EN

PRM

Extension module

User guide

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Contents

1. Overview **2**

2. Specifications **3**

- 2.1 Environmental conditions 4
- 2.2 Galvanic isolation 4

3. Safety **5**

- 3.1 Intended use 5

4. Mounting **6**

- 4.1 Intended use 6
- 4.2 Internal bus 6
- 4.3 Wiring 7
- 4.4 Quick replacement 8

5. Configuration **9**

- 5.1 Firmware update 10

6. Maintenance **11**

7. Transportation and storage **12**

8. Scope of delivery **13**

Appendix A Dimensions **14**

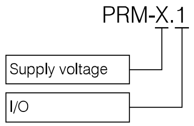
1. Overview

PRM extension module provides additional inputs and outputs for the basic device PR200. The module inputs and outputs can be controlled by PR200 as its own I/Os.

The module is a passive device and cannot be used without connection with the basic device over internal bus.

The module is manufactured in several modifications, differing by the supply voltage. All modifications are designed in a plastic enclosure for DIN rail mounting.

Ordering code:


PRM-X.1
Supply voltage
I/O

Supply voltage
230 - 230 (94…264) V AC
24 - 24 (19…30) V DC

I/O
1 - 8 DI, 8 DO

Ordering example:

PRM-230.1 – extension module with 230 VAC supply voltage, 8 230 VAC digital inputs and 8 relay outputs.

▶ **NOTICE** ***Each PRM module is powered independently of the basic device. The basic device and the modules may have different supply voltages.***

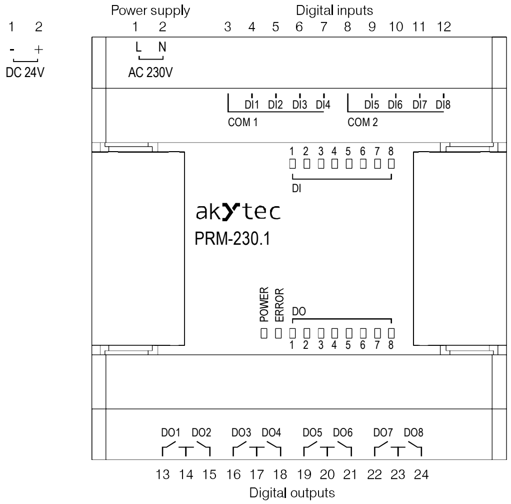

Power supply
Digital inputs
1 2
- +
DC 24V
1 2 3 4 5 6 7 8 9 10 11 12
L N
AC 230V
DI1 DI2 DI3 DI4
COM 1
DI5 DI6 DI7 DI8
COM 2
1 2 3 4 5 6 7 8
DI
akYtec
PRM-230.1
POWER
ERROR
DO
1 2 3 4 5 6 7 8
DO1 DO2 DO3 DO4 DO5 DO6 DO7 DO8
13 14 15 16 17 18 19 20 21 22 23 24
Digital outputs

Fig. 1.1

Table 1.1 LED indicators

Indicator	Color	Description
POWER	green	Lights if the power supply is on
ERROR	red	Flashes if the communication with the basic device is interrupted
DI1…DI8	yellow	Indicates the state of the input (lights = on)
DO1…DO8	yellow	Indicates the state of the output (lights = on)

2. Specifications

Table 2.1 General specification

Device	PRM-230.1	PRM-24.1
Power supply	230 (94…264) V AC; 50 (47…63) Hz	24 (19…30) V DC
Power consumption, max	8 VA	4 W
Galvanic isolation	2830 V	1780 V
Appliance class	II	
Digital inputs	8	8
Digital outputs	8	8
Internal bus		
Frequency	2.25 MHz	
Packet rate (each 16 bit)	4000 packet/s	
Max. module number	2	
LEDs	18	
Dimensions (with terminal blocks)	88 x 108 x 58 mm	
Mounting	DIN rail (35 mm)	
Weight	approx. 250 g	
IP class	IP20	

