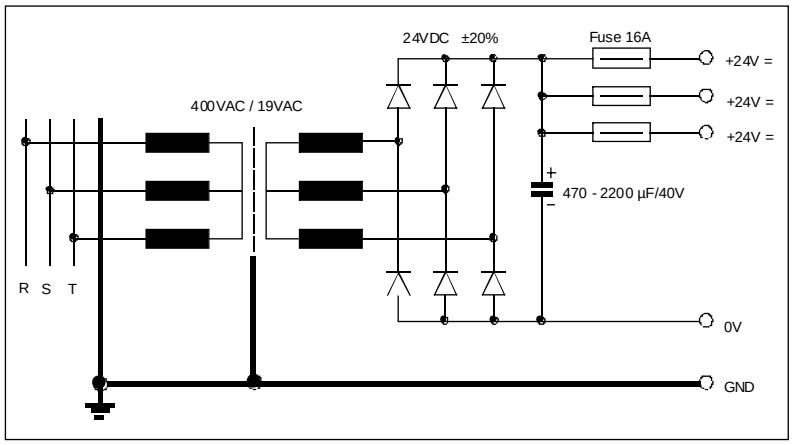
2.1.2 Application: small to medium installations



- Sensors — Electromechanical switches, proximity switches and photoelectric barriers
- Actuators — Relays, lamps, displays and small valves with < 0.5 A switching current
- For modules — PCD1.M1.., PCD2.M1.., PCD2.C1..,
  PCD2.E1.., E5.., E6.., A2.., A4.., B1.., G4..
  PCD2.W1.., W2.., W4.., W5..
  PCD2.H1.. *), H2.. *), H3.. *)
  PCD7.D1.. *), D2.. *), PCA2.D12 *), D14 *)

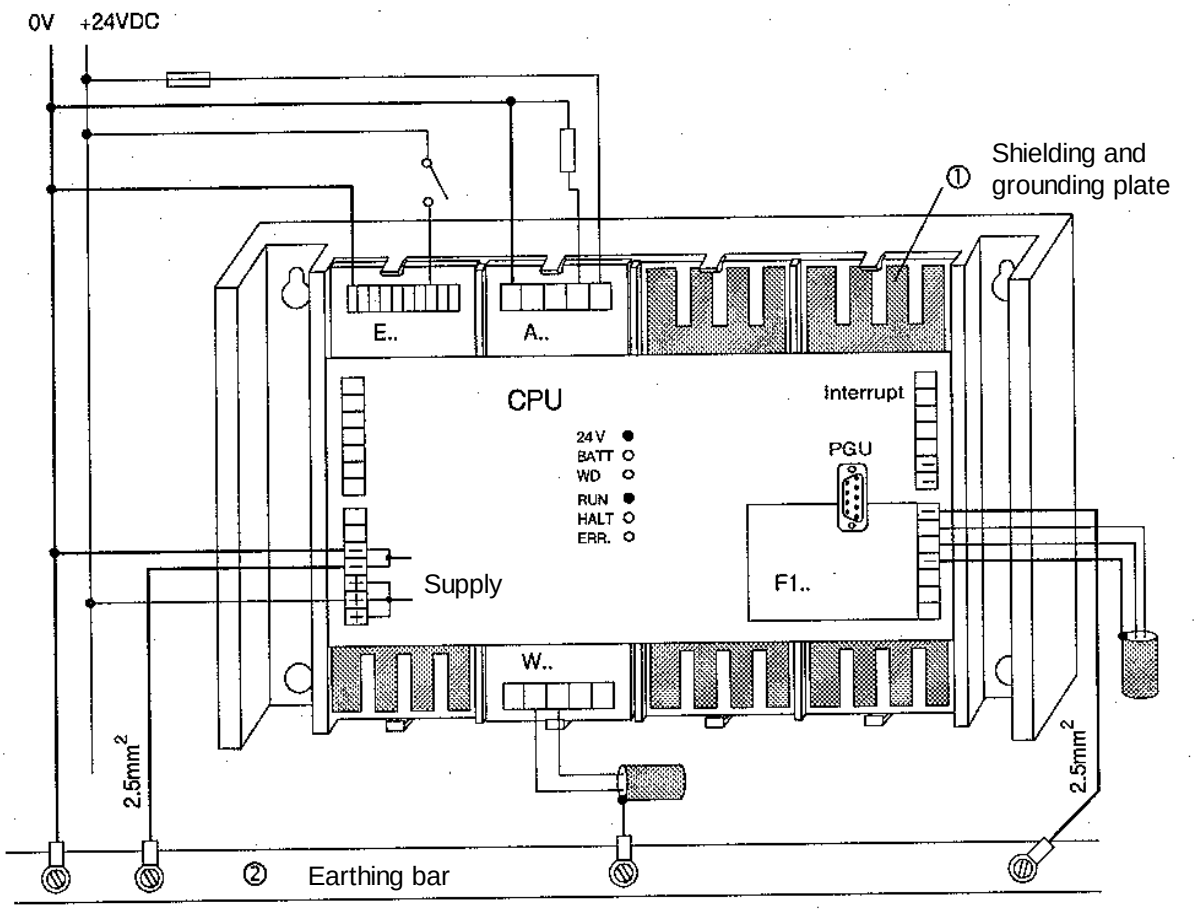
*) These modules must be connected to 24 VDC smoothed.

2.1.3 Application : medium to large installations



- Sensors — Electromechanical switches, proximity switches and photoelectric barriers
- Actuators — Relays, lamps, large valves and large contactors with consumtion up to 2 A.
- For modules — PCD1.M1.., PCD2.M1.., PCD2.C1..
  PCD2.E1.., E5.., E6.., A2.., A3.., A4.., B1.., G4..
  PCD2.W1.., W2.., W4.., W5..
  PCD2.H1.., H2.., H3..
  PCD7.D1.., D2...
  PCA2.D12, D14

2.2 Grounding and connection layout



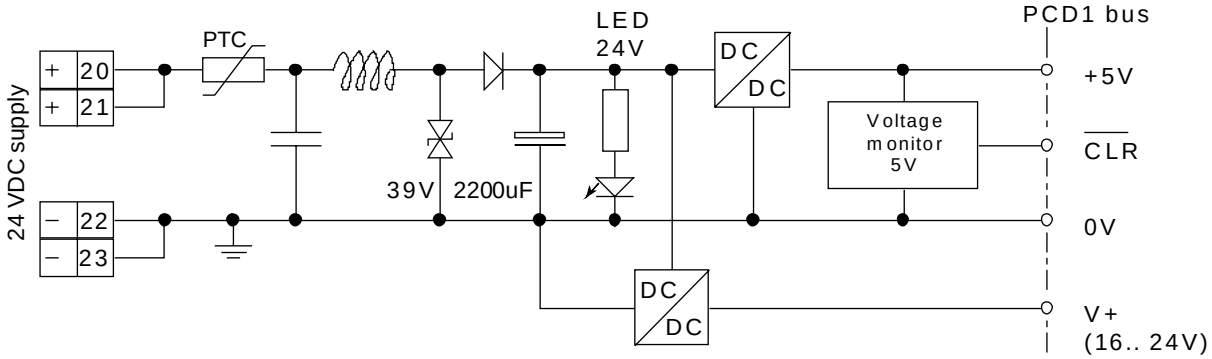
① The lower part of the PCD1 or of the PCD2 housing contains the shielding and grounding plate. It forms the common, large-surface user ground for all I/O modules and for the external supply. Whenever an I/O module is inserted, a reliable multipoint contact with the module is produced by the plate contact strip.

② The zero potential (negative pole) of the 24 V supply is connected to the negative terminal of the PC1 or the PCD2 supply. This latter should be connected to the earthing bar by the shortest possible 2.5 mm^2 wire. The negative terminal of the F1.. module must also be connected to the earthing bar as well as, on the PCD2, the negative terminal of the "Interrupt" part.

Any shielding of analogue signals or communications cables should also be brought to the same ground potential, either via a negative terminal or the earthing bar.

2.3 Internal power supply

2.3.1 Schematic diagram of the PCD1

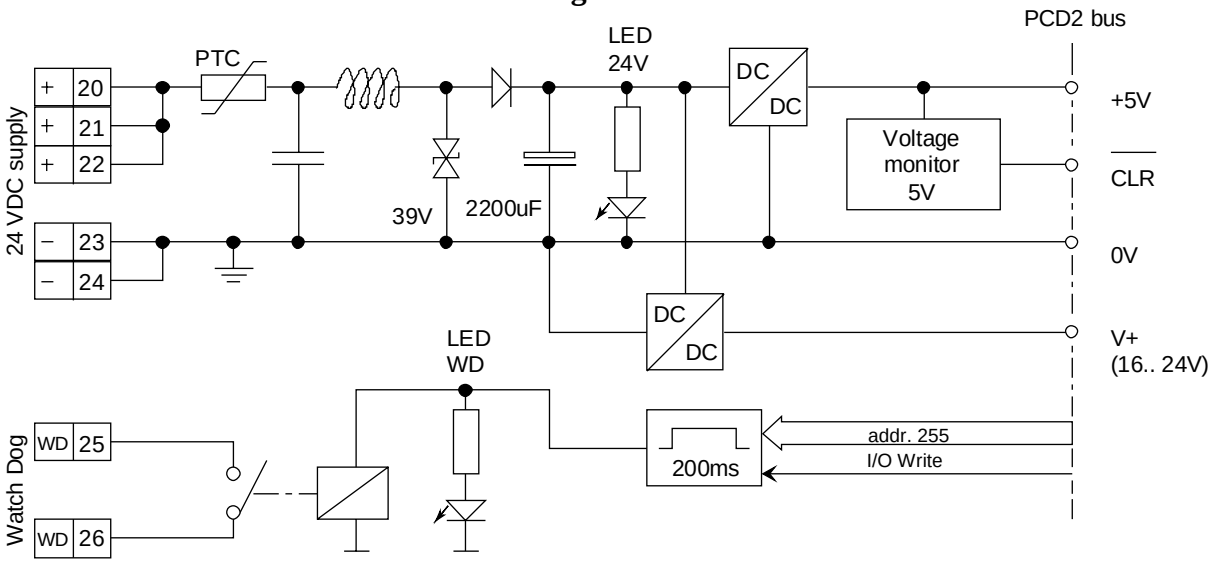


Rating of internal voltages

With effect from basic units PCD2.M137, the following currents are available for plug-on modules :

+5V	:	750 mA
+V (16.. 24V)	:	100 mA

2.3.2 Schematic diagram of the PCD2



Rating of internal voltages

With effect from basic units PCD2.M127 or PCD2.M227, the following currents are available for plug-on modules :

+5 V	:	1600 mA	(1100 mA on the hardware prior
+V (16.. 24 V)	:	200 mA	to version "H")

2.3.3 Power requirements of PCD2 modules

Type	Internal power supply I at +5 V (mA)	Internal power supply I at + V (mA)	External power supply I at 24 VDC
PCD2.			
E11x	1 .. 24	--	8 I with 6 mA
E500	< 1	--	
E61x	1 .. 24	--	8 I with 5.0/3.7 mA
A200	1 .. 15	--	max. 32 mA
A220	1 .. 20	--	max. 48 mA
A250	1 .. 25	--	max. 64 mA
A300	1 .. 20	--	Load current
A400	1 .. 25	--	Load current
A410	1 .. 24	--	Load current
B100	1 .. 25	--	Load current
G400	10 .. 65	35	Load current
W10x	45	15	--
W110/111	45	30	--
W112/113	45	20	--
W200/210	8	5	--
W220	8	16	--
W4x0	1	30	100 mA (W410)
W5x0	200	--	--
H100	90	--	CCO output : 0.5 A
H110	70	--	Load current
H150	50	--	Load current
H210	75	--	Load current
H31x	150	--	max. 15 mA
F500	70	--	
F510	140	--	
F520	250	--	
F530	350	--	
F540 [1)]	(10)	--	
F550 [2)]	(75)	--	
C100	10 [3)]	-- [3)]	
C150	10 [3)]	-- [3)]	

[1) 2) 3)] See in the following page

Type	Internal power supply I at +5 V (mA)	Internal power supply I at + V (mA)	External power supply I at 24 VDC
PCD7.			
F110	50	--	
F120	10	--	
F130	10	40	
F150	130	--	
F700	200	--	
F750	330	--	

Warning about the consumption of the terminal PCD7.D16x

Type	Internal power supply I at +5 V (mA)	Internal power supply I at + V (mA)	Back-lighting
PCD7.			
D160	(25)	--	No
D160	(225)	--	Yes
D162 [1)]	35	--	No
D162 [1)]	235	--	Yes
D163 [2)]	100	--	No
D163 [2)]	300	--	Yes

The back-lighting of the terminal PCD7.D160 increases the consumption **of 200 mA** like described in the above table

1) Set of modules including the terminal PCD7.D160 and the communication interface PCD2.F540.

2) Set of modules including the terminal PCD7.D160 and the communication interface PCD2.F550.

3) The E/A/W/H modules on the expansion unit are also supplied from the base unit PCD2.M127 or M227.

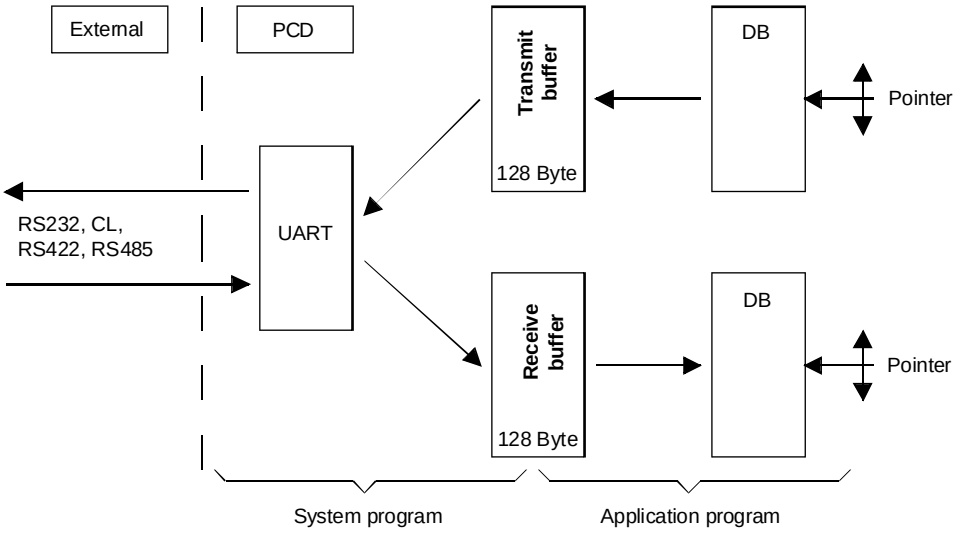
3. Specific system functions

General

All system functions use a "0" value in the BIE bit of the status word to indicate whether an error has occurred during the processing of a function. In addition, some SFCs supply a further error code in the return value ("RET_VAL"). Error-free execution sets the BIE bit.

3.1 Serial communication

General structure

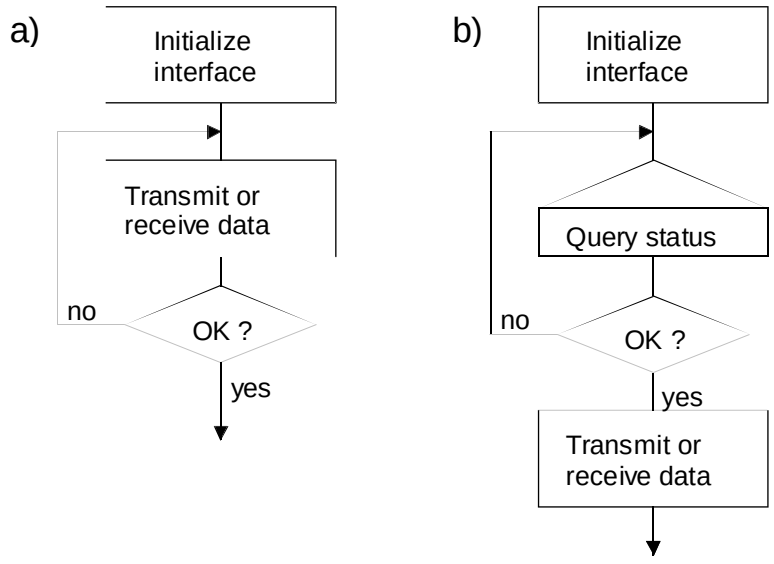


The UART (Universal Asynchronous Receiver Transmitter) is the interface between the outside world and the PCD's transmit or receive buffer. Data is transferred between the UART and the transmit or receive buffer via the system program. Data transfer between the transmit or receive buffer and the DBs in the PCD is done by the application program. This arrangement exists for each separate interface.

There are two basic methods for transmitting or receiving:

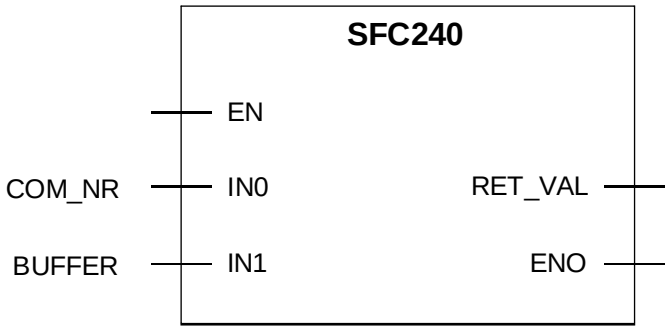
a) Attempts are made to execute a data transfer until success is finally achieved, or

b) The status of the transmitter/receiver is assessed and, on arrival of an event, data transfer is executed specifically.



3.1.1 Read serial interface SFC 240 "RCV_COM"

When the "RCV_COM" SFC is called, the number of bytes indicated is transferred from the receive buffer to the buffer specified.



Parameters

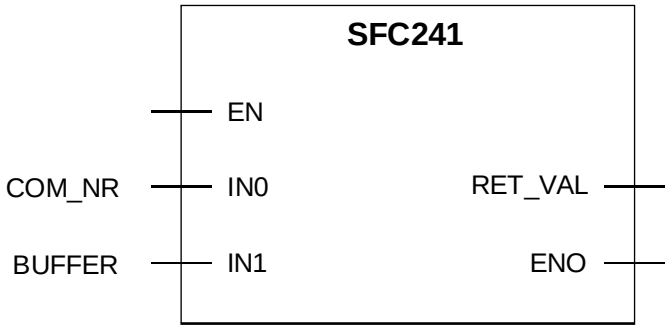
Parameter	Declaration	Data type	Memory range	Description
COM_NR	INPUT	BYTE	E,A,M,D,L,Const.	Interface number 1, 2, 3
BUFFER	INPUT	ANY		Pointer to buffer (128 Byte)
RET_VAL	OUTPUT	WORD	E,A,M,D,L	Error information

Error information

Error code (W#16#....)	Description
0000	no error
00FE	incorrect interface number
0001	insufficient bytes in receive buffer

3.1.2 Transmit serial interface SFC 241 "COM_SEND"

When the "COM_SEND" SFC is called, the number of bytes indicated is transferred from the specified buffer into the transmit buffer. The transmission itself takes place in the background.



Parameters

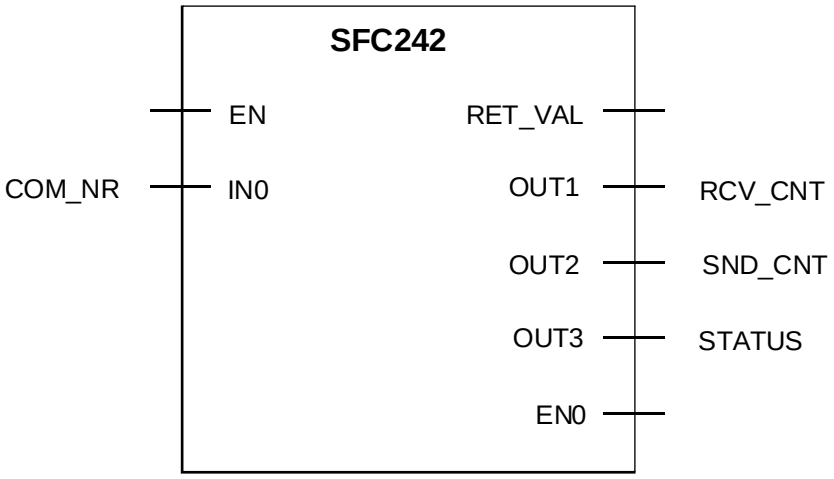
Parameter	Declaration	Data type	Memory range	Description
COM_NR	INPUT	BYTE	E,A,M,D,L,Const.	Interface number 1, 2, 3
BUFFER	INPUT	ANY		Pointer to buffer (128 Byte)
RET_VAL	OUTPUT	WORD	E,A,M,D,L	Error information

Error information

Error code (W#16#....)	Description
0000	no error
00FE	incorrect interface number
0001	insufficient space in transmit buffer

3.1.3 Read status of serial interface SFC 242 "COM_STAT"

When the "COM_STAT" SFC is called, the status of the specified serial interface is returned.



