PCD3 WAC

0

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0.1   Document History

Date	Version	Changes	Remarks
pEN01	2009-02-15	-	New edition
EN02	2009-03-15	2009-05-15	Modifications
EN03	2010-05-15	2010-06-05	WAN possibilities
	2010-08-08	2010-08-11	Reworked chapter Ch01
	2010-09-02	2010-09-02	Chapter Ch03: Definition of the ambient temperatur for the PCD7.F150
EN04	2012-12-08	-	New PCD7.F1xxS modules in Ch03
EN05	2014-04-09	-	Change of Logo
EN06	2014-11-04		Chapter 1.3.1 : Connection of the «+24VDC» and «GND» inverted

0.2   Brands and trademarks

Saia PCD® and Saia PG5®
are registered trademarks of Saia-Burgess Controls AG.

Technical modifications are based on the current state-of-the-art technology.

Published in Switzerland

1 Orientation guide

1.1 Introduction

This manual covers the technical aspects of the PCD3.M2x30A4Tx. The following terms are used frequently:

- CPU   Central processing unit: the heart of the Saia PCD®

- LIOs   Local I/Os: these are connected to the CPU via the I/O bus

- Modules   Input/output elements, mounted in a housing, matched to the PCD3 system

- Moduleholder   CPU, RIO or LIO, to which modules may be attached

- WAC   Wide Area Controller

The aim of this section is to present the essentials of planning and installing control systems with PCD3 components.

1.2 Instructions for connecting Saia-PCD® controllers to the internet

When Saia PCD controllers are connected directly to the internet, they are also a potential target of cyber attacks. For secure operation, appropriate protective measures must always be taken.

PCD controllers include simple, built-in protection features. However, secure operation on the internet is only ensured if external routers are used with a firewall and encrypted VPN connections.
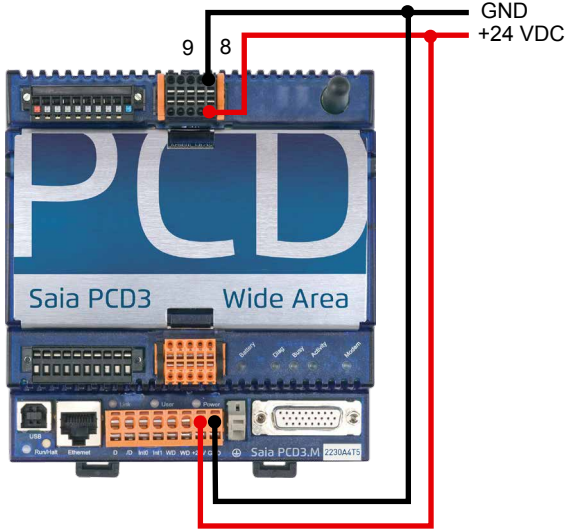
For more information, please refer to our support site:
www.sbc-support.com/security
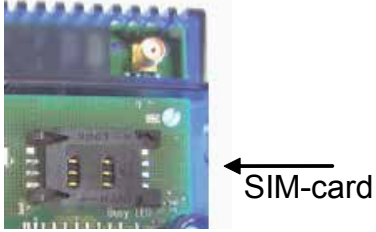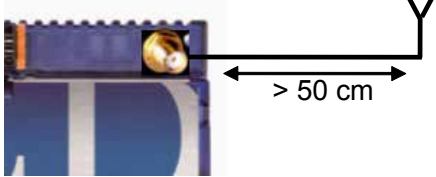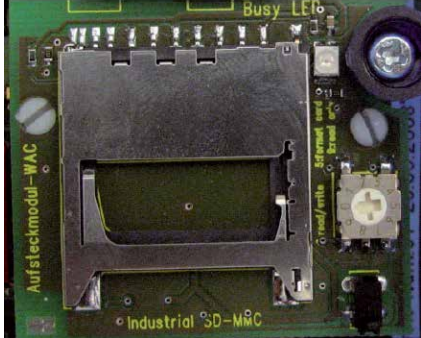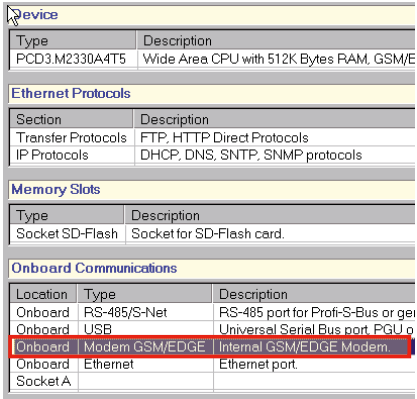
1.3   Starting up check list

1.3.1   General
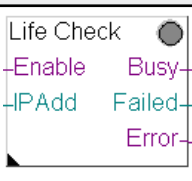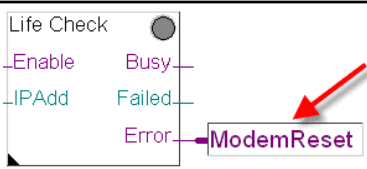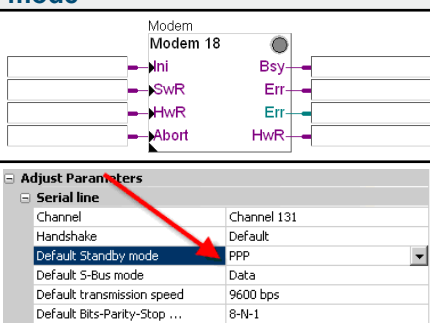
1. **Cabling of PCD3.WAC**	**(Only PCD3.M2x30A4T5)**

For a proper operation of the GSM modem of a PCD3 Wide Area Controller (PCD3.M2230A4T5 and PCD3.M2330A4T5), the modem needs to be connected to the 24 VDC power supply on terminal block X0!
ℹ This additional power connection is not required for WAC with analogue or ISDN Modem (PCD3.M2330A4T1 and PCD3.M2330A4T3)

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2 Insert SIM card	(Only PCD3.M2x30A4T5)
Disable the PIN code check (→ Can be done with a mobile phone) and insert SIM card.	SIM-card
3 Connect GSM/GPRS antenna	**(Only PCD3.M2x30A4T5)**
Place the antenna at least 50 cm away from the WAC device.	> 50 cm
4 Power on equipment	
Without any configuration, the modem will not connect to the GPRS network.	
5 Use SD flash card	
The SD flash card is accessible with the name SL2Flash. The factory default position of the rotary switch is 0 for reading and writing to flash memory → Works only if the cover is closed. → If the switch is put on position 4, the SD flash card can be used without cover. This mode is recommended for test only.	
6 Configuration with Device Configurator	
In the Saia PG5® Device Configurator choose the right device for configuration. The section „Onboard Modem" includes all modem parameters. Modem configuration	

1.3.2 GPRS and PPP configuration

1   **Starts Saia PG5® Device Configurator**

Onboard Modem configuration	

Onboard Communications

Location	Type	Description
Onboard	RS-485/S-Net	RS-485 port for Profi-S-Bus or
Onboard	USB	Universal Serial Bus port, PGU
Onboard	Modem GSM/GPRS	Internal GSM/GPRS Modem.
Onboard	Ethernet	Ethernet port.
Socket A		

2   **Activate PPP**

Change PPP Enable to **Yes**	

☐ **PPP Protocol**

Port Number PPP	Port disable
PPP Enabled	No
Connection Type	No
Local IP Address	Yes
Remote IP Address	0.0.0.0

3   **Enter GPRS access data (APN)**

In Skript Modem, Line 5 replace Tag GPRS_APN with the data of your provider. e.g: GPRS_APN => ProviderData.GPRS	Script Modem, Line 3 AT&D2\r;OK;0;3;0;5 Script Modem, Line 4 AT$MSCLS=10\r;OK;0;4;0;5 Script Modem, Line 5 AT+CGDCONT=1,"IP","GPRS_APN"\r;OK; Script Modem, Line 6 ATDT*99***1\#\r;CONNECT;0;-1;0;60 Script Modem, Line 7 0;NO CARRIER;0;-1;0
Some GPRS access data includes a user name and a password.	Baud Rate 115200 baud Remote User Name username Remote Password password

4   **Automatic restart of PPP**

By default the PPP communication will be set up automatically after every disconnection. This means that after a modem reset the PPP connection will be initialised and the system will get a new IP address from the GPRS provider.	PPP Restarted On Disconnection Yes Immediate Start Enabled Yes

!	With automatic restart of PPP, the STOP command cannot be used within the user programme.

5   **DNS configuration**

For a name resolution the right DNS server corresponding to the providers APN must be selected. DNS Time out must be set to 8000.	☐ **DNS Client Protocol**

DNS Client Enabled	**Yes**
DHCP Information Enabled	No
Primary DNS Server IP Address	**193.254.160.2**
Secondary DNS Server IP Address	**193.254.160.1**
Response Timeout [ms]	**8000**

6   **Transfer configuration to the controller**

If all parameters are correct, the configuration can be downloaded to the controller.	**⬇ Download Configuration**

7   **Place Diagnose Saia PG5® FBoxen**

To check the configuration the WAA FBoxes should be placed. ● PPP Status: E.g. to check the received IP address. ● GPRS Status: E.g. to view the GPRS signal quality.	PPP Status ○ —Enable Link— State— Event— SubEv— IP— PPP— Error— GPRS Status ○ —Enable Level— Register— Operator— Error— Error— PPP—

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8	Check the Internet connection	
Once the GPRS connection is established the connection to the Internet can be checked with Life Check FBox For GPRS communication the Timeout should be set 8000!	
9	**Modem Reset**	
In Error cases the controller is able to reset the modem to reinitialize a connection. For preventive reasons this can be done once a day.	
10	**Work with modem 18 library and PPP Stanby mode**	
This FBox should only be place if the modem 18 functions are used.	
Chose the right PCD3.WAC modem type and select port 131 for the serial communication with the modem. To execute PPP and modem 18 functions one after the other, PPP must be selected as Standby mode.	

> **!** Every time the PPP communication is reinitialized the system gets a new IP address (e.g. from the local provider)

1.4   PCD3.WAC as GPRS S-Bus client station

To transmit date using S-Bus on GPRS the following configuration should be used:

1	S-Bus configuration for GPRS	
Select Channel 9 and Timeout 15'000 in the S-Bus configurations-FBox.	
2	**S-Bus Station Indirect**	
For the reference of the communication F-Boxes, the „Node" and „Station" must correspond.	
3	**Data exchange**	
The communication F-Boxes control the automatic data exchange.	

1.5 Planning an application

The following aspects should be considered when planning PCD3 applications:

- It's only **one** module holder allowed
  - PCD3.C200 or PCD3.C110 (Connection with cable PCD3.K106/K116)
  - PCD3.C200Z09 or PCD3.C110Z09 (Connection with connector PCD3.K010)

- The internal load current taken by the I/O modules from the +5V and V+ supply must not exceed the maximum supply current specified for the CPUs or the LIO PCD3.C110/C110Z09

When planning an application, we recommend the following procedure:

Select the I/O modules according to your requirements. Where possible, use PCD3 I/O modules with 16 connections; these have 16 red LEDs.

PCD3	M2230A4T5	M2330A4T1	M2330A4T3	M2330A4T5
I/O bus connection for expansion units	Yes			
Number of inputs/outputs with the one I/O module holder (PCD3.C200)	78[1]			

1) Using digital I/O modules PCD3.E16x or A46x with 16 I/Os each

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1.6   I/O Extension

Only one extension PCD3.C200 or PCD3.C110 can be connected!
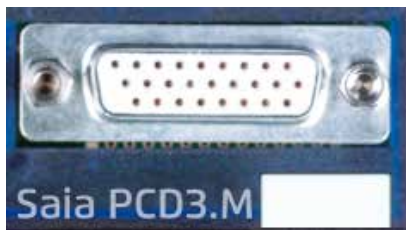
The additional I/Os can be mapped with the device configurator.

The first I/O address on the extension module is 64.

No SPI communication on the extension.

With Profi-S-Net on port 2 or Ethernet the System can also be extended with PCD3. RIO (PCD3.T760 or PCD3.T660) modules.

