

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 (420 mA)	AI2	Measurement range: - 190105°C
RS-485 digital display (SMI2)	Modbus RTU	RS-485 Slot 2	Address: 16 Datatype: Float Decimal place: 2
Temperature sensor DTS125L- PT1000	Analog (04000 Ohm)	Al4	
Humidity and temperature Transmitter PVT100	Modbus RTU	RS-485 Slot 1	
Process indicator ITP11	Analog (420 mA)	A01	Measurement range: - 40120°C or 0100% for humidity measuring

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Compatible with PR200.24.2.2 PR200.230.2.2

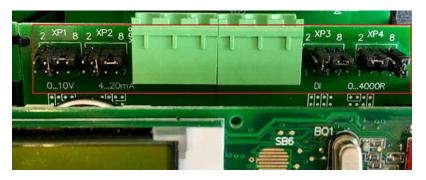


1.1. Device configuration

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).

Device configuration			_		×
i Interfaces					
		Input mode	Analog		-
PVT100, 1		Filter (060 s)		1	
		The (0003)			_
SMI2, 16		Analog mode			
i≘ Inputs		Input signal	4000 O	hm	-
- Analog		Lower measurement limit		0	
Al1		Upper measurement limit		1	
AI2				0	
AI3		Decimal places		0	
Al4		Read]	Close	
⊡… Digital	•				
Device configuration			_		×
Device configuration		Innut mode	-		
		Input mode	Analog		×
RS-485, Slot1, Master	•	Input mode Filter (060 s)	 Analog	1	
RS-485, Slot1, Master		Filter (060 s)	 Analog		
			Analog	1	
		Filter (060 s)	420 m	1	
		Filter (060 s) Analog mode Input signal Lower measurement limit	420 m	1 nA 190	
		Filter (060 s) Analog mode Input signal Lower measurement limit Upper measurement limit	420 m	1 nA 190 105	
		Filter (060 s) Analog mode Input signal Lower measurement limit	420 m	1 nA 190	
		Filter (060 s) Analog mode Input signal Lower measurement limit Upper measurement limit	420 m	1 nA 190 105	

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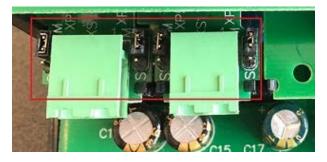
The humidity and temperature transmitter PVT100 is connected to the PR200 on the RS485 slot 1. The akYtec ALP software is configured as shown in the figure below.

Device configuration			_	
	Save the device a	s a template 🛛 🙀 Dele	te device	
Display Clock	Name	PVT100	Address	1
	Request cycle (ms)	100	Attempts, max.	3
	Time-out (ms)	100	Broadcast requ	iest
PVT100, 1	State	< none >	Request	< none >
SMI2, 16		Cahange register or	der 🔽 Cahang	e byte order
	REAL	2	1 4	3
🖬 Analog 🗐 Digital	Comment	Temperature and humidit	ty sensor	
			Read	Close

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

Device configuration			_	
	Save the device a	s a template 🛛 🙀 Delete	device	
Display	N	01110	Address	16
Clock	Name	SMI2	Address	0
Interfaces	Request cycle (ms)	100	Attempts, max.	3
RS-485, Slot1, Master	Time-out (ms)	100	Broadcast requ	lest
PVT100, 1	State	< none >	Request	< none >
E RS-485, Slot2, Master				[
SMI2, 16		Cahange register orde	er Cahang	e byte order
⊡… Inputs	REAL	3 4	1	2
Analog				
	Comment	RS485 digital display		
			Read	Close
			Rodu	01036

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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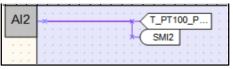
Compatible with
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2. The program

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.

Pt100	0_1								
AI4 × × R × Rw	Er × ×	TO BOOL	 	 	 	 1	 	 · · · · · · · · · · · · · · · · · · ·	F2

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).

RH_PV 100	T100)*		×	1	VIV	-*	125	10.80 10.17	 ×	TO I	FLO	AT				×	RH	UP	VT10.		
1111			1.59		313	135											1					• • • • •
												. 1	_	100)	1.	- 0	fDI\	1	*	 ×	A01

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

RН	_	Ρ	۷	Т			:	+	0	0	,	0	%
т_	Ρ	т	1	0	0		:	+	0	0	,	0	С
Т_	Р	т	1	0	0	0	:	+	0	0	,	0	С
т_	Р	V	т	1	0	0	:	+	0	0	,	0	С

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PR200.230.2.2



2.2. Variable table

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

Local variables

Name	Data ty	pe	Persistence	Default value	Use in project	Comment	^	Variables
Temp_PT100-PR200	REAL	-		0	Yes	PR200 Display		bles
Temp_PT1000-PR200	REAL	•		0	Yes	PR200 Display		S
Humid_PVT100-PR200	REAL	•		0	Yes	PR200 Display		en.
Temp_PVT100-PR200	REAL	•		0	Yes	PR200 Display		Ce V
T_Analog_Output	REAL	•		0	Yes	Analog Output 4-20 mA	~	Service varia
		_			1		_	

Network variables (Slot 1 and 2)

PVT100, 1									4 Þ	Var
Name	Data ty	pe	Read functio		Write functio		Register address	Bit number	Comment	Variables
RH_PVT100	INT	•	0x03	•	0x06	•	259		Humidity	8
T_PVT100	INT	•	0x03	•	0x06	•	258		Temperature	ervio

SMI2, 16 4 Þ										Var
Name	Data type		Read function		Write function		Register address	Bit number	Comment	Variables
Display_SMI2	REAL	•	0x03	•	0x10	•	27		Float value	8
< none >	BOOL	•	0x01	•	0x05	•	0	0		Service