Table 2.2 Digital inputs

Device	PRM-230.1	PRM-24.1
Input signal	Switch contact	Switch contact PNP with open collector
Input voltage	230 V AC	24 V DC
Input voltage, max	264 V AC	30 V DC
Logical 1	159…264 V (0.75…1.5 mA)	15…30 V (5 mA)
Logical 0	0…40 V (0…0.5 mA)	-3…+5 V (0…1 mA)
Pulse length, min	50 ms	2 ms
Response time, max	100 ms	30 ms
Galvanic isolation	in groups of 4 (1-4, 5-8)	
Test voltage between groups	1780 V	
Test voltage against other circuits	2830 V	

Table 2.3 Digital outputs

Device	PRM-230.1	PRM-24.1
Type	Relay (NO)	
Switching capacity AC	5 A, 250 V (resistive load)	
Switching capacity DC	3 A, 30 V	
Minimum load current	10 mA (at 5 V DC)	
Service life, electrical		
5 A, 250 V AC (resistive load)	100,000 switching cycles	
3 A, 30 V DC	200,000 switching cycles	
Galvanic isolation	in groups of 2 (1-2, 3-4, 5-6, 7-8)	
Test voltage between groups	1780 V	
Test voltage against other circuits	2830 V	

2.1 Environmental conditions

The device is designed for natural convection cooling. It should be taken into account when choosing the installation site.
The following environment conditions must be observed:

- clean, dry and controlled environment, low dust level
- closed non-hazardous areas, free of corrosive or flammable gases

Table 2.4

Conditions	Permissible range
Ambient operating temperature	-20…+55°C
Storage temperature	-25…+55°C
Relative humidity	up to 80% (at +25°C, non-condensing)
Altitude	up to 2000 m above sea level
EMC immunity	conforms to IEC 61000-6-2
EMC emission	conforms to IEC 61000-6-4

2.2 Galvanic isolation

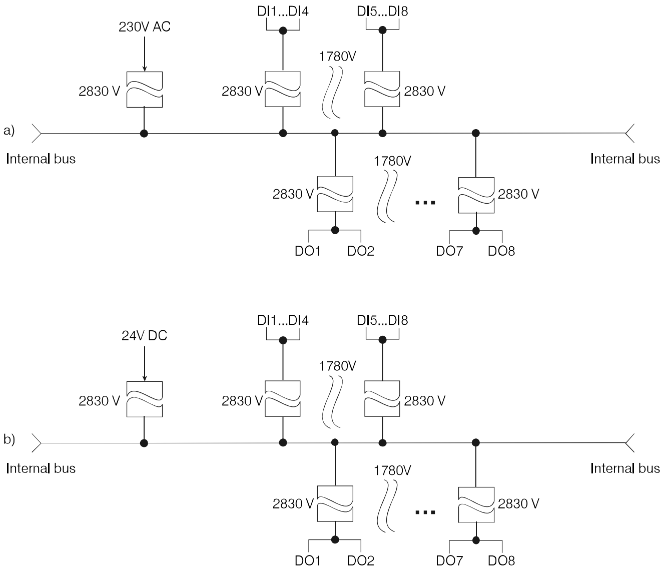


Fig. 2.1 Galvanic isolation PRM-230 (a) and PRM-24 (b)

3. Safety

Explanation of the symbols and keywords used:

⚠ **DANGER**	***DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.***
⚠ **WARNING**	***WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.***
⚠ **CAUTION**	***CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.***
▶ **NOTICE**	***NOTICE indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects.***

3.1 Intended use

Extension modules of PRM series have been designed and built solely for the intended use described in this manual, and may only be used accordingly. The technical specifications contained in this manual must be observed.

The module may be operated only in properly installed condition.

Improper use

Any other use is considered improper. Especially to note:

- This device should not be used for medical devices which receive, control or otherwise affect human life or physical health.
- The device should not be used in an explosive environment.
- The device should not be used in an atmosphere with chemically active substance.

4. Mounting

The extension module PRM is designed for DIN rail mounting. For the dimension drawing see Appendix A.

The safety precautions from the section 4.1 and the operating conditions from the section 2.1 must be observed.

After mounting on the DIN rail, first the internal bus connection should be implemented (see 4.2 ‘Internal bus’), then the power supply and the external devices should be connected to the module terminal blocks (see 4.3 ‘Wiring’).

For device quick replacement see 4.4.