Parameters

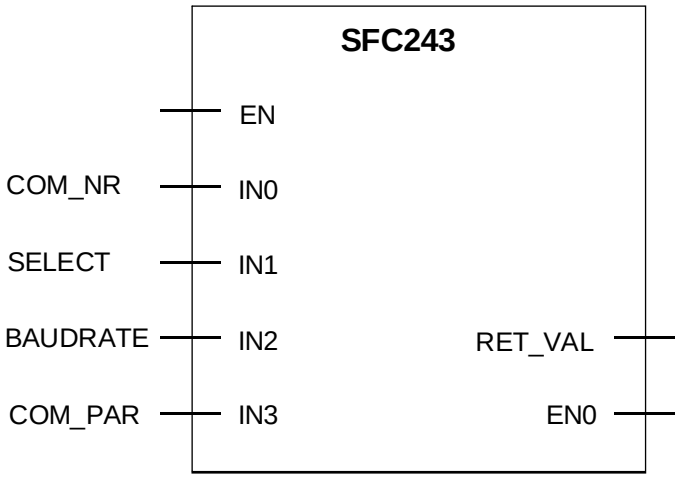
Parameter	Declaration	Data type	Memory range	Description
COM_NR	INPUT	BYTE	E,A,M,D,L,Const.	Interface number 1, 2, 3
RET_VAL	OUTPUT	WORD	E,A,M,D,L	Error information
RCV_CNT	OUTPUT	WORD	E,A,M,D,L	Number of bytes in receive buffer
SND_CNT	OUTPUT	WORD	E,A,M,D,L	Number of bytes in transmit buffer
STATUS	OUTPUT	WORD	E;A;M;D;L	Status Bit 0 = 1 → Receive buffer overrun Bit 1 = 1 → Interface error

Error information

Error code (W#16#....)	Description
0000	no error
00FE	incorrect interface number

3.1.4 Initialize serial interface SFC 243 "COM_INIT"

When the "COM_INIT" SFC is called, the specified serial interface is initialized.



Parameters

Parameter	Declaration	Data type	Memory range	Description
COM_NR	INPUT	BYTE	E,A,M,D,L,Const.	Interface number
SELECT	INPUT	BYTE	E,A,M,D,L,Const.	Interface mode RS232 = 0 RS485 = 1 RS422 = 2 CL 20 mA = 3
BAUDRATE	INPUT	DINT	E,A,M,D,L,Const.	Baud rate
COM_PAR	INPUT	WORD	E,A,M,D,L,Const.	Initialization parameters for the interface (see below)
RET_VAL	OUTPUT	WORD	E,A,M,D,L	Error information

Error information

Error code (W#16#....)	Description
0000	no error
00FE	incorrect interface number or incorrect initialization values

Meaning of "COM_PAR"

Bits 1..0	Number of data bits (00 = 5, 01 = 6, 10 = 7, 11 = 8)
Bits 4..2	Parity (000 = even, 001 = odd, 010 = force low, 011 = force high, 10x =no)

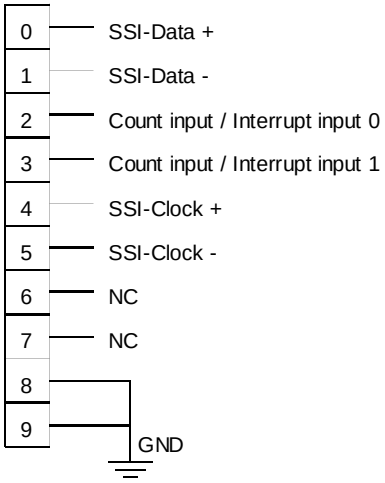
Permitted baud rates : 300, 600, 1200, 2400, 4800, 9600, 19200, 38400*)

*) 38400 for COM1 only

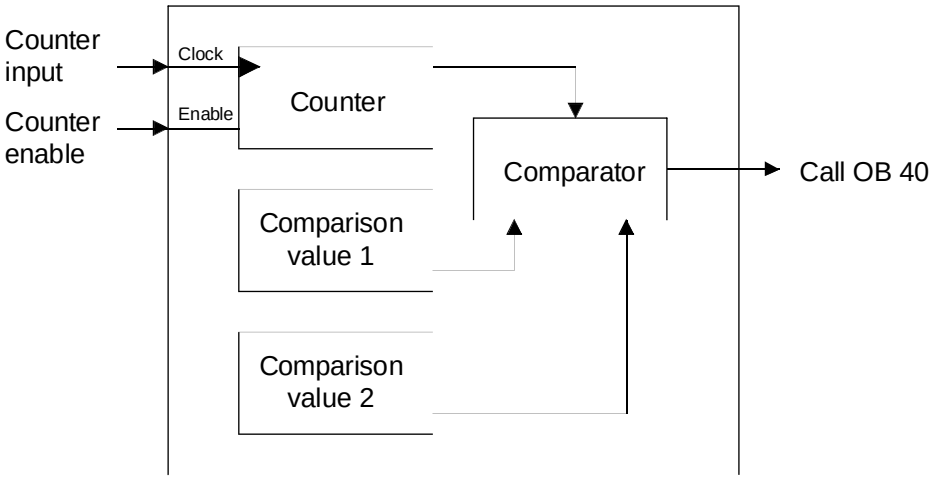
3.2 Interrupt inputs / fast counters

Interrupt inputs and the fast counter occupy the same elements. It is therefore only possible to use either the interrupt inputs or the fast counter.

Assignment of terminal block (see also section 1.4.4, terminal block above right).



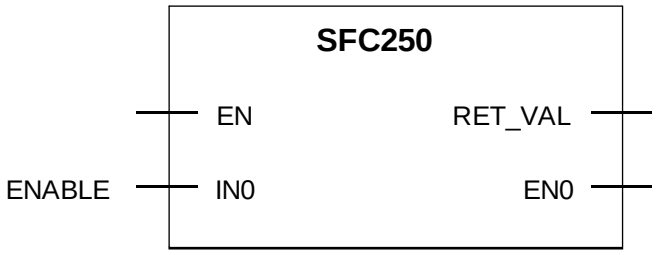
Block diagram of the fast counter



- The counter always starts from 0 (zero)
- Comparison value 1 must be smaller than comparison value 2
- The counter can count no higher than comparison value 2
- The counter always counts upwards

3.2.1 Block / enable interrupt inputs SFC 250 "INP_INT"

The "INP_INT" SFC is used to block or enable the interrupt inputs.



Parameters

Parameter	Declaration	Data type	Memory range	Description
ENABLE	INPUT	BIT	E,A,M,D,L	1 → Enable interrupts 0 → Block interrupts
RET_VAL	OUTPUT	WORD	E,A,M,D,L	Error information

When the interrupt condition occurs, OB 40 is called.

Caution : Interrupt input 2 (terminal 3) becomes active with a rising edge while interrupt input 1 (terminal 2) becomes active with a falling edge. Input 1 only triggers an interrupt when input 2 = zero.

Error information

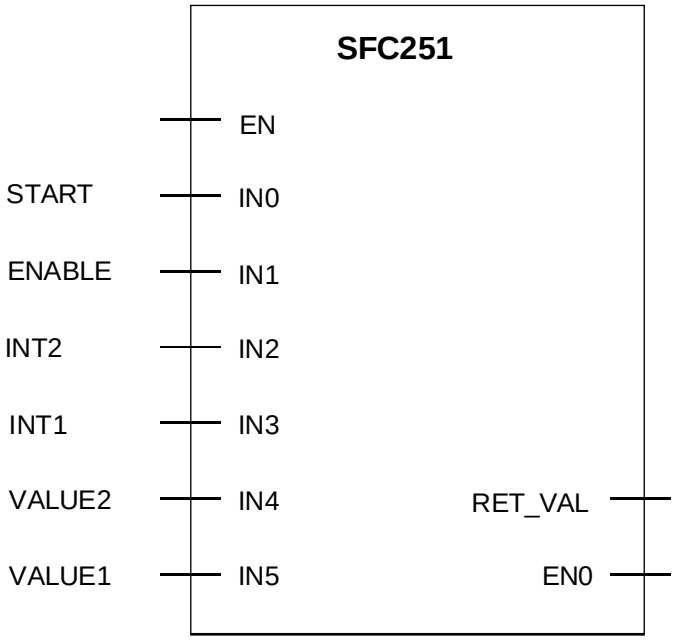
none

Using local variable 0B40_STRT_INF it is possible to query which of the two interrupt inputs is active:

OB40_STRT_INF = B#16#41 → Interrupt input 0
OB40_STRT_INF = B#16#42 → Interrupt input 1

3.2.2 Configure / start counter SFC 251 "INITCNTR"

The "INITCNTR" SFC configures and starts or stops the integral counter.



Parameters

Parameter	Declaration	Data type	Memory range	Description
START	INPUT	BIT	E,A,M,D,L	1 → Start counter (counts up) 0 → Stop counter
ENABLE	INPUT	BIT	E,A,M,D,L	1 → Enable input active 0 → Enable input inactive
INT2	INPUT	BIT	E,A,M,D,L	1 → Interrupt when second counter status is reached 0 → No interrupt when second counter status is reached
INT1	INPUT	BIT	E,A,M,D,L	1 → Interrupt when first counter status is reached 0 → No interrupt when first counter status is reached
VALUE2	INPUT	WORD	E,A,M,D,L	second counter status
VALUE1	INPUT	WORD	E,A,M,D,L	first counter status
RET_VAL	OUTPUT	WORD	E,A,M,D,L	Error information

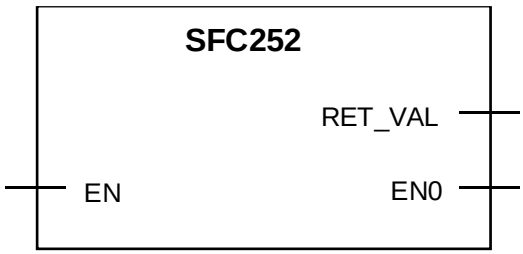
If the interrupts are enabled, OB 40 is called when the relevant counter status is reached.
Possible values for VALUE1 or VALUE2 : W#16#0002 to W#16#FFFF or 0.

Error information

Error code (W#16#....)	Description
0000	no error
00FD	invalid counter status (i.e. counter status has been transmitted as 1)

3.2.3 Read counter status SFC 252 "READCNTR"

The "READCNTR" SFC reads counter status.



Parameters

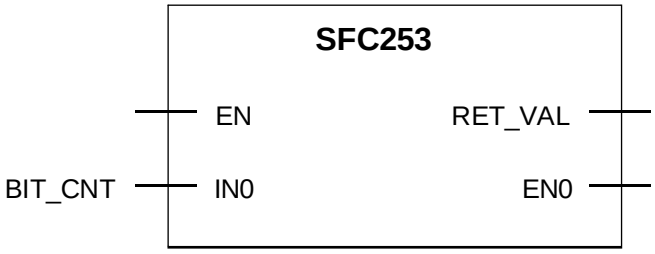
Parameter	Declaration	Data type	Memory range	Description
RET_VAL	OUTPUT	WORD	E,A,M,D,L	The RET_VAL parameter contains the value read.

3.3 SSI interface

3.3.1 Read SSI interface SFC 253 "READ_SSI"

(SSI = Synchronous Serial Interface)

The "READ_SSI" SFC can be used to read the integral SSI interface. This SFC reads the number of bits specified. No attempt is made to interpret the value read, i.e. any coded error bits which the value might contain must be evaluated in the STEP7 program. If the value is supplied in Gray code, this can be converted with SFC 254.



Parameters

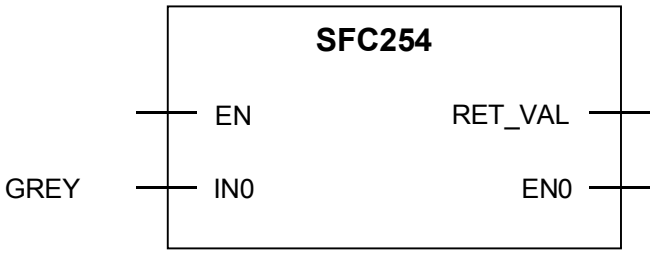
Parameter	Declaration	Data type	Memory range	Description
BIT_CNT	INPUT	BYTE	E,A,M,D,L,Const.	Number of bits to be read (1..32)
RET_VAL	OUTPUT	DWORD	E,A,M,D,L	The RET_VAL parameter contains the value read.

Error information

If when called an invalid number is transferred in "BIT_COUNT", the BIE bit is reset.

3.3.2 Converting Gray code to binary SFC 254 "GRAY2BIN"

The "GRAY2BIN" SFC converts a Gray code format number into binary format.



Parameters

Parameter	Declaration	Data type	Memory range	Description
GRAY	INPUT	DWORD	E,A,M,D,L,Const.	Value in Gray code
RET_VAL	OUTPUT	DWORD	E,A,M,D,L	The RET_VAL parameter contains the binary value

Error information

none

4. The serial communications interfaces (F - Modules)

The F-Modules are inserted directly into spaces A and B and make the following functions possible :

The following is available for space A (interface no. 1) :

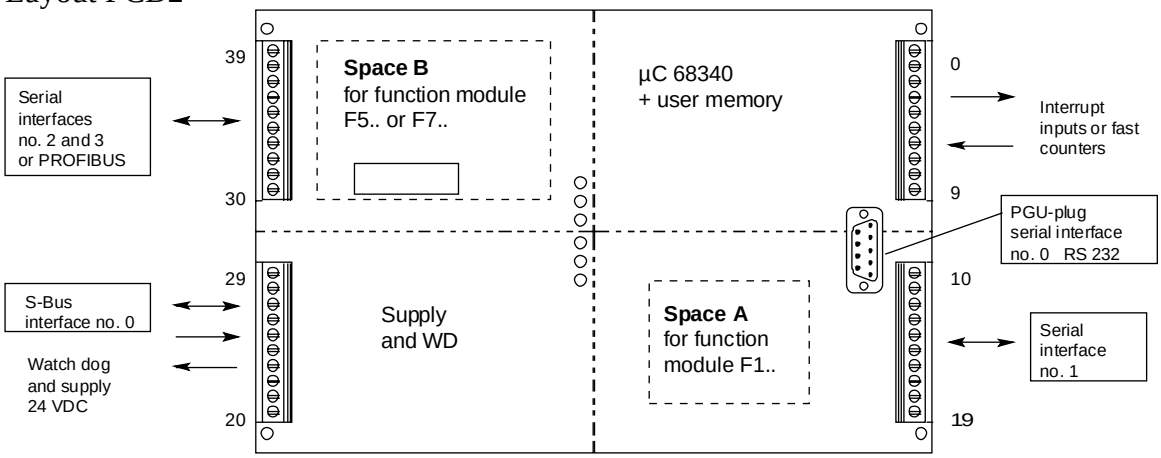
- model PCD7.F110 with RS 422/485 interface
- model PCD7.F120 with RS 232 interface
- model PCD7.F130 with 20 mA current loop interface
- model PCD7.F150 with RS 485 interface, electrically isolated

The following is available for space B **of the PCD2**:

- Type PCD2.F520/530 with communications interface no. 2 (RS232) as well as no. 3 (RS422/485). The PCD2.M127 base unit is required for the F520 module

4.1 Overview of the serial communications interfaces

Layout PCD2



In its maximum layout, the PCD1 has 2 communications interfaces and the PCD2 has 4 communications interfaces.

All interfaces can be assigned individually using the SASI instruction for various communications modes in the range 110 to 38400 bps.

The following baud rate combinations are **not possible** for the interfaces no. 0 and no. 1 (DUART 1), nor for interfaces no. 2 and no. 3 (DUART 1) :

38.4 KBaud	+	38.4 Kbaud
38.4 KBaud	+	19.2 KBaud
38.4 KBaud	+	150 Baud or 110 Baud

The following interfaces are available :

Interface 0 :
- MPI (Multi Point Interface)

Interface 1 :
- RS 422/RS 485,
  with PCD7.F110 plug-in module
  (fix RS 485 equipped on the PCD1.M110)
- RS232 (suitable for modem connection)
  with PCD7.F120 plug-in module
- 20 mA current loop
  with PCD7.F130 plug-in module
- RS 485 electrically isolated
  with PCD7.F150 plug-in module

Interface 2 :
- RS 232 ¦ on plug-in module

Interface 3 :
- RS 422/485 ¦ PCD2.F5..

4.2 The MPI interface no. 0

The following functions can be carried out via the MPI interface:

- Programming
- Data exchange with other controllers
- Connection of operator terminals and observation devices

The pin assignment of the MPI interface is the following:

Pin no.		Meaning
7	P24V	+ 24V
2	M24V	0V of the 24V supply
6	P5V	+ 5V
5	M5V	0V of the 5V supply
4	RTSAS	RTS of the AS
9	RTSPG	RTS of the PG
8	LTG_A	Data conductor A
3	LTG_B	Data conductor B

Warning: **No** PCD8.K111 cable may be employed

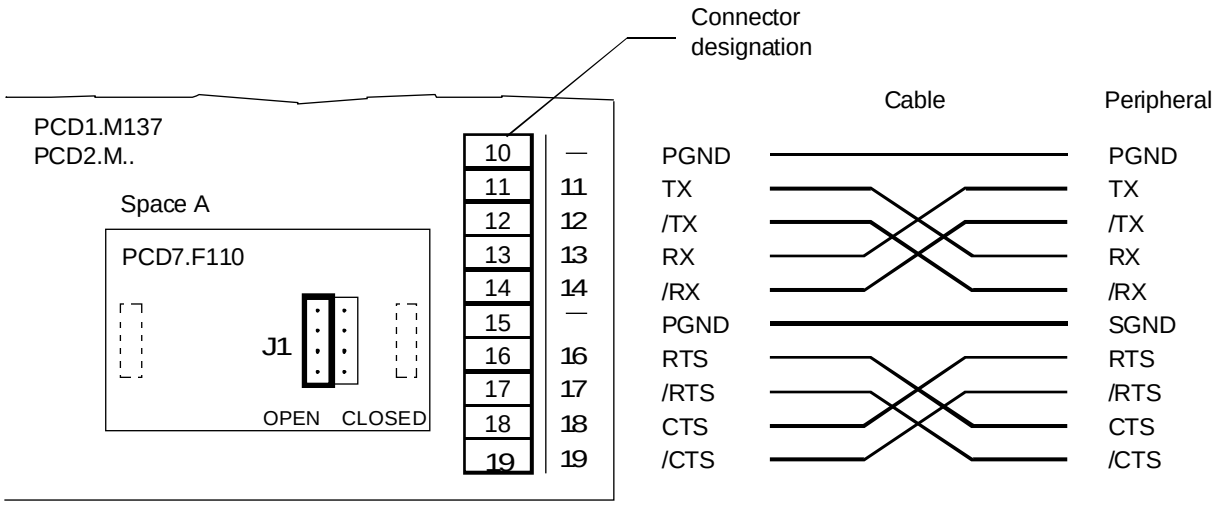
4.3 Interface no. 1 with modules PCD7.F1..

Interface no. 1 can be fitted by the PCD1.M137, by the PCD2:127 and by the PCD2.M227 with various interface modules of the type PCD7.F1.. at connection site A .

4.3.1 RS 422/485 with module PCD7.F110

- **Connexion for RS 422**

Point-to-point communications in all modes with the exception of MC4 and SS../SM.. (S-Bus) modes.

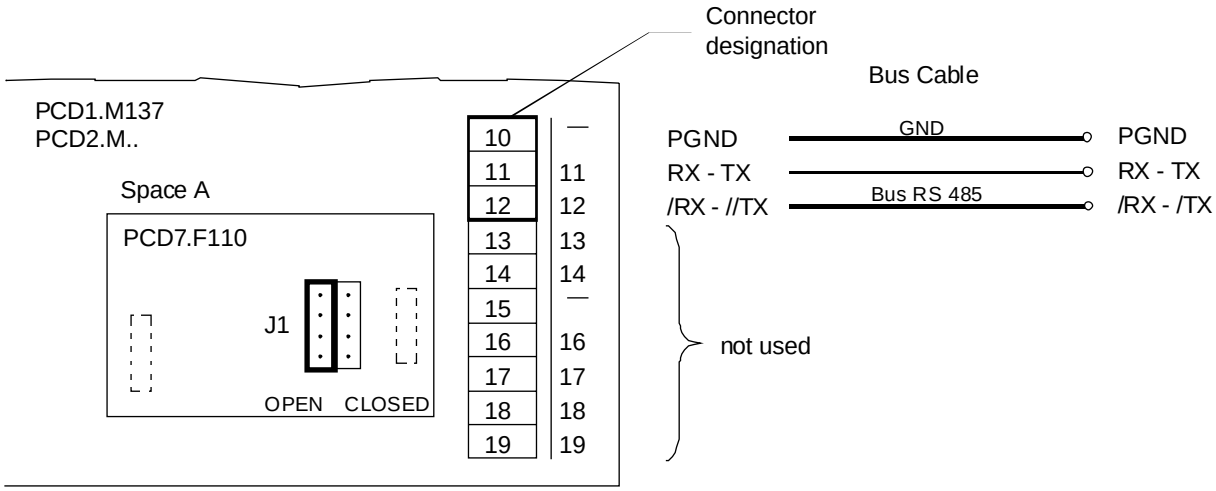


Note : For RS422 each pair of receiver lines is terminated on the ..F110 module with a 150Ω line termination resistor.

