Compatible with
PR200.24.2.2
PR200.230.2.2

Sample Project:
Temperature & Humidity Monitoring

PR200 Programmable Relays

- This is an example project for processing of analog signals, which are not only displayed directly on an analog process display 4-20 mA ITP11 but also converted first to be displayed on an RS485 digital display. This document describes which devices are used for this program and how the program structures and its functions work.
- In this example, temperature and humidity data from temperature sensors PT100 and PT1000 as well as humidity transmitter PVT100 are used in this program.
- The addition and division functions are used in this program. They serve for the conversion of varied measurement ranges.
- A project macro PT1000 provided by akYtec GmbH is used in this program to convert the analog resistance value to temperature data.

1. Devices and signal types

The table below lists which devices are used in this sample project and which signal types are used by these devices.

Device	Signal type	PR200-Interface	Configuration of the device
Temperature sensor DTS125L-PT100 via temperature transmitter NPT1	Analog (4…20 mA)	AI2	Measurement range: -190...105°C
RS-485 digital display (SMI2)	Modbus RTU	RS-485 Slot 2	Address: 16 Datatype: Float Decimal place: 2
Temperature sensor DTS125L-PT1000	Analog (0...4000 Ohm)	AI4	
Humidity and temperature Transmitter PVT100	Modbus RTU	RS-485 Slot 1	
Process indicator ITP11	Analog (4...20 mA)	AO1	Measurement range: -40...120°C or 0...100% for humidity measuring

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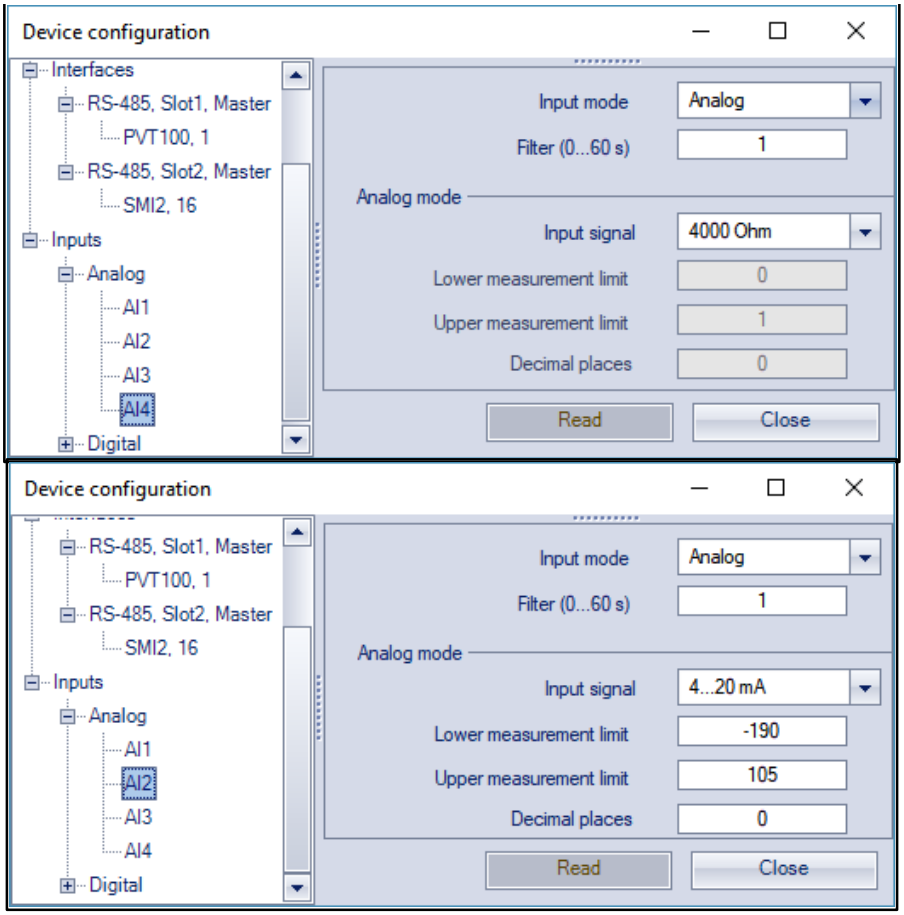
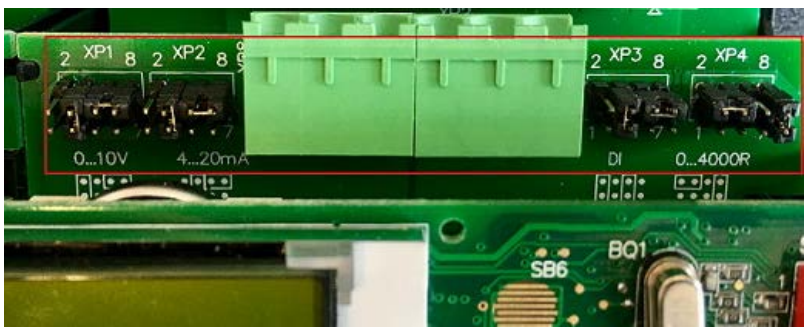
1.1. Device configuration

The analog inputs AI2 and AI4 for the temperature sensor PT100 via the temperature transmitter NPT1 and temperature sensor PT1000 must first be configured at the akYtec ALP software (see pictures below).