4.1 Intended use

⚠ **DANGER** ***The device must be powered off before connecting to internal bus or I/O devices.***

⚠ **WARNING** ***Improper installation can cause serious or minor injuries or device damage.***
Installation must be performed only by fully qualified personnel.

⚠ **WARNING** ***Ensure that the mains voltage matches the voltage marked on the nameplate!***
Ensure that the device is provided with its own power supply line and electric fuse!
Do not feed any external devices from the power contacts of the device.

▶ **NOTICE** ***It is necessary to observe the polarity while connecting 24V power sources. Improper connection can damage the device.***

▶ **NOTICE** ***Supply voltage for 24 VDC models may not exceed 30 V. Higher voltage can damage the device.***

If the supply voltage is lower than 19 V DC, the device cannot operate properly but will not be damaged.

▶ **NOTICE** ***Signal cables should be routed separately or screened from the supply cables.***

▶ **NOTICE** ***Shielded cable should be used for the signal lines to ensure the EMC precautions.***

▶ **NOTICE** ***Removing of the terminal blocks may be performed only after powering off the device and all connected equipment.***

▶ **NOTICE** ***Before switching on, make sure that the device was stored at the specified ambient temperature (-20 ... +55 °C) for at least 30 minutes.***

4.2 Internal bus

A high-speed internal bus that connects PR200 to PRM modules provides the same high-speed performance of the module I/Os that of the built-in I/Os of the basic device. This allows reading the module input vales and writing the module output values within one cycle of the program running on PR200.

The PRM modules are connected to PR200 in series. Maximum two modules can be connected (Fig. 4.1). To implement the internal bus, connect PRM to PR200, using the 4.5 cm flat cable included to the module.

PRM has two connectors marked ‘EXT’ located under the right and left covers on the device front. The connector under the left cover is used to connect the 1st PRM to PR200 or the 2nd PRM to the

1st one. The connector under the right cover is used to connect PR200 to the 1st PRM or the 1st PRM to the 2nd one.

To enable control by PR200, the module should be added to the PR200 configuration in the programming software ALP (see 5 ‘Configuration’).

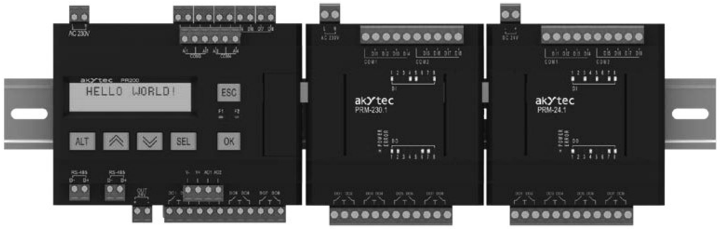


Fig. 4.1

When connected, the flat cable should be placed in a special recess under the cover to enable PRM to be pushed close to PR200.

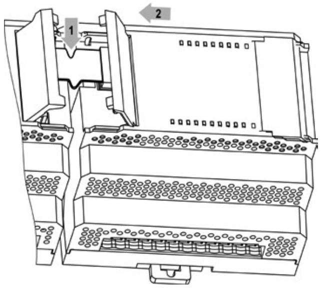


Fig. 4.2

4.3 Wiring

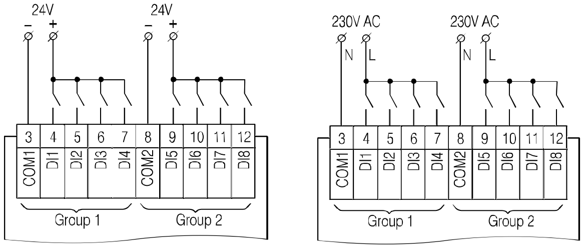
The safety precautions from the section 4.1 must be observed.

Terminal assignment is given in Table 4.1. Electrical connections for inputs and outputs are given in Fig. 4.3…4.5. Maximum conductor cross-section is 0.75 mm².