PCD3.K010
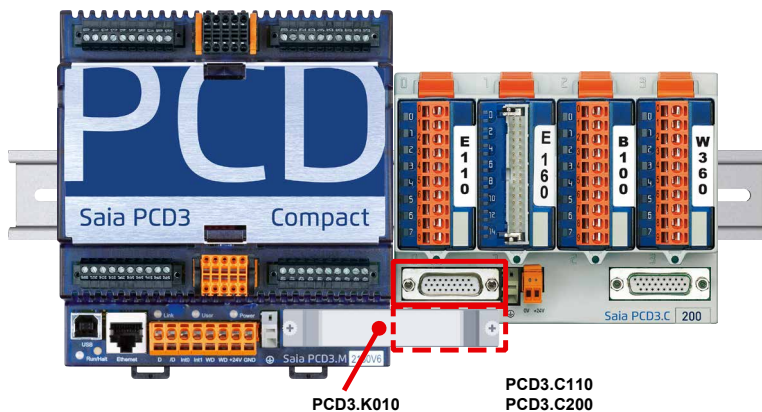
PCD3.C110
PCD3.C200

For connecting the former extension modules to the Saia PCD®, use the following cables:

PCD3.K106 0.7 m or
PCD3.K116 1.2 m

With the new extension modules PCD3.C110Z09 and PCD3.C200Z09 the connector PCD3.K010 can be used.

PCD3.K010

PCD3.C110Z09
PCD3.C200Z09
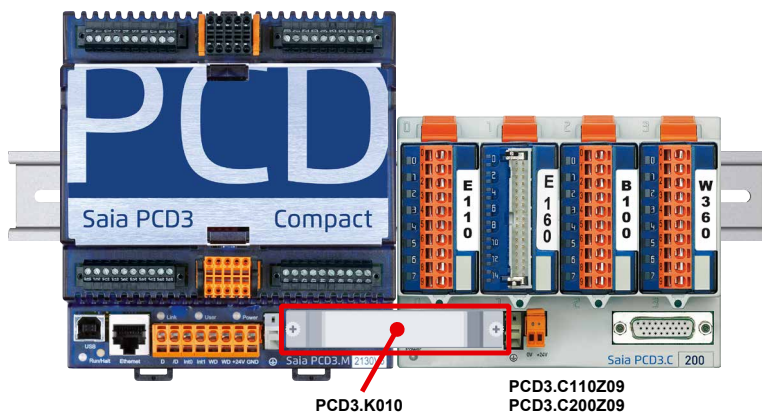
1.7   Mounting rules

1.7.1   Airflow
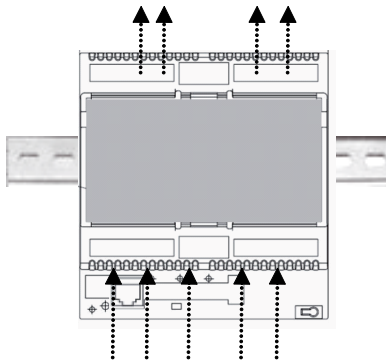
The controller must be mounted in a vertical way so that cooling is given by thermic air flow from down to the upper side of the shape.

1.7.2   Mounting

The PCD3.WAC will be mounted on a 35 mm top hat rail DIN EN60715.
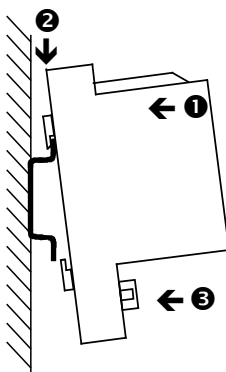
Mounting:

❶ Press the top of the housing onto the mounting surface
❷ Press downwards against the top hat rail
❸ Press the bottom of the housing against the mounting surface and snap into place.

Remove:

Push downwards the two holding elements and pull out.

1.7.3   Earthing and connection plan
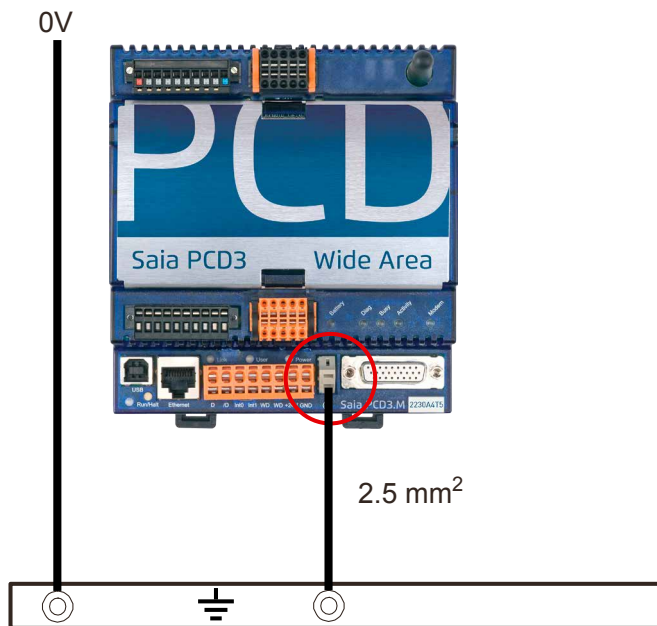
In the bottom part of the PCD3.WAC there is a shielding and earthing plate.

The zero-potential (Minus pole) of the 24 V supply is connected to the Minus terminal of the supply. This should be connected to the earthing bar with the shortest possible wire (< 25 cm) of 1.5 mm².

Any shielding of analogue signals or communication cables should also be brought to the same earth potential, either via a Minus terminal or via the earthing bar.

All Minus connections are linked internally. For problem-free operation, these connections should be reinforced externally with short wires of 1.5 mm².

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1.8 General technical details

Supply (external and internal)	
Supply voltage	24V DC ±+25% smoothed or 19V AC ±15% full-wave rectified (18V DC)
Power consumption[1]	typ. 250 mA at 24 V 400 mA max. peak consumption with PCD7.F1xxx module or external I/O module support PCD3.C110 and GSM/GPRS communication (bad reception)
Capacity of internal 5 V bus[2]	600 mA
Capacity of internal +V bus (16...24 V)[2]	The capacity of the +V bus depends on the capacity of the 5V bus, as follows (the more precisely the 24 V are maintained, the higher the possible capacity): $$24\,V\,{}^{-25\,\%}_{+30\,\%}: 100\,[mA]$$ $$24\,V\,{}^{-20\,\%}_{+25\,\%}: 150 - \frac{I_{5\,V\,Bus}}{15}\,[mA]$$ $$24\,V\,{}^{-10\,\%}_{+10\,\%}: 260 - \frac{I_{5\,V\,Bus}}{4.8}\,[mA]$$

1) The loads handled by the outputs and other consumers are generally more important for sizing the supply than the internal power leakage of the control

2) When planning PCD3 systems, it is essential to check that the two internal supplies are not overloaded. This check is especially important when using analogue, counter and positioning modules, as these may have a very large power consumption.

Atmospheric conditions	
Ambient temperature	When mounted on vertical surface with vertically aligned terminals: 0...+55 °C In all other mounting positions, a reduced temperature range of 0..+40 °C applies
Storage temperature	-20...+85 °C
Relative humidity	10...95% without condensation
Vibration resistance	
Vibration	according to EN/IEC 61131-2: 5...13.2 Hz constant amplitude (1.42 mm) 13.2...150 Hz, constant acceleration (1 G)

Electrical safety	
Protection type	IP 20 according to EN60529
Air/leakage paths	according to EN61131-2 and EN 50178: between circuits and bodies and between electrically isolated circuits: surge category II, fouling level 2
Electromagnetic compatibility	
Electrostatic discharge	according to EN61000-4-2: 8 kV: contact discharge
Electromagnetic fields	according to EN61000-4-3: field intensity 10 V/m, 80...1000 MHz
Bursts	according to EN61000-4-4: 4 kV on DC supply lines, 4 kV on I/O signal lines, 1 kV on interface lines
Noise emission	according to EN61000-4-6: Class A (for industrial areas)
Noise immunity	acc. to EN61000-6-4

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Mechanism and mounting	
Housing material	Module holder: PC/ABS, light grey, RAL7035 I/O modules: PC, transparent blue Clips: PAM, orange, RAL2003 Fibre optics: PC, crystal-clear
Mounting rail	Top-hat rail according to EN50022-35 (35 mm)

Electromagnetic compatibility	
Electrostatic discharge	according to EN61000-4-2: 8 kV: contact discharge
Electromagnetic fields	according to EN61000-4-3: field intensity 10 V/m, 80...1000 MHz
Bursts	according to EN61000-4-4: 4 kV on DC supply lines, 4 kV on I/O signal lines, 1 kV on interface lines
Noise emission	according to EN61000-4-6: Class A (for industrial areas)
Noise immunity	acc. to EN61000-6-4

Mechanism and mounting	
Housing material	Module holder: PC/ABS, light grey, RAL7035 I/O modules: PC, transparent blue Clips: PAM, orange, RAL2003 Fibre optics: PC, crystal-clear
Mounting rail	Top-hat rail according to EN50022-35 (35 mm)

Connections						
Terminal blocks	Spring terminals 10-pole, 4-pole	Screw terminals 10-pole	Spring terminals 14-pole, 12-pole, 8-pole	Spring terminals 24-pole, 6-pole	Earth terminal	Terminal 2-pole supply
Section stranded single wire	0.5...2.5 mm² 0.5...2.5 mm²	0.5...2.5 mm² 0.5...2.5 mm²	0.5...1.5 mm² 0.5...1.5 mm²	0.5...1.0 mm² 0.5...1.0 mm²	0.08... 2.5 mm²	0.5... 1.5 mm²
The terminal blocks may only be plugged onto 20 times. They must then be replaced, to guarantee a reliable contact						
Length of insulation	7 mm	7 mm	7 mm	7 mm	5...6 mm	7 mm

2 PCD3.M2x30 WAC CPUs

2.1 Supported WAN communication technologies

Four different types of PCD3 Wide Area Controller are available. Every model has an integrated modem with which WAN connections can be established over a provider's telecommunications network.

PCD3.M2230A4T5	GSM/GPRS modem
PCD3.M2330A4T1	Ethernet, PSTN modem
PCD3.M2330A4T3	Ethernet, ISDN modem
PCD3.M2330A4T5	Ethernet, GSM/GPRS modem

2.2 Wired Wide Area Automation

Where wired communication with a telecommunications provider is available at a location, this technology should be preferred to wireless connections because the connection quality is better.

You may also wish to use GSM to optimise costs; however, you will then have to accept certain restrictions in the quality of communication. For applications where the availability of the connection is very important, a wired connection should be provided as the normal communication channel with a GSM / GPRS channel as a backup.

2.2.1 PSTN modem

The WAC with integrated PSTN modem (PSTN stands for Public Switched Telecommunications Network) can be run over a normal telephone line. Depending on whether the device is attached to a trunk line or an (internal) PBX (Private Branch Exchange), the functionality may be more or less restricted. It may be that no incoming calls will be accepted, or outgoing calls may be wholly or partly blocked. There are also (internal) exchanges that have to be specially configured in order to run modems and fax machines. A dedicated trunk line has the advantage that the behaviour and capabilities of such a line are well known, which is not always the case with connections through a PBX. Where the reliability of the alarm function is a key criterion, you should use a separate line, as the (internal) exchange is an additional link in the chain that could restrict the function.

The WAC model with the integrated PSTN modem is the PCD3.M2330A4T1

2.2.2 ISDN modem

With the WAC with ISDN modem, the problem is similar to the PSTN version. ISDN stands for Integrated Services Digital Network. When an ISDN line has been ordered, the provider usually supplies a device which is needed to operate a modem or ISDN telephone. This device is called a Network Termination for ISDN Basic Rate Access (NTBA) (in Switzerland, NT2ab). It is possible to connect multiple ISDN devices and 2 analogue devices to this adapter. ISDN connections offer approximately twice the speed of analogue point-to-point connections. With analogue point-to-point connections, you are limited to a speed of 33600 bit/s, while ISDN point-to-point connections using a B channel can reach a speed of 64 kBit/s. In principle, the two existing B channels can be combined to 128 kBit/s. If you have to transmit larger volumes of data, ISDN is an advantage.

For connections to the Internet provider's digital modems, there is only a small difference in speed between analogue (56 kBit/s) and ISDN connections (64 kBit/s). The advantages of ISDN are particularly the fast connection setup and better quality.

The WAC model with the integrated ISDN modem is the PCD3.M2330A4T3.

