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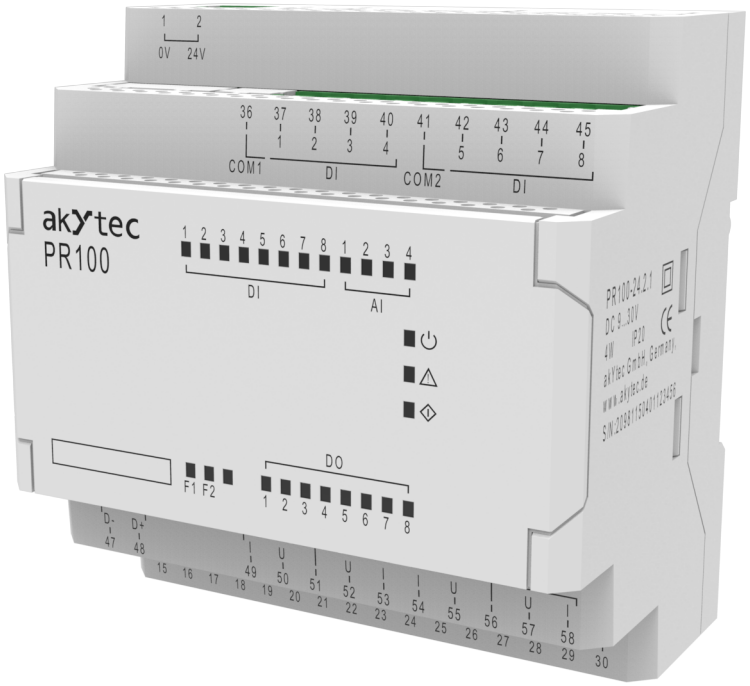

PR100.24.2.1

Programmable relay

User guide

PR100.24.2.1_3-EN-73563-1.12

Contents

1 Introduction

This manual describes the functions, configuration, operating instructions, programming and troubleshooting of the multifunctional programmable relay PR100 (hereinafter referred to as PR100, device, or relay).

1.1 Terms and abbreviations

- **ALP** – programming software akYtec ALP for programming PR series relays, based on Function Block Diagram programming language (FBD)
- **ADC** – analog-digital converter
- **DAC** – digital-analog converter
- **Modbus** – application layer messaging protocol for client/server communication between devices connected on different types of buses or networks, originally published by Modicon (now Schneider Electric), currently supported by an independent organization Modbus-IDA (www.modbus.org)
- **Project** – user application created in ALP software that also includes the device configuration
- **RAM** – random access memory, volatile part of the device memory
- **Retain memory** – non-volatile device memory for retain variables
- **Retain variable** – type of variable that keeps its value after device restart (power off/on cycle)
- **ROM** – read-only memory, non-volatile part of the device memory
- **RTC** – real time clock

1.2 Symbols and key words

WARNING
WARNING indicates a **potentially dangerous situation** that could result in death or serious injuries.

CAUTION
CAUTION indicates a **potentially dangerous situation** that could result in minor injuries.

NOTICE
NOTICE indicates a **potentially dangerous situation** that could result in damage to property.

NOTE
NOTE indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

1.3 Intended use

Programmable relays of PR100 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. Only by akYtec GmbH recommended extension modules may be connected to the relay.

The relay 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.

2 Overview

The programmable relay PR100 is a small controller, developed for automated control systems in industry, agriculture, building technology and household applications.

User program is created as a function plan with the ALP programming software, which is available for free download.

The ALP project includes the program as well as the device configuration.

Dynamically allocated memory enables to create complicated programs with many functional blocks, display elements and advanced display management.

The PR100 enables the following basic functions:

– programming and configuration using ALP software
– input signal processing
– output control
– master or slave in Modbus network over RS485 interface
– real-time clock
– 2 programmable LEDs F1, F2

The analog inputs can be also used as digital inputs (see sect. 4.2).

The device is designed in a plastic enclosure for DIN rail mounting. The enclosure has 3-level stepped form for the installation in switchboards.

Plug-in terminal blocks enable quick and easy replacement of the device.

3 Specification

3.1 Specification tables

Table 3.1 General specification

Power supply		24 (9…30) V DC
Power consumption, max.		4 W
Galvanic isolation		1500 V / 1 s
Inputs	Digital	8
	Analog	4
Outputs	Digital	8
	Analog	—
Network interface		RS-485
	Protocol	Modbus-RTU, Modbus-ASCII
	Mode	Master/Slave
	Baud rate	9.6…115.2 kbit/s
	Galvanic isolation	1500 V / 1 s
Extension modules		none
Real-time clock accuracy		± 3 s/day
Dimensions (with terminal blocks)		88 × 108 × 58 mm
Mounting		DIN-rail (35 mm)
Weight		approx. 250 g

Table 3.2 Digital inputs

Logical 1	8.5…30 V / 2…5 mA
Logical 0	-3…+5 V / 0…15 mA
Pulse length, min.	2 ms
Response time, max.	30 ms
Galvanic isolation	in groups of 4 (1-4, 5-8)
between inputs groups	1780 V / 1 s
against other circuits	2830 V / 1 s

Table 3.3 Analog inputs

Galvanic isolation	no
ADC resolution	12 bit
Analog mode	
Input signal	0-10 V, 4-20 mA
Input voltage, max.	30 V
Input resistance for 0-10 V input	61 kΩ
Basic error	±0.5 %
Temperature influence	±0.5 % / 10 °C
Digital mode	
Nominal input voltage	24 V DC
Logical 1/0 switching threshold (adjustable in ALP)	2.5…10 V
Logical 0/1 switching threshold (adjustable in ALP)	3…10.5 V
Pulse length, min.	5 s
Signal frequency, max.	100 Hz