Table 4.1 Terminal assignment

№	Designation	Function	№	Designation	Function
1	AC230V L / DC24V -	Power supply AC / DC *	13	DO1	Digital output DO1
2	AC230V N / DC24V +	Power supply AC / DC *	14	-	Common contact DO1...DO2
3	COM1	Common minus pole DI1...DI4	15	DO2	Digital output DO2
4	DI1	Digital input DI1	16	DO3	Digital output DO3
5	DI2	Digital input DI2	17	-	Common contact DO3...DO4
6	DI3	Digital input DI3	18	DO4	Digital output DO4
7	DI4	Digital input DI4	19	DO5	Digital output DO5
8	COM2	Common minus pole DI5...DI8	20	-	Common contact DO5...DO6
9	DI5	Digital input DI5	21	DO6	Digital output DO6
10	DI6	Digital input DI6	22	DO7	Digital output DO7
11	DI7	Digital input DI7	23	-	Common contact DO7...DO8
12	DI8	Digital input DI8	24	DO8	Digital output DO8

** Depending on the device modification (PRM-230 or PRM-24)*


24V
–
+
230V AC
N
L
3
4
5
6
7
8
9
10
11
12
COM1
DI1
DI2
DI3
DI4
COM2
DI5
DI6
DI7
DI8
Group 1
Group 2

a *b*

Fig. 4.3 Connection of switch contacts to digital inputs: a) PRM-24, b) PRM-23

▶ **NOTICE**

PRM-230 (230 V AC)

The digital inputs are divided into two groups, each of four inputs. All inputs must be operated on the same phase. Different phases are not allowed.

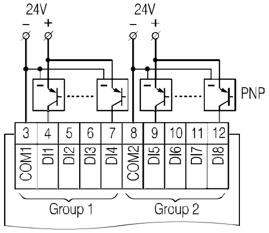

24V
–
+
PNP
3
4
5
6
7
8
9
10
11
12
COM1
DI1
DI2
DI3
DI4
COM2
DI5
DI6
DI7
DI8
Group 1
Group 2

Fig. 4.4 Connection of 3-wire sensors to PNP transistor inputs (PRM-230 only)

For PRM-24, it is allowed to connect sensors with switch contacts and transistor outputs within the same input group. One voltage source can be used for two input groups.

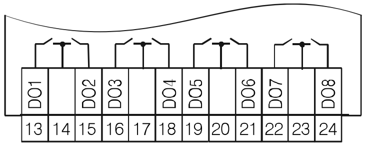

DO1
DO2
DO3
DO4
DO5
DO6
DO7
DO8
13
14
15
16
17
18
19
20
21
22
23
24

Fig. 4.5 Relay outputs

4.4 Quick replacement

PRM is equipped with plug-in terminal blocks which enable quick replacement of the device without disconnecting the existing wiring (Fig. 4.6).

To replace the device:

- power off all connected lines including power supply
- remove all detachable parts of the terminal blocks
- replace PRM
- connect detachable parts with existing wiring to the device

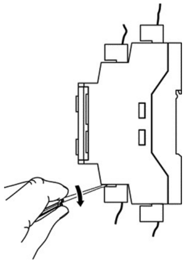


Fig. 4.6 Quick replacement

5. Configuration

To add a module to the basic device configuration:

- open a PR200 project in ALP programming software
- open the tool ‘**Device configuration**’
- select the item ‘**Extension modules**’
- add PRM module using the context menu (Fig. 5.1)

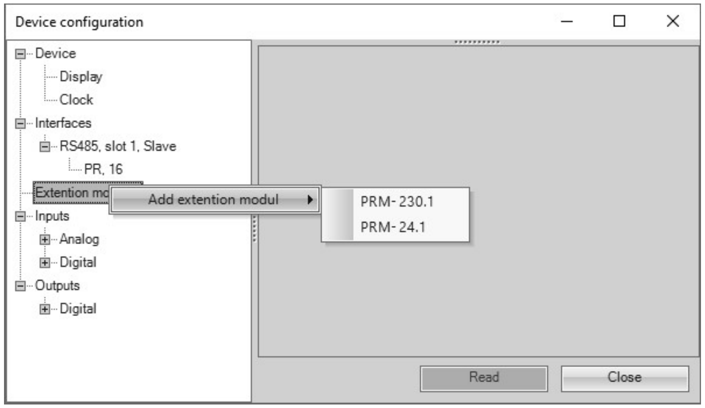

Device configuration
Device
Display
Clock
Interfaces
RS485, slot 1, Slave
PR, 16
Extention mo
Add extention modul
PRM- 230.1
PRM- 24.1
Inputs
Analog
Digital
Outputs
Digital
Read
Close

Fig. 5.1

The PRM counting number, when counting from left to right from PR200, determines the slot number in the configuration (Fig. 4.1). The module next to PR200 should be added to the configuration first to be assigned to the slot 1. The next added module is always assigned to the slot 2. If there is no module assigned to the slot 1, it is impossible to assign the module to the slot 2.