The jumper positions for the analog inputs 2 and 4 on the PR200 must be set in accordance with Fig. 6.3. b) and d) in the PR200 User guide page 21.



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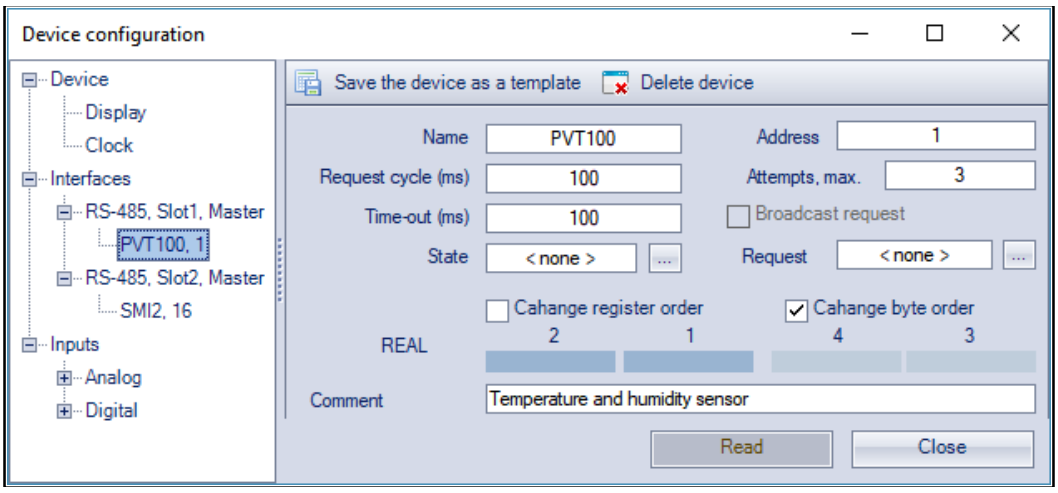
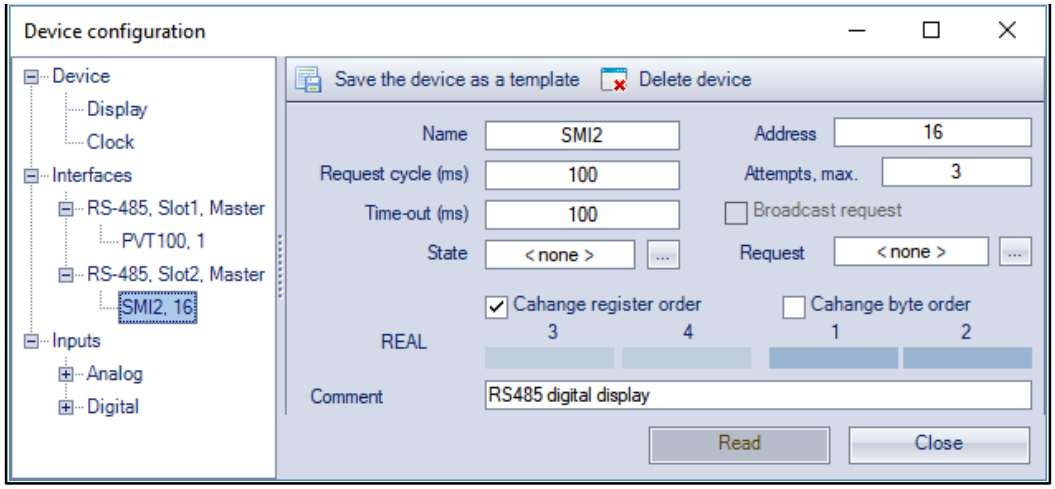
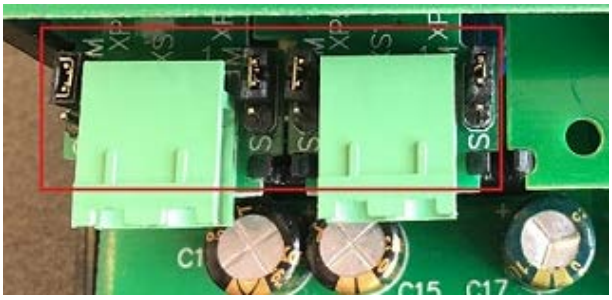
The humidity and temperature transmitter PVT100 is connected to the PR200 on the RS485 slot 1. The akYtec ALP software is configured as shown in the figure below.