2

2.2.3 WAC with Ethernet port

Another alternative with wired connections is a broadband line, e.g. with xDSL. With this technology, the existing transfer capacity of normal copper cable trunk lines is much better utilised. These are always Internet connections. By connecting an xDSL router to the Ethernet port of a WAC, you can achieve much higher transfer rates than with analogue or ISDN modems. As you only have to pay a fixed amount per month, communication costs are easier to calculate. A drawback of xDSL that is often overlooked is that, in contrast to a modem connection, you no longer have a password-protected private communication channel as standard. You have to create such channels yourself using VPNs (Virtual Private Networks). This generally requires additional hardware, which is not normally included in the xDSL package. The use of a modem with an integrated firewall or an additional external firewall is strongly recommended.

The following WAC models have an Ethernet port: PCD3.M2330A4T1, PCD3.M2330A4T3 and PCD3.M2330A4T5.

2.3 Wide Area Automation with wireless connection

Where a communication connection over wires is not possible because the unit is to be placed in an area that is not served by the fixed network, you should use the WAC with GSM / GPRS modems. WACs with GSM / GPRS are also well suited for use as a communication backup.

2.4 WAC versions with GSM/GPRS modem

2.4.1 Wireless network connection

The following types in the PCD3 Wide Area Controller series:
PCD3.M2330A4T5 and PCD3.M2230A4T5 can use the functions of the GSM mobile communication network.

The GSM versions of the Wide Area Controller can be used in locations where there is reception from a GSM network. If you can use mobile phones with the GSM standard, and the signal strength is sufficient, you should also be able to use a PCD3 Wide Area Controller.

GSM (Global System for Mobile Communications) is the best-known standard for mobile communication. Its share of the global mobile communications market is about 80%. GSM is now available in around 200 countries.

The PCD3.M2330A4T5 and PCD3.M2230A4T5 have an integrated quadband GSM/GPRS modem. The following frequencies are supported:
850 MHz, 900 MHz, 1800 MHz, 1900 MHz. It should be possible to use them in Europe without any restrictions. It is advisable to check that there is good GSM reception at the desired location. If the devices are to be used in America, Asia, Africa or Australia, you should check beforehand what frequencies are available and whether you need to apply for additional licenses.

The PCD3 WAC can use the following services provided by GSM mobile network providers:

SMS   Short Message Service
CSD   Circuit Switched Data
GPRS   General Packet Radio Service

In order to operate the PCD3.M2330A4T5 and PCD3.M2230A4T5 devices, you need a SIM card from a mobile network provider. Depending on the communication service that you want to use, you should ask for the appropriate subscription from the provider. There are subscriptions that support SMS, CSD and GPRS. Voice may also be supported, but there is no benefit in this, as it is not supported by the WAC. There are subscriptions that only support CSD and SMS, and others that only support SMS. If you limit yourself to a few services, the price of the subscription should be quite affordable. Many operators offer attractive framework contracts for sufficiently high volumes.

2.4.2   Difference between GSM (CSD) and GPRS (PSD)

With CSD (Circuit Switched Data Service) a "channel" is established temporarily. The baud rate over this channel is 9600 baud. By using other coding schemes and bundling channels (high-speed CSD, or HSCSD), a higher baud rate can be provided for data communication. This must be supported by the hardware and the operator. A channel is established from A to B. The two devices are addressed by their telephone numbers, as is usual with fixed line communication.

The costs are calculated per time unit; the exact formula may vary according to the operator. For example, there may be a cost element per call + a time element in seconds or minutes (rounded).

With PSD (Packet Switched Data Service), IP packets are transmitted.

GSM networks can offer the following PSD services: GPRS and EDGE. Not all providers have expanded their infrastructure to include EDGE. No transparent data channels are established as with CSD. It is not possible simply to exchange data between two terminals.

Operators usually bill the communication costs for PSD by data volume and not by time as with CSD.

With GPRS transmission, you are not allocated a constant bandwidth as with CSD communication. A certain number of channels in each wireless cell are reserved for the whole IP packet traffic to and from all signed-on GPRS terminals. The more devices are communicating via the same wireless cell, the smaller the bandwidth available to any individual device.

For operators, voice communication always has the highest priority for commercial reasons. The GSM system has not been optimised for data transfer.

2.5 General Overview

The CPU is similar to the PCD3.M3xxx.

This manual specifies only the differences to a PCD3. Please refer to the PCD3 Hardware manual for the whole feature set, also refer to the PCD3.WAC flyer.

2

Terminal block X1 10..19
Terminal block X0 0...9
Power supply for GSM/GPRS modem
Battery
Analogue Inputs
Telecom port ISDN, PSTN GSM, GPRS
SIM card holder
SD Flash card up to 1024 MB
Sockets for F-Modules
Functions for SD flash card
Terminal block X3 30...39
SD card protection
USB
Status LED's
Ethernet
IO connector
CPU connector 1...9
Terminal block XF 0...9
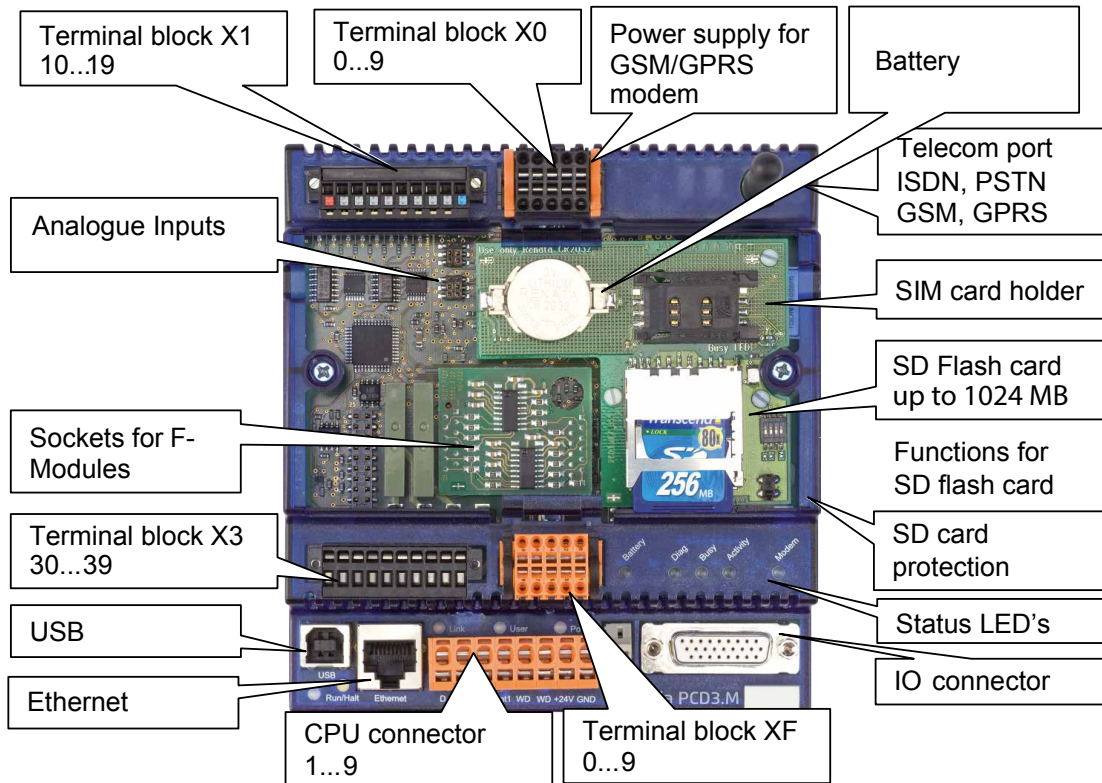
2.5.1 Characteristics

- Compact size: 130 × 140 × 75 mm (W × H × D)
- User program memory: 512 KByte RAM
- Flash onboard for user program backup: 512 KByte
- Flash onboard for file system: 1 MB
- USB, RS-485, 2 interrupts onboard and integrated Web server
- Ethernet TCP/IP (PCD3.M2230A4T5 not)
- Data protection with removable lithium battery: 1-3 years
- 14 Data points with compact I/O Board:
  - 8 Digital Inputs (DI): 15...30 VDC, 0.8 ms "ON"-Delay.
  - 2 Relais-outputs: 24 VDC, 0.5 A, change over
  - 4 Analogue Inputs (AI): 13 Bit +/- 10 V; 12 Bit 0...10 V, 0...20 mA, 0...2500Ohm, Pt/Ni1000
- 1 Port (socket A) for PCD7.F1xx
- 1 Telecom port for PSTN, ISDN or GSM/GPRS
- Adequate pluggable screw terminal blocks included*
- Options: Pluggable "Push-in" terminal block with LED (10 poles - 1x plus, 1x ground, 8x I/O signals) (only for X1)
  Pluggable "Push-in" terminal block with LED (3 x 10 poles, 3 wire connection) (only for X1)

2.6 Dimensions
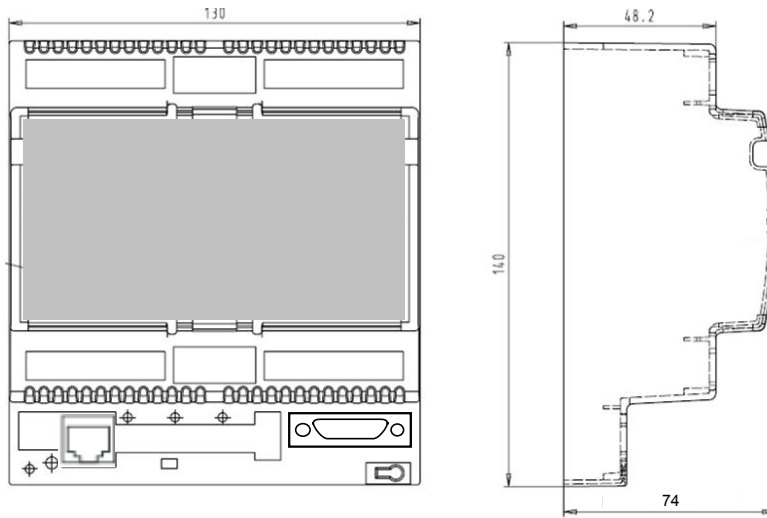
2

2.7   Memory

SD flash card memory
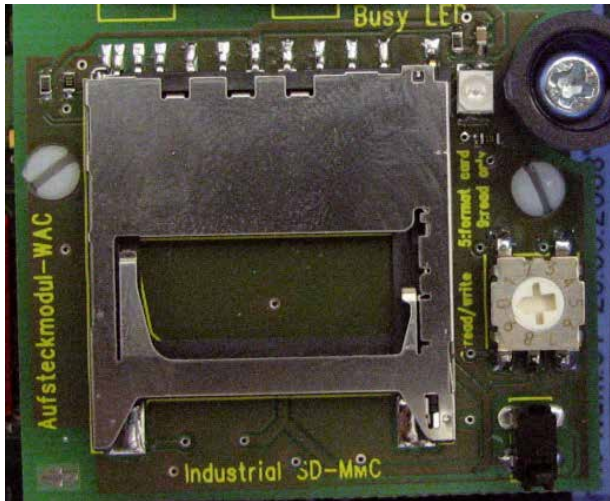
The Function switch has the same functionality like that at the PCD3.R600 module. When removing the cover the controller stops all writing and reading activities.

Pos.	Function	
0	Read/Write	Does only work when cover is placed.
1	Do not use	
2	Do not use	
3	Do not use	
4	Read/Write (without cover)	Only remove SD card when there is no access to the card
5	Format (without cover)	
6	Do not use	
7	Do not use	
9	Read only	Does only work when cover is placed.

The inserted flash device will have the following name: SL2FLASH.
The absolute path to access the file will look like:
SL2FLASH:/MYFOLDER/MYFILE.TXT

Onboard Flash memory of 1 MB

For using onboard flash memory, choose for Saia PCD® Memory Internal

The internal flash will have the following name: INTFLASH.
The absolute path to access the file will look like:
INTFLASH:/MYFOLDER/MYFILE.TXT

2.8   Connections of the CPU

For all types				Profibus signal	Profibus wiring
Terminal block for supply, watchdog, interrupt inputs and Port 2				Profibus signal	Profibus wiring
	Pin	Signal	Explanation		
	1	D	Port#2; RS-485 up to 115.2 kbit/s usable as free user interface or Profi-S-Bus up to 187.5 kbits/s	RxD/TxD-N	A green
	2	/D		RxD/TxD-P	B red
	3	Int0	2 interrupt inputs 24 VDC or 1 fast counter 24 VDC		
	4	Int1			
	5	WD	Watchdog		
	6	WD			
	7	+24V	Power supply		
	8	GND			
RS-485 terminator switch					
Switch position	Designa-tion		Explanation		
left	O		without termination resistors		
right	C		with termination resistors		

1   2   3   4   5   6   7   8

The connections are the same like on all other PCD3 CPUs.