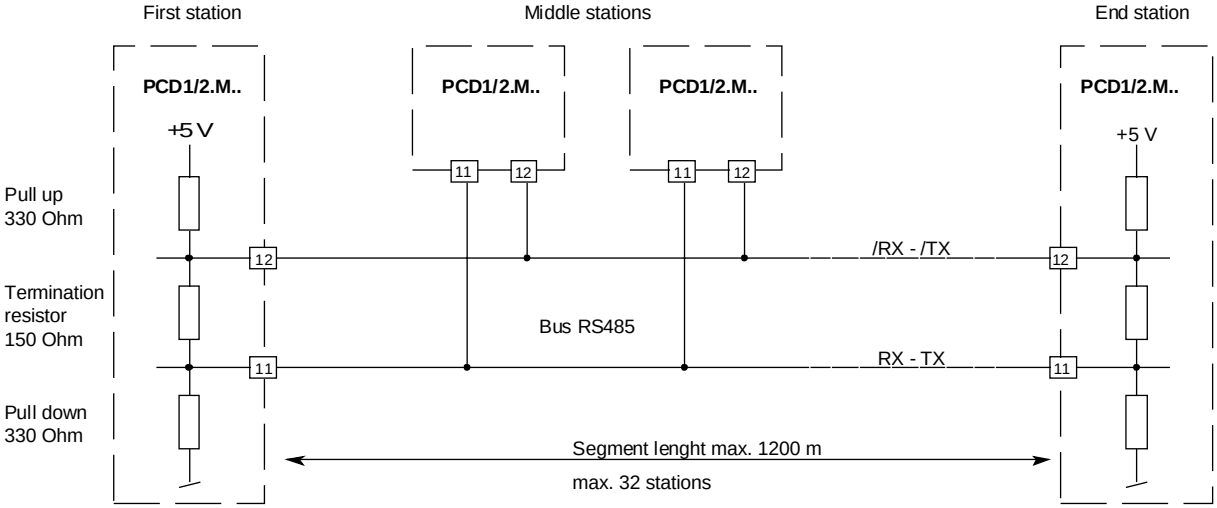
For this, jumper J1 must be left in the "OPEN" position (factory setting). The jumper J1 is located on the rear side of the F1 board.

F-Module PCD7.F120 is not available for PCD1.M137.

- **Connexion for RS 485 and S-Bus**



Selection of line termination resistors



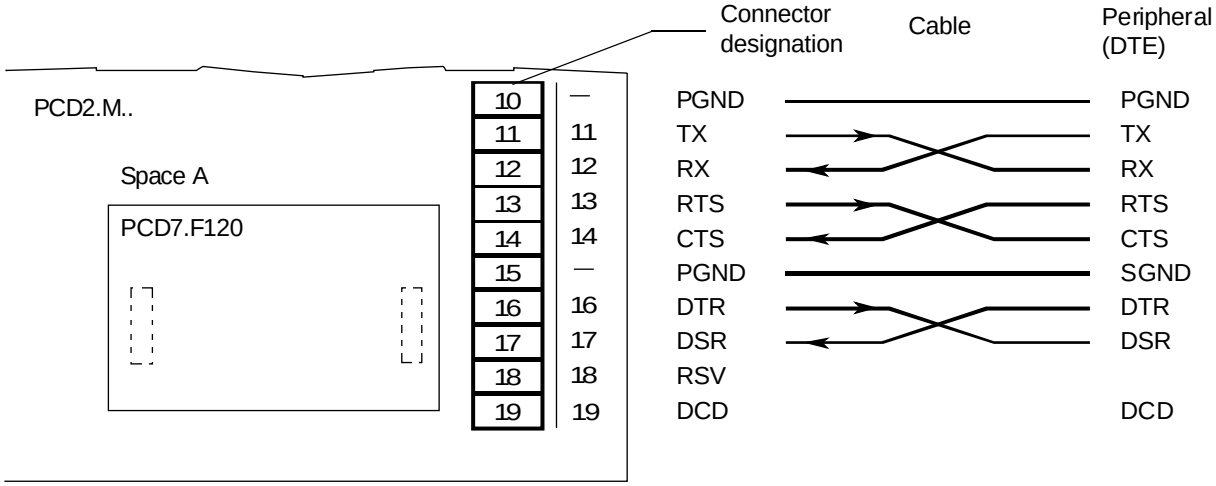
Note :

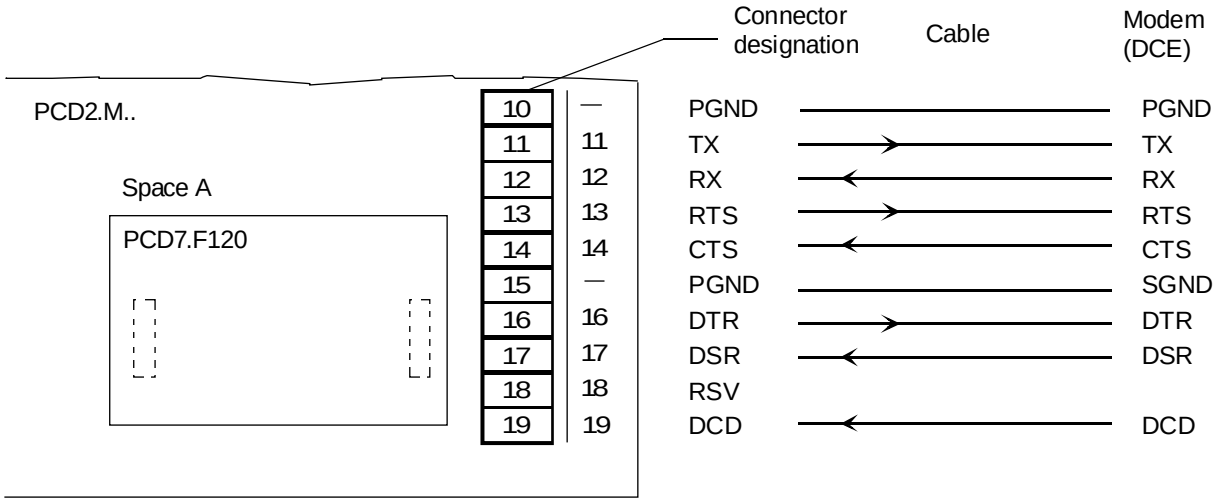
- At the first and last stations jumper J1 must be set to the "CLOSED" position.
- For all other stations, jumper J1 must be left in the "OPEN" position (factory setting).
  The jumper J1 is located on the rear side of the F1-board.

See also the manual "Installation Components for RS 485 Networks"

4.3.2 RS 232 with module PCD7.F120

This interface allows a connection to a modem.





(RSV → Reserve)

4.3.3 20mA current loop with module PCD7.F130 *)

Terminal	11:	TS	Transmitter Source	
Terminal	13:	TA	Transmitter Anode	Transmitter
Terminal	16:	TC	Transmitter Cathode	
Terminal	18:	TG	Transmitter Ground	
Terminal	12:	RS	Receiver Source	
Terminal	14:	RA	Receiver Anode	Receiver
Terminal	17:	RC	Receiver Cathode	
Terminal	19:	RG	Receiver Ground	

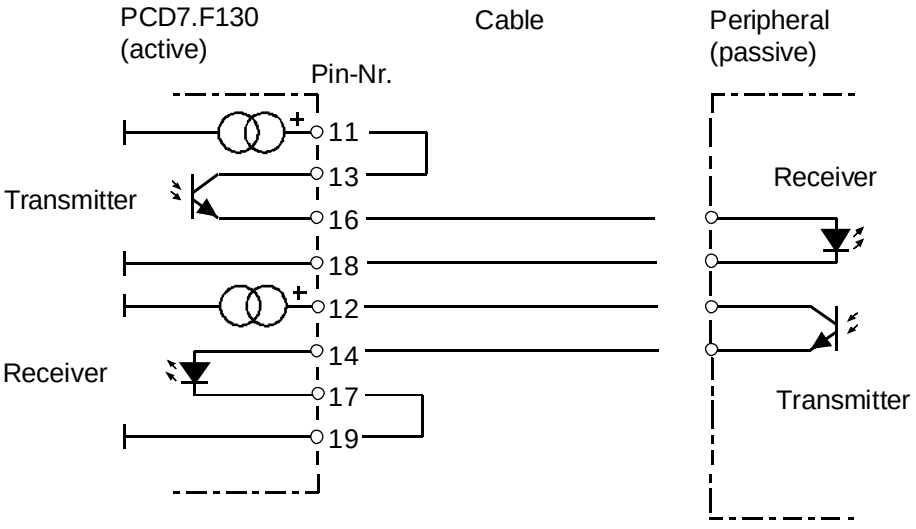
Signal type	Required value		Nominal value
Power for logic L (space)	-20mA...	+ 2mA	0mA
Power for logic H (mark)	+12mA...	+24mA+	20mA
Neutral Voltage on TS, RS	+16.0V...	+24.0V	+24.0V
Short circuit power on TS, RS	+18mA...	+29.6mA	+23.2mA

The idle state for data signals is "mark".

The user selects "active" or "passive" switching by means of wire jumpers on the screw terminals.

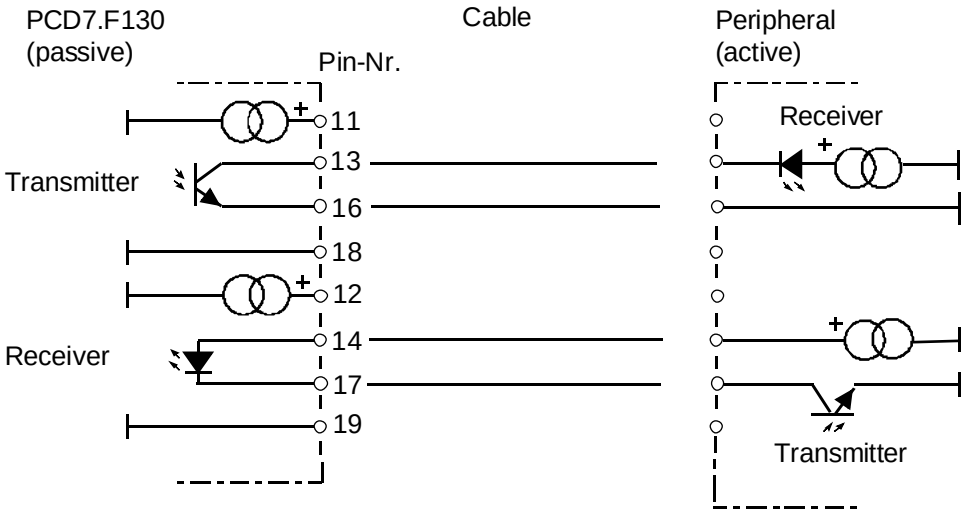
Connection examples for 20mA current loop

a) PCD1 or PCD2 active

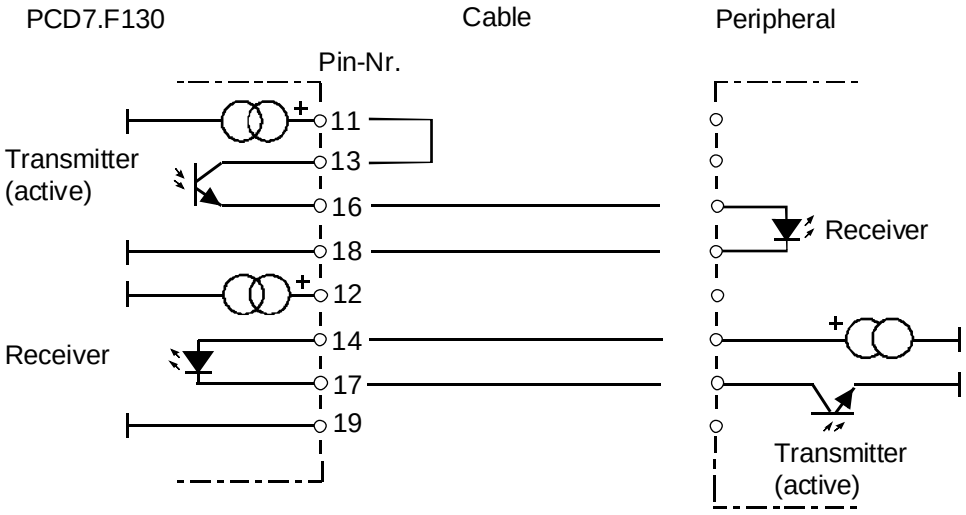


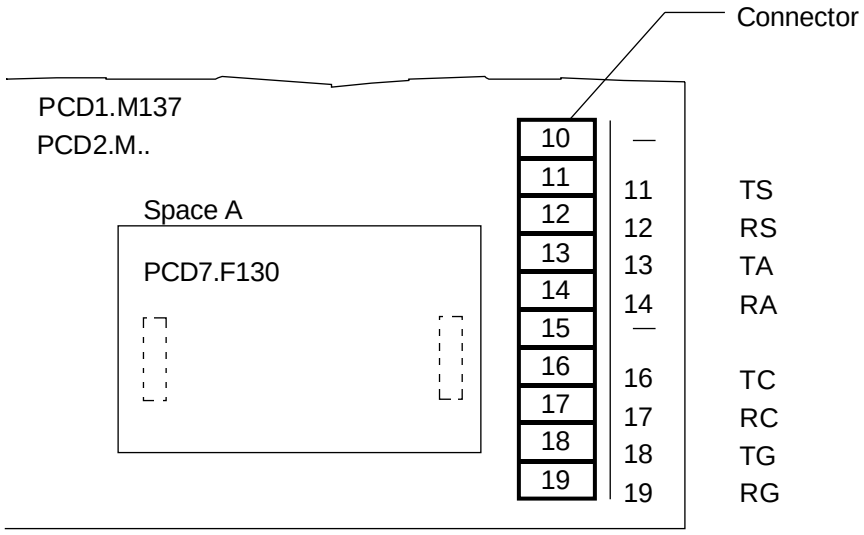
*) max. baud rate for 20mA current loop limited to 9600 Baud

b) PCD1 or PCD2 passive



c) PCD1 or PCD2 transmitter and peripheral transmitter active

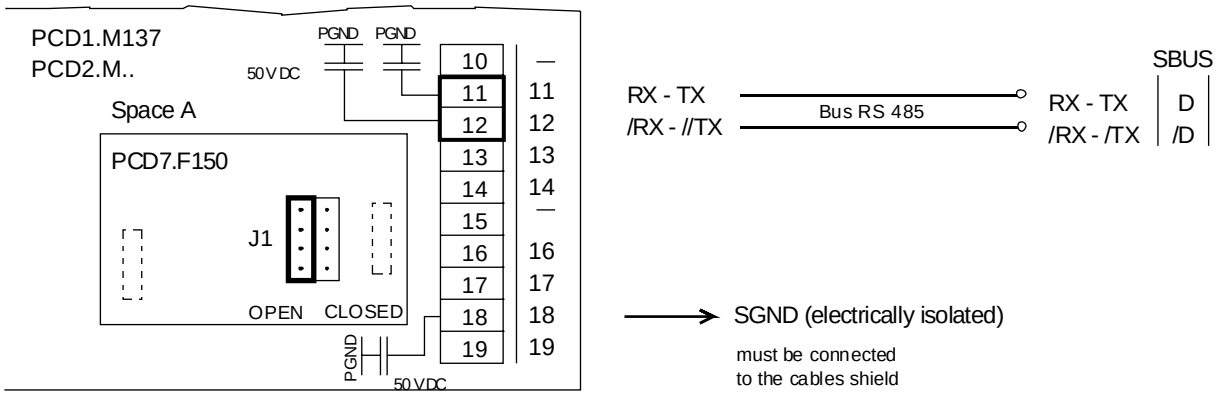




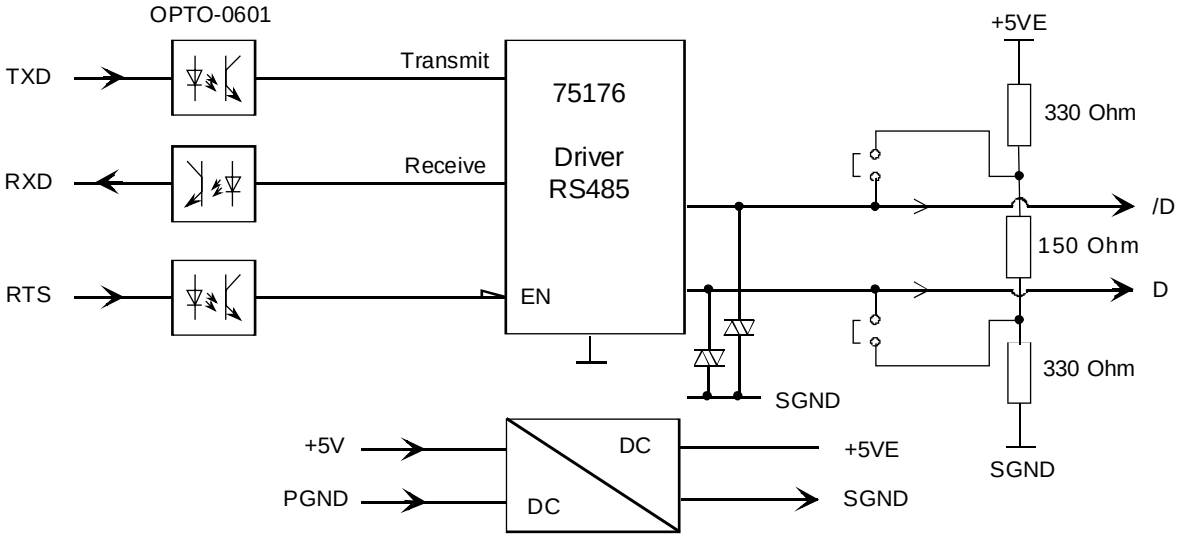
4.3.4 RS 485 electrically isoled with module PCD7.F150

Electrical isolation is achieved with 3 optocouplers and a DC/DC converter. Data signals D and /D are each protected against overvoltages by a suppressor diode (10V). The line termination resistors can be connected or disconnected with jumper J1.

Connection



Block diagram



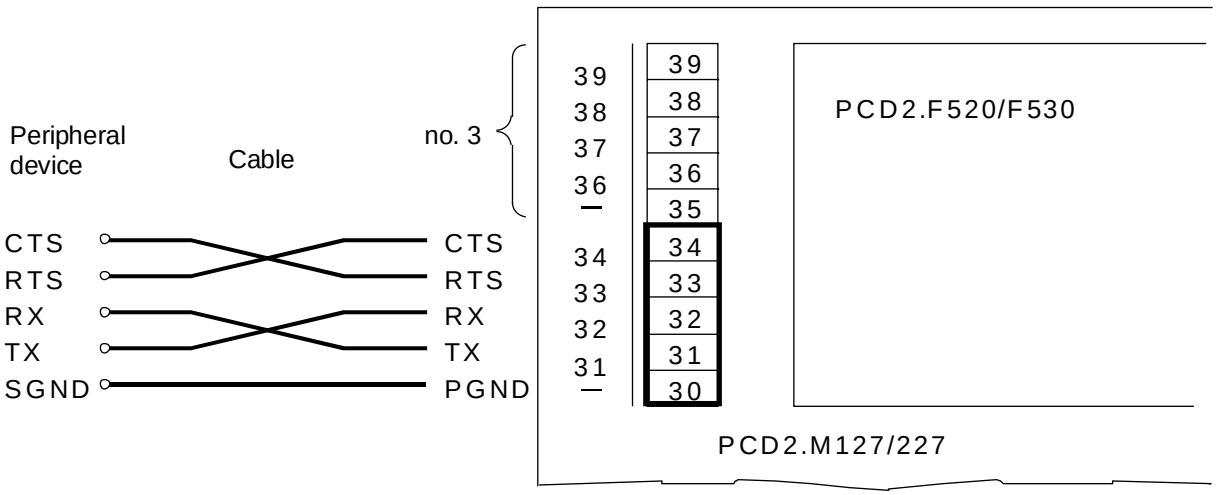
Note: Common mode voltage :
50 V, limited by capacitors between the data lines and SGND (on the base module)

For the installation, see the manuel "Installation Components for RS-485 Networks", order code 26/740 F.