The data exchange between PR200 and PRM at the slot 2 is carried out through PRM at the slot 1. If PRM at the slot 1 is powered off, the data exchange between PR200 and PRM at the slot 2 is interrupted.

You can remove PRM from the project only after disconnecting all the variables connected to its inputs and outputs.

You can change the position of PRM in the configuration using the context menu.

The project can be transferred to P200 irrespective of whether the modules are connected or not.

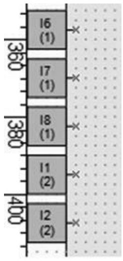

I6 (1)
I7 (1)
I8 (1)
I1 (2)
I2 (2)
360
380
400

Fig. 5.2

When a module is added to configuration, additional inputs I1…I8 and outputs O1…O8 with the module number in brackets appear in the workspace (Fig. 5.2).

The inputs from I6 (1) to I8 (1) are the inputs 6…8 of the module at the slot 1.

The inputs from I1 (2) to I2 (2) are the inputs 1, 2 of the module at the slot 2

When have been added to the project, the module is ready for operation. The following optional settings can be made:

1. **Status –** a parameter to witch a Boolean variable in the project can be assigned. The value of the parameter is:

- TRUE, if the communication with PRM is established and the modification of PRM matches the one specified in the project
- FALSE, if the communication with the module is lost or the modification of PRM does not match the one specified in the project

2. **Output safe state –** the parameter can be set for each output using the item '**Outputs \ Digital**' in the configuration tree. The parameter defines the safe output state if communication with PR200 has been interrupted.
3. **Debouncing filter –** the parameter is available only for inputs of PRM-24. It can be set for each input using the item '**Inputs \ Digital**' in the configuration tree. The parameter defines the input filter time for contact bounce suppression and can be set in the range of 0…255 ms.

▶ **NOTICE**

It is not recommended to use the contact bounce suppression for input signals with a frequency above 90 Hz and a duty cycle of 50% or less. A useful signal can be missed.

5.1 Firmware update

When communication between akYtec ALP software and PR200 with PRM(s) connected is established, you can check all devices for firmware update. If a firmware update is available, it will be prompted to install it on the basic device and the modules.

6. Maintenance

The maintenance includes:

- cleaning of the housing and terminal blocks from dust, dirt and debris
- check the device fastening
- checking the wiring (connecting leads, fastenings, mechanical damage)

The device should be cleaned with a damp cloth only. No abrasives or solvent-containing cleaners may be used. The safety information in section 3 must be observed when carrying out maintenance.

7. Transportation and storage

Pack the device in such a way as to protect it reliably against impact for storage and transportation. The original packaging provides optimum protection.

If the device is not taken immediately after delivery into operation, it must be carefully stored at a protected location. The device should not be stored in an atmosphere with chemically active substances.

Permitted storage temperature: -25...+55 °C

▶ **NOTICE**

The device may have been damaged during transportation.
Check the device for transport damage and completeness!
Report the transport damage immediately to the shipper and akYtec GmbH!

8. Scope of delivery

– PRM	1
– Short guide	1
– Connecting cable	1
– Terminal blocks (set)	1

Appendix A Dimensions

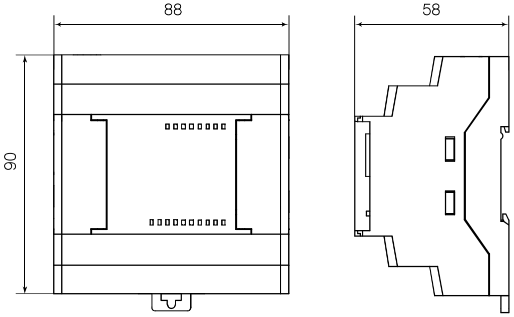


Fig A.1