Table 3.4 Digital outputs

Type	relay (NO)
Galvanic isolation	individual
between outputs	1780 V
against other circuits	2830 V
Switching capacity AC	5 A, 250 V AC (resistive load)

Switching capacity DC		3 A, 30 V DC
Load current at 5 V DC, min.		10 mA
Service life, electrical	3 A, 30 V DC	100 000 switching cycles
	5 A, 250 V AC (resistive load)	200 000 switching cycles

Table 3.5 Programming

Software		ALP
Interface		Micro-USB
Memory	ROM	128 kB
	RAM	16 kB
	Retain	1 kB
	Network variables	128 Byte
Program execution cycle, min.		1 ms

3.2 Operating conditions

The device is designed for natural convection cooling.
The following environmental conditions must be observed:
– clean, dry and controlled environment, low dust level
– closed non-hazardous areas, free of corrosive or flammable gases

Table 3.6 Operating conditions

Condition	Permissible range
Operating temperature	-40…+55 °C
Relative humidity	up to 80 % (at +25 °C, non-condencing)
Attitude	up to 2000 m above sea level
Appliance class	II
IP code	IP20
EMC immunity	conforms to IEC 61000-6-2
EMC emission	conforms to IEC 61000-6-4

3.3 Galvanic isolation

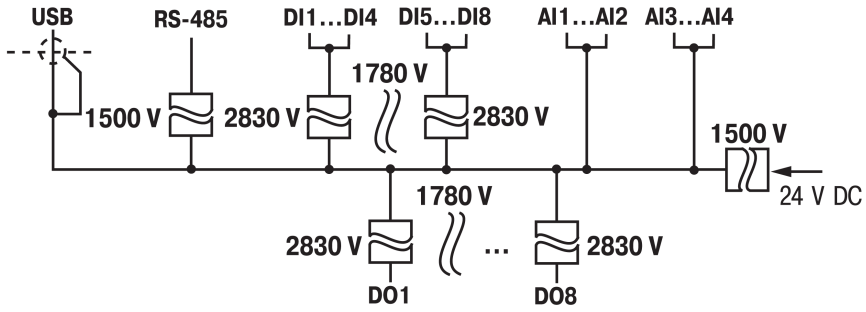

Fig. 3.1 Galvanic isolation

4 Configuration and programming

4.1 General instructions

It is recommended to configure and program the device prior to installation and wiring. Configuration and programming are carried out when creating a user project in ALP. Proceed as follows:

1. Connect the power supply to the removable terminal block and plug it into the device.
2. Switch on the device power.
3. Make sure the indicator ⚠ shows no error.
4. Connect the PR100 programming socket (Pos. 1 in Fig. 6.3) to PC over a USB-to-Micro-USB connection cable.
5. Start ALP and ensure the device is detected correctly.
6. Open the configuration window using the menu item ***Device > Configuration*** or the toolbar icon  .
7. Configure the relay.
8. Create a user program.

A completed project can be transferred to the device memory using the menu item ***Device > Transfer application to device***.

The following hardware can be configured:

– RTC
– RS485 interface
– digital inputs
– analog inputs

See ALP Help for detailed information about configuration.

4.2 Digital inputs

Open the node ***Inputs > Digital*** in the open window ***Device configuration*** and select an input.

Each of the digital inputs DI1…DI8 has only one configurable parameter:

Debouncing filter – parameter defines the filter time constant for contact bounce suppression and can be set in the range of 0…255 ms. The setting 0 disables the filter.

4.3 Analog inputs

Open the node ***Inputs > Analog*** in the open window ***Device configuration*** (Fig. 4.1) and select an input for configuration.

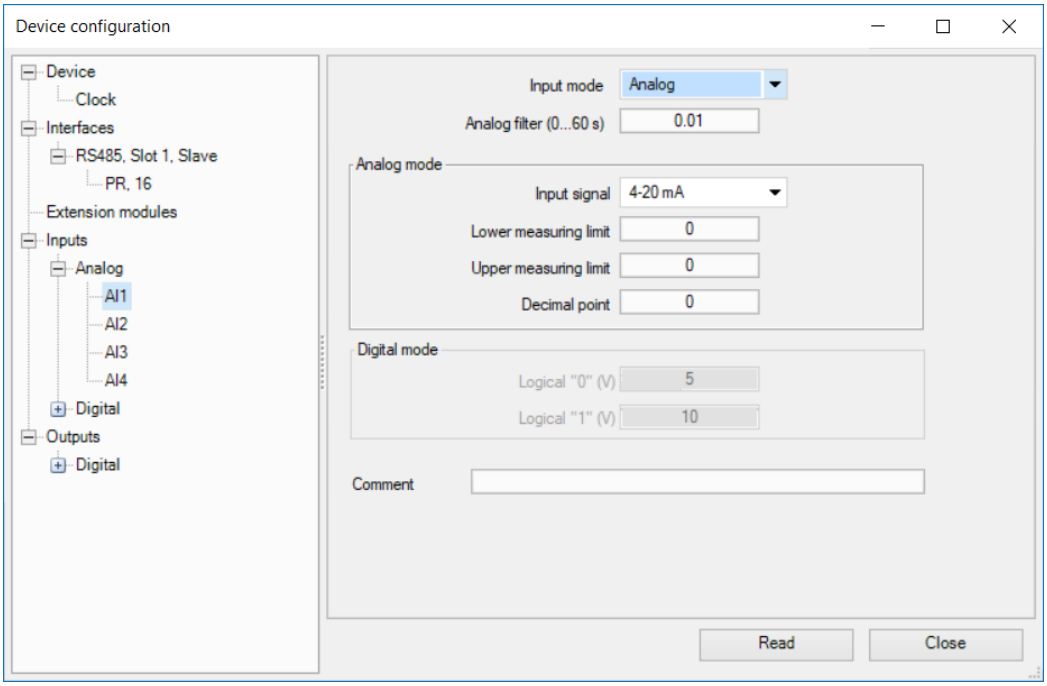

Fig. 4.1 Analog input configuration

For quick access select an input in the circuit program and use Property Box (see Fig. 4.2) to set the parameters. The parameter ***Input mode*** has to be set first.