4.4 Interface no. 2 RS 232 with modules PCD2.F5..

With the PCD2.M127 and PCD2.M227 only.
Inserting the PCD2.F520 or PCD2.F530 module in space B of the PCD2.M120 base unit configures interface no. 2 as RS 232.

Because of insufficient control lines, this interface **is not suitable** for the connection of a modem. For modem connection please use interface no. 1 with PCD7.F120 (see section 4.3.2).



Instructions :

- The PCD2.F530 module is also equipped with a 6-digit display.

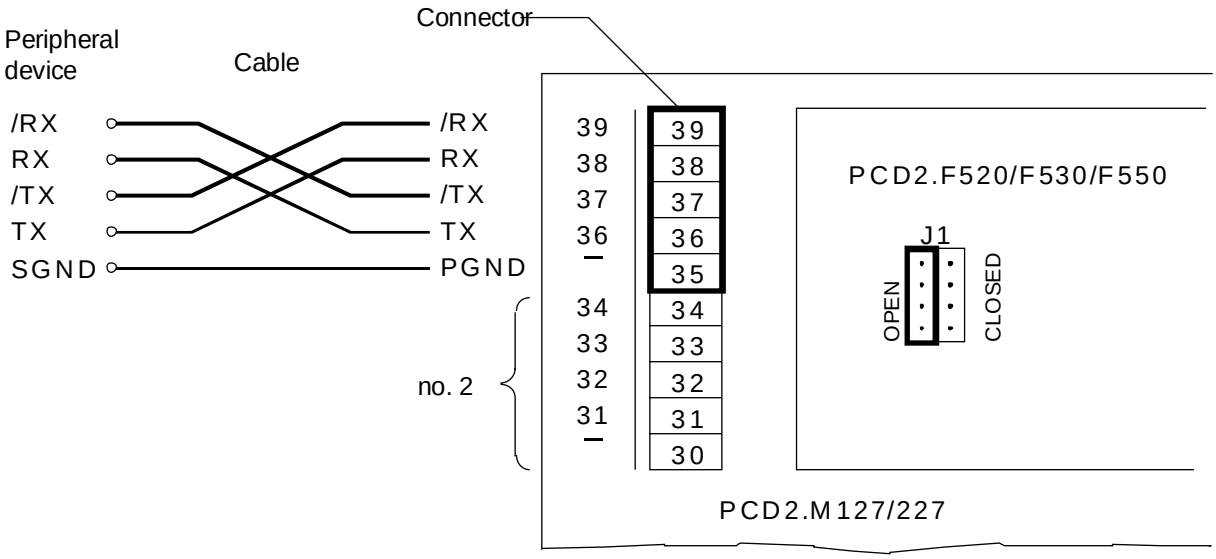
4.5 Interface no. 3 RS 422/RS 485 with modules PCD2.F5..

With the PCD2.M127 and PCD2.M227 only.
Inserting the PCD2.F520, F530 or F550 module in space B of the PCD2.M120 base unit configures interface no. 3 as RS 422/485.

- **Connexion for RS 422**

Point-to-point communications in all modes with the exception of MC4 and SS../SM.. (S-Bus) modes.

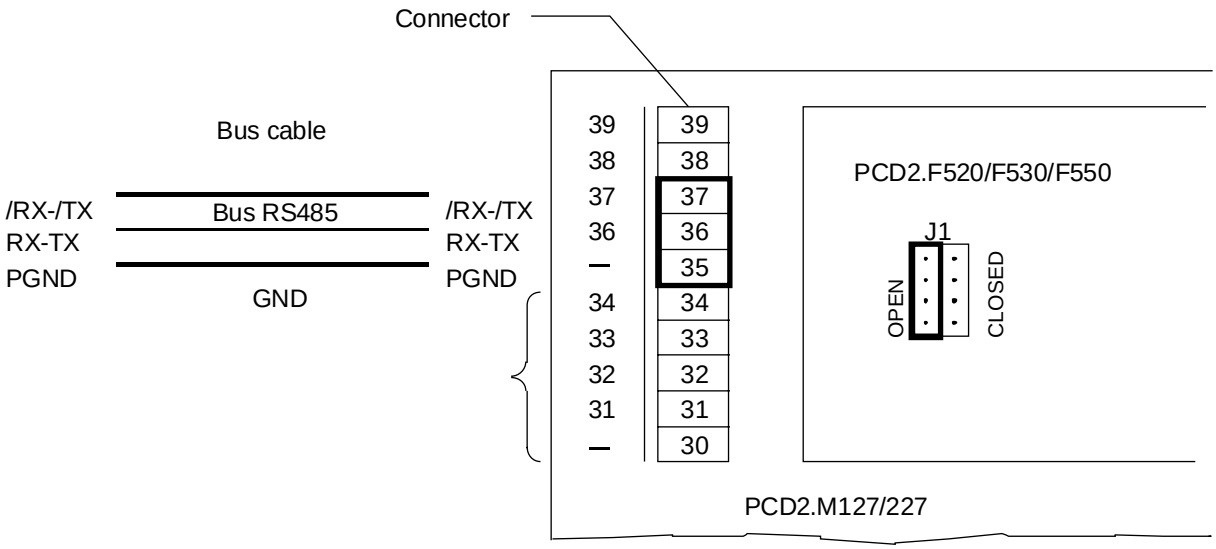
This RS 422 does not have any control lines. If they are required, the PCD7.F110 module should be used in space A.



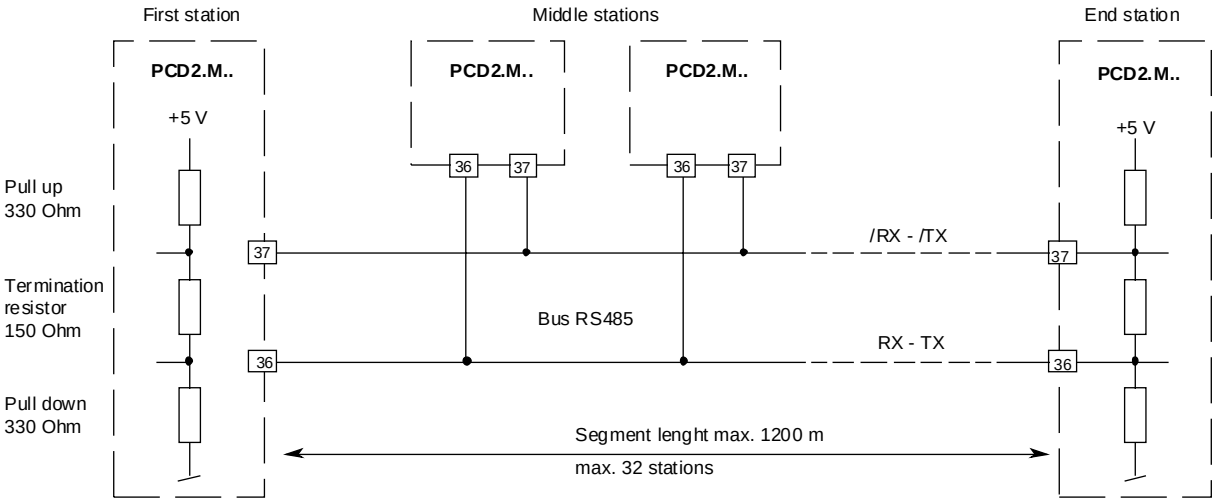
Instructions:

- Every pair of receiving lines for the RS 422 interface is closed with a termination resistance of 150 Ω.
- This requires jumper J1 to be in the "OPEN" position (factory setting).

- **Connexion for RS 485**



Selection of line termination resistors



Note :

- At the first and last stations jumper J1 must be set to the "CLOSED" position.
- For all other stations, jumper J1 must be left in the "OPEN" position (factory setting).
- See also the manual "Installation Components for RS485 Networks

4.6 Definitions for serial interfaces

Signal types

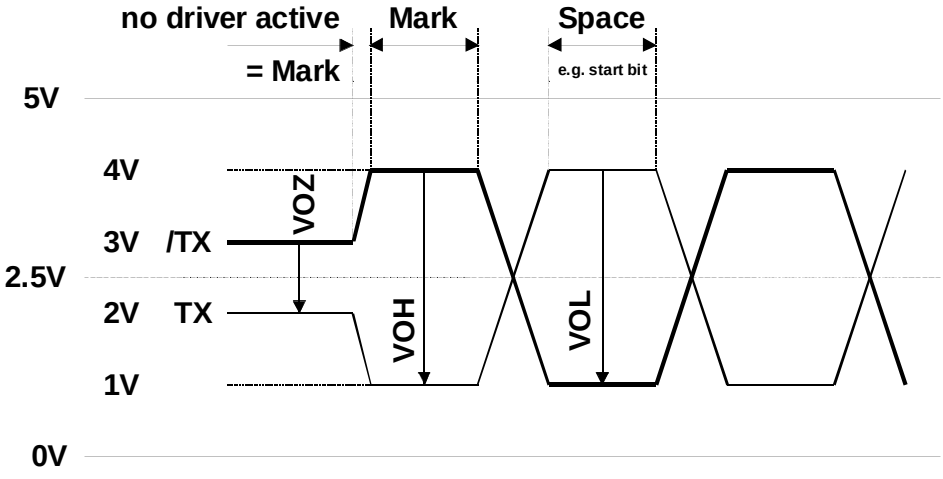
TX	Transmit Data	Data signal
RX	Receive Data	
RTS	Request To Send	Control/Message signal
CTS	Clear To Send	
DTR	Data Terminal Ready	
DSR	Data Set Ready	
RI	Ring Indicator	
DCD	Data Carrier Detect	

Signal for RS 232

Signal type	Logical state	Required value	Nominal value
Data signal	0 (space)	+ 3 V to +15 V	+7 V
	1 (mark)	-15 V to - 3 V	- 7 V
Control/	0 (off)	-15 V to - 3 V	- 7 V
Message sinal	1 (on)	+ 3 V to +15 V	+7 V

The idle state of data signals is "mark". The idle state for control/message signals is "off".

Signal for RS 485 (RS 422) *)



VOZ = 0.9 V min. to 1.7 V max. (no driver active)
VOH = 2 V min. (with load) to 5 V max. (without load)
VOL = -2 V to -5 V

*) RS 422 is in the "Mark" position in its inactive state.

RS 422

Signal type	Logical state	Polarity
Data signal	0 (space) 1 (mark)	TX positive to /TX /TX positive to TX
Control/ Message signal	0 (off) 1 (on)	/RTS positive to RTS RTS positive to /RTS

RS 485

Signal type	Logical state	Polarity
Data signal	0 (space) 1 (mark)	RX-TX positive to /RX-/TX /RX-/TX positive to RX-TX

Caution :

The RS485 bus must be laid in a cable channel which has been isolated from high power cables. Moreover, in high interference environments, electrically isolating convertor modules of the type PCD7.T1.. should be used...!

5. Digital input/output modules

To guarantee maximum protection against interference, all digital I/O modules pass a stringent interference test, in accordance with IEC 801-4. Modules can be plugged into any slot on the PCD1 or PCD2 I/O bus.

Caution : Digital I/O modules should only be changed when the PCD is disconnected from power source.

Input modules PCD2.E...

Types / characteristics	..E110 ..B100*)	..E111	..E500	..E610	..E611
Number of inputs	8	8	6	8	8
Nominal input voltage	24 VDC	24 VDC	115-230VAC	24 VDC	24 VDC
Electrically isolated	No	No	Yes	Yes	Yes
Operating mode	Source or sink	Source or sink	Source	Source or sink	Source or sink
Input delay (ms.)	8	0.2	30	10	0.2/1.0
See chapter	5.1	5.1	5.2	5.3	5.3

Output modules PCD2.A...

Types/characteristic	..A200	..A220	..A250	..A300	..A400 ..B100*)	..A410
Number of outputs	4	6	8	6	8	8
Control element	Relay 1)	Relay 2)	Relay 2)	MOSFET	MOSFET	MOSFET
Electrically isolated	Yes	Yes	Yes	No	No	Yes
Operating mode	(Make contact)	(Make contact)	(Make contact)	Positive switching	Positive switching	Positive switching
Breaking capacity	2A, 250VAC 2A, 50 VDC	2A, 250VAC 2A, 50 VDC	2A, 48 VAC 2A, 50 VDC	2A, 24VDC	0.5A, 24VDC	0.5A, 24VDC
Short-circuit protection	No	No	No	No	No	No
See chapter	5.4	5.5	5.6	5.7	5.8	5.9

*) PCD2.B100 input/output module - see chapter 5.10
1) Relays with integrated contact protection
2) Relays without contact protection

Notes:

5.1 PCD2.E110/111 Digital input module, electrically connected

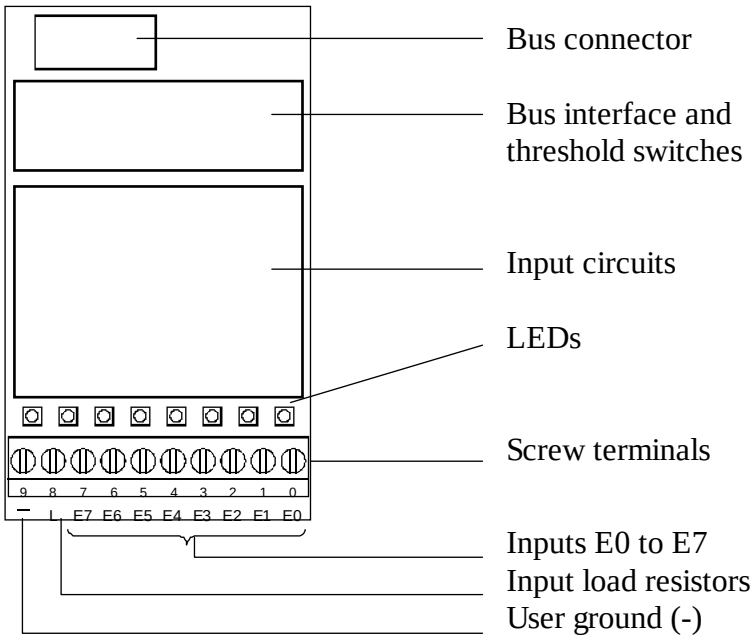
Application

Low price input module for source or sink operation with 8 non-isolated inputs. Suitable for most electronic and electro-mechanical switching elements at 24 VDC.
Type PCD2.E111 has a short input delay of typ. 0.2 ms.

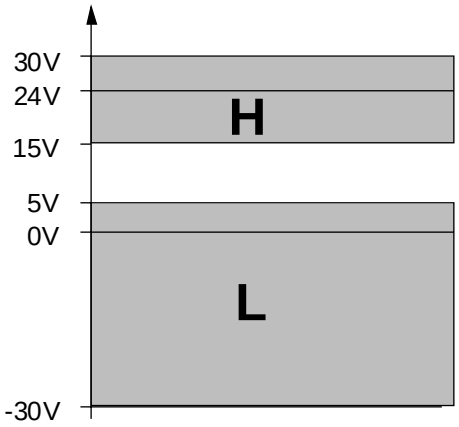
Technical information

Total inputs per module	8, non-isolated
Operating mode	Source or sink operation
Input voltage Ue (nominal)	E110 : 24 VDC, smoothed or pulsed E111 : 24 VDC, smoothed with ripple of max. 10 % Special : 5 and 12 VDC on request
Input current	6 mA at 24 VDC
Typical input delay	E110 : 8 ms E111 : 0.2 ms
Resistance to interference as IEC 801-4	2 kV under capacitive coupling (whole brunch of pairs)
Internal current consumption (from 5 V bus)	1 to 24 mA

Presentation



Input signal definition



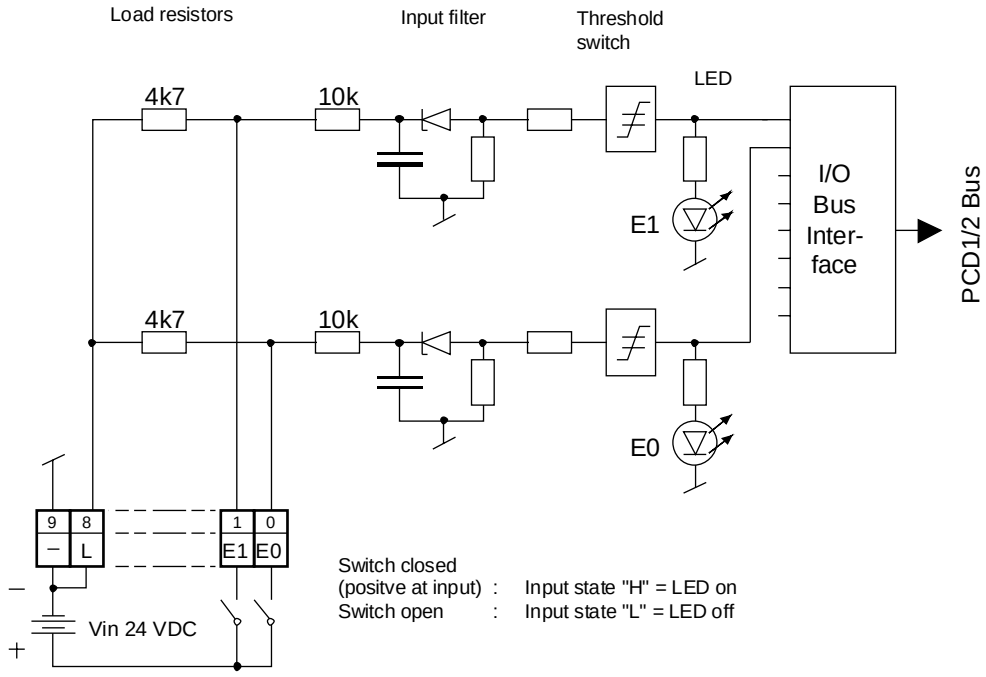
Because of the typical input delay of 8 ms for type E110, full-wave rectified DC is adequate for external supply.

Type E111 needs smoothed DC voltage.

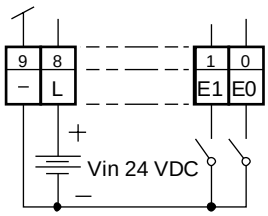
Input circuits and terminal assignment

Depending on external wiring, this module may be used for source or sink operation.

Source operation or positive logic :



Sink operation or negative logic :



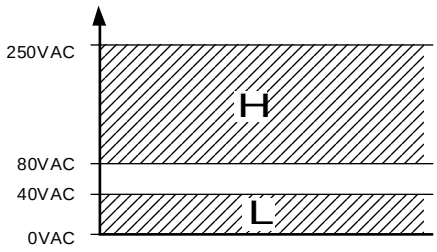
Switch closed
(negative at input) : Input state "L" = LED off
Switch open : Input state "H" = LED on

5.2 PCD2.E500 Digital input module for voltages from 115 to 230 VAC

Application

Module with 6 decoupled inputs for AC voltage. The inputs are designed for source operation and have a common "COM" connection. Only the positive half-wave of the AC voltage is evaluated.