2.9   Description of the LEDs for the Flash card and communication

Battery	●	ON (red)	Battery error
	○	OFF	Battery okay

Diag
Busy   }   SD card (same functionality like PCD3.R600)
Activity

Modem   modem activity: ●   red flashing Communication from the CPU to the modem.

●   green flashing communication from the modem to the CPU.

2

2.10   I/O Connections
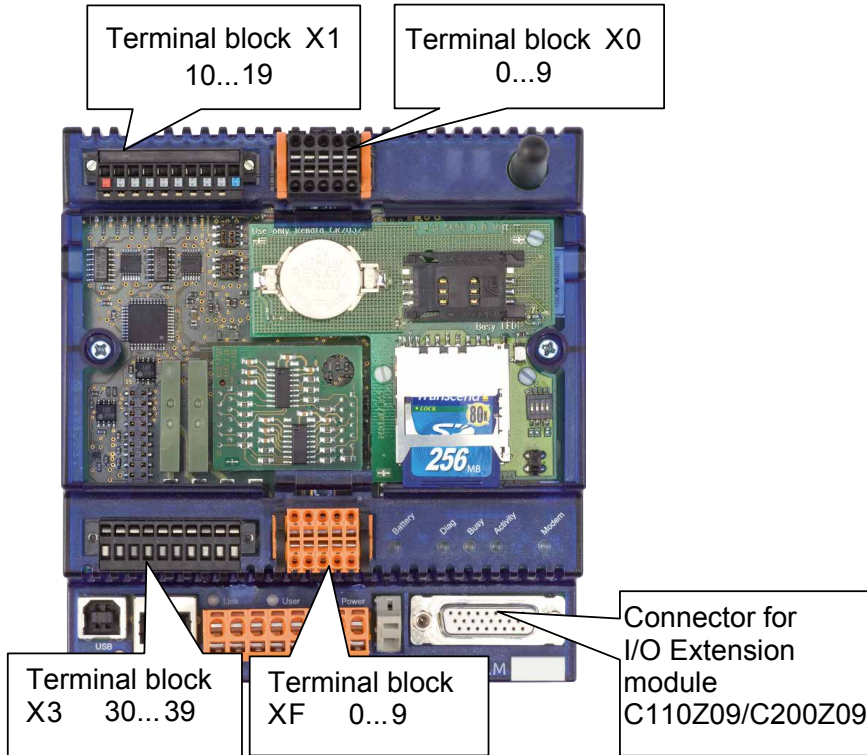
Terminal block X0		Terminal block X1		Terminal block X3		
0	AIN 0+	10	empty	30	--	
1	AIN 1+	11	IN0	31	--	
2	AIN 2+	12	IN1	32	--	
3	AIN 3+	13	IN2	33	--	
4	PGND	14	IN3	34	Rel0 Make	NO
5	PGND	15	IN4	35	Rel0 COM	CO
6	PGND	16	IN5	36	Rel0 Break	NC
7	PGND	17	IN6	37	Rel1 Make	NO
8	24VDC for GSM modem	18	IN7	38	Rel1 COM	CO
9	GND for GSM modem	19	PGND	39	Rel1 Break	NC

Pin 4,5,6,7 and 9 have all the same potential and they are internally connected together.
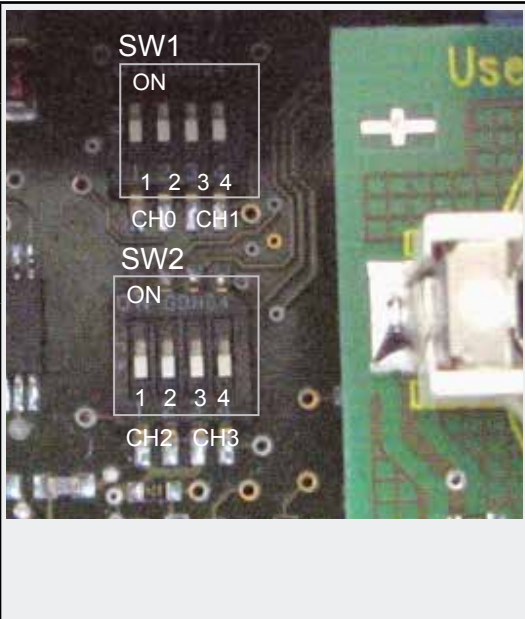
Terminal block XF *	PCD7.F121	PCD7.F110		PCD7.F180	PCD7.F150
	RS-232	RS-485	RS-422	Belimo	RS-485 isolated
0	PGND	PGND	PGND	PGND	PGND
1	TxD	Rx-Tx	Tx	MP	Rx-Tx
2	RxD	/Rx-/Tx	/Tx	‚MST'	/Rx-/Tx
3	RTS		Rx	‚IN'	
4	CTS		/Rx	GND	
5	PGND	PGND	PGND	PGND	PGND
6	DTR		RTS		
7	DSR		/RTS		
8	COM		CTS		SGD
9	DCD		/CTS		

*Same terminal block as delivered with PCD3.F2xx

2.10.1 Analogue Inputs (Terminal block X0)

Number of inputs:	4
Galvanic separation:	no
Signal ranges:	-10…+10 V -20…+20 mA RTD
Resolution (digital representation):	12 bits + sign
Connection technique for sensors	2-wires (passive input)
Measuring principle:	Single ended
Input resistance:	±10 V range: 140 kΩ ±20 mA range: 125 Ω
Input filter:	typ. 5 ms
Input ranges for temperature sensors	PT1000: -50…+400 °C NI1000: -60…+200 °C NI1000 L&S: -30…+140 °C Resistance 0-2.5 kΩ
Accuracy at 25°C:	± 0.5%
Temperature error (0…+55°C):	± 0.25%
Overrange protection:	±10 V range: ± 35 V (39V TVS Diode) ±20 mA range: ±40 mA
LEDs	no
Terminals	pluggable "push in" terminal block 10-pole, 3.5 mm for wiring up to 1 mm^2

Configuration of the analogue input channels:

		U	C	T
CH0	SW1	1 OFF 2 OFF	1 ON 2 OFF	1 OFF 2 ON
CH1	SW1	3 OFF 4 OFF	3 ON 4 OFF	3 OFF 4 ON
CH2	SW2	1 OFF 2 OFF	1 ON 2 OFF	1 OFF 2 ON
CH3	SW2	3 OFF 4 OFF	3 ON 4 OFF	3 OFF 4 ON

As shown in the picture above, analogue input range selection is done by configuration switches. Following ranges are supported:

Voltage	±10 V	Both switches off (see channel 0 configuration above)
Current	±20 mA	Switch 'C' on, Switch 'T' off (See channel 1 configuration above)
Temperature/Resistance		Switch 'T' on, Switch 'C' off (See channel 2 & 3 configuration above)

Definition of range, over/under range and status flag:

Temperature inputs:

| Type	min./max. staus flag	range values
Pt 1000 (-50...400 °C)	-500 / 4000	limites -500...4000
Ni 1000 (-50...210 °C)	-500 / 2100	limites -500...2100
Ni 1000 L&S (-30...140 °C)	-500 / 1400	limites -300...1400

Every time the min/max values are reached the min/max status flag will be set (Saia PG5® 2.0 Device Configurator).

Resistive, tension and current inputs:
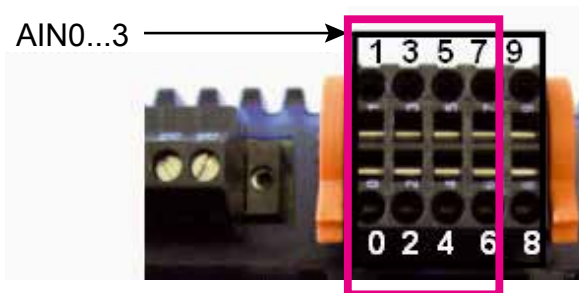The total range of values is defined by the type of range:

Type	min./max. staus flag	range of calculated values
Resistance 0...2500 Ω	0...25000 Min. flag not set	over range 25500 (25000+2%)
Voltage Input (-10...+10 V)	Xx / yy	102% of the defined range
Current Input (-20...+20 mA)	Xx / yy	102%

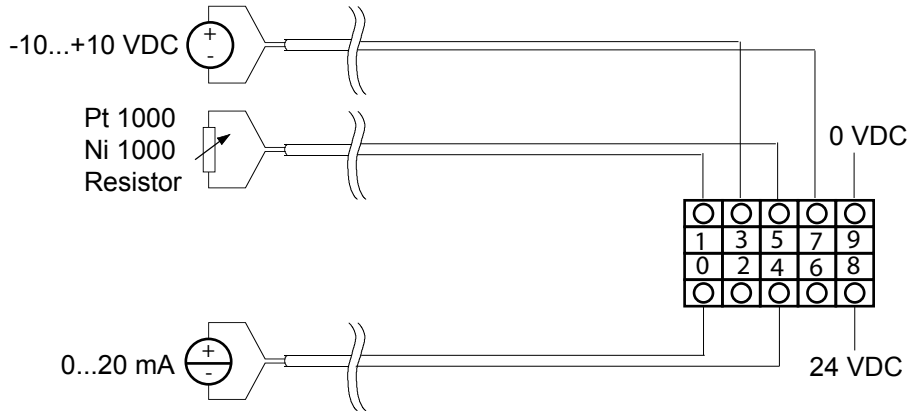Every time the min/max values are reached the min./max. status flag will be set.
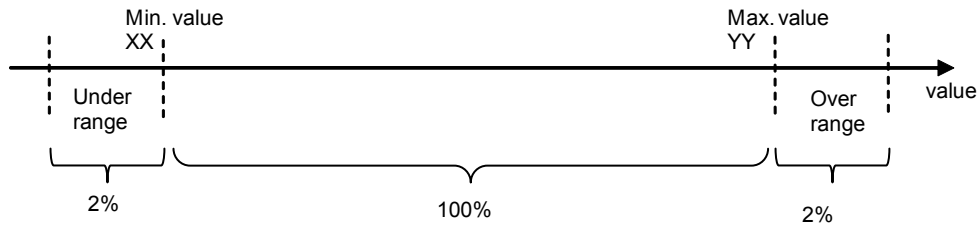
The status flag remains to set until the status is read. With media mapping the status flag is read at the end of each COB. This means the status flag is reset at the end of each COB.
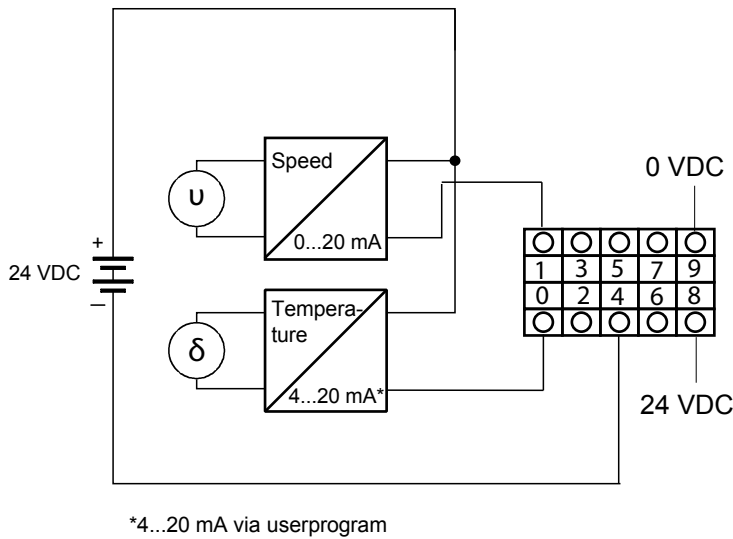
With direct access the status flag is reset as soon the user program reads the status flag.