NOTICE
Ensure that the input signal is connected to the correct input terminals and that the input configuration corresponds to the signal. Non-observance can cause damage to the device.

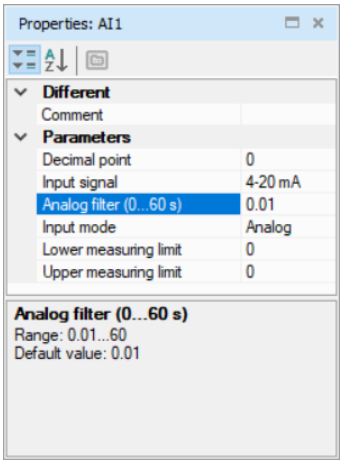

Fig. 4.2 Property Box for analog input

4.3.1 Analog mode

Configurable parameters:
- ***Input mode*** – select ***Analog***
- ***Filter*** – filter time constant (sect. 4.3.3)
- ***Input signal*** – 4-20 mA, 0-10 V.

With the option "4...20 mA", a 121 Ω shunt resistor is connected to each channel.

– ***Lower measuring limit*** – minimum level of the input signal
– ***Upper measuring limit*** – maximum level of the input signal.

The lower and upper measuring limits must be set to scale the input signal.

– ***Decimal point offset (DP)*** – The input value is saved as REAL32 and INT16 in the device Modbus register. Decimal point offset determines the decimal point shift to the right while saving the input value as INT16. For instance: If the input value is 3.14 and the offset is 1, then 31 will be written in the INT16 register.

4.3.2 Digital mode

Configurable parameters:

– ***Input mode*** – select ***Digital***
– ***Filter*** – filter time constant (sect. 4.3.3)
– ***Logical 0*** – switching threshold from 1 to 0, can be adjusted in ALP in the range 2.5…10 V and should me less than logical 1 by at least 0.5 V
– ***Logical 1*** – switching threshold from 0 to 1, can be adjusted in ALP in the range 3.0…10.5 V and should me greater than logical 0 by at least 0.5 V

The input operates as a comparator with parameters ***Logical 0*** and ***Logical 1*** which determine the hysteresis.

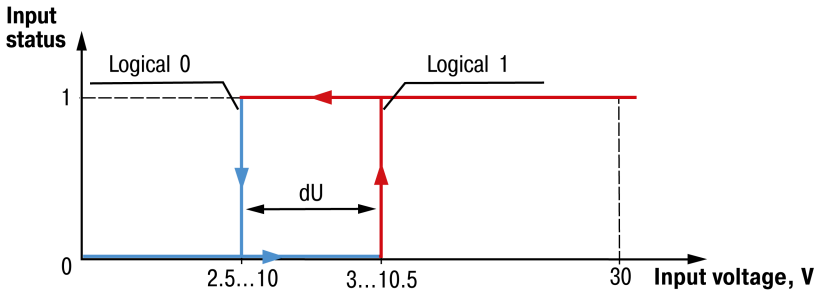

Fig. 4.3 Digital mode of an analog input

The input state will not change, until the input voltage is within the dU interval. To avoid the ambiguity of determining the input state, set the parameter ***Logical 1*** greater than the parameter ***Logical 0*** by at least 0.5 V.

4.3.3 Analog filter

The input filter stabilizes the input reading. The filter parameter is a time constant representing the time interval in which the signal reaches 0.63 of the measured value. It can be set within the range of 0.01…60 s for each input separately.

The greater the time constant, the higher the damping of the interference signal and the slower the reaction to rapid changes in the input value.

4.4 RS485 interface

PR100 uses the common standard RS485 for data exchange. RS485 serial interface is based on two-wire technology and half-duplex mode. Protocols Modbus RTU / ASCII are supported, with automatic protocol detection.

The network consists of a master device and up to 16 slaves. The maximum length is 1200 m. The number of slave devices and the network length can be increased using a RS485 interface repeater.

Devices are connected to a network according to linear (bus) topology. It means that the line goes from the first device to the second one, from the second one to the third one, etc. Star connections and spur lines are not allowed. Line reflections always occur at the open bus ends (the first and the last node). The higher the data transmission rate, the stronger they are. Terminating resistors are sometimes needed to minimize reflections. Experience proves that the most efficient practice is to use terminating resistors of 150 Ω.

The device can be used as master or slave. For further information about Modbus working and RS485 interface configuration see ALP HELP.

4.4.1 Master mode

There can be only one master in Modbus network.

The following request methods are supported:

– read by time using the parameter of master ***Interval between requests***
– write by change (default)
– read / write by event

PR100 as a master can control up to 16 slaves. Each slave can maintain up to 256 variables.

It is allowed to use the same name and the same address for different slaves.

4.4.2 Slave mode

Following functions are supported:

– 01 (0x01) Read Coils
– 02 (0x02) Read Discrete Inputs
– 03 (0x03) Read Holding Registers
– 04 (0x04) Read Input Registers
– 05 (0x05) Write Single Coil
– 06 (0x06) Write Single Register
– 15 (0x0F) Write Multiple Coils
– 16 (0x10) Write Multiple Registers

To read the separate bits of a bitmask, use the functions 0x03 and 0x01. To calculate the bit number to be requested, multiply the bit mask register number by 16 and add the desired bit number within the mask.