Technical information

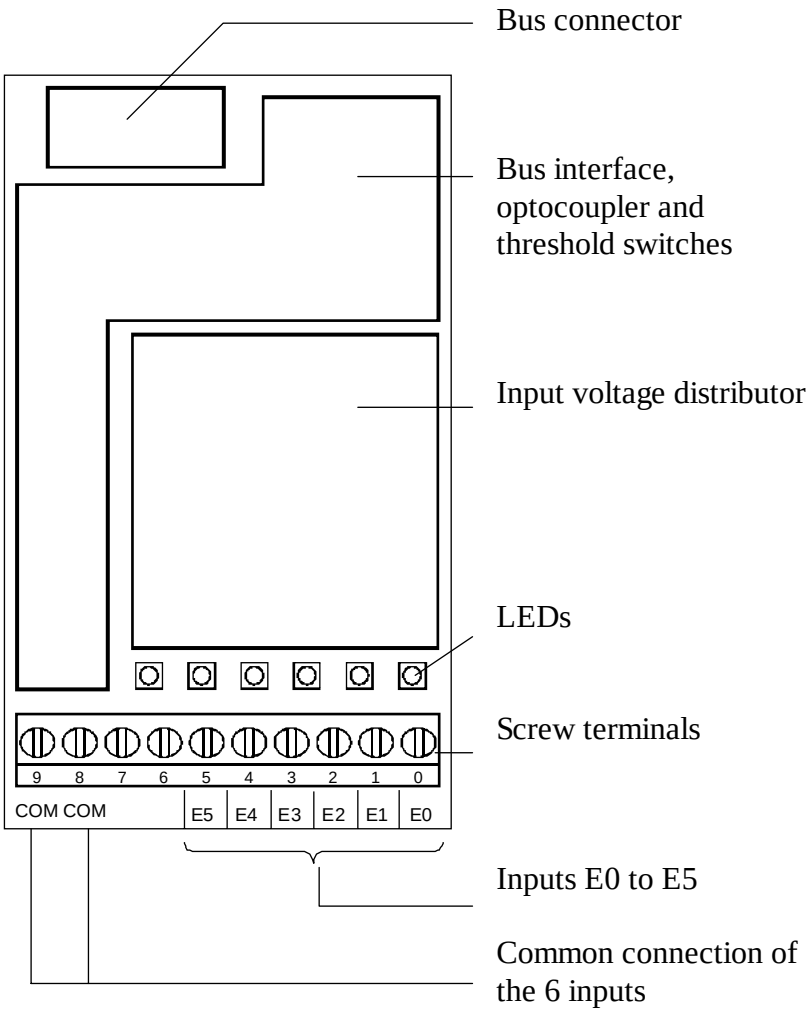
Total inputs per module	6, electrically decoupled from the processor (CPU)
Operating mode	Source operation For any one module, all inputs are at the same phase.
Input voltage (Ue)	115 to 230 VAC, 50 or 60 Hz, sine form (80 to 250 VAC)
On/Off switching level	
Input current	115 VAC 5 - 6 mA (idle current) 230 VAC 10 - 12 mA (idle current)
Input delay : switching on switching off	 typ. 10 ms; max. 20 ms typ. 20 ms; max. 30 ms
LED	supplied directly from input current
Resistance to interference as IEC 801-4	4 kV, under direct coupling 2 kV, under capacitive coupling (whole brunch of pairs)
Electrical isolation voltage	2000 VAC, 1 minute
Resistance isolation voltage	100 MΩ at 500 VDC
Optocoupler isolation voltage	2.5 kV
Internal current consumption (from 5 V bus)	< 1 mA

Installation instructions

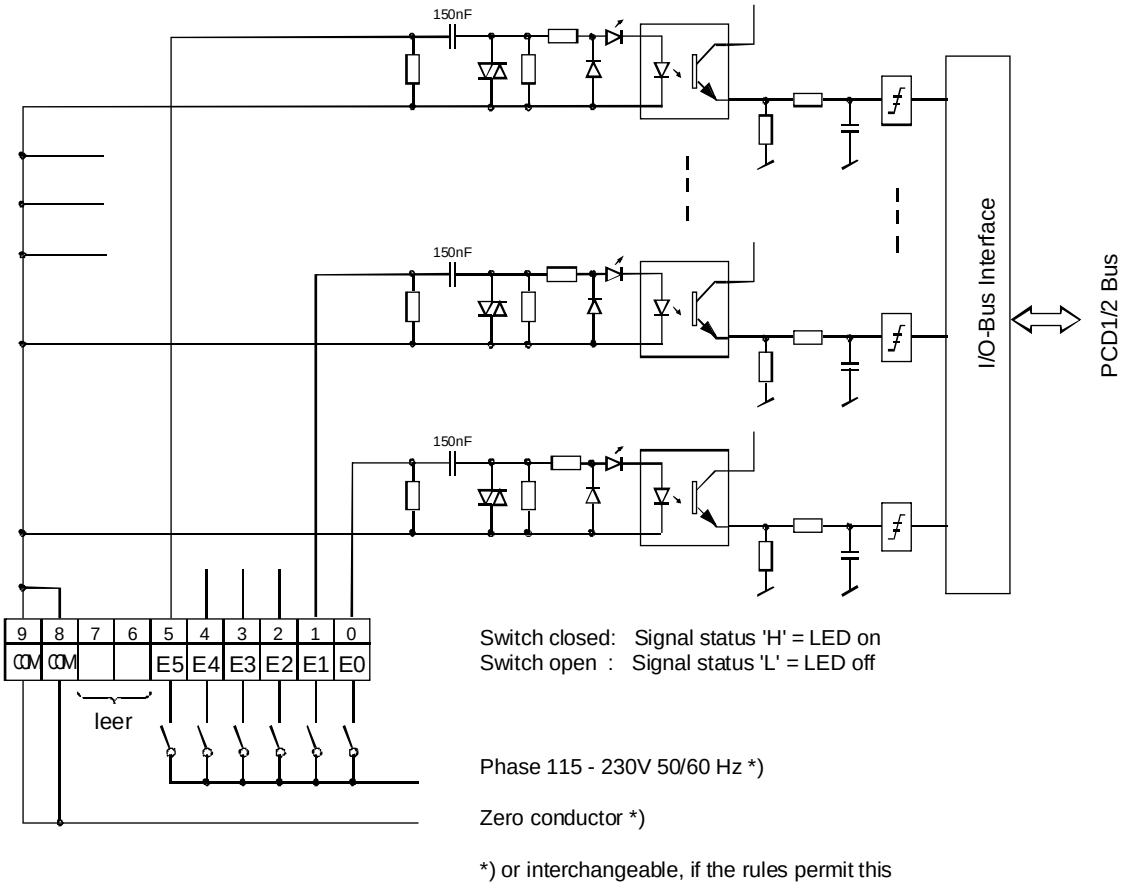
For safety reasons, extra-low voltage (up to 50V) and low voltage (50 to 250V) should not be connected to the same module.

If a PCD1 or a PCD2 system module is connected to low voltage (50 to 250V), approved low-voltage components must be used for any elements which are electrically coupled to that system.

Presentation



Input circuit and terminal identification



*) Phase and zero conductor (neutral) can be interchangeable, if the rules permit this.

Notes:

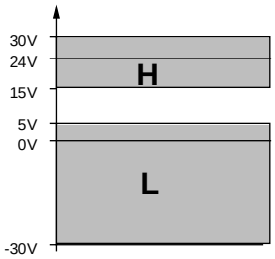
5.3 PCD2.E610/611 Digital input module, with electrical isolation

Application

Input module with electrical isolation for source or sink operation with 8 inputs. Suitable for most electronic and electro-mechanical switching elements at 24 VDC.
Type PCD6.E611 has a short input delay.

Technical information
From version "B" (30.06.97) some values have changed

Total inputs per module	8, electrically isolated by optocouplers
Operating mode	Source or sink operation
Input voltage Ue (nominal)	E610 : 24 VDC, smoothed or pulsed E611 : 24 VDC, smoothed with ripple of max. 10 % Special : 5 and 48 VDC on request



Because of the typical input delay of 10 ms for type E610, full-wave rectified DC is adequate for external supply.

Typ E611 needs smoothed DC voltage.

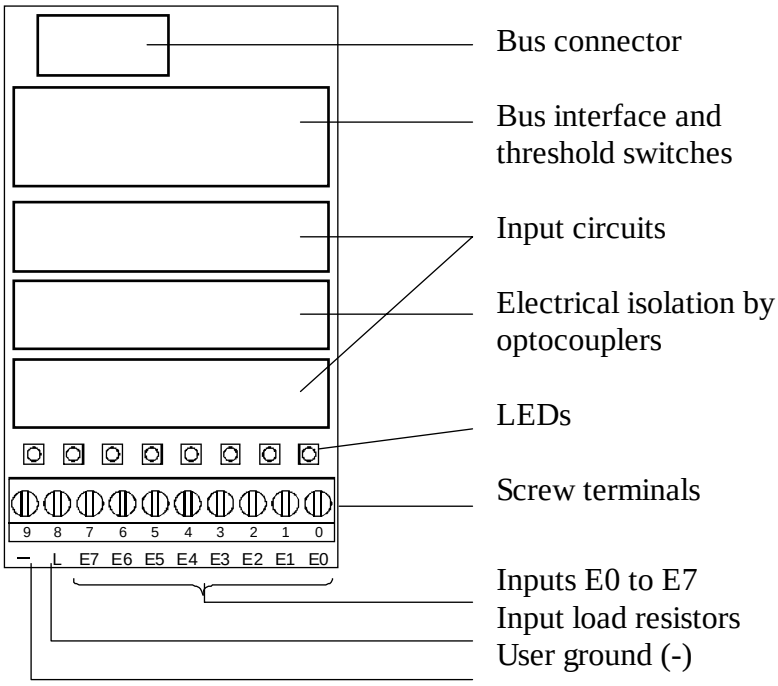
Supply voltage (Ue)	for source operation : min. 15 V for sink operation : min. 18 V

Input current (at 24 VDC)	Version:	"A"	"B"
	for source op.:	12 mA	5.0 mA
	for sink op.:	5.5 mA	3.7 mA

Typical input delay (low-high / high-low)	Version:	"A"	"B"
	E610 :	8/8 ms	10/10 ms
	E611 :	0.1/0.3 ms	0.2/1.0 ms

Resistance to interference as IEC 801-4	4 kV under direct coupling 2 kV under capacitive coupling (whole brunch of pairs)
Electrical isolation voltage	1000 VAC, 1 minute
Optocoupler isolation voltage	2.5 kV
Internal current consumption (from 5 V bus)	1 to 24 mA

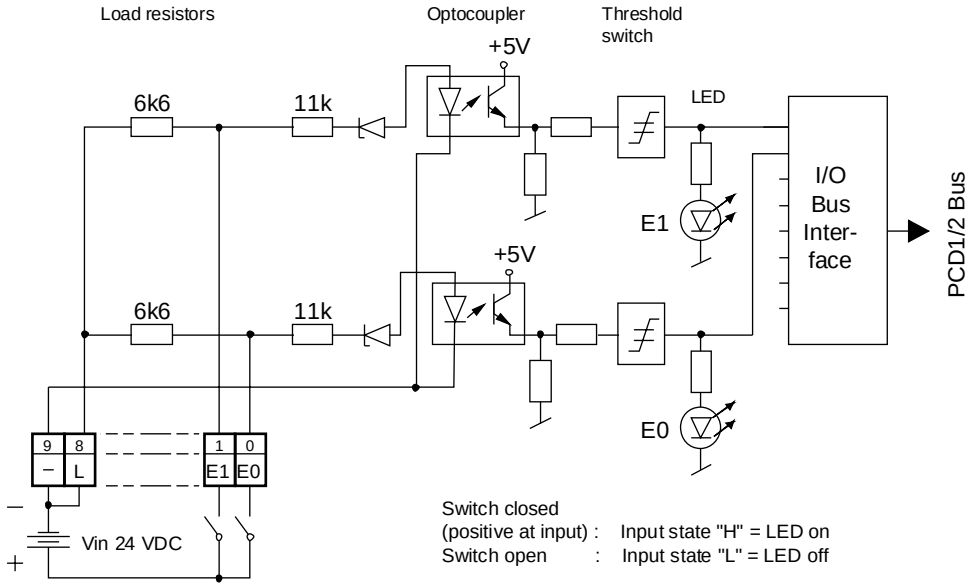
Presentation



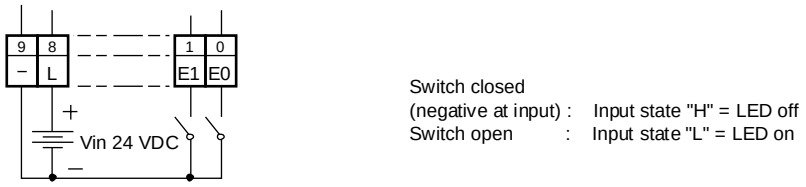
Input circuits and terminal assignment

Depending on external wiring, this module may be used for source or sink operation.

Source operation or positive logic:



Sink operation or negative logic:



5.4 PCD2.A200 Digital output module with 4 relay contacts (with contact protection)

Application

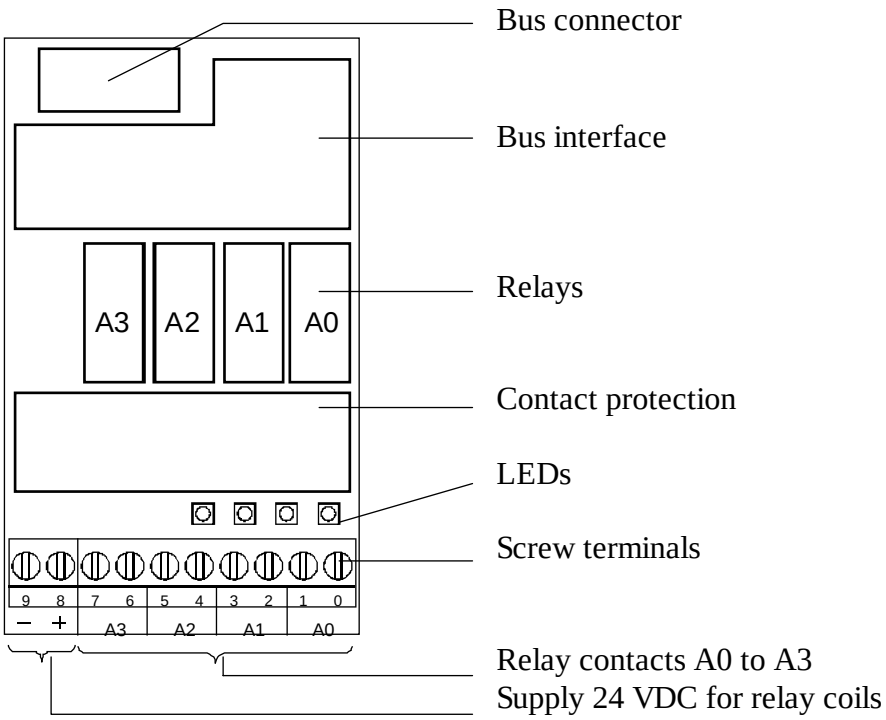
The module contains 4 relays with normally-open contacts for direct or alternating current up to 2 A, 250 VAC. It is especially suited wherever perfectly isolated AC switching circuits must be controlled with infrequent switching (see installation notes on page 5-13). The relay contacts are protected by a varistor and an RC spark quenching.

Technical information

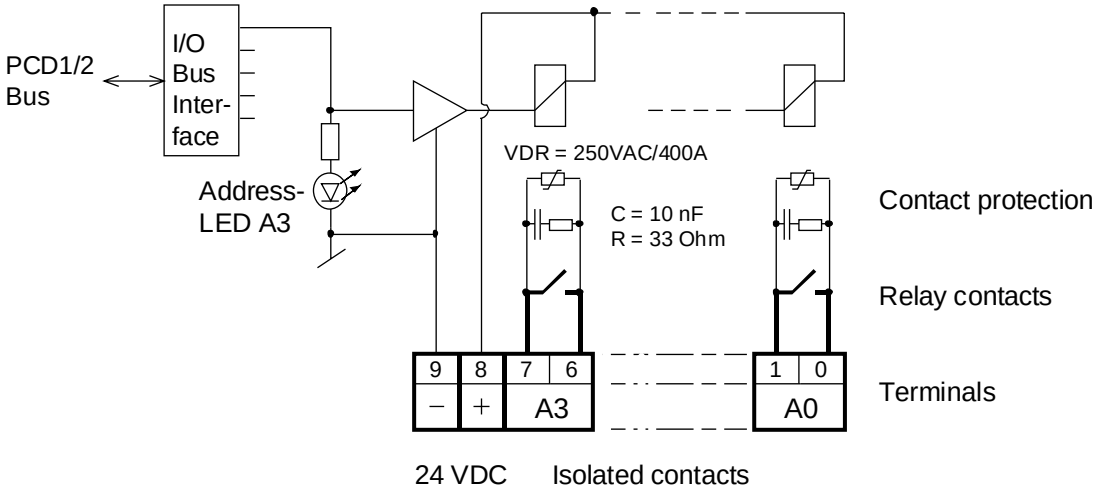
Total outputs per module	4, electrically isolated, normally open contacts (NO)
Type of relay (typical)	REO 30024, SCHRACK
Switch rating (contact lifetime)	2 A, 250 VAC AC1 (0.7×10^6 operations) 1 A, 250 VAC AC11 (10^6 operations) 2 A, 50 VDC DC1 (0.3×10^6 operations) 3) 1 A, 24 VDC DC11 (0.1×10^6 operations) 1) 3)
Relay coil supply 2)	nominal 24 VDC, smoothed or pulsed, 8 mA per relay
Voltage tolerance dependent on ambient temperature	20°C : 17.0 .. 35 VDC 30°C : 19.5 .. 35 VDC 40°C : 20.5 .. 32 VDC 50°C : 21.5 .. 30 VDC
Typical output delay	5 ms on 24 VDC
Resistance to interference as IEC 801-4	4 kV under direct coupling 2 kV under capacitive coupling (whole brunch of pairs)
Internal current consumption (from 5 V bus)	1 to 15 mA

1) With external protective diode
2) With reverse voltage protection
3) These ratings are not UL-listed !

Presentation



Output diagram and terminal assignment



Relay energized (contact closed) : LED on
Relay reset (contact open) : LED off
24 VDC must be connected to terminals "+" and "-".

If the relay contact is open, the current leakage through the contact protector is **0.7 mA** (at 230 V/50 Hz). This should be taken into account for the smaller AC loads.

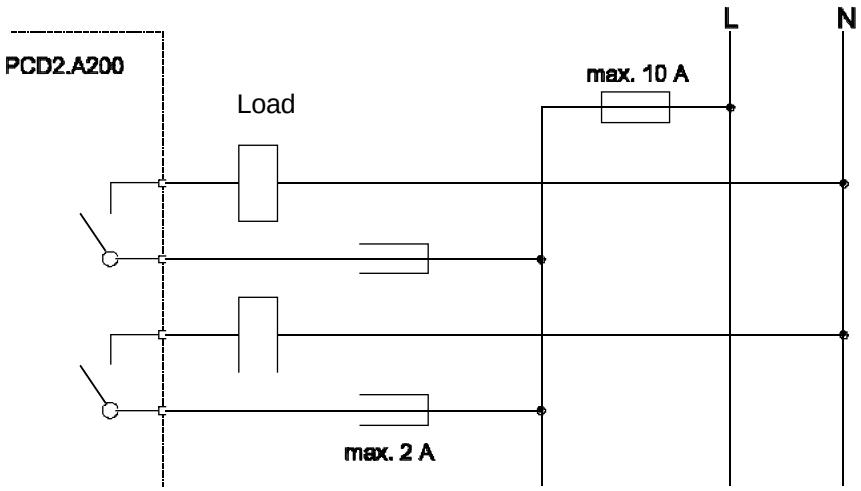
Advice : if it is the case, use a PCD2.A220 module , without contact protection.

Installation notes

For reasons of safety it is **not allowed** that low voltages (up to 50V) and higher voltages (50..250V) are connected to the same module.

If a PCD1 or a PCD2 system module is connected to a higher voltage (50.. 250V), higher voltage approved components have to be used for all elements which are galvanically connected to the system.

Using higher voltage (50... 250V), all connections to the relay contacts are to be connected on the same circuit. That means at one point in such a way that they are all protected against **one AC-phase** by only **one fuse**. Each load circuit may be protected individually by a fuse of max. 2A.



Switching inductive loads

Because of the physical properties of inductivity, it is not possible to disconnect inductance without interference. This interference must be minimized as far as possible. Although the PCD is immune to this interference, there are other devices which may be susceptible.

Is should be noted here that, as part of the harmonization of standards throughout the EU, the EMC standards are valid from 1996 (EMC Directive 89/336/EG). Two principles should therefore be emphasized :

1) THE PROTECTION AGAINST INTERFERENCES FROM INDUCTIVE LOADS IS IMPERATIVE.

2) INTERFERENCE SHOULD BE ELIMINATED AS CLOSE AS POSSIBLE TO ITS SOURCE.

It is therefore recommended that a protection circuit should be fitted at the load (often available as normal components on standardized contactors and valves).

When switching direct voltage it is urgently recommended that a recovery diode is fitted above the load. This should even take place when, theoretically, an Ohmic load is switched.

In practice, there will always be a proportion which is inductive (connection cable, resistance coil, etc.). In this case it should be noted that the switch-off time will be longer :

$$\text{Ta approx. } L/RL * \sqrt{(RL * IL/0.7)}$$

For direct voltage the transistor output modules are recommnended.

Relay manufacturer's information on RC unit dimensioning.

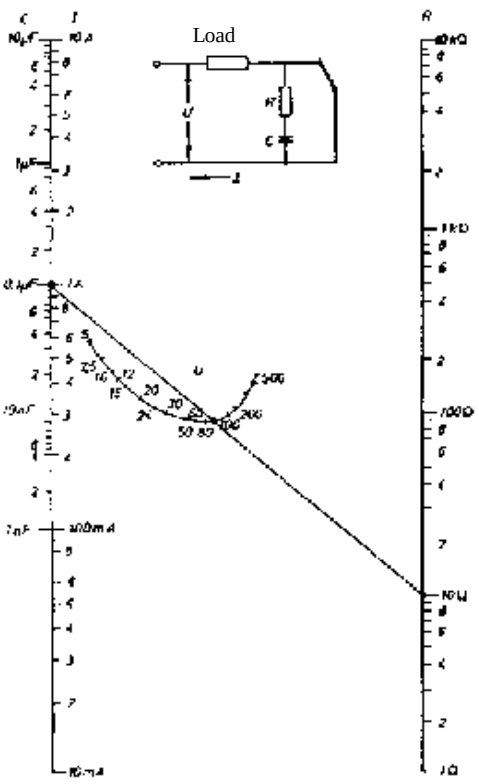
Wiring contact protection :

The purpose of contact protection wiring is to suppress switch arcing ("sparks") and thereby prolong the lifetime of the contacts. All protection wiring has disadvantages as well as advantages. The diagram opposite should simplify the search for a favorable solution in each case. For the cancellation of arcing by means of an RC unit, see example.