Connection concept

-10...+10 VDC

Pt 1000
Ni 1000
Resistor

0...20 mA

0 VDC

1	3	5	7	9
0	2	4	6	8

24 VDC

Connection concept for two-wire transducers

24 VDC

Speed

0...20 mA

Tempera-
ture

4...20 mA*

0 VDC

| 1	3	5	7	9
0	2	4	6	8

24 VDC

*4...20 mA via userprogram

2.10.2 Digital Inputs (Terminal block X1)

Number of inputs:	8, electrically connected, source operation
Input voltage:	typ. 24 VDC
Input current:	typ. 4 mA at 24 VDC
Input delay:	typ. 8 ms
Overvoltage protection:	no
LEDs	no
Terminals	plug-in screw terminal block

Ue 24 VDC

10	11	12	13	14	15	16	17	18	19

X1

DI0 DI1 DI2 DI3 DI4 DI5 DI6 DI7

2
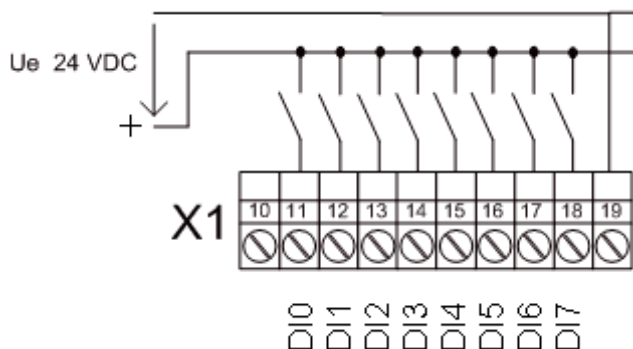
Number of outputs:	2 (change over / NO – COM – NC)
Voltage range:	250 VAC
Output current:	max. 6 A AC1 (min > 10 mA, > 12 V)
Contact lifetime	60 x 103 operations (6 A, 250 VAC AC1)
Contact protection	One VDR per contact (NO-COM and NC-COM) No R-C on the module, must be installed externally when switching inductive load
LEDs	no
Terminals	plug-in screw terminal block
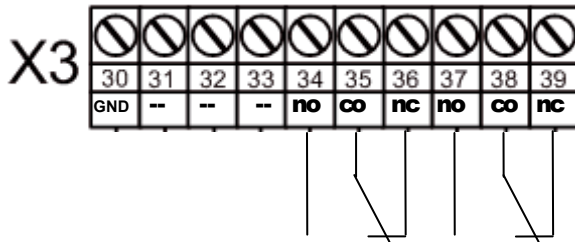
2.10.4 Terminal block with "Push In" system and LED (optional)

4 405 5066 0
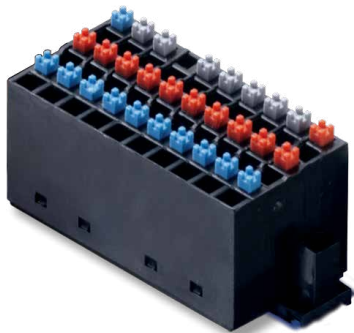
4 405 5079 0

- Push In
  - for solid wires
  - for flexible wires
  - with or without ferrules
  - 1.5mm² wire size with or without ferrules
- Easy handling
  - Simply insert the wire to connect it
  - Push the button to remove the wire
- LED
  - Clear and save monitoring of the signals

There are 2 versions available:

4 405 5066 0 Pluggable "Push-in" terminal block with LED, 10-pole, as connector for X1 only

or

4 405 5079 0 Pluggable "Push-in" terminal block with LED, 3×10 pole (3-wire connection) as connector for X1 only

The two optional terminal blocks with LEDs will not work on X3 with relay outputs.

3 Communication interfaces

3.1 Ethernet

Please refer to the PCD3 Hardware manual for more information.

3.2 USB

Please refer to the PCD3 Hardware manual for more information.

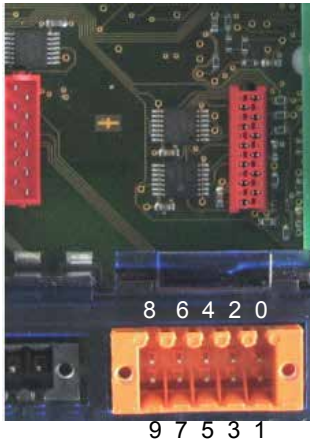## 3.3 Onboard Serial ports

Like on the other PCD3 CPUs

. 1 2 3 4 5 6 7 8

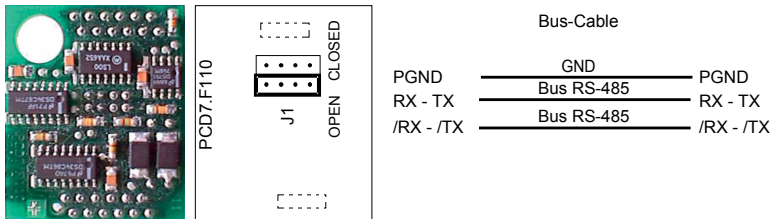Please refer to the PCD3 Hardware manual for more information.

3.4 Communication ports with socket A

Socket A on the CPU

8 6 4 2 0

9 7 5 3 1

3.4.1 Possible F-Modules Serie PCD7.F1xx

PCD7.F110 serial Interface module RS-422 / RS-485

Bus-Cable

	GND	
PGND	Bus RS-485	PGND
RX - TX	Bus RS-485	RX - TX
/RX - /TX		/RX - /TX

RS-422

0	PGND	Tx	1
2	/Tx	Rx	3
4	/Rx	PGND	5
6	RTS	/RTS	7
8	CTS	/CTS	9

RS-485

0	PGND	Rx-Tx	1
2	/Rx-/Tx		3
4		PGND	5
6			7
8	(SGD)		9

PCD7.F121 Serial interface module RS-232 suitable for modem connection
(PCD7.F120 will not be supported)

RS-232

0	PGND	TxD	1
2	RxD	RTS	3
4	CTS	PGND	5
6	DTR	DSR	7
8	COM	DCD	9
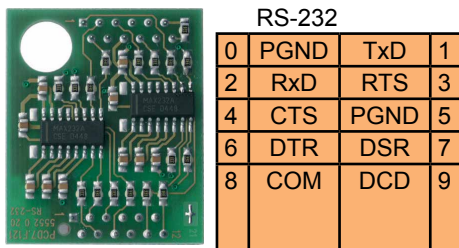
PCD7.F150 Connection for RS-485 with electrical isolation

The electrical isolation is achieved with 3 optocouplers and a DC/DC transducer. The data signals are protected against surges by a suppressor diode (10 V). The line termination resistors can be connected/disconnected with a jumper.
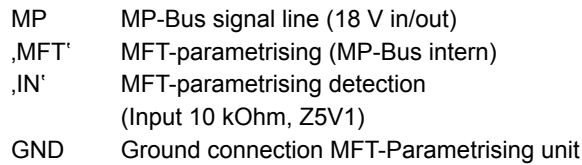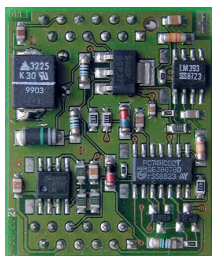
RX - TX ——— Bus RS-485 ——— RX - TX
/RX - /TX ——— Bus RS-485 ——— /RX - /TX

3

RS-485
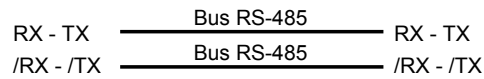
0	PGND	Rx-Tx	1
2	/Rx-/Tx		3
4		PGND	5
6			7
8	(SGD)		9

! Use of this module will reduce the allowed ambient temperature of the operating system about 5 °C.

PCD7.F180 serial interface module for Belimo MP-Bus max. 8 actuators and sensors connectable

MP	MP-Bus signal line (18 V in/out)
‚MFT‘	MFT-parametrising (MP-Bus intern)
‚IN‘	MFT-parametrising detection
	(Input 10 kOhm, Z5V1)
GND	Ground connection MFT-Parametrising unit

Belimo MP-Bus

0	GND	MP	1
2	‚MFT‘	‚IN‘	3
4		GND	5
6			7
8			9

3.4.2   Possible F-Modules new serie PCD7.F1xxS

Only PCD7-F1xxS modules use possible advantage of PCD7.F1xxS compared with PCD7.F1xx: Smaller, less current use, module detection and TTL inputs, it is a 5 V interface but with TTL inputs possible.
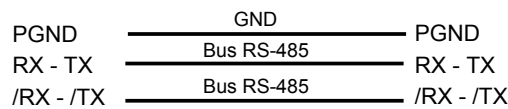
● PCD7.F110S Serial interface module for RS-485/422

3
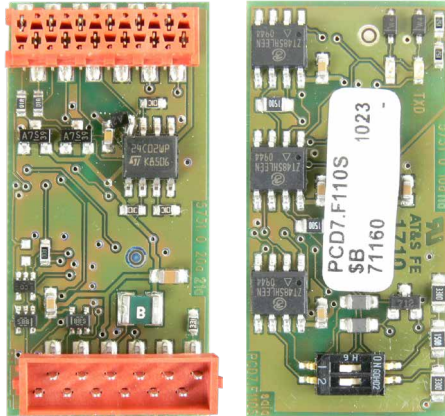
Pin assignment:

RS-485

0	PGND	Rx-Tx	1
2	/Rx-/Tx		3
4		PGND	5
6			7
8	(SGD)		9

Terminal block, socket XF — Bus-Cable

	GND	
PGND		PGND
RX - TX	Bus RS-485	RX - TX
/RX - /TX	Bus RS-485	/RX - /TX

RS-422

0	PGND	Tx	1
2	/Tx	Rx	3
4	/Rx	PGND	5
6	RTS	/RTS	7
8	CTS	/CTS	9

Terminal block, socket XF — Cable — Peripheral

PGND	PGND
TX	TX
/TX	/TX
RX	RX
/RX	/RX
PGND	SGND
RTS	RTS
/RTS	/RTS
CTS	CTS
/CTS	/CTS
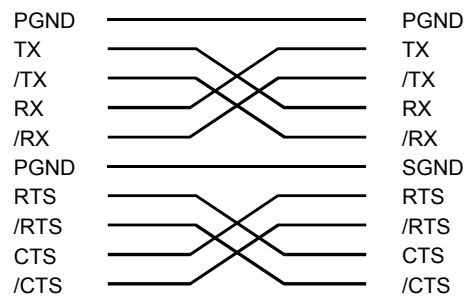
● PCD7.F121S Serial interface module RS-232 suitable for modem connection

3

Pin assignment:

RS-232

0	PGND	TxD	1
2	RxD	RTS	3
4	CTS	PGND	5
6	DTR	DSR	7
8	COM	DCD	9
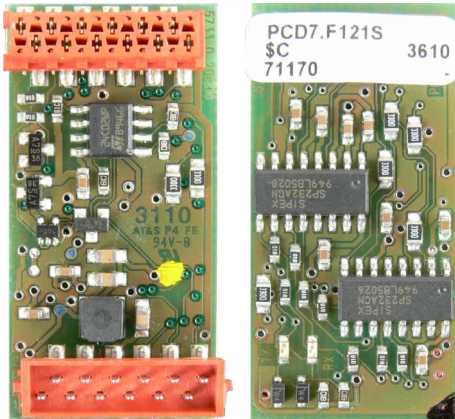
Terminal block, socket XF	Cable	Peripheral (DTE)	D-Sub f 9 pol. (e.g. PC)	D-Sub m 25 pol. (e.g. PC)
PGND	———————	PGND		
TXD	⟍	TX	3	2
RXD	⟋	RX	2	3
RTS	⟍	RTS	7	4
CTS	⟋	CTS	8	5
PGND	———————	SGND	5	7
DTR	⟍	DTR	4	20
DSR	⟋	DSR	6	6
Reserve				
DCD		DCD	1	8

● PCD7.F150S Connection for RS-485 with electrical isolation

The electrical isolation is achieved with 3 optocouplers and a DC/DC transducer. The data signals are protected against surges by a suppressor diode (10 V). The line termination resistors can be connected/disconnected with a jumper.
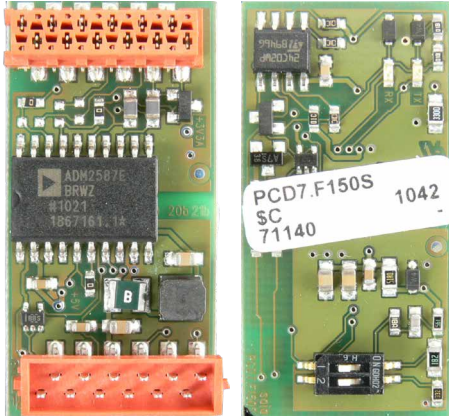
Pin assignment:

RS-485

0	PGND	Rx-Tx	1
2	/Rx-/Tx		3
4		PGND	5
6			7
8	(SGD)		9

RX - TX ——————— Bus RS-485 ——————— RX - TX
/RX - /TX ——————— Bus RS-485 ——————— /RX - /TX

Use of this module will reduce the allowed ambient temperature of the operating system about 5 °C.

3

● PCD7.F180S serial interface module for Belimo MP-Bus max. 8 actuators and sensors connectable
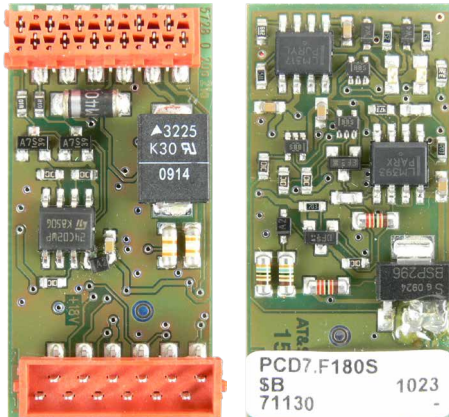
Pin assignment:

Belimo MP-Bus

0	GND	MP	1
2	‚MFT'	‚IN'	3
4		GND	5
6			7
8			9

0	**GND**	Ground connection, MP line
1	**MP**	**Multi Point** The MP-Bus is the Belimo master-slave bus. On a master device, up to 8 slaves can be connected. These are: ■ MFT (2) actuators ■ MFT (2) valve actuators ■ MFT-fire damper actuators ■ VAV-Compact controller NMV-D2M
2	**‚MFT'**	MFT programming unit (MP-Bus internal)
3	**‚IN'**	MFT programming unit detection (input 10 kΩ, Z5V1)
5	**GND**	Ground connection, MFT programming unit

3.5   Modem (Port 131)

3.5.1   General

Place of the connector to GSM antenna or RJ11 for PSTN or RJ45 for ISDN
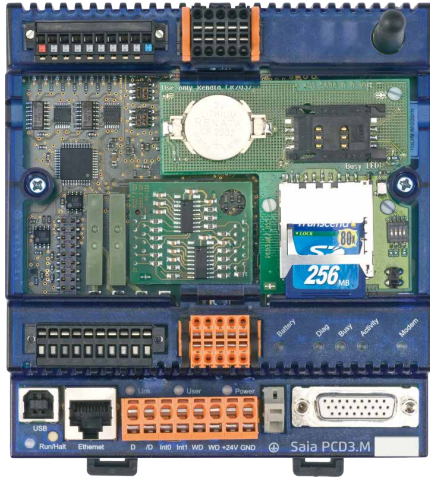
Modem Status LED description:

🔴   red flashing Communication from the CPU to the modem.
🟢   green flashing communication from the modem to the CPU.

The following chapters show possibilities for different applications.

3.5.2   GSM/GPRS Modem

Modem: Enfora Enabler III; Model: GSM0308-10

Radio Performance	
Frequency	850/900/1800/1900 MHz
Sensitivity	-106 dB (typical)
Transmit power	Class 4 (2 W @ 850/900 MHz)
Class 1	1 W 2@ 1800/1900 MHz
GPRS	
Mode	Class B, Multislot 10
Protocol	GSM/GPRS Rel 97, AMR Rel 99
Coding schemes	CS1-CS4
Packet channel	PBCCH/PCCCH
GSM	
CS data	Asynchronous, Transp. and non-transp. ≤ 14.4 kB/s
GSM SMS	Text, PDU, MO/MT, Cell Broadcast

For GSM an antenna and a SIM card is necessary.

3

Connection of the antenna
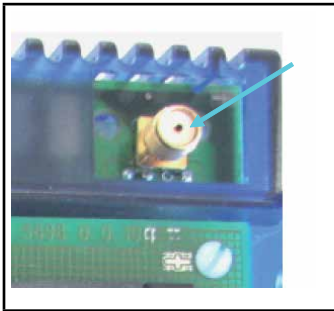
	The antenna connection on the PCD3.WAC controller is a SMA female connector for 50 Ohm antennas with SMA male connector

Antenna types

Magnetic
CD7.K840

Wall mounted

Outdoor

Magnetic GSM/GPRS dual band 900/1800 antenna with 2 m cable.

SIM card
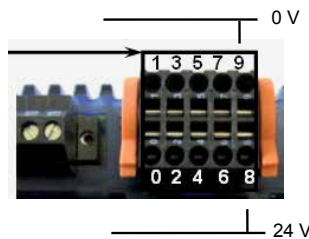
	!	The GSM modem needs external power supply at pin 8 and 9. Without this external supply the modem will not work
	Do not use the following type of antennas, use only antennas connected by cable.	

3.5.3 PSTN Modem

Modem: Xmodus, Swiss GmbH; model: 3094S-3V-R
The PSTN modem has a 6 pole RJ11 jack (female) for the connection to the PSTN.
The PSTN modem does not need any external power supply.

1 --
2 OT
3 T
4 R
5 OR
6 --
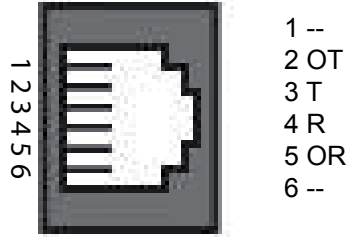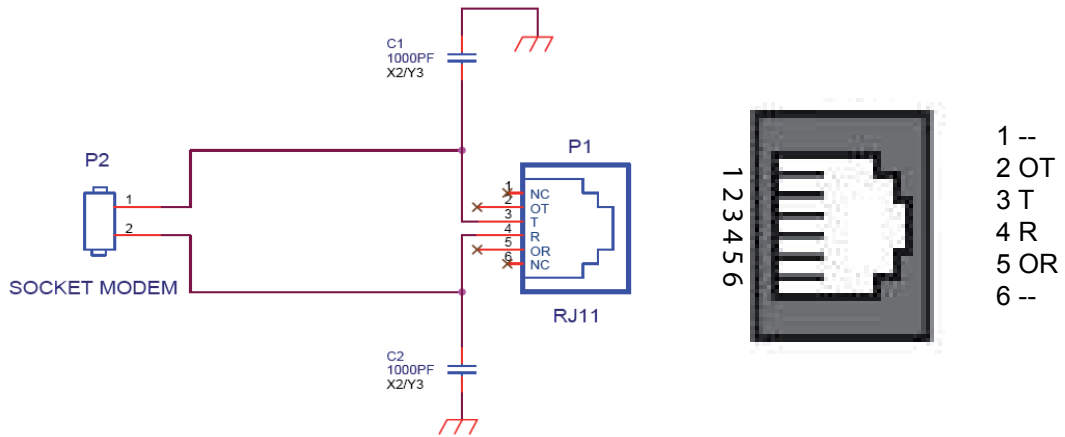
3.5.4 ISDN Modem

Modem: Xmodus, Swiss GmbH; model: AL5068S-3V-R The ISDN modem has a 8 pole RJ45 jack (female) for the connection to the ISDN network. The ISDN modem does not need any external power supply.

1 --
2 --
3 TX+
4 RX+
5 RX-
6 TX-
7 --
8 --

3
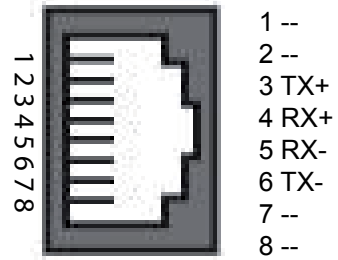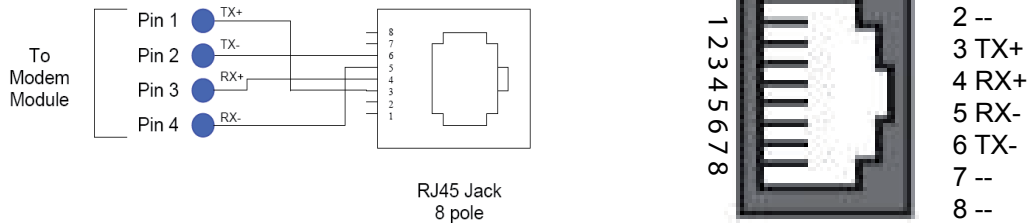
3.6   Life check and modem reset

3.6.1   Check Internet connection via GPRS

With life check FBox it is possible to check the Internet connection via GPRS. The life check FBox uses a ping command to any visible server in the network (e.g. Internet). With this PING command the PCD3.WAC can recognise if it is connected to the network or not. If for some reason the communication fails, perhaps because of external reasons, e.g. telecom provider disconnects the PCD3.WAC from GPRS network, the controller will recognise that there is no connection to the network, and the controller starts a new initialisation of the communication with a modem reset.
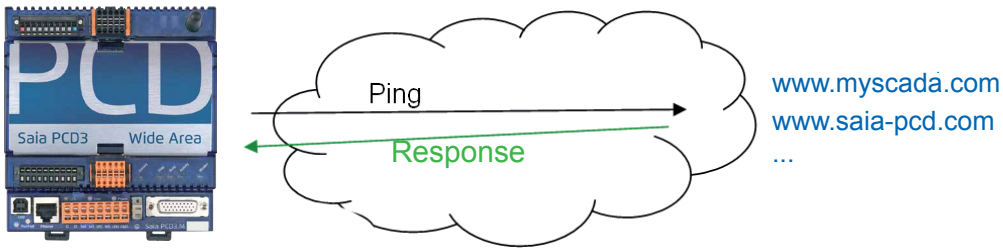
Please note:
- Make sure that the server you ping is always reachable.
- GPRS provider sometimes does not allow pinging GPRS devices.

Enabling the life check FBox, a ping command will be sent to the server periodically. The time and total retries before an error is displayed can be configured within the FBox parameter

For more details, please refer to the FBox help.

3.6.2   GPRS diagnosis

This FBox enables the checking of the GPRS parameters with open PPP connection.

Please note that this FBox need Open Data Mode.

The time interval for new values can be changed in the FBox.

For more details, please refer to the FBox help.

Roaming

In wireless telecommunications, roaming is a general term that refers to the extending of connectivity service in a location that is different from the home location where the service was registered. Roaming ensures that the wireless device keeps connected to the network without interference.

With "register" and "operator" information, the user can recognise if the device is connected to the home provider.

3

3.6.3   Using modem reset

By using this special modem command, only the modem part of the controller will be reset. This command works for all PCD3.WAC with ISDN, PSTN, GSM/GPRS modem.

The output for modem reset is preferably the last flag of the relay output mapping	**I/O 1 : 2 Relay Outputs**
	Media Mapping
	Media Mapping Enabled — Yes
	Media Type — Flag
	Number Of Media — 8
	Media Address — 0
	Flag Symbols Definition — (Default)
	Register Symbols Definition — (Default)

A positive edge will reset the modem After reset the flag is set to 0 automatically.	Symbol Name | Type | Address/Value | Comment
	ROOT
	IO.DigitalOutput0 | F | 0 | Digital output 0
	IO.DigitalOutput1 | F | 1 | Digital output 1
	IO.DigitalOutput2 | F | 2 | Digital output 2 (not used)
	IO.DigitalOutput3 | F | 3 | Digital output 3 (not used)
	IO.DigitalOutput4 | F | 4 | Digital output 4 (not used)
	IO.DigitalOutput5 | F | 5 | Digital output 5 (not used)
	IO.DigitalOutput6 | F | 6 | Digital output 6 (not used)
	IO.DigitalOutput7 | F | 7 | modem reset on positive edge

The reset modem functionality can be used with modem 18 library initialisation FBox and "HW Reset" output.	Modem **Modem 18** ● Ini Bsy SwR Err HwR Err Abort HwR — Modem_Reset

!   **Please note:**

■ The communication with the modem (e.g. PPP) will break down and restart.
  → Make sure that the PPP automatic restart is active! Or else you need to restart PPP connection manually.

■ Automatic change of IP address in case of using dynamic addressing.

Wide Area   For preventive proposes, the modem can be reset once a day (or week) by the user programme.

3.6.4   Modem connection via ISDN or PSTN

Modem configuration using modem 18 library.
All functionalities of modem 18 library can be used with PCD3 WAC.

Modem configuration using PPP
Setup with device configurator => No need of modem 18 library.

3.7   Modem LED functionality
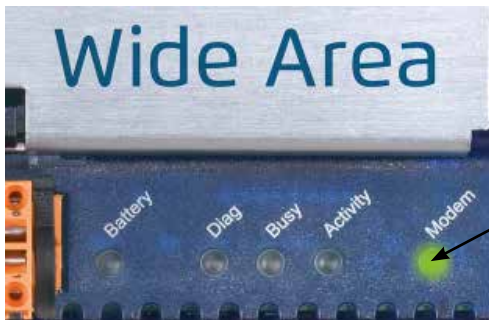
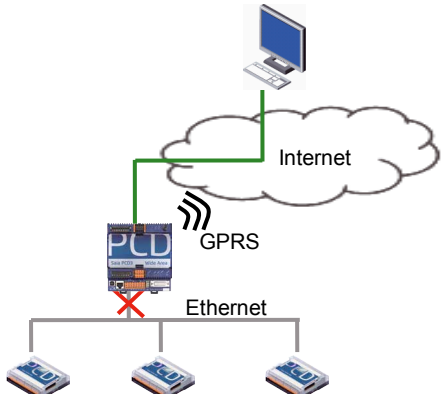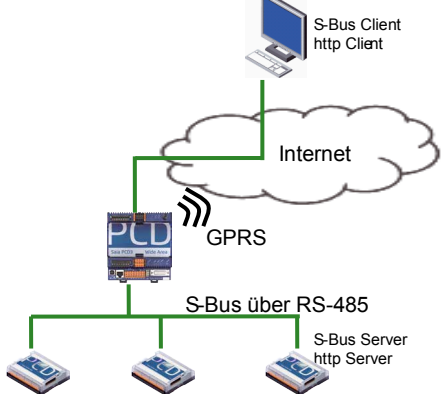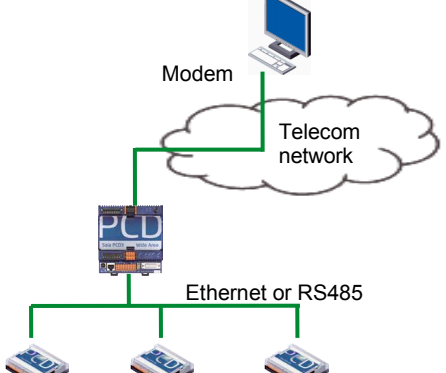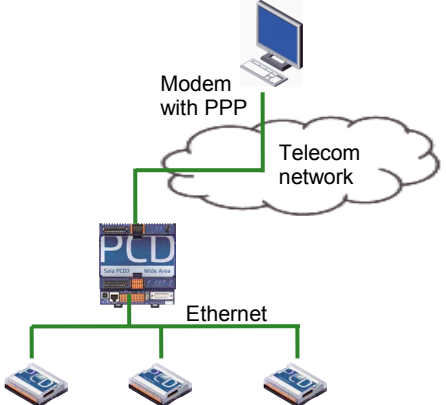The integrated two colour LED signals the actual state of the modem.

LED signalisation:

⬤/◯ 1)	Red flashing 1100 ms on 100 ms off	**GSM/GPRS modem not powered** Modem not powered→ red flashing (This indication is only available with HW version B)
🟢/◯ 1)	Green flashing 600 ms on / 600 ms off	**Modem is connecting to GSM/GPRS network**
🟢/◯ 1)	Slow flashing 1x 100 ms on / 3.1 s off	**Idle**
⬤/◯ 1)	100 ms on / 1.1 s off	**General error**
⬤/🟢	Rapid flashing	**Communication** RED rapid flashing: from the CPU to the modem Green rapid flashing: from the modem to the CPU

1) only for PCD3.WAC with GSM/GPRS modem
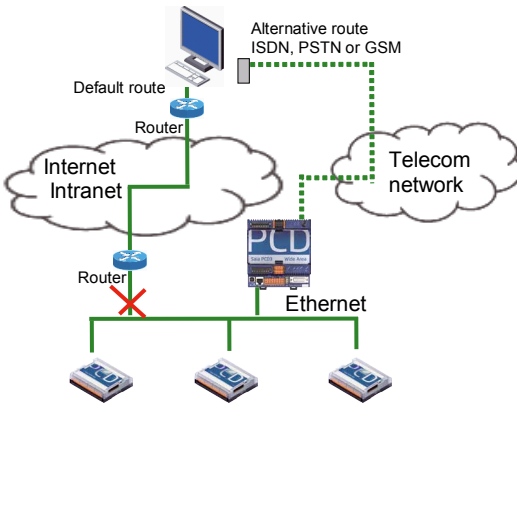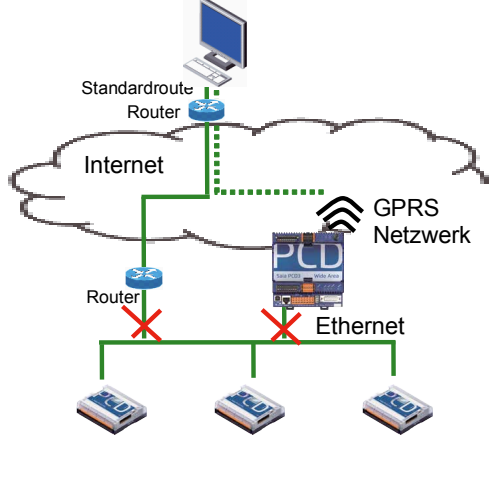
4   WAN, possibilities of configuration

4.1   Default gateway/Routing with PPP communication

From GPRS to Ethernet The PCD3.WAC cannot be used for routing IP communication over the Internet. The PCD3.WAC has no complete routing functionality (e.g. NAT tables) Routing possibilities: ✖ In this case no IP protocols can be routed through the PCD3.WAC	
From GPRS to serial RS-485 and S-Bus communication: The integrated S-Bus gateway can be used to access other devices connected to the PCD3.WAC by RS-485 through the Internet. With the implemented http functionality via S-Bus it is also possible to access the Web server of these stations. Routing possibilities: ✓ S-Bus ✓ Web server access ✖ Other IP protocols	
From ISDN, PSTN or GSM modem-modem connection To Ethernet or serial RS-485 and S-Bus communication: The integrated S-Bus gateway allows S-Bus Master/Slave communication or access web server. Routing possibilities: ✓ S-Bus ✓ Web server access ✖ Other IP protocols	

From ISDN, PSTN or GSM and PPP communication	
With IP forwarding functionality all IP protocols can be used to access the devices behind the PCD3. WAC. Note: You need to set up a PPP communication on the PC. Routing possibilities: ✓In this application all supported IP protocols (Ether-S-Bus, HTTP, FTP…) can be routed through the PCD3.WAC	

4.2 Use Modem communication as backup to Ethernet

Backup communication via modem-modem communication (ISDN, PSTD or GSM): Default communication to the network is over a router (e.g. ADSL router). If for some reason the communication breaks, the Saia PCD® will switch to alternative communication automatically. With IP forwarding mechanism the PPP communication via ISDN, PSTN or GSM can be used for alternative communication route for IP protocols. When PPP is active the default gateway switches to the PPP channel. Restrictions: The alternative route does not allow any connection to the Internet.	
Backup communication via GPRS communication: The PCD3.WAC can open communication via Ethernet or via GPRS network. Please note that the Saia PCD® can only have one active router configuration at a time. The router configuration can be changed by the user programme. Restrictions: The PCD3.WAC has no routing functionality trough the Internet. This means the devices behind the PCD3.WAC are not reachable via GPRS. Implementation of S-Bus gateway from PPP to Ethernet is in preparation.	

4.3   Dyn DNS for PCD3.WAC

Dynamic DNS Free (DDNS) is a free domain name service allowing aliases of dynamic (DHCP) IP addresses to static host names.

Every time the IP address changes, the controller send its new IP address to DynDNS server
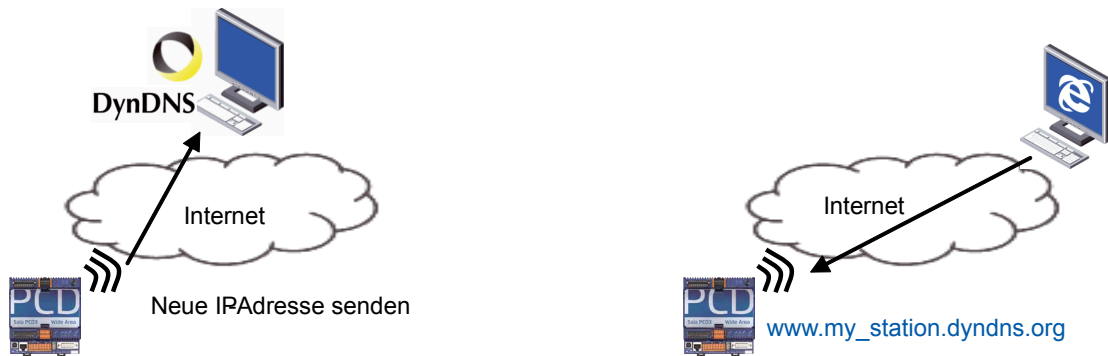
To use DynDNS please use DynDNS FBox. This FBox is part of the WAA library	
Dyn DNS does not work when PCD3.WAC is in STOP/HALT → No update will be initialised if the IP address changes.	
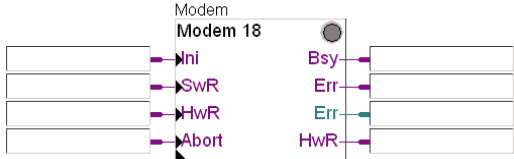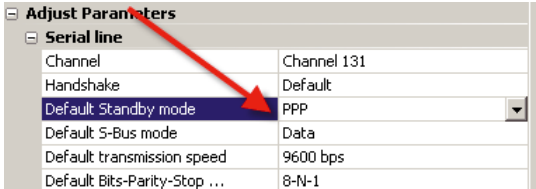
To use DynDNS functionality, the DNS protocol on the PCD3.WAC should be activated. Please note that every APN usually has a dedicated DNS server. A list can be found in the networking guide or in the PCD3.WAC demo description.

Initialise GPRS DNS server e.g. for APN *a1.net*	

Open Data Mode need to be initialised

Initialising ODM (Open Data Mode)	

4.4 Modem 18 library and PPP communication

Choose PCD3.WAC modem type and select port 131 for serial communication to the modem		
Select PPP as default standby mode .		

The port is configured for the PPP protocol which allows TCP/IP communication (incl. UDP and other Ethernet protocols). When the modem is used for an outgoing call (like Call Pager or SMS), the PPP link is stopped. The consequence is that TCP/IP communication is not possible during this time. When the call is ended, the PPP link is automatically restarted and TCP/IP is possible again.

Every time the PPP communication is established, the system will get a new IP address (e.g. from GPRS provider)

5 Input/output (I/O) modules

If there is the need to extend the basic unit you will have the possibility to add one further extension module out of the PCD3 range (PCD3.C200Z09 or PCD3.C110Z09) and to equip them with PCD3 I/O modules. Well over 45 different types of I/O modules (digital, analogue, counters) are available.

For further details about the PCD3 I/O modules see chapter 6 of the PCD3 manual, 26/789.

5

6 Configuration

6.1 General

The following description assumes that the user is familiar with the Saia PG5® software.
If not, you are advised to read manual 26/733 "Saia PG5®".

Software requirements: Saia PG5® 2.0 or higher

This chapter shows how to use the onboard IOs of the PCD3 Wide Area Controller with new Device Configurator.

The Device Configurator defines:

● A cyclically media mapping to enables a link between peripheral I/O modules values and the device resources (Saia PCD® Media)
● Direct access programming instructions to read value from the peripheral input module and write value to the peripheral output module

> IO handling is always enabled for the PCD3.M2x30
> Via direct access there is no bit access command. The minimal access range is "byte", therefore we recommended to use the media mapping to read/write all I/O channels.

For more details refer to the help texts of the Device Configurator.l

6.2 Device Configurator

Chose the right Saia PCD® Type or load configuration

Device properties

6.3 Digital Inputs
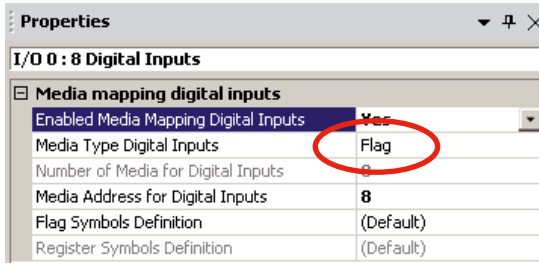
a) Accessing over flags mapping
   1) Enabled Media mapping
   2) Select "Media" Type as "Flag"
   3) Give first "Media Address" x

The "inputs" flags are updated before COB 0 starts with the current inputs state:

Example: x=0
- F0 = DI0
- F1 = DI1
- ...
- F19 = DI19

Remark: F 20 to F 23 will be put to '0'

6

b) Accessing over registers mapping
   1) Enabled Media mapping
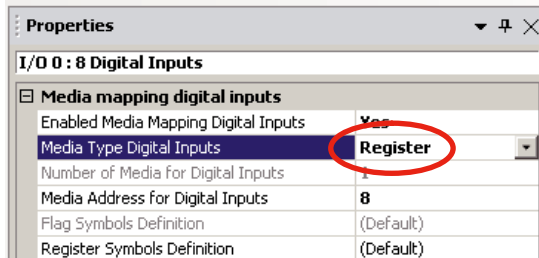   2) Select "Media Type" as "Register"
   3) Give first "Media Address" x

The "inputs" registers are updated before first COB starts, with the current inputs state:

- Bit0 of R0 = DI0
- Bit1 of R0 = DI1
- ...
- Bit19 of R0 = DI19

Remark: Bit 20 to Bit 31 of R0 will be put to '0'

6.4 Digital Outputs

The digital outputs of the PCD3 WAC can be mapped in flags or registers.
Select under "Onboard Inputs/Outputs" the line I/O 1, all corresponding properties appears on the right side.

a) Accessing over flags mapping
   1) Enabled Media mapping
   2) Select "Media Type" as "Flag"
   3) Give first "Media Address" y

The Flags states are transferred to outputs DO 0 until DO 11 at COBs end.

Example: y=24
- DO0 = F24
- DO1 = F25
- ...

F 26 to F 39 have always '0' bit

b) Accessing over registers mapping
   1) Enable Media mapping
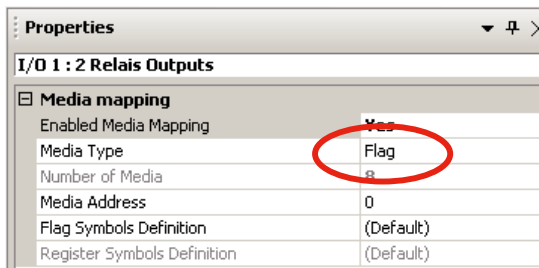   2) Select "Media Type" as "Register"
   3) Give first "Media Address" y

The register's value ('Low'-Bits) is transferred to outputs DO 0 until DO 11 at COBs end:

- DO0   = Bit0 of R24
- DO1   = Bit1 of R24
- ...
- DO11   = Bit11 of R24

Bit12 to Bit31 of R24 have always '0' value

6

6.5   Analogue Inputs

The analogue inputs of the PCD3 WAC can be mapped into registers.
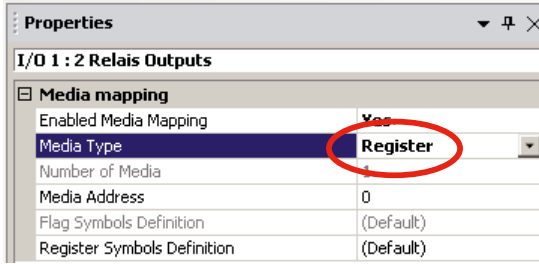Select under "Onboard Inputs/Outputs" the line I/O 2, all corresponding properties appear on the right side.

a) Accessing over registers mapping
   1) Enable Media Mapping
   2) Give first "Media Address" a

The 4 "inputs" registers are updated at the COB 0's start with the current values of analogue inputs:
Example: a=3

- R3 = AI0
- R4 = AI1
- R5 = AI2
- R6 = AI3

b) Filter activation and Range mode
   Filtering: The analogue inputs can be read directly (unfiltered) or a 16 tap floating average filter can be switched "ON" to reduce noise
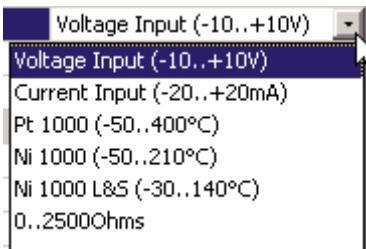
Possible Range mode:
- 12 Bit Resolution (default)
  → -4096...4095
- -20...+20 mA in µA resolution
  → -20'000...20'000
- -10...+10 V in mV or % resolution
  → -10'000...10'000
- User defined range
  (Value between -32'768 and 32'767)

Don't forget to place corresponding jumpers for Inputs voltage/current range

7 Maintenance

PCD3 components are maintenance-free, apart from some CPUs, where the battery needs to be changed occasionally. The PCD3.WAC has an integrated battery.

PCD3 components do not contain any parts that can be swapped out by the user. If hardware problems arise, the components should be returned to Saia Burgess Controls.

7.1 Changing the battery

The resources (registers, flags, timers, counters etc), and possibly the user program and the text strings/DBs, are stored in RAM. To ensure that they are not lost and that the hardware clock (where present) continues to run when there is a power outage, the PCD3s are equipped with a buffer battery.

CPU type	Buffer	Buffer time
PCD3.M2xx0	Renata CR2032 lithium battery	1-3 years[1]

1) Depending on the ambient temperature; the higher the temperature, the shorter the buffer time

> **!** With new controllers, the batteries are packaged with the units, and have to be inserted on commissioning. Observe the polarity of the batteries:

- Insert Renata CR2032 coin cells in such a way that the Plus pole is visible

CPUs with lithium batteries are not maintenance-free. The battery voltage is monitored by the CPU. The BATT LED lights up and XOB 2 is called if

- the battery voltage is less than 2.4 V
- the battery is missing

We recommend changing the batteries with the Saia PCD® attached to the power supply, to avoid any loss of data.

A   Appendix

A.1   Icons

i	In manuals, this symbol refers the reader to further information in this manual or other manuals or technical information documents. As a rule there is no direct link to such documents.
	This symbol warns the reader of the risk to components from electrostatic discharges caused by touch. **Recommendation:** Before coming into contact with electrical components, you should at least touch the Minus of the system (cabinet of PGU connector). It is better to use a grounding wrist strap with its cable permanently attached to the Minus of the system.
!	This sign accompanies instructions that must always be followed.
Classic	Explanations beside this sign are valid only for the Saia PCD® Classic series.
xx7	Explanations beside this sign are valid only for the Saia PCD® xx7 series.

A

A.2   Definitions of serial interfaces

A.2.1   RS-232

Designation of signal lines:

Data lines	TXD	Transmit data
	RXD	Receive data
Signal and message lines	RTS	Request to send
	CTS	Clear to send
	DTR	Data terminal ready
	DSR	Data set ready
	RI	Ring indicator
	DCD	Data carrier detect

Signals to 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/ message signal	0 (off)	-15 V to -3 V	-7 V
	1 (on)	+3 V to +15 V	+7 V

The idle state   of the data signals = "mark"

of the control and message signals = "off"

A

A.2.2   RS-485/422

Signals to RS-485 (RS-422)
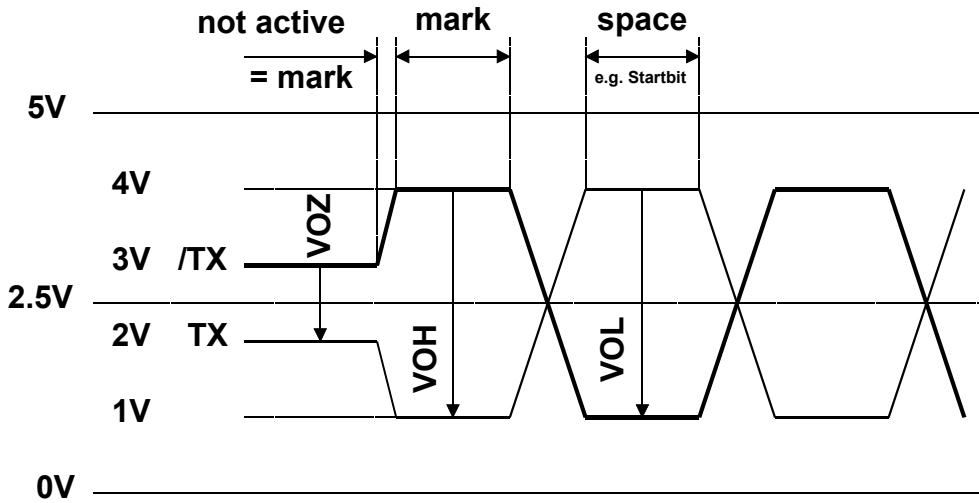
VOZ =   0.9 V min ... 1.7 V
VOH =   2 V min (with load) ... 5 V max (without load)
VOL =   -2 V ... -5 V

In the idle state, RS-422 is in the "mark" position

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

> **!** Not all manufacturers use the same connection configuration, so the data lines may need to be crossed

> **!** To guarantee error-free operation of an RS-485 network, the network should be terminated at both ends. Cable and line termination resistors should be selected in accordance with manual 26/740 "Installation components for RS-485 networks".

A.3   Order details

Type	Description	Weight
	Basic units	
PCD3.M2230 A4T5	Wide Area CPU with 512 KBytes RAM, GSM/GPRS Modem, USB, 8/2 digital in-/outputs, 4 analogue inputs, Profi-S-Net	750 g
PCD3.M2330 A4T1	Wide Area CPU with 512 KBytes RAM, PSTN Modem, USB, Ethernet, 8/2 digital in-/outputs, 4 analogue inputs, Profi-S-Net	750 g
PCD3.M2330 A4T3	Wide Area CPU with 512 KBytes RAM, ISDN Modem, USB, Ethernet, 8/2 digital in-/outputs, 4 analogue inputs, Profi-S-Net	750 g
PCD3.M2330 A4T5	Wide Area CPU with 512 KBytes RAM, GSM/GPRS Modem, USB, Ethernet, 8/2 digital in-/outputs, 4 analogue inputs, Profi-S-Net	750 g
	Flash memory cards	
PCD7.R-SD256	256 MByte Saia PCD® SD flash memory card with file system	3 g
PCD7.R-SD512	512 MByte Saia PCD® SD flash memory card with file system	3 g
PCD7.R-SD1024	1024 MByte Saia PCD® SD flash memory card with file system	3 g
	Spares	
4 507 4817 0	Lithium battery Renata CR 2032	3 g
	Communication modules on Socket A	
PCD3.F110	with RS-422/RS-485 interface (electrically connected)	80 g
PCD3.F121	with RS-232 interface (suitable for modem)	80 g
PCD7.F150	with RS-485 interface (electrical isolated)	80 g
PCD3.F180	Belimo MP-Bus (based on RS-232)	80 g
	Module holders for expansions	
PCD3.C110	Module holder for 2 I/O modules, (PCD3.K106/K116)	180 g
PCD3.C110Z09	Module holder for 2 I/O modules, (PCD3.K010)	180 g
PCD3.C200	Module holder for 4 I/O modules, with 24V supply, (PCD3.K106/K116)	350 g
PCD3.C200Z09	Module holder for 4 I/O modules, with 24V supply, (PCD3.K010)	350 g
	Accessories	
4 405 5066 0	Optional: Pluggable "Push-in" terminal block with LEDs, 10-pole, as connector for X1 only	12 g
4 405 5079 0	Optional: Pluggable "Push-in" terminal block with LEDs, 3×10 pole (3-wire connection) as connector for X1 only	30 g
PCD7.K840	GSM/GPRS antenna with magnetical food and 2m cable	50 g
PCD3.K106	Connecting cable 0.7 m	70 g
PCD3.K116	Connecting cable 1.2 m	90 g
PCD3.K010	Connector between CPU and expansion housing	90 g

A

A.4   Contact

Saia-Burgess Controls AG
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3280 Murten
Switzerland

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Fax... +41 26 672 74 99

Email support: .... support@saia-pcd.com
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SBC site: .... www.saia-pcd.com
International Represetatives &
SBC Sales Companies: .... www.saia-pcd.com/contact

Postal address for returns from customers of the Swiss Sales office

Saia-Burgess Controls AG
Service Après-Vente
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