Data types:

– BOOL – one bit
– UINT16 – 2 Byte unsigned integer
– REAL32 – 4 Byte float (byte order 2143)

Available Modbus registers are listed in Table 4.1.

Table 4.1 Modbus registers

Parameter	Data type	Modbus function	Address (hex)	Address (dec)	Access
Digital inputs					
DI1…DI8 inputs status	BOOL	0x01, 0x02	0x1000 – 0x1007	4096 – 4103	R
	UINT16	0x03, 0x04	0x0100	256	R
Network and service variables					
Network variables	BOOL	0x01, 0x02, 0x05, 0x0F	0x2000 – 0x23F0	8192 – 9200	RW
	UINT16	0x03, 0x04, 0x06, 0x10	0x0200 – 0x023F	512 – 575	RW
Seconds	UINT16	0x03, 0x04, 0x06, 0x10	0x0400	1024	RW
Minutes	UINT16	0x03, 0x04, 0x06, 0x10	0x0401	1025	RW
Hours	UINT16	0x03, 0x04, 0x06, 0x10	0x0402	1026	RW
Day	UINT16	0x03, 0x04, 0x06, 0x10	0x0403	1027	RW
Month	UINT16	0x03, 0x04, 0x06, 0x10	0x0404	1028	RW
Year	UINT16	0x03, 0x04, 0x06, 0x10	0x0405	1029	RW

Parameter	Data type	Modbus function	Address (hex)	Address (dec)	Access
Weekday	UINT16	0x03, 0x04, 0x06, 0x10	0x0406	1030	R
Week of month	UINT16	0x03, 0x04	0x0407	1031	R
Calender week	UINT16	0x03, 0x04	0x0408	1032	R
Analog inputs					
AI1 measured value REAL	REAL32	0x03, 0x04	0x0B00, 0x0B01	2816, 2817	R
AI2 measured value REAL	REAL32	0x03, 0x04	0x0B02, 0x0B03	2818, 2819	R
AI3 measured value REAL	REAL32	0x03, 0x04	0x0B04, 0x0B05	2820, 2821	R
AI4 measured value REAL	REAL32	0x03, 0x04	0x0B06, 0x0B07	2822, 2823	R
AI1 measured value INT	UINT16	0x03, 0x04	0x0B80	2944	R
AI2 measured value INT	UINT16	0x03, 0x04	0x0B81	2945	R
AI3 measured value INT	UINT16	0x03, 0x04	0x0B82	2946	R
AI4 measured value INT	UINT16	0x03, 0x04	0x0B83	2947	R
AI1 Decimal point offset (DP) INT	UINT16	0x03, 0x04	0x0BC0	3008	R
AI2 Decimal point offset (DP) INT	UINT16	0x03, 0x04	0x0BC1	3009	R
AI3 Decimal point offset (DP) INT	UINT16	0x03, 0x04	0x0BC2	3010	R
AI4 Decimal point offset (DP) INT	UINT16	0x03, 0x04	0x0BC3	3011	R
AI1 input status (digital mode)	BOOL	0x01, 0x02	0x1010	4112	R
AI2 input status (digital mode)	BOOL	0x01, 0x02	0x1011	4113	R
AI3 input status (digital mode)	BOOL	0x01, 0x02	0x1012	4114	R
AI4 input status (digital mode)	BOOL	0x01, 0x02	0x1013	4115	R
Digital outputs					
DO1…DO8, F1, F2 output status	BOOL	0x01, 0x02, 0x05, 0x0F	0x0000 – 0x0009	0–9	RW*
	UINT16	0x03, 0x04, 0x06, 0x10	0x0000	0	RW*

* The status of outputs can be only written via network if the device is in the I/O mode (sect. 6.4).

5 Installation

The relay is designed for DIN rail mounting. The operating conditions from the sect. 3.2 should be taken into account when choosing the installation site. For dimension drawing see Fig. A.1.

Installation:

1. Place the device on a DIN rail as shown in Fig. 5.1.
2. Press the device firmly against the DIN rail in the direction of arrow 2 until the latch locks.
3. Wire the device using the supplied terminal blocks.

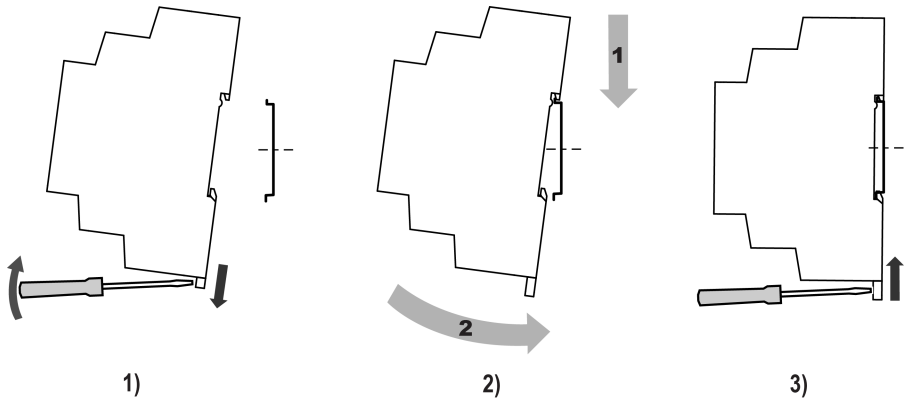

Fig. 5.1

Removing:

1. Take off the terminal blocks without disconnecting wires.
2. Insert a screwdriver into the eyelet of the slide interlock.
3. Loosen the slide interlock and then remove the relay from the DIN rail.

5.1 Wiring

WARNING

Electric shock could kill or seriously injure.

All electrical connections must be performed by a fully qualified electrician.

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.

Remove the terminal blocks only after powering off the device and all connected equipment.

WARNING

The device must be powered off before connecting to peripheral devices or PC. Switch on the power supply only after the wiring of the device has been completed.