The value for C is the direct result of the switching current. The resistance value R can be established by drawing a straight line through the corresponding points on the I and U curves and reading off the resistance at the intersection with the R curve.

When switching off load circuits with inductive components (e.g. relay coils and magnet coils) the interruption of current results in overvoltage (standard inductance) at the switching contacts. This may amount to many times the operating voltage and so threatens the insulation of the load circuit. The resultant breaking spark leads to rapid wear of the relay contacts. For this reason contact protection wiring is particularly important with inductive load circuits.

Dimensioning guide for RC combinations



Example :

U = 100V; I = 1A
C is found directly as 0.1 µF
R = 10 Ω (from line trough R scale)

Notes:

5.5 PCD2.A220 Digital output module with 6 relay contacts (without contact protection)

Application

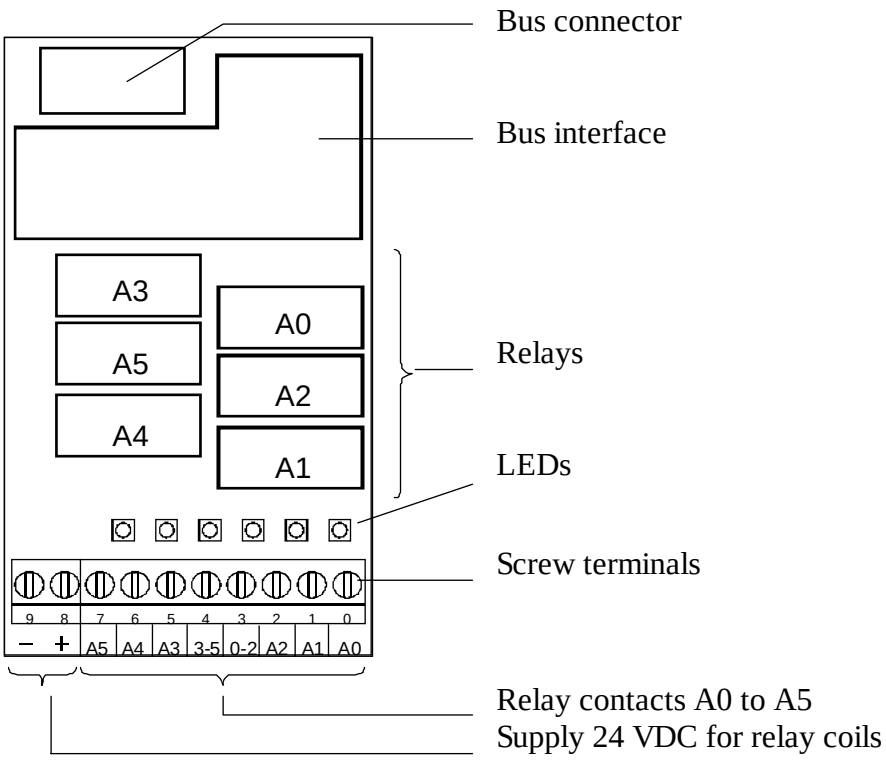
The module contains 6 relays with normally-open contacts for direct or alternating current up to 2 A, 250 VAC. It is especially suited wherever perfectly isolated AC switching circuits must be controlled with infrequent switching (see installation notes on page 5-19). On this module there is no contact protection available. 3 relay contacts have one common terminal (see output diagramm).

Technical information

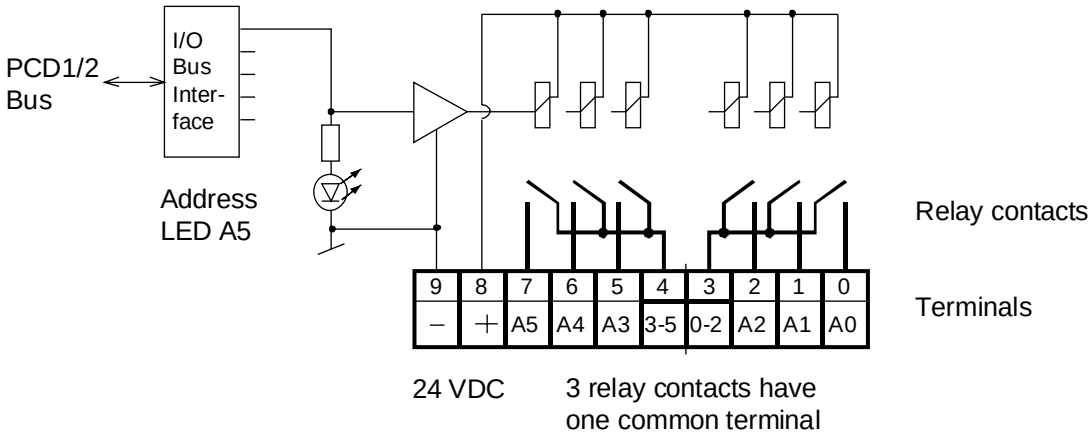
Total outputs per module	3 + 3, with common terminal, normally open contacts (NO)
Type of relay (typical)	REO 30024, SCHRACK
Switch rating (contact lifetime)	2 A, 250 VAC AC1 (0.7×10^6 operations) 1 A, 250 VAC AC11 (10^6 operations) 2 A, 50 VDC DC1 (0.3×10^6 operations) 3) 1 A, 24 VDC DC11 (0.1×10^6 operations) 1) 3)
Relay coil supply 2)	nominal 24 VDC, smoothed or pulsed, 8 mA per relay
Voltage tolerance dependent on ambient temperature	20°C : 17.0 .. 35 VDC 30°C : 19.5 .. 35 VDC 40°C : 20.5 .. 32 VDC 50°C : 21.5 .. 30 VDC
Typical output delay	5 ms on 24 VDC
Resistance to interference as IEC 801-4	4 kV under direct coupling 2 kV under capacitive coupling (whole brunch of pairs)
Internal current consumption (from 5 V bus)	1 to 20 mA

1) With external protective diode
2) With reverse voltage protection
3) These ratings are not UL-listed !

Presentation



Output diagram and terminal assignment



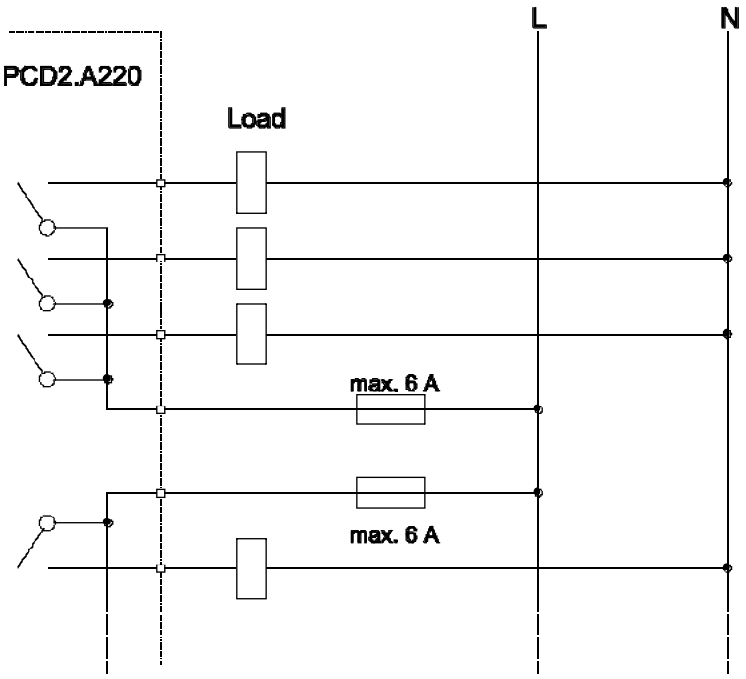
Relay energized (contact closed) : LED on
Relay reset (contact open) : LED off
24 VDC must be connected to terminals "+" and "-".

Installation notes

For reasons of safety it is **not allowed** that low voltages (up to 50V) and higher voltages (50..250V) are connected to the same module.

If a PCD1 or a PCD2 system module is connected to a higher voltage (50..250V), higher voltage approved components have to be used for all elements which are galvanically connected to the system.

Using higher voltage (50...250V), all connections to the relay contacts are to be connected on the same circuit. That means in such a way that they are all protected against **one AC-phase** by only **two fuses**.



Switching inductive loads

Because of the physical properties of inductivity, it is not possible to disconnect inductance without interference. This interference must be minimized as far as possible. Although the PCD is immune to this interference, there are other devices which may be susceptible.

Is should be noted here that, as part of the harmonization of standards throughout the EU, the EMC standards are valid from 1996 (EMC Directive 89/336/EG). Two principles should therefore be emphasized :

1) THE PROTECTION AGAINST INTERFERENCES FROM INDUCTIVE LOADS IS IMPERATIVE.

2) INTERFERENCE SHOULD BE ELIMINATED AS CLOSE AS POSSIBLE TO ITS SOURCE.

It is therefore recommended that a protection circuit should be fitted at the load (often available as normal components on standardized contactors and valves).

When switching direct voltage it is urgently recommended that a recovery diode is fitted above the load. This should even take place when, theoretically, an Ohmic load is switched.

In practice, there will always be a proportion which is inductive (connection cable, resistance coil, etc.). In this case it should be noted that the switch-off time will be longer :

$$\text{Ta approx. } L/RL * \sqrt{(RL * IL/0.7)}$$

For direct voltage the transistor output modules are recommnended.

Relay manufacturer's information on RC unit dimensioning.

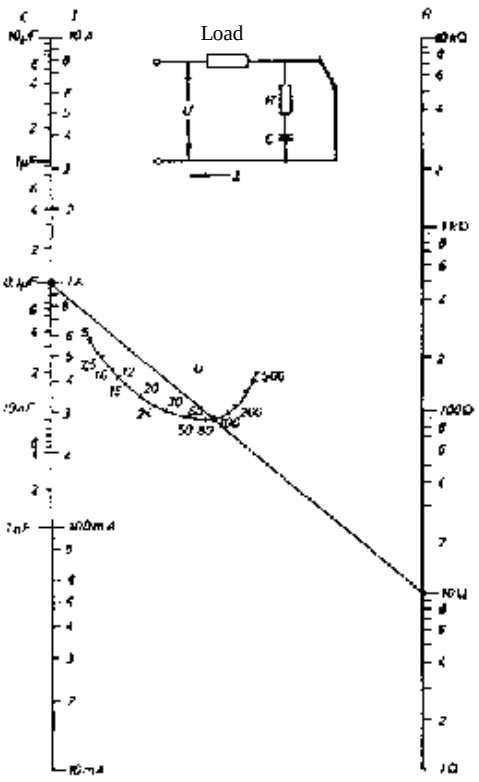
Wiring contact protection :

The purpose of contact protection wiring is to suppress switch arcing ("sparks") and thereby prolong the lifetime of the contacts. All protection wiring has disadvantages as well as advantages. The diagram opposite should simplify the search for a favorable solution in each case. For the cancellation of arcing by means of an RC unit, see example.

The value for C is the direct result of the switching current. The resistance value R can be established by drawing a straight line through the corresponding points on the I and U curves and reading off the resistance at the intersection with the R curve.

When switching off load circuits with inductive components (e.g. relay coils and magnet coils) the interruption of current results in overvoltage (standard inductance) at the switching contacts. This may amount to many times the operating voltage and so threatens the insulation of the load circuit. The resultant breaking spark leads to rapid wear of the relay contacts. For this reason contact protection wiring is particularly important with inductive load circuits.

Dimensioning guide for RC combinations



Example :

U = 100V; I = 1A
C is found directly as 0.1 µF
R = 10 Ω (from line trough R scale)

Notes

6. Analogue input/output modules

PCD2.W10x Fast input module for general application.
4 channels, 12 bit resolution, with signal ranges of 0...+10 V, -10...0 V, -10...+10 V or 0...+20 mA, -20...0 mA, -20...+20 mA.

PCD2.W11x Input module for registering absolute temperatures by means of Pt 100, Ni 100, Pt 1000 or Ni 1000 detectors. The characteristic temperature curves are linearized independently in the module. Resolution is 12 bits.

PCD2.W2x0 Fast input module with < 50 µs conversion time for standard use.
8 channels of 10 bits each for 0...10 V, 0...20 mA or resistive temperature sensors Pt/Ni 1000, according to version.

PCD2.W4x0 Very fast output module with < 5 µs conversion time for general applications, wherever 8 bit resolution is sufficient.
4 channels for 0...10V, 0...20 mA or 4...20 mA, according to version..

PCD2.W5x0 Combined high speed analogue input/output module with 2 inputs and 2 outputs, all with 12 bit resolution. The module is suitable for precise high speed applications.

Caution : W modules should only be changed when PCD1 or PCD2 is disconnected from power source.

Notes:

6.1 PCD2.W10x Analogue input module 4 channels, each with 12 bit resolution

Application

Fast module for general application to register analogue signals, with a conversion time of ≤ 30 µs and 12 bit resolution.

Module overview

PCD2.W100 : 4 channels for signals 0...10 V
Unipolar *) : 0 V...+10 V or -10 V...0 V
Bipolar *) : -10 V...+10 V
Input resistance : > 10 MΩ

PCD2.W105 : 4 channels for signals 0...20 mA
Unipolar *) : 0 mA...+20 mA or -20 mA...0 mA
Bipolar *) : -20 mA...+20 mA
Circuit resistance (Rshunt) : 100 Ω / 0.1 %

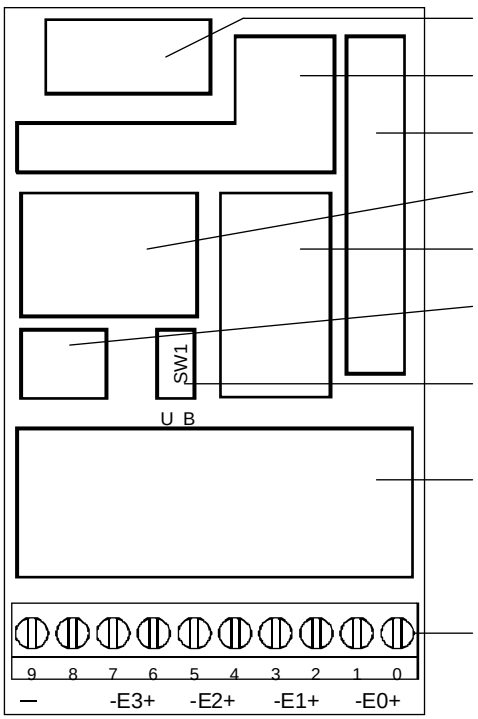
*) Unipolar - bipolar, switchable with jumper.

Technical data

Input ranges	see above « module overview »
Potential separation	no
Resolution (digital representation)	12 bits (0...4095)
Measuring principle	differential
Conversion time	≤ 30 µs
Input resistance	W100 : ≥ 10 MΩ W105 : 100 Ω / 0.1 %
Accuracy at 25°C (referring to measured value)	W100 : ± 0.1% + ± 1 LSB Bipolar W100 : ± 0.05% + ± 1 LSB Unipolar W105 : ± 0.2% + ± 1 LSB Unipolar/Bipolar
Repeating accuracy	± 1 LSB

Common mode voltage range	CMR	W100 : ± 11 V W105 : ± 8 V
Common mode rejection	CMRR	≥ 70 dB
Temperature error (0...+55°C)	W100 : W105 :	± 0.2% + ± 2 LSB ± 0.3% + ± 2 LSB
Overvoltage protection	W100 :	± 60 VDC (permanent)
Overcurrent protection	W105 :	± 50 mA (permanent)
Protection against interference voltages capacitance coupling according to IEC 801-4		± 1 kV with cables not shielded ± 2 kV with cables shielded
Time constant of input filter		3 ms
Current consumption :		
internal from 5 V bus		45 mA
internal from 24 V bus		15 mA

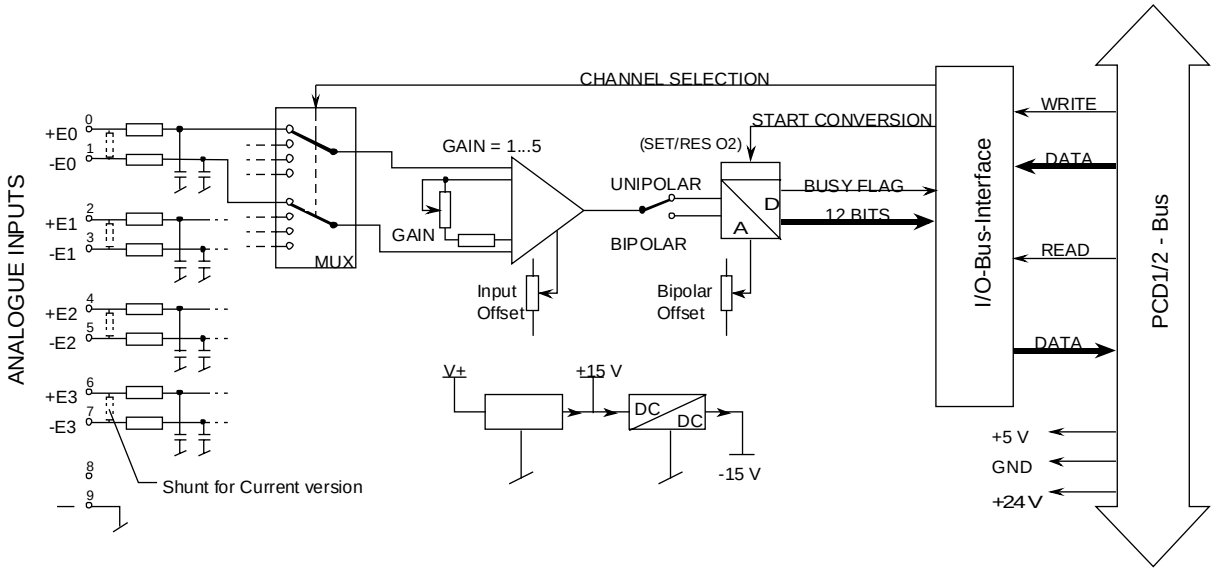
Presentation



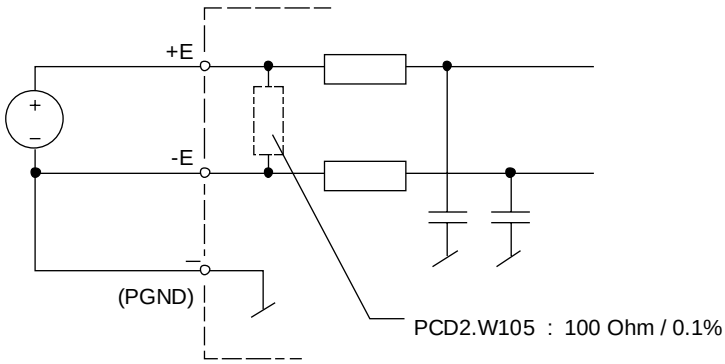
Bus connector
Bus interface
± 15 V
Differential amplifier
A/D converter
Analogue multiplexer
Jumper U : unipolar
B : bipolar
Input filter
(overvoltage protection)
Screw terminals

Caution : On this module there are components between the input filter and the bus connector which are susceptible to electrostatic discharges !

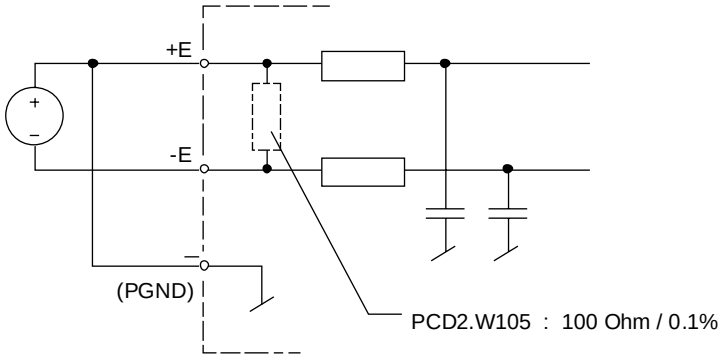
Block diagram



Wiring for positive unipolar or bipolar analogue inputs

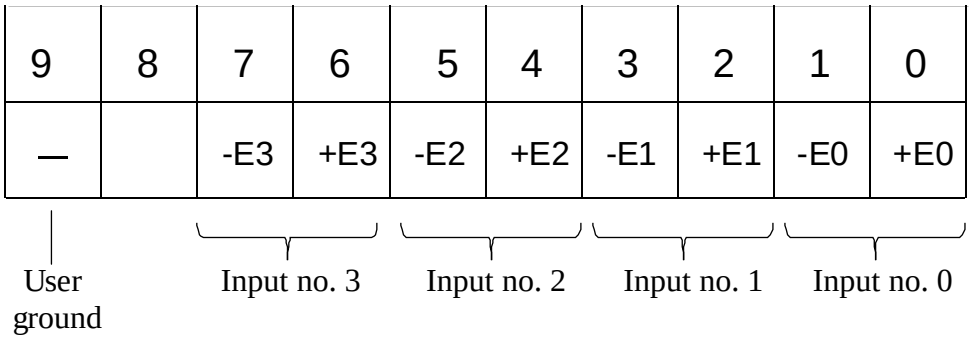


Wiring for negative unipolar analogue inputs



Caution : All unused inputs must be connected to logic ground.