At last the RS485 digital display is configured. The display is connected to the PR200 on RS485 slot 2.



The RS485 network interface is set to Slave by default. To use the interface as Master, the jumper positions must be set in accordance with Fig. 4.2a in the PR200 User guide page 10



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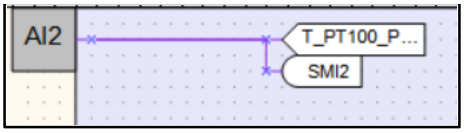
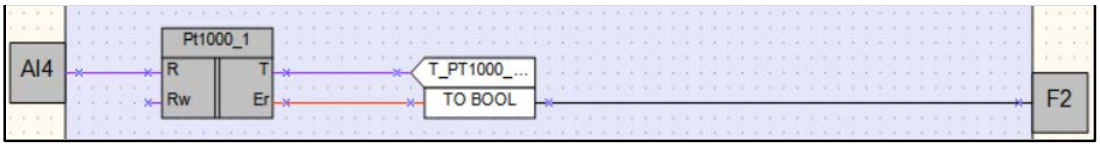
2. The program

2.1. Functions and structure of the program

4...20 mA analog temperature data from temperature sensor PT100 via temperature transmitter NPT1 (AI2) are read by PR200 and output to the RS485 digital display SMI2 via Modbus.



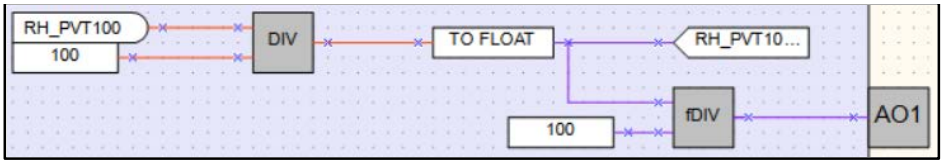
The temperature sensor PT1000 (AI4) outputs a resistance signal, which is proportional to the temperature. PR200 reads this signal, converts it with the PT1000 macro and outputs it on the screen. If there are problems with the temperature sensor, the red LED F2 on the PR200 will light up.



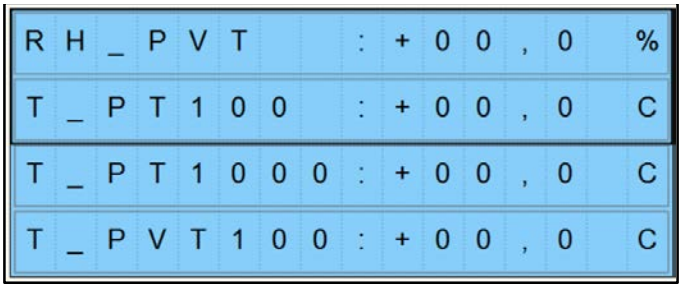
The humidity values from the PVT100 are read from the PR200 via Modbus, converted and displayed as analog signals on a 4 ... 20 mA analog display ITP11 (AO1).

The PVT100 outputs the humidity values in the data type Integer with the measuring range from 0 to 10000. First, the measurement data is divided by 100 (DIV) and then converted to FLOAT (TO FLOAT), because the data is to be output to an analog display.

The limits of the analog display ITP11 are configured from 0...100. Therefore, the measurement data on the akYtec ALP software must once again be divided by 100 (fDIV: FLOAT Division).



All measured data are displayed on the PR200 LCD-Display.



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2.2. Variable table

The following pictures list all the variables used in the program.

Local variables

Name	Data type	Persistence	Default value	Use in project	Comment
Temp_PT100-PR200	**REAL**	☐	0	**Yes**	**PR200 Display**
Temp_PT1000-PR200	REAL	☐	0	Yes	PR200 Display
Humid_PVT100-PR200	REAL	☐	0	Yes	PR200 Display
Temp_PVT100-PR200	REAL	☐	0	Yes	PR200 Display
T_Analog_Output	REAL	☐	0	Yes	Analog Output 4-20 mA

Network variables (Slot 1 and 2)

PVT100, 1

Name	Data type	Read function	Write function	Register address	Bit number	Comment
RH_PVT100	**INT**	**0x03**	**0x06**	**259**		Humidity
T_PVT100	INT	0x03	0x06	258		Temperature

SMI2, 16

Name	Data type	Read function	Write function	Register address	Bit number	Comment
Display_SMI2	**REAL**	**0x03**	**0x10**	**27**		**Float value**
< none >	BOOL	0x01	0x05	0	0	