CAUTION

The program runs after transferring it to the relay. It is recommended to transfer the program before wiring the relay.

Otherwise ensure that all peripheral devices are disconnected from relay outputs before transferring the program.

NOTICE

Supply voltage may not exceed 30 V. Higher voltage can damage the device.

If the supply voltage is lower than 9 V DC, the device cannot operate properly but will not be damaged.

NOTICE
Ensure that the input signal is connected to the correct input terminals and that the input configuration corresponds to the signal. Non-observance can cause the device damage.

NOTICE
Signal cables should be routed separately or screened from the supply cables. Shielded cable should be used for the signal lines to ensure compliance with the EMC requirements.

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

5.1.1 Terminal block layout

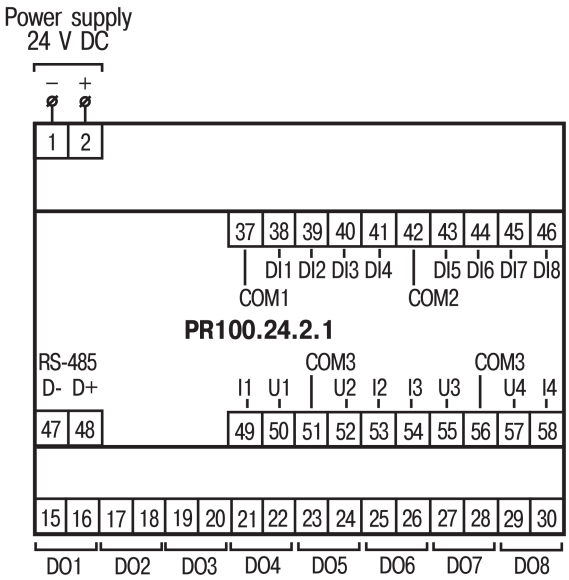

Fig. 5.2 Terminal block layout

Table 5.1 Terminal assignment

No	Mark-ing	Description	No	Mark-ing	Description
1	0 V	Power supply	55	U3	AI3 analog input (voltage)
2	24 V	Power supply	56	COM3	AI3, AI4 common contact
37	COM1	DI1…DI4 common contact	57	U4	AI4 analog input (voltage)
38	DI1	DI1 digital input	58	I4	AI4 analog input (current)
39	DI2	DI2 digital input	15	DO1	DO1 digital output
40	DI3	DI3 digital input	16	DO1	DO1 digital output
41	DI4	DI4 digital input	17	DO2	DO2 digital output
42	COM2	DI5…DI8 common contact	18	DO2	DO2 digital output
43	DI5	DI5 digital input	19	DO3	DO3 digital output
44	DI6	DI6 digital input	20	DO3	DO3 digital output
45	DI7	DI7 digital input	21	DO4	DO4 digital output
46	DI8	DI8 digital input	22	DO4	DO4 digital output
47	D-	RS-485 interface	23	DO5	DO5 digital output
48	D+	RS-485 interface	24	DO5	DO5 digital output
49	I1	AI1 analog input (current)	25	DO6	DO6 digital output
50	U1	AI1 analog input (voltage)	26	DO6	DO6 digital output
51	COM3	AI1, AI2 common contact	27	DO7	DO7 digital output
52	U2	AI2 analog input (voltage)	28	DO7	DO7 digital output

No	Mark-ing	Description	No	Mark-ing	Description
53	I2	AI2 analog input (current)	29	DO8	DO8 digital output
54	I3	AI3 analog input (current)	30	DO8	DO8 digital output

5.1.2 Digital inputs

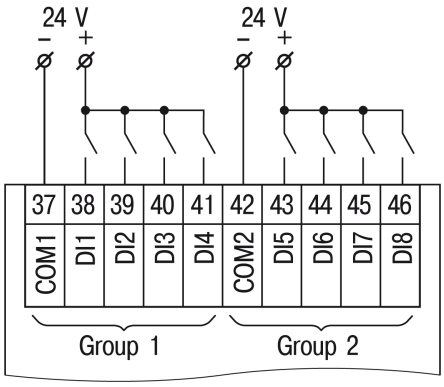

Fig. 5.3 Switch contacts

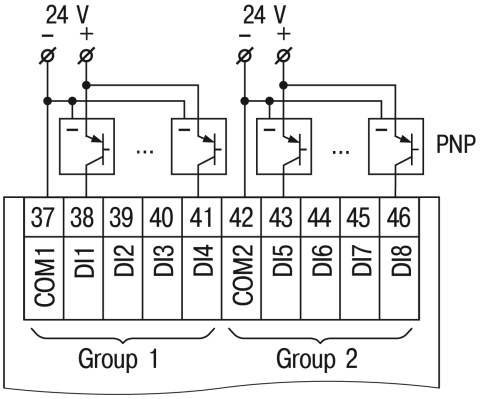

Fig. 5.4 3-wire sensors with PNP transistor outputs

5.1.3 Analog inputs

Table 5.2 Sensor cable requirements

Signal	Length, max. (m)	Total resistance, max. (Ω)
4-20 mA	100	100
0-10 V	100	5

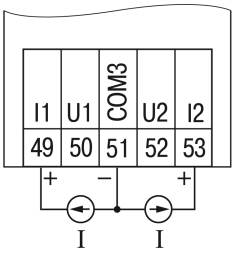

Fig. 5.5 Current signal (4-20 mA)

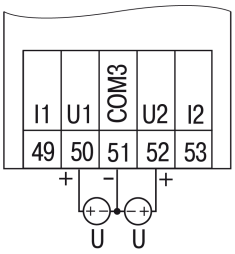

Fig. 5.6 Voltage signal (0-10 V)

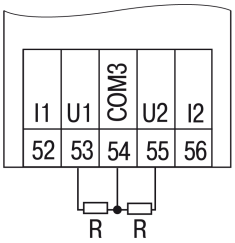

Fig. 5.7 Digital signal

5.1.4 Outputs

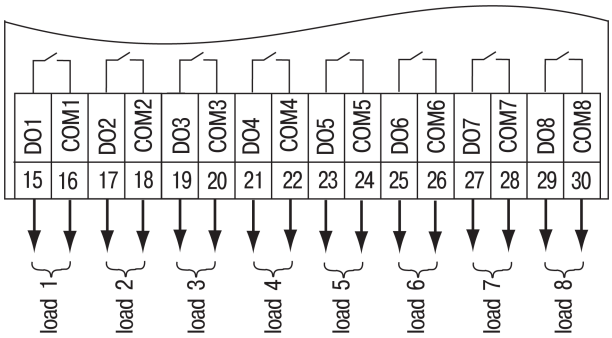

Fig. 5.8 Output wiring

5.2 Quick replacement

PR100 is equipped with plug-in terminal blocks which enable quick replacement of the device without disconnecting the existing wiring (Fig. 5.9).

To replace the device:

1. Power off all connected lines including power supply.
2. Remove the terminal blocks.
3. Replace the device.
4. Connect the terminal blocks with existing wiring to the device.

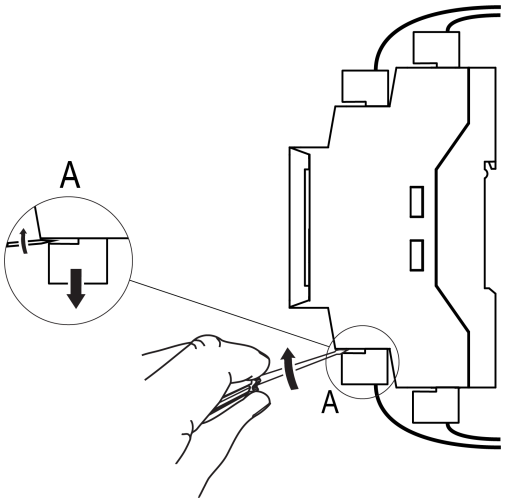

Fig. 5.9 Quick replacement

6 Operation

6.1 Operation diagram

WARNING

The program is executed after it has been transferred to the device memory. It is recommended to transfer the program before wiring the device.

Otherwise ensure that all external devices are disconnected from outputs before transferring the program.

NOTE

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

Operation diagram is presented in Fig. 6.1.

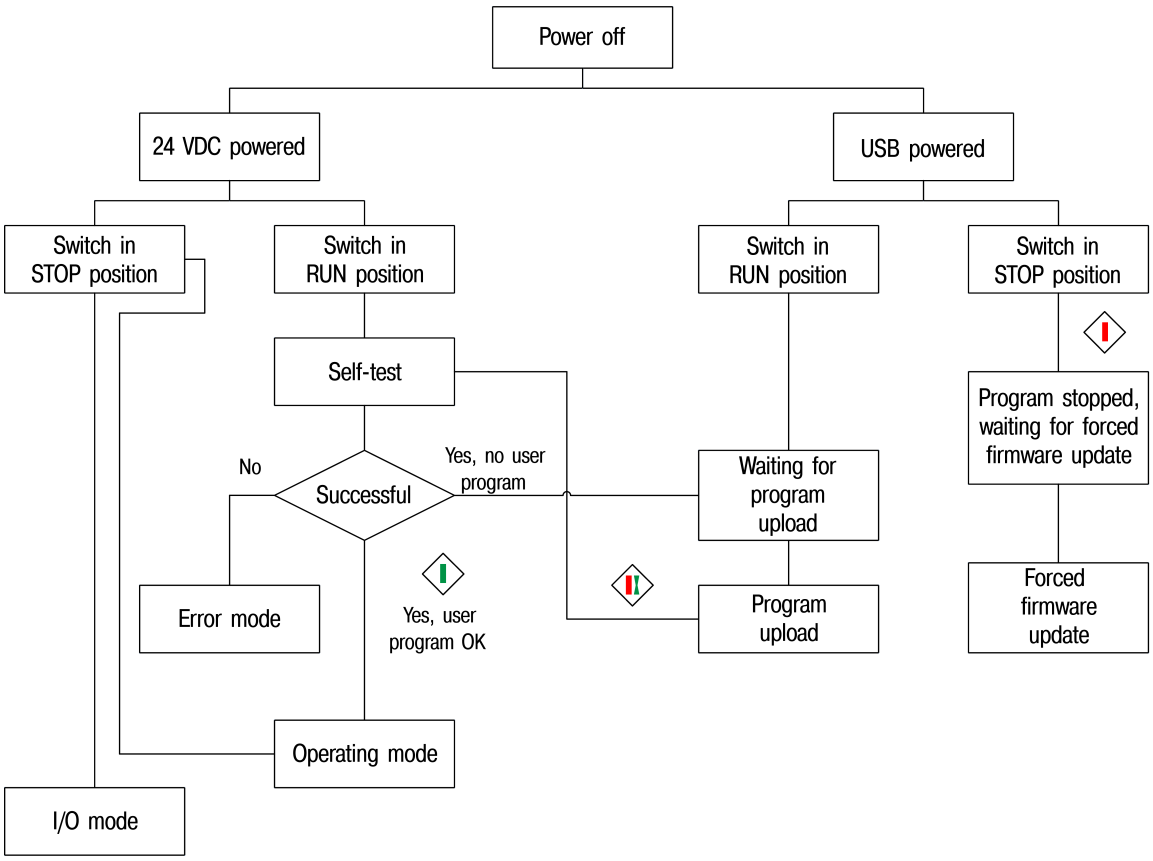

Fig. 6.1 Operation diagram

If the device is powered via USB, the inputs, outputs and the RS485 interface will not work.
Once the program has been transferred to the device memory, the relay restarts.
Operation of the device is cycle oriented:

1. operational readiness test
2. input process image update
3. program execution for one cycle
4. output process image update
5. back to 1

6.2 Controls and interfaces

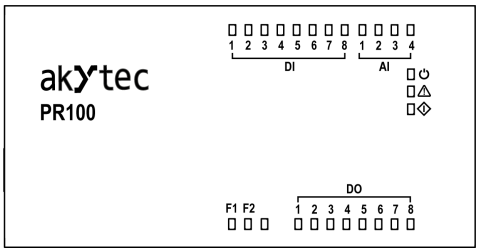

Fig. 6.2 Front view

Assignment of LEDs is described in Tab. 6.1.

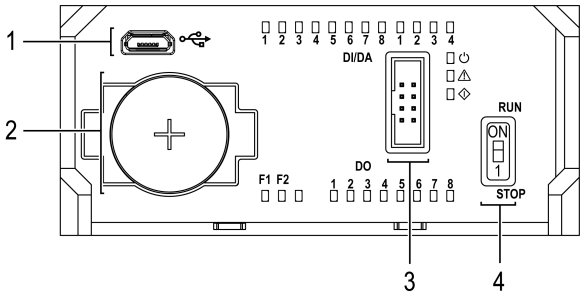

Fig. 6.3 Open front cover

Under the front cover:

1. MicroUSB programming socket
2. RTC battery
3. Service interface
4. Run / Stop switch

Table 6.1 Indication

LED	Color	State	Description
⏻	green	ON	Power on
⚠	red	ON	– program checksum error – retain memory error – system error
		flashing	Overheating
F1	green	ON	Programmable
F2	green	ON	
DI1…DI8	green	ON	Logical 1 on input
AI1…AI4	green	ON	Logical 1 on input (digital mode only)
DO1…DO8	green	ON	Output is on
⏼	red	ON	24 V DC power off, powered over USB, program stopped
	green	ON	24 V DC power on, program runs
	red / green	red – ON green – fast flashing	24 V DC power on, program is being transferred to device

6.3 Error mode

In the error mode, the program is stopped until the error cause is eliminated.

Table 6.2 Error indication

Indication	Cause	Remedy
⚠ ON	Program checksum error	Update the firmware
	Retain memory error	
	System error	Re-load the user program in the device. If it does not help, contact technical service
⚠ flashing	Overheating	Ensure the operation temperature according to Tab. 3.6

6.4 I/O mode

In I/O mode:

– user program is stopped
– relay operates as I/O extension module

To use the relay as I/O module, the RS485 interface must be previously configured in ALP as a slave. In I/O mode it is possible to read inputs and to control outputs, but there is no access to network variables.

The I/O mode can be used for

– firmware update
– user program rewriting if it causes an incorrect operation of the device

To activate the I/O mode, turn the Run/Stop switch (Fig. 6.3, Pos. 4) to ***Stop*** position.

To switch to normal operation the relay, turn the Run/Stop switch to ***Run*** position.

6.5 Real-time clock

A fully charged backup battery (Fig. 6.2, Pos. 2) ensures uninterruptable operation of the built-in RTC for 5 years. In the case of operation at a temperature near the limits of the operating range (Tab. 3.6), the operating time of the battery is reduced.

The time correction of RTC can be made in the configuration mask in ALP (see ALP HELP).

7 Firmware update

The firmware update is carried out in ALP using the menu item ***Device > Firmware update*** or during user project transfer.

If the firmware update was unsuccessful (power outage, communication errors etc.), it can be forced. The forced firmware update can be made if the device is not detected in ALP, but the device connection is correctly displayed in the Windows Device Manager.

To force the firmware update:

1. Connect the PR100 programming socket (Pos. 1 in Fig. 6.3) to PC over a USB-to-microUSB connection cable.
2. Power on the device.
3. Turn the Run/Stop switch to ***Stop*** position.

   The LED ⓘ lights red. The firmware and user program are blocked.
4. Check in the Windows Device Manager which COM port is assigned to the device.
5. Enter this COM port number in ALP mask ***Device > Port Settings*** and confirm with ***OK***.
6. Select menu item ***Device > Firmware update***. The currently connected device will be proposed. You can select another one.

   During firmware update, the LED ⓘ flashes green and the ALP progress bar is displayed on PC.
7. After the firmware update is successfully completed (message in ALP, LED ⓘ lights red), turn the Run/Stop switch to ***Run*** position to start the normal device operation.

If problems were not resolved after a forced firmware update, contact technical support.

8 Maintenance

8.1 General instructions

The maintenance includes:
– cleaning of the housing and terminal blocks from dust, dirt and derbis
– checking the device fastening
– checking the wiring (connecting leads, fastenings, mechanical damage)

NOTICE
The device should be cleaned with a damp cloth only. No abrasives or solvent-containing cleaners may be used. During maintenance, observe the safety instructions in the section "Wiring"

8.2 Battery replacement

NOTE
The supply voltage may remain on when replacing the battery. This will prevent the real-time clock reset.

To replace the RTC battery:

1. Open the front cover (Fig. 8.2).
2. Using a screwdriver, pick up the battery on the right and remove it from the device.
3. Observing polarity, insert a new battery.
4. Close the cover.

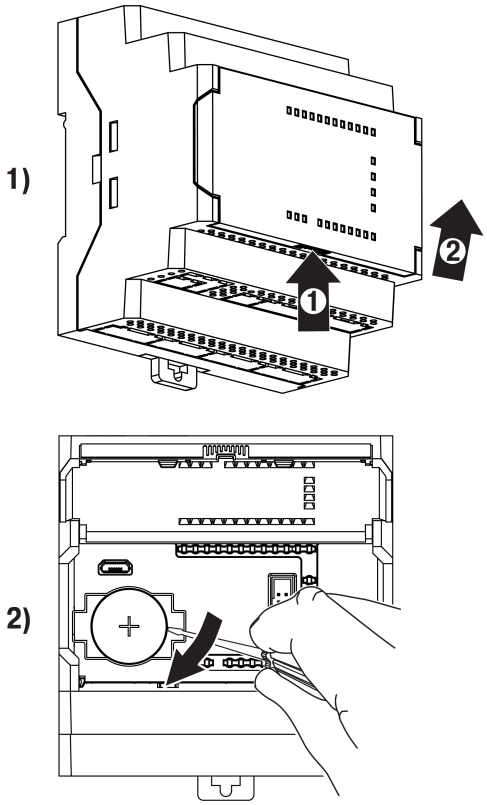

Fig. 8.1 Battery replacement

9 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: – 40…+55 °C

NOTE

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!

10 Scope of delivery

PR100	1
Short guide	1
Terminal blocks (set)	1

Appendix A Dimensions

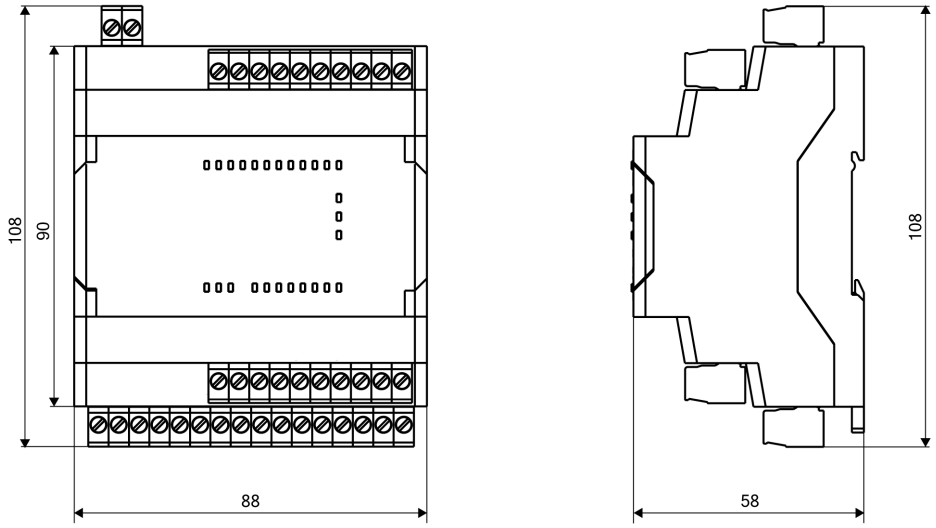

Fig. A.1 Dimensions

Appendix B Calibration

If the accuracy of the device inputs is no longer in accordance with the specification, it can be calibrated.

Each analog input has its own calibration coefficients for each sensor type.

Calibration is performed using a reference signal source connected to the device input.

The calibration coefficients are calculated based on the ratio between the current input signal and the reference signal and stored in non-volatile device memory.

If calculated coefficients go beyond the permissible limits, a message about the error cause will be displayed.

B.1 Input calibration

To calibrate an input:

1. Connect the reference signal source to the input.

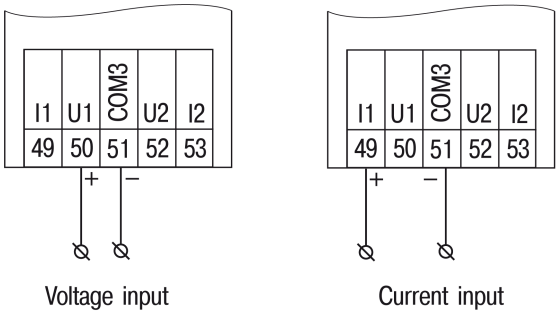

Fig. B.2 Connection of the reference signal source to an input

2. Connect the PR100 programming socket (Pos. 1 in *Fig. 6.3*) to PC over a USB-to-microUSB connection cable.
3. Switch on the power supply of the device.
4. Start ALP and select the menu item ***Device > Calibration*** to start the calibration tool.
5. Select ***Analog inputs*** as calibration target.
6. Select the type of input signal and other calibration parameters (*Fig. B.3*).

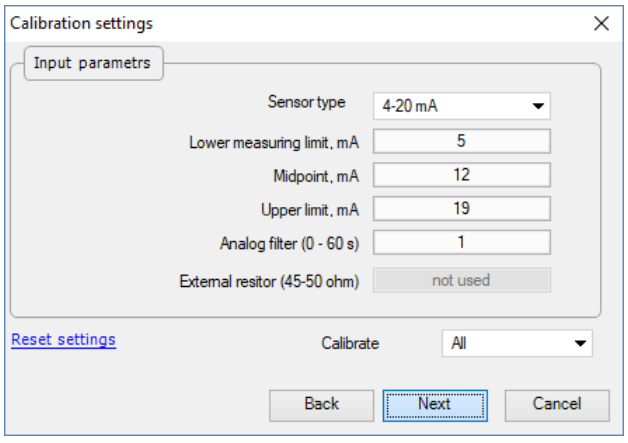

Fig. B.3 Parameter configuration

Set the three points for calibration curve and the filter time constant.

The greater the filter time constant, the longer the calibration process will take, but the more accurate calculation of the coefficients will be achieved.

Select the input to calibrate. If you select ***All***, all inputs will be calibrated sequentially, therefore the appropriate reference signal has to be applied to all inputs.

7. Click ***Next*** and follow the instructions.

Click the item ***Reset settings*** to use the default calibration setting.