Module connection



Note : The negative connections " - " of each input **are not** joined to the user ground.

6.2 PCD2.W11x Analogue input module for resistance thermometer Pt 100/1000 or Ni 100/1000, 4 channels, each with 12 bit resolution

Application

Fast, convenient module for registering absolute temperatures in the range -50...+150°C by means of resistance thermometer. (2-wire-type connection with null balance). The characteristic temperature curves are linearized independently in the module. Resolution is 12 bits.

Module overview

PCD2.W110	4 analogue inputs for temperature measurement using Pt 100 detectors, according to IEC 751.
PCD2.W111	4 analogue inputs for temperature measurement using Ni 100 detectors, according to DIN 43 760.
PCD2.W112	4 analogue inputs for temperature measurement using Pt 1000 detectors, according to IEC 751.
PCD2.W113	4 analogue inputs for temperature measurement using Ni 1000 detectors, according to DIN 43 760.

General technical data

Number of channels	4	
Potential separation	no	
Resolution (digital representation)	12 bits (0...4095)	
Measuring principle	differential	
Conversion time	< 30 µs	
Time between 2 measurements	≥ 1 ms	
Temperature error	+10...+30°C :	max. ± 0.4 °C
	0...+55°C :	max. ± 1 °C

Repeating accuracy (more than one measurement on the same module under the same conditions.)	± 2 LSB
Detector type	2 wires
Linearization	integral
Current sources	1 for each channel
External supply	none
Offset adjustment	separate for each channel (allows null balancing dependent on cable length)
Sensitivity	20.475 LSB/°C (4095 ÷ 200) or 0.0488 °C/LSB (200 ÷ 4095)
Current consumption :	
internal from 5 V bus	45 mA
internal from 24 V bus	30 mA (W110/111) 20 mA (W112/113)

Technical data of additional modules (substitution modules)

PCD2.W110	4 inputs for Pt 100 detectors
Current sources	2 mA
Measuring range	-50°C...+150°C
Accuracy of measurement	better than 0.2°C
PCD2.W111	4 inputs for Ni 100 detectors
Current sources	2 mA
Measuring range	-50°C...+150°C
Accuracy of measurement	better than 0.4°C
PCD2.W112	4 inputs for Pt 1000 detectors
Current sources	0.2 mA
Measuring range	-50°C...+150°C
Accuracy of measurement	better than 0.2°C
PCD2.W113	4 inputs for Ni 1000 detectors
Current sources	0.2 mA
Measuring range	-50°C...+150°C
Accuracy of measurement	better than 0.4°C

Accuracy of measurement

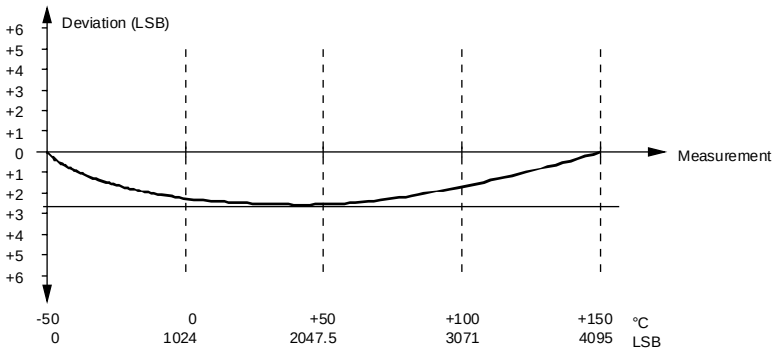
The curves below show the maximum measuring error (measuring and repeating accuracy).

Each channel is tuned to the minimum and the maximum value :

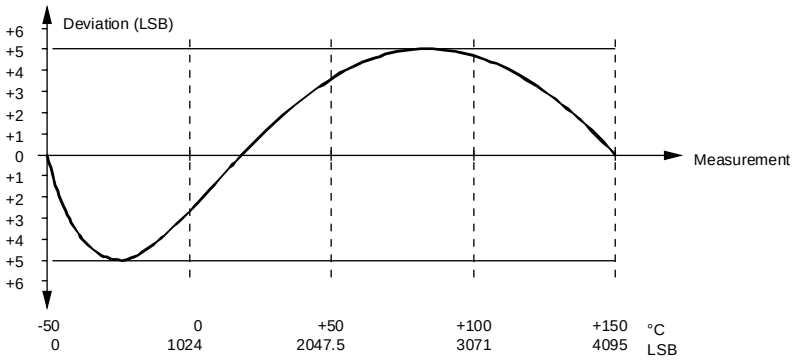
-50°C	→	0	+ 2 LSB
+150°C	→	4095	- 2 LSB

For both these values the measuring error = 0.

Typical linearity error for W110 / W112 (Pt 100 / Pt 1000)



Typical linearity error for W111 / W113 (Ni 100 / Ni 1000)



If cable breaks	→	Measuring value	4095
If short-circuited	→	Measuring value	0

Presentation

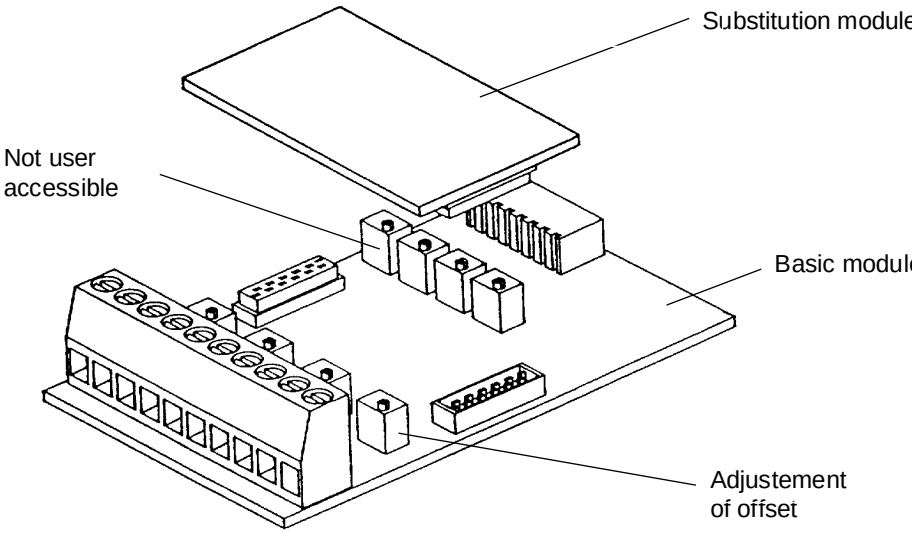
Each module consists of 2 individual modules :

- Basic module with input filters, A/D converter, inputs/outputs interface. Same module with same components for all 4 options.
- Plug-on substitution modules with switching circuit for the production of -15 V, current sources, linearization. Each of the 4 options has its own substitution module, i.e. a module with different components.

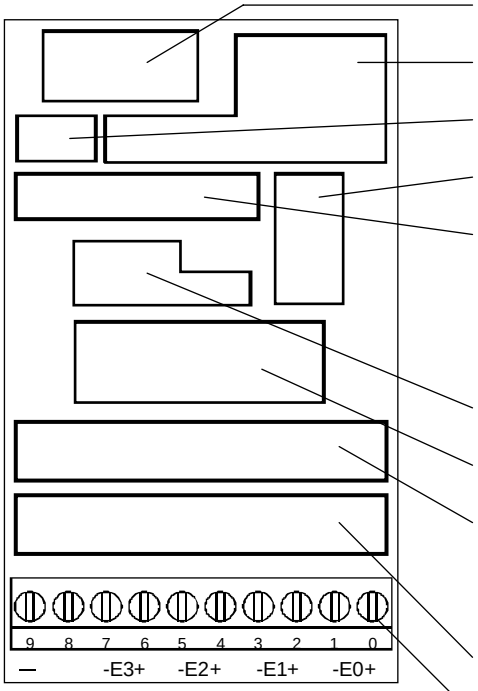
The user has access to the 4 potentiometers for adjusting the offset of each individual channel. This can be very useful for readjusting the null (at -50°C) for long measurement connections.

Caution : All modules are assembled and balanced in the factory as a pair (basic module with substitution module). The substitution modules **should not be** exchanged.

The 4 potentiometers for setting the amplification are not accessible to the user when they have been assembled and **should not be** adjusted.

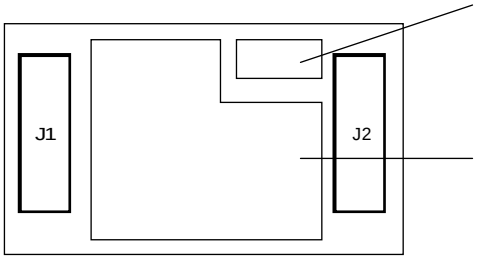


Presentation



Bus connector
Bus interface
+15 V
A/D converter
Adjustment of amplification
Digital value = 4095
Temperature = +150°C
(not for users)
Analogue multiplexer
Input amplifier
Adjustment of offset
Digital value = 0
Temperature = -50°C
Input filter
Screw terminals

Basic module

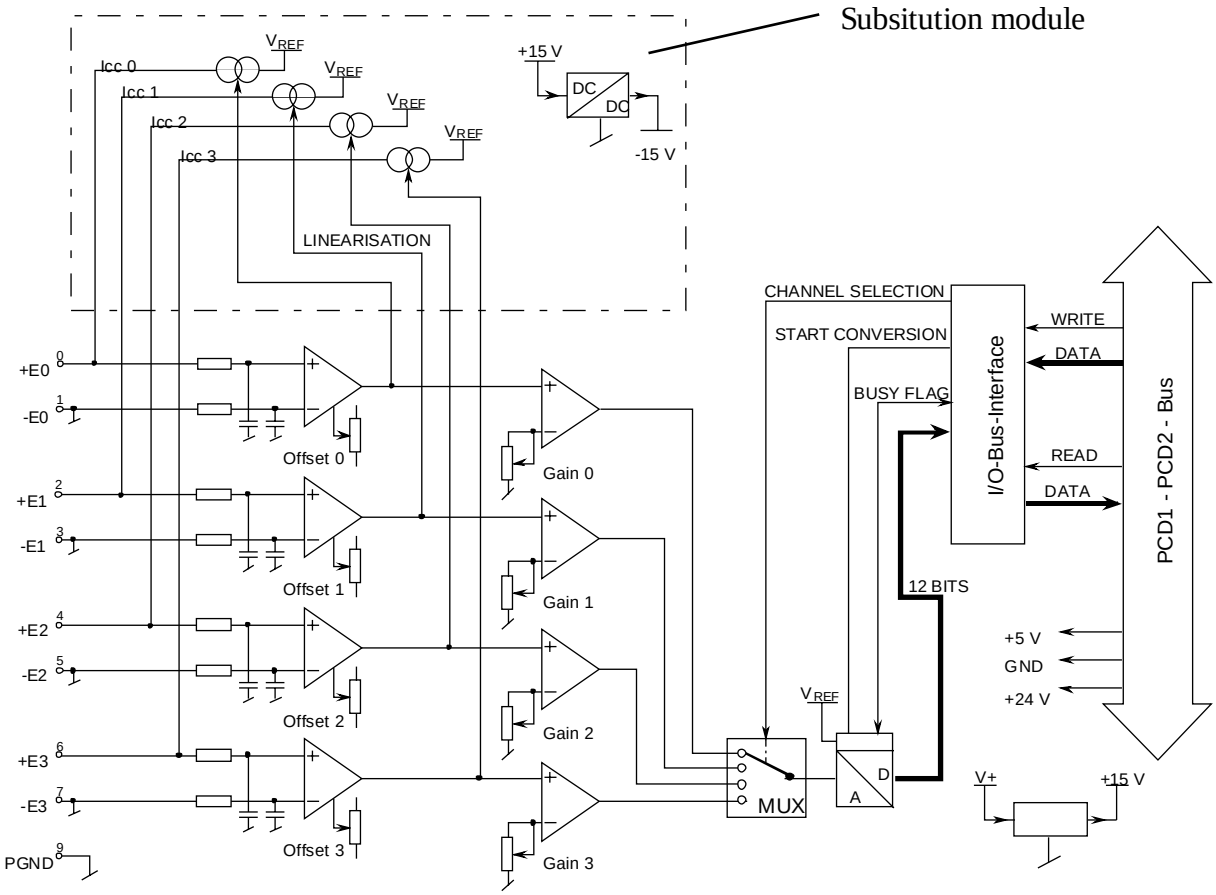


-15 V
Current sources and linearization

Substitution module

Caution : On these modules there are components which are susceptible to electrostatic discharges !

Block diagram



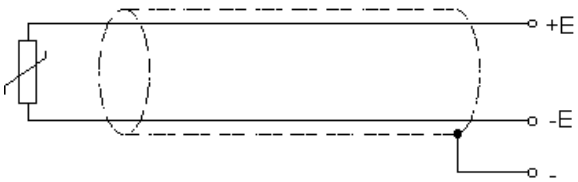
Module connection

9	8	7	6	5	4	3	2	1	0
—		-E3	+E3	-E2	+E2	-E1	+E1	-E0	+E0

User ground — Input no. 3 — Input no. 2 — Input no. 1 — Input no. 0

Note : The negative connections « - » of each input **should always be** joined to the user ground.

Wiring



Caution : Any unused connections should be short-circuited: connect each + E to - E.

6.3 PCD2.W2x0 Analogue input module 8 channels, each with 10 bit resolution

Application

With its short conversion time of <50 µs, this module is universally suitable for recording analogue signals. Limitations occur only in the case of very small signals, such as arise when resistive temperature sensors Pt 100 or thermoelements are used.

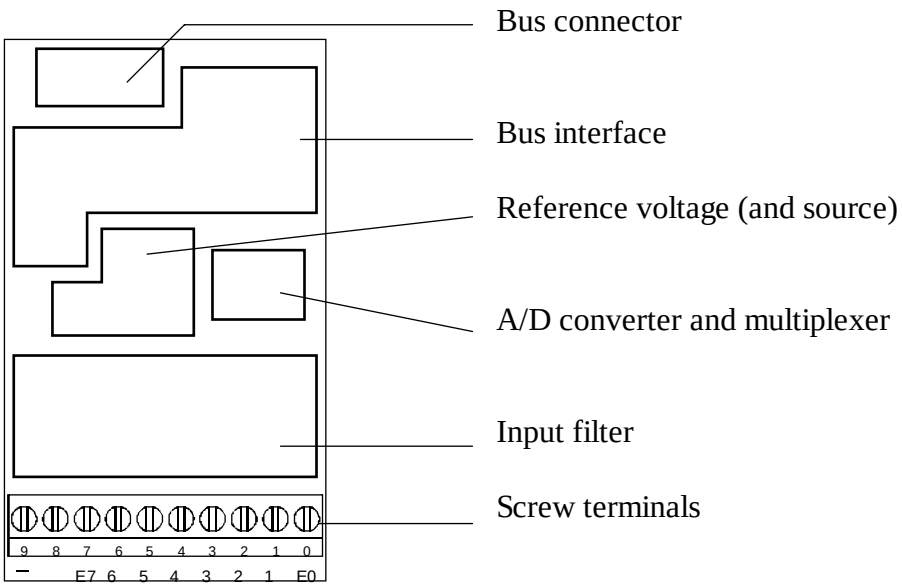
Module overview

PCD2.W200 : 8 channels for signals 0...10 V
PCD2.W210 : 8 channels for signals 0...20 mA
PCD2.W220 : 8 channels for resistive temperature sensors Pt/Ni 1000

Technical data

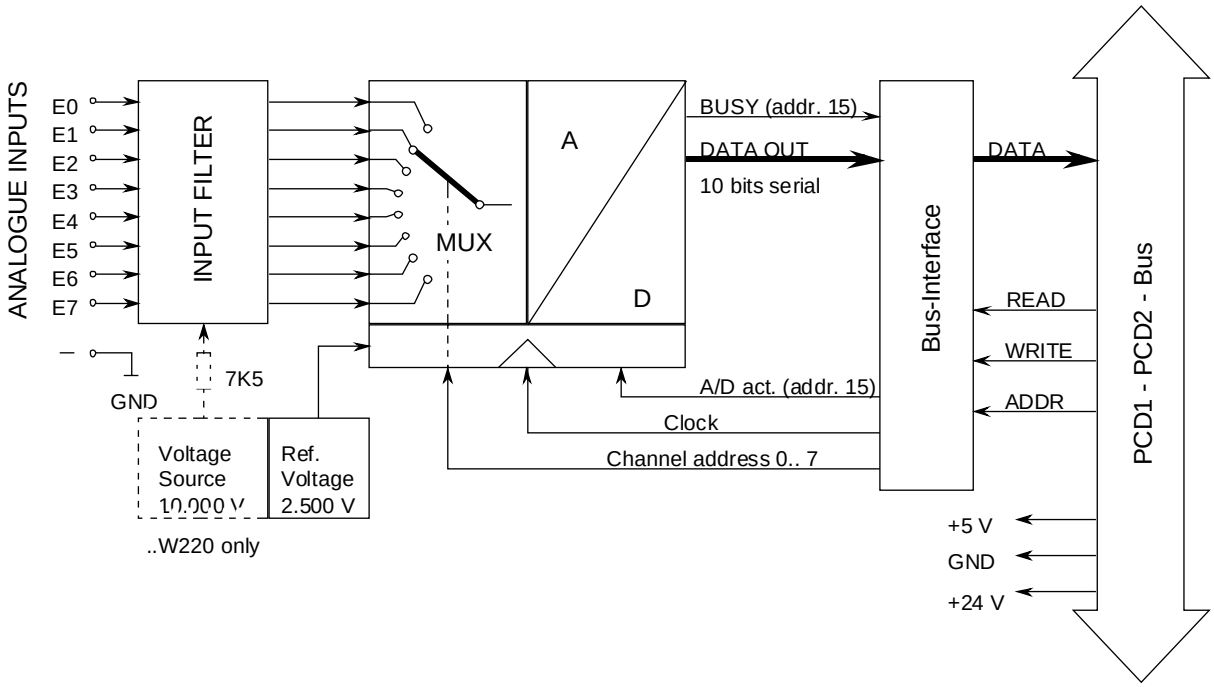
Input ranges	see above « module overview »
Potential separation	no
Resolution (digital representation)	10 bits (0...1023)
Measuring principle	not differencial
Input resistance	0...10 V : 200 kΩ / 0.15 % 0...20 mA : 125 Ω / 0.1 % Pt/Ni 1000 : see terminal contacts
Accuracy (referring to measured value)	± 1 LSB
Repeating accuracy (under same conditions)	within ± 1 LSB
Temperature error	± 0.3 % (± 3 LSB) across temperature range 0...+55°C
Overvoltage protection Overcurrent protection	W200/220 : ± 50 VDC W210 : ± 40 mA
Protection against interference voltages according to IEC 801-4	± 1 kV with cables not shielded ± 2 kV with cables shielded
Time constant of input filter	W200 : typically 5 ms W210/W220 : typically 1 ms W220 : typically 10 ms from version B, modif. 1
Current consumption : internal from 5 V bus internal from 24 V bus	 8 mA 5 mA (W200/210) 16 mA (W220)

Presentation

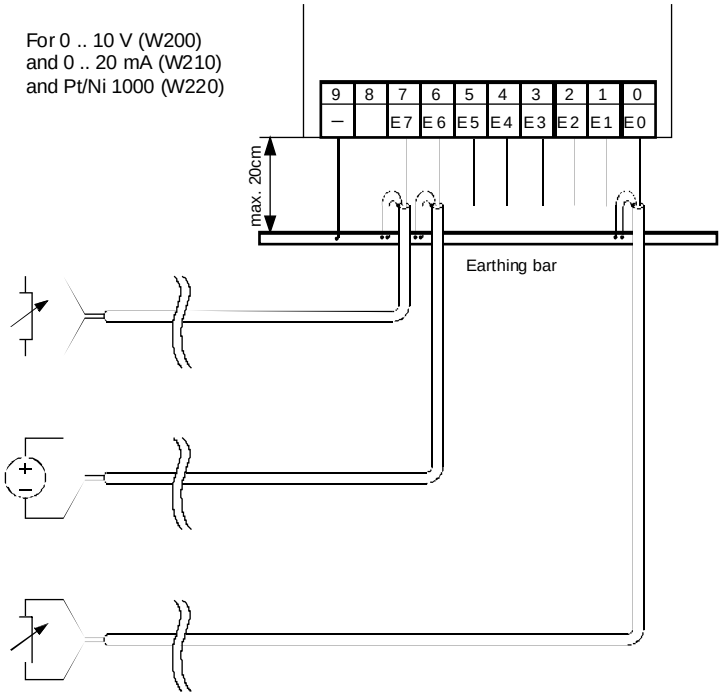


Caution : This module contains components between the input filter and the bus connector which are sensitive to electrostatic discharges !

Block diagram



Module connection



Temperature measurement with Pt 1000

In the temperature range -50°C to +200°C the following formula can be used for working to an accuracy of ±1 % (±1.5°C). Repeating accuracy is significantly higher.

$$T\,[°C] = \frac{DV}{2.08 - (0.509 \times 10^{-3} \times DV)} - 261.8$$

T = temperature in °C DV = digital value (0...1023)

Example 1 : digital value DV = 562
temperature T in °C ?

$$T\,[°C] = \frac{562}{2.08 - (0.509 \times 10^{-3} \times 562)} - 261.8 = \underline{51.5°C}$$

$$DV = \frac{2.08 \times (261.8 + T)}{1 + (0.509 \times 10^{-3} \times (261.8 + T))}$$

DV = digital value (0...1023) T = temperature in °C

Example 2 : preset temperature T = -10°C
appropriate digital value DV ?

$$DV = \frac{2.08 \times (261.8 - 10)}{1 + (0.509 \times 10^{-3} \times (261.8 - 10))} = \underline{464}$$

Tables for Pt 1000 and Ni 1000 are also available on request.

6.4 PCD2.W4x0 Analogue output module 4 channels, each with 8 bit resolution

Application

Rapid output module with 4 output channels of 8 bits respectively. Different output signals can be reversed with the aid of insertable jumpers (type ..W410). Suited for processes in which a large number of actuators must be controlled such as in the chemical industry and building automation.

Modules overview

PCD2.W400 : Single signal version for 0...10 V.
4 output channels of 8 bits respectively.

PCD2.W410 : Universal module with 4 output channels of 8 bits respectively, signals can be selected from 0...10 V, 0...20 mA or 4...20 mA

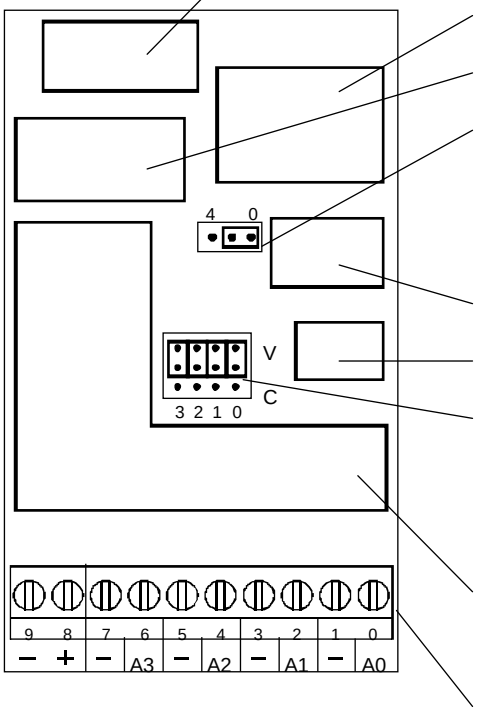
Technical data

Number of output channels		4, short-circuit protected	
Signal ranges	..W400 :	0...10 V	
	..W410 :	0...10 V *)	¦ selectable
		0...20 mA	¦ with
		4...20 mA	¦ jumpers
Resolution (digital representation)		8 bits (0...255)	
D/A conversion time		< 5 µs	
Load impedance		for 0...10 V :	≥ 3 kΩ
		for 0...20 mA :	0...500 Ω
		for 4...20 mA :	0...500 Ω
Accuracy (referring to output value)		for 0...10 V :	1 % ± 50 mV
		for 0...20 mA :	1 % ± 0,2 mA
		for 4...20 mA :	1 % ± 0,2 mA
Residual ripple		for 0...10 V :	< 15 mV pp
		for 0...20 mA :	< 50 µA pp
		for 4...20 mA :	< 50 µA pp
Temperature error		typ. 0.2 % within the range 0...50°C	

*) Factory setting

Protection against interference voltages capacitive coupling according to IEC 801-4	1 kV with cables not shilded 2 kV with cables shielded
Current consumption :	
internal from 5 V bus	1 mA
internal from 24 V bus	30 mA
External 24 VDC supply voltage	max. 0.1 A (only type ..W410 for current outputs) Tolerance as power supply for PCD1.M1.. or PCD2.M1..

Presentation



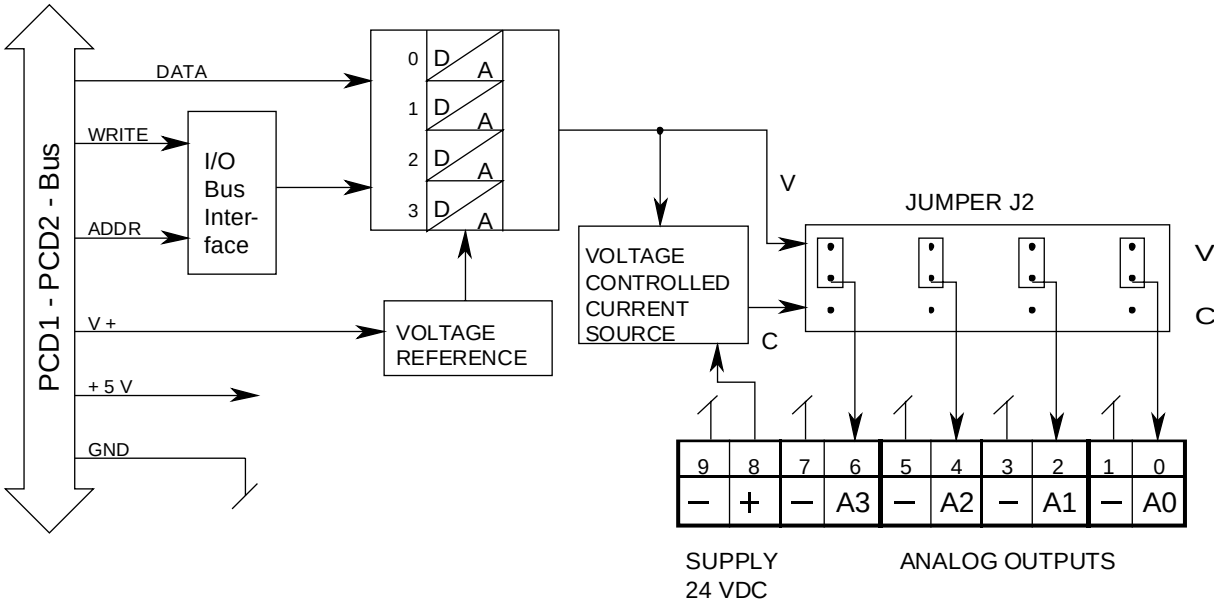
Bus connector
Reference voltage
Bus interface
Offset jumper J1
(only for type ..W410)
Position "0" : 0...10 V or 0...20 mA
Position "4" : 2...10 V or 4...20 mA
D/A converter
Output amplifier 0...10 V
Jumper J2 for voltage / current
(only for type ..W410)
Position "V" : Voltage output
Position "C" : Current output
External supply to V/C converter
(only for type ..W410)
Screw terminals

Reinsertion of jumpers

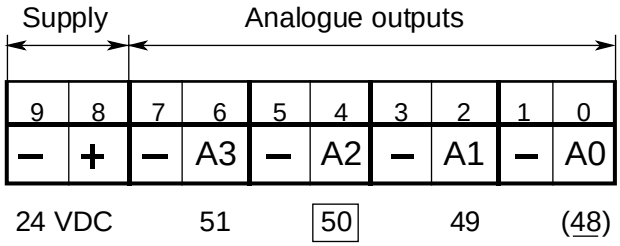
Caution : The entire board contains components which are susceptible to electrostatic discharging.

Factory setting of jumpers (type ..W410) :
"V" : voltage output
"0" : range 0...10 V

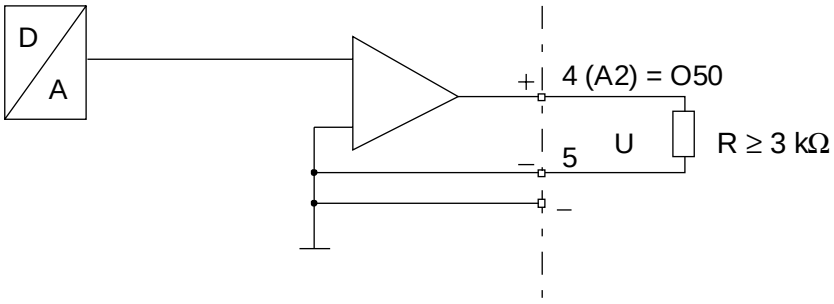
Block circuit diagram for PCD2.W410



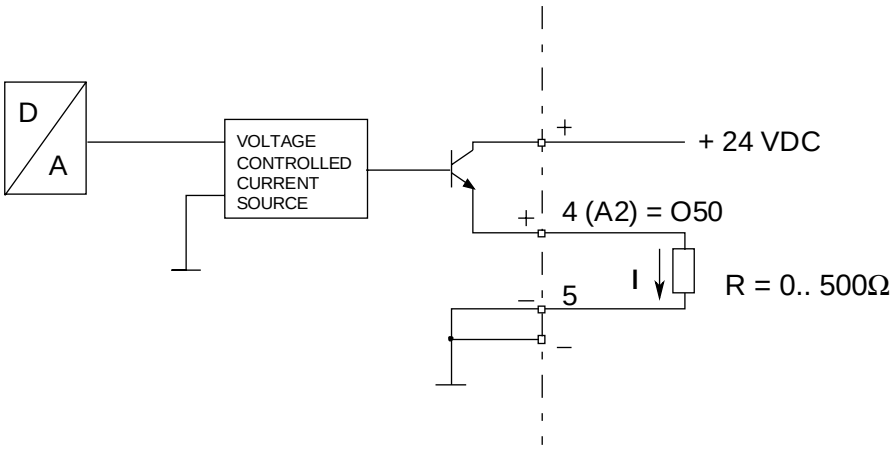
Module connection (see user program example) **:**



Connection for 0...10 V (terminal for output O 50) **:**



Connection for 0...20 mA or 4...20 mA
(selectable with jumpers on type ..W410) **:**



An external 24 VDC supply voltage is required for current outputs.

6.5 PDC2.W5x0 Analogue input/output module 2 + 2 channels, each with 12 bit resolution

Application

Combined high speed analogue input/output module with 2 inputs and 2 outputs, all with 12 bit resolution. The module is suitable for precise, high speed applications.

Modules overview

PCD2.W500 : Module with 2 voltage inputs and 2 voltage outputs 0...+10 V (unipolar) or -10...+10 V (bipolar), jumper selectable (standard module).

PCD2.W510 : Module with 2 current inputs 0...+20 mA or -20...+20 mA, jumper selectable, and 2 voltage outputs 0...+10 V or -10...+10 V, jumper selectable individually.
(special execution, available only on request)

Technical data

Inputs

Number of input channels		2	
Signal ranges	..W500 :	0...+10 V -10...+10 V	¦ jumper selectable ¦ together
	..W510 :	0...+20 mA -20...+20 mA	¦ jumper selectable ¦ together
Potential separation		no	
Measuring principle		differential	
A/D conversion time		< 30 µs	
Resolution (digital representation)		12 bits (0...4095)	
Input resistance		0...+10 V : 1 MΩ 0...+20 mA : 100 Ω	
Accuracy (referring (to measured value)	unipolar bipolar	± 2 LSB ± 10 LSB	
Repeating accuracy (under same conditions)		± 2 LSB	
Common mode voltage range		CMR ± 10 V	
Common mode rejection		CMRR ≥ 75 dB	
Overvoltage protection		..W500 : ± 40 VDC (permanent)	
Overcurrent protection		..W510 : 45 mA	
Time constant of input filter		3 ms	

Outputs

Number of output channels	2, short-circuit protected
Signal ranges	0...+10 V ¦ jumper selectable -10...+10 V ¦ individually
Potential separation	no
D/A conversion time	< 20 µs
Resolution (digital representation)	12 bits (0...4095)
Load impedance	≥ 3 kΩ
Accuracy (referring to output value)	0.3 %, ± 20 mV

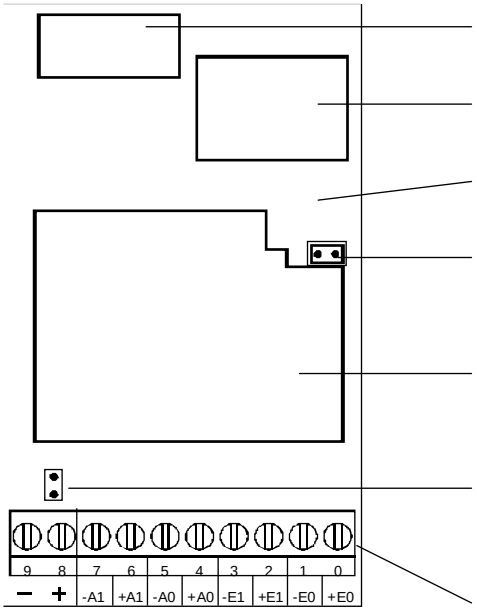
Technical data common to the whole module

Protection against interference voltages according to IEC 801-4	± 1 kV with cables not shielded ± 2 kV with cables shielded
Temperature error	0.3 % (across temperature range 0...+55 °C)
Current consumption : internal from 5V bus	 max. 200 mA

Important :

Since the current consumption of this module is considerable, when using a number of them in the same PCD1 or PCD2 the total load for all modules must be taken into consideration. The 5V supply accepts a max. load of 750 mA for the PCD1, resp. 1600 mA for the PCD2.

Presentation



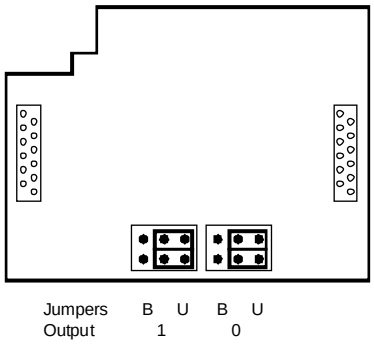
PCD2.W500 module fully equipped
(with additional module plugged-on)

Apart from the bus connector, DC-DC converter and terminals, the base module carries the two input channels with the 2-pole jumper for unipolar or bipolar operation and a number of preset potentiometers, which cannot be adjusted by the user.

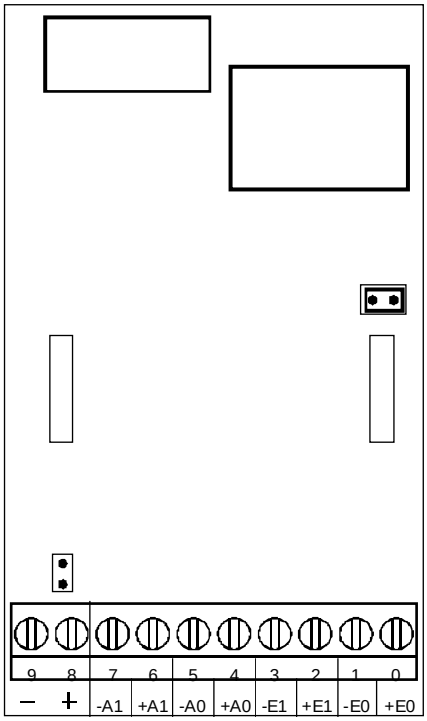
The plug-on module contains the two analogue outputs with the two 3-pole jumpers for the individual unipolar or bipolar operation of each output.

Note: The base module alone is working.

Caution : This module contains components which are sensitive to electrostatic discharges!.



Plug-on module
with 2 analogue outputs

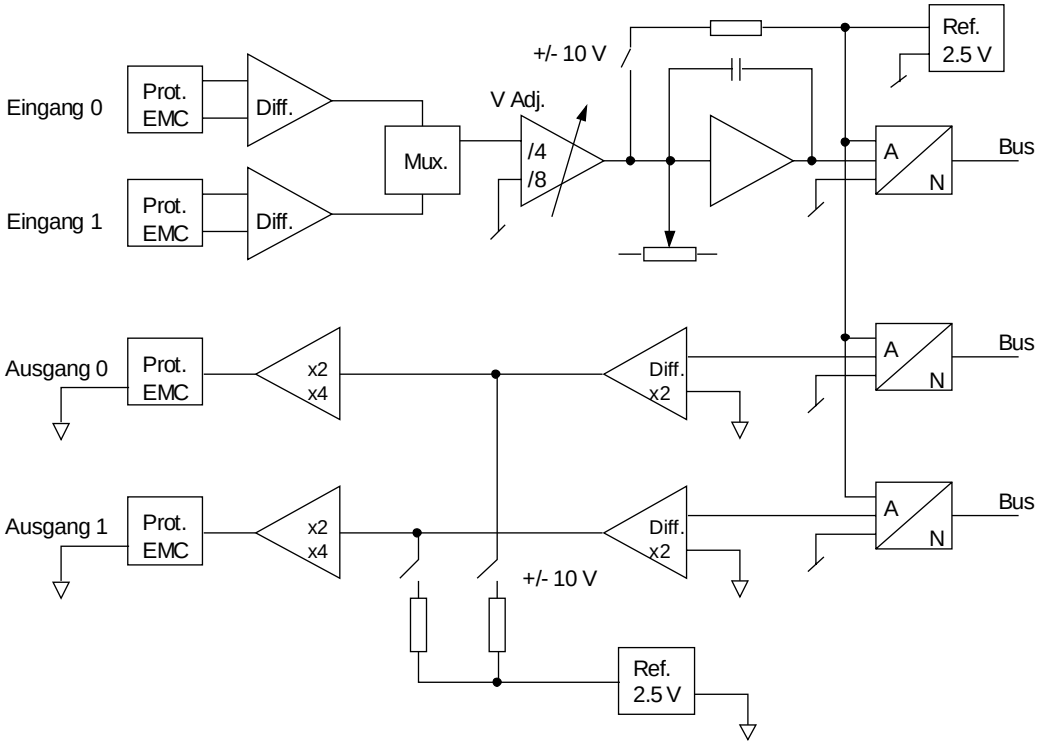


Base module
with 2 analogue inputs

Base module and plug-on module are separate.

The two jumpers for selection of signal range (unipolar U / bipolar B) can only be reversed after the plug-on module has been removed..

Block circuit diagram



Module connection

9	8	7	6	5	4	3	2	1	0
−	+	-A1 *)	+A1	-A0 *)	+A0	-E1	+E1	-E0	+E0
				Output 1		Output 0		Input 1	Input 0

User ground (PGND)

not used

*) Note : The negative terminals « - » of outputs are connected internally, each via a 100 Ω resistor, to the user ground.

7. Fast counter and positioning modules

PCD2.H100 Fast counting module for pulses up to 20 kHz. This simple module, comprising two inputs marked "IN-A" and "IN-B" plus one direct countrol output marked "CCO", allows counting of the number of revolutions or the calculation of distances (pulses) and the measurement by counting of pulses within a logical AND window (second input).

PCD2.H110 Measuring and fast counting module for specific applications, such as frequency measurement, period measurement, various counting measurements, generator, etc.. The module is equipped with a FPGA (Field Programmable Gate Array) and can be programmed for special applications via plug-in PROM memory.

PCD2.H150 Motion control module using absolute encoders with SSI interface (SSI = synchronous serial interface). In addition to the RS 422 port, it also has 4 digital, short-circuit proof outputs for general-purpose use.

PCD2.H210 Stepper motor module for triggering the power stage of a stepper motor drive. This module enables the fully autonomous control and monitoring of stepper motor motion cycles (including acceleration and braking ramps). The module is based on the PCD2.H110 with FPGA and has 4 digital inputs and 4 digital outputs

PCD2.H31x The PCD2.H31x positioning module is used to position an independent axis fitted with a variable rotation speed drive (servo-drive). This servo-motor is an adjustable DC motor, capable of determining the number of rotations and the position via a power stage and an incremental rotation speed detector.

The implementation of the counting and position modules is in preparation. For details please ask your representatives.

Notes: