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USER GUIDE

KLH

Produal

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KLH - Room humidity transmitter/controller

User Guide

This user guide is for devices with the software version 1.3.6 or newer.

PRODUAL
measure-be sure.

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1 Safety precautions

The product is developed, manufactured and tested according to high quality standards. However, instructions for safe use shall be taken account when installing, using or disposing the product or parts of product.

Read this user guide carefully before commissioning, using or servicing this device. To avoid any kind of damage to people or property, follow the instructions carefully. is not liable for any hazards or damages to people or property which are caused by ignoring the using or installation instructions.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing the product. Use only a proper wiring rated for the full operating voltage and maximum current in the system even in the event of a fault.

To avoid potential fire and/or explosion, do not use the product in potentially flammable or explosive atmosphere.

The product condition must be checked before installation. Do not drop the product or use excessive force during installation. Do not use the product if any damages are visible.

After installation the product will be part of a system whose specifications and performance characteristics are not designed or controlled by . Refer to national and local authorities to ensure that the installation is functional and safe.

The product should only be used in professionally designed applications. Unauthorised modifications are not allowed. The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or property.

In this document, there are different kind of warnings and notes. The warning and note types are defined in the following table.

Sign	Description
WARNING:	The warning symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION:	The caution symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
Important:	The important symbol indicates a potentially hazardous situation which, if not avoided, could result in damage to the device or property.
Note:	The note symbol indicates a useful tip or a recommended way to complete a task. These notes also provide information that is useful but not critical to the user.

1.1 Intended use

The KLH room humidity transmitters are intended to be used for measuring and controlling humidity and temperature in room environment.

These transmitters are intended to be connected to building automation systems in the HVAC/R industry.

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2 Commissioning

2.1 Mounting room transmitters

The device can be installed in dry surroundings (IP20) by screws on the wall surface or on the standard flush mounting box. The recommended installation height is 150...180 cm.

The device position should be selected carefully. All the error factors that can affect to the measurements should be eliminated as well as possible. The following list defines the typical measurement error factors.

- direct sun light
- occupant proximity
- air flow coming from windows or doors
- air flow coming from ventilation nozzles
- air flow coming from the flush mounting box
- differential temperature caused by external wall

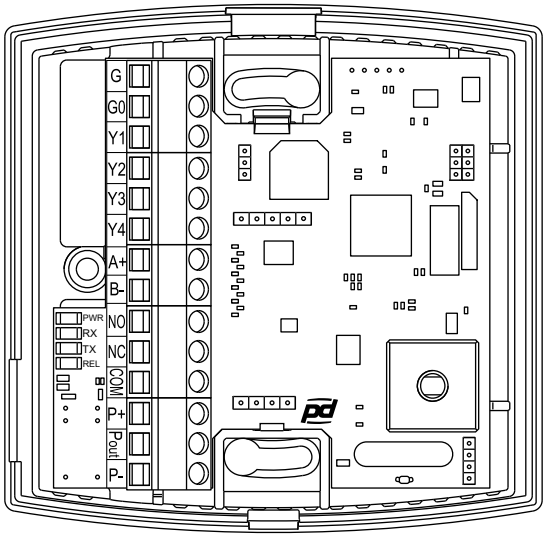
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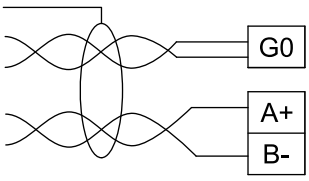
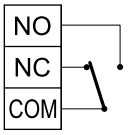
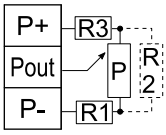
2.2 Wiring

WARNING: Device wiring and commissioning can only be carried out by qualified professionals. Always make the device wirings in de-energised electricity network.

WARNING: This product is appliance class III product according to IEC 60664-1. The product may only be connected to SELV (safety extra low voltage) electricity network.

CAUTION: The product may only be connected to overvoltage category I, II or III electricity network according to IEC 60664-1.



G	24 Vac/dc, 2 VA supply	
G0	0 V	
Y1	Not in use.	
Y2	Temperature output, 0...10 Vdc / 2...10 Vdc / 0...5 Vdc, < 2 mA	
Y3	Humidity output / active potentiometer output, 0...10 Vdc / 2...10 Vdc / 0...5 Vdc, < 2 mA	
Y4	Control output / active potentiometer output, 0...10 Vdc / 2...10 Vdc / 0...5 Vdc, < 2 mA	
A+ *B-*		Modbus RTU, RS-485
NO *NC* *COM*		Relay output, 24 Vac, 1 A
P+ *Pout* *P-*		Passive potentiometer output.

2.3 Selecting information to be viewed on the display

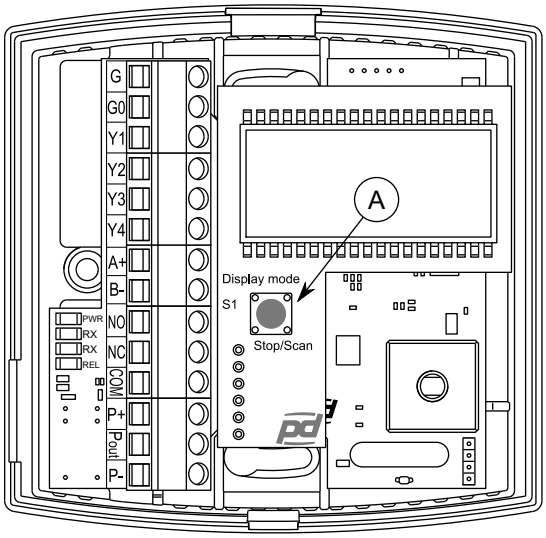
The measurement values scroll on the N model display by default.

Note: In M models, the shown measurement information can be selected also via Modbus.

Note: When the potentiometer (PU models) is configured to change the controller setpoint, the setpoint is shown on the display when the potentiometer is rotated.

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- Press the S1 button to stop the scrolling to the currently displayed value.



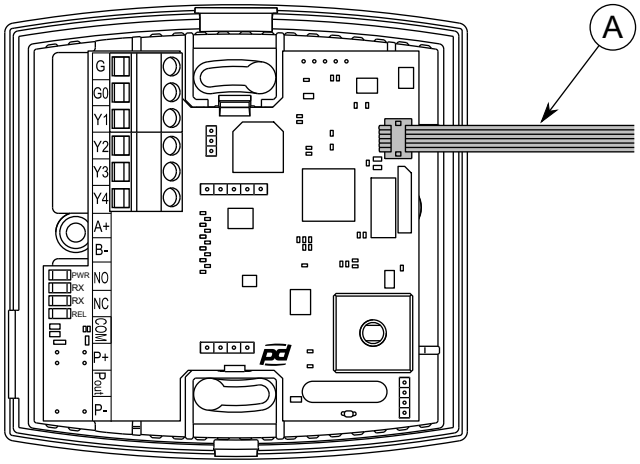
A. S1 button

- Press the S1 button again to start the scrolling.

2.4 ML-SER tool

2.4.1 Connecting ML-SER tool to the device

1. Open the cover.
2. Remove the display.
3. Connect the ML-SER cable to the display connector.

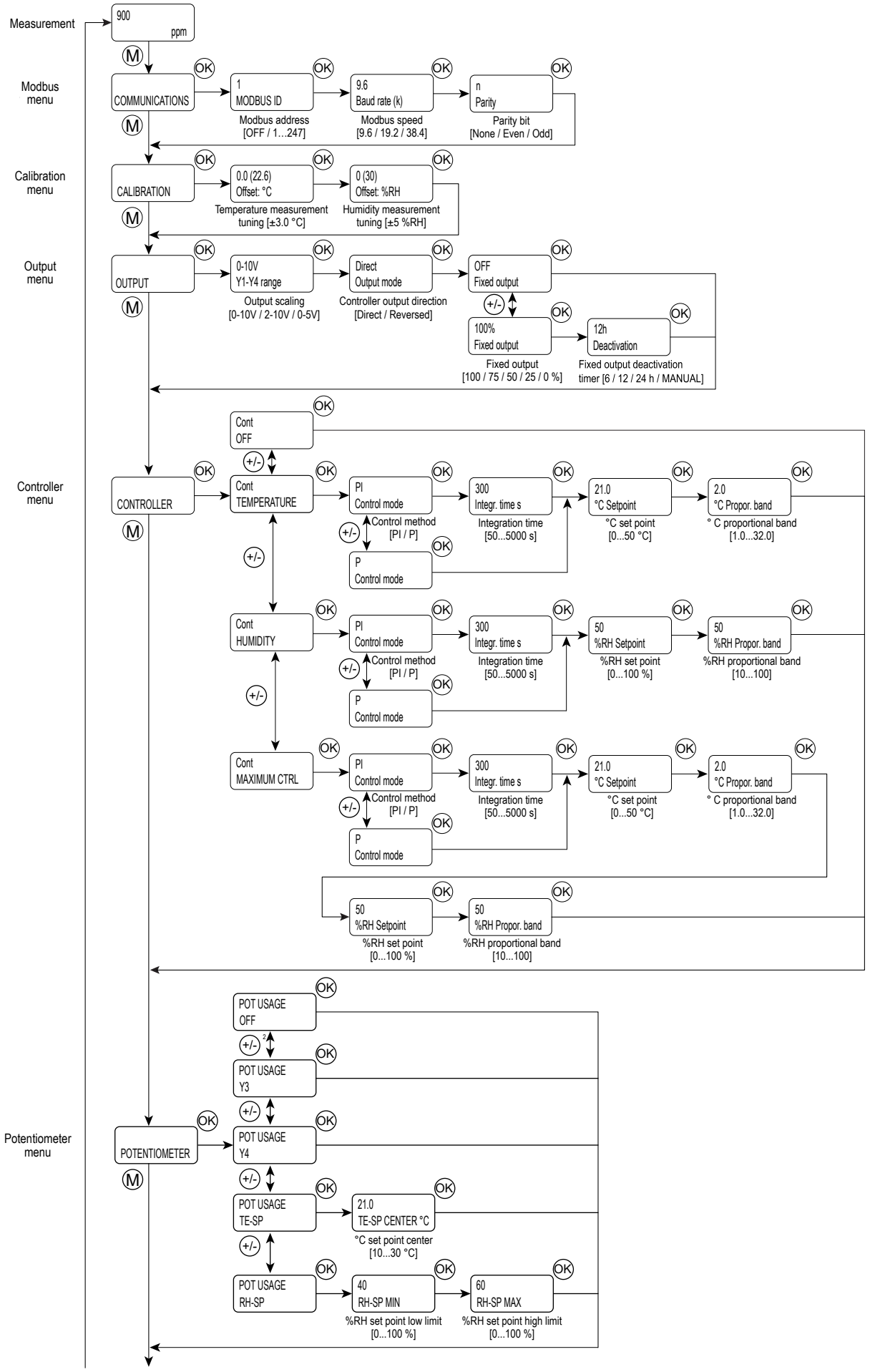


A. ML-SER cable

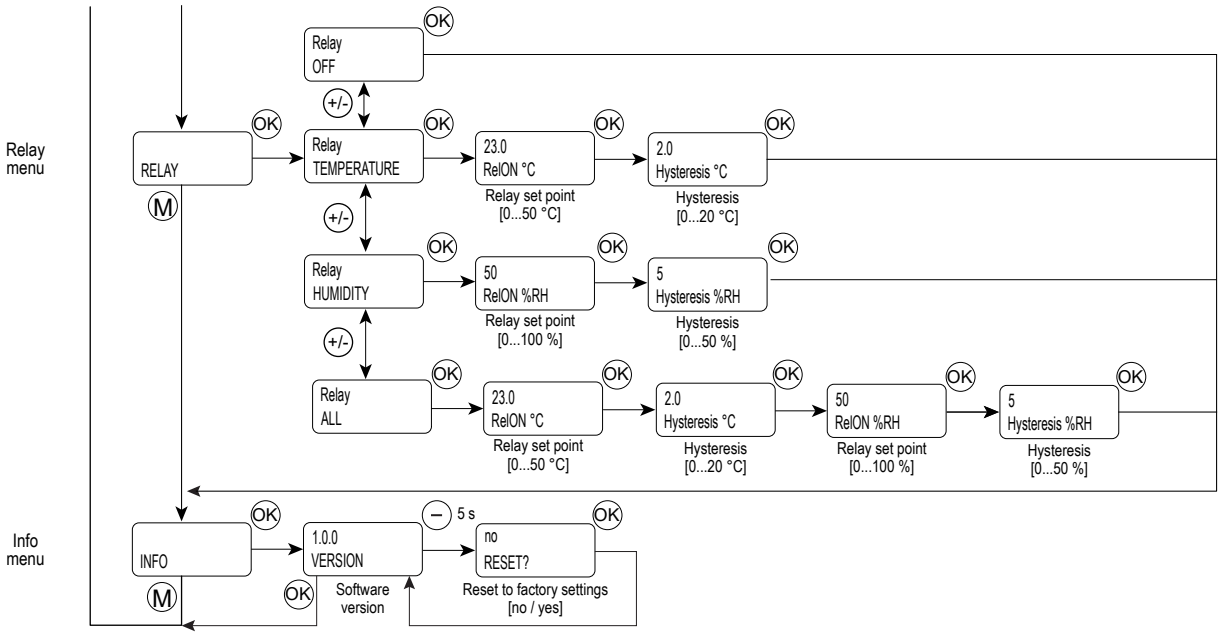
2.4.2 ML-SER menu

ML-SER menu opens by pressing the M button. The values can be changed with the ”+” and ”-” buttons. The menu is device-specific and the content depends on the device and installed options.

The following menu structure contains the factory settings.

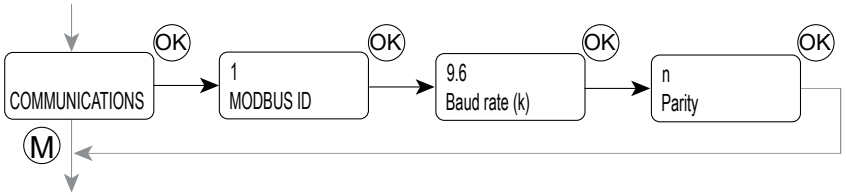


The diagram continues on the next page.



2.4.2.1 Communication menu

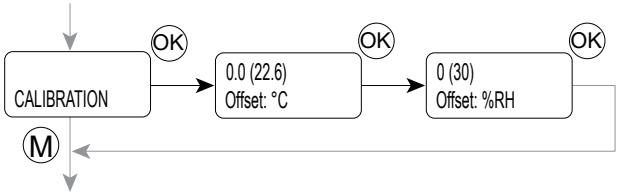
Communication menu is available in M models.



Parameter	Available values	Description
MODBUS ID	*OFF / 1...247*	Modbus address.
Baud rate (k)	*9.6 / 19.2 / 34.8 / 56.0 / 57.6 / 76.8 / 115.2*	Modbus speed (kbit/s).
Parity	*n / E / O*	Parity bit. *n* None *E* Even *O* Odd

2.4.2.2 Calibration menu

All the measurements can be tuned through the calibration menu.

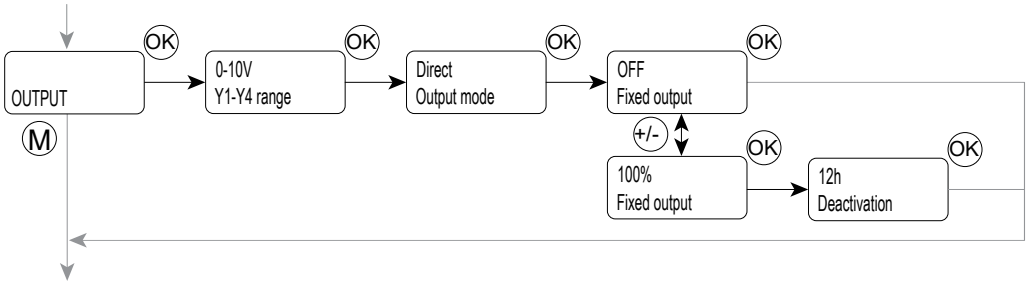


Parameter	Available values	Description
Offset °C	*-3.0...3.0*	Temperature measurement tuning. The value can be adjusted by 0.1 °C steps.
Offset %RH	*-5...5*	Humidity measurement tuning, RH models. The value can be adjusted by 1 % steps.

ML-SER tool display shows how much the current value is tuned. The measured value is shown in brackets after the tuning value.

2.4.2.3 Output menu

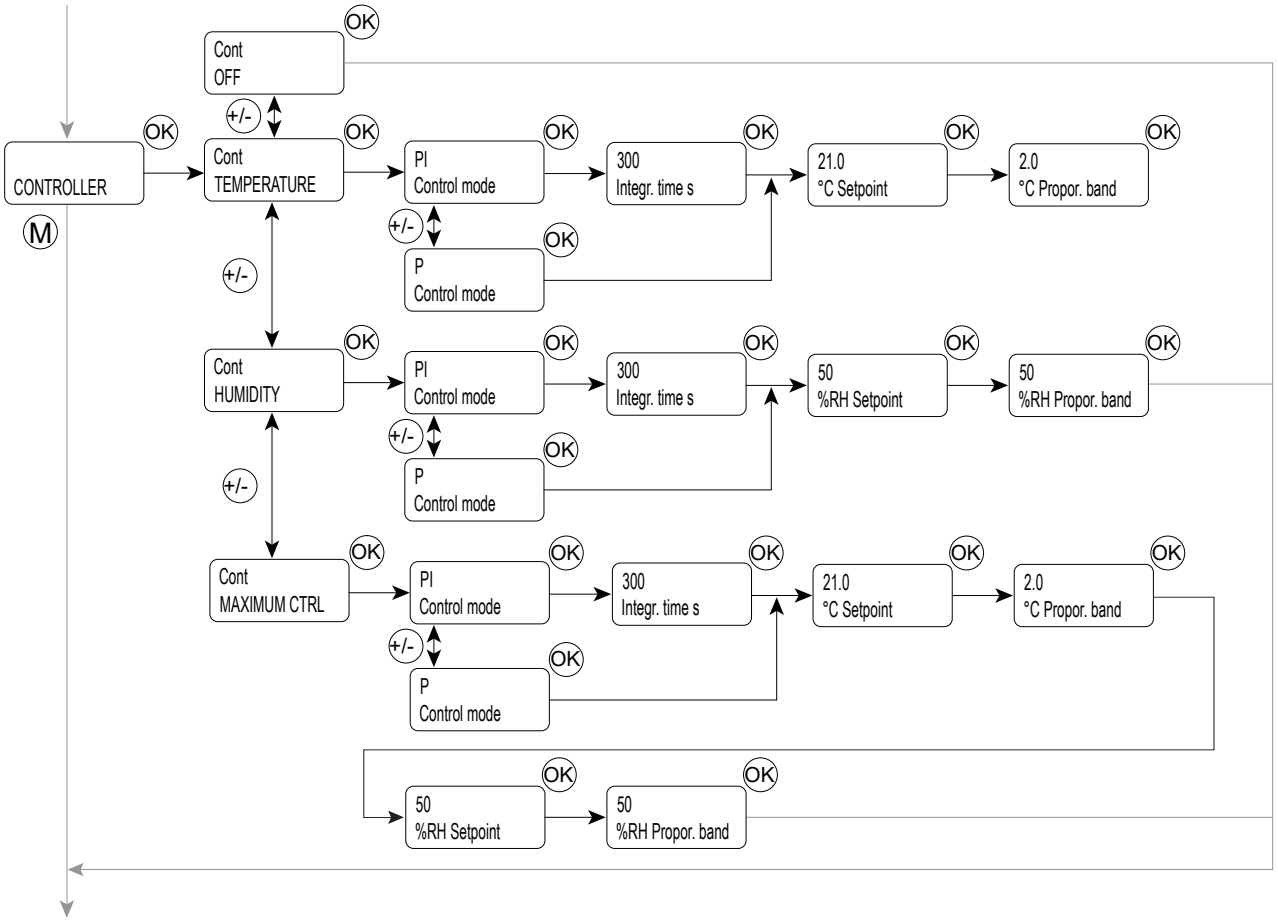
You can change the output scaling of all outputs and the controller output direction through the output menu. Also, the fixed controller output value and duration can be selected through the menu.



Parameter	Available values	Description
Y1-Y4 range	*0-10V / 2-10V / 0-5V*	Output scaling.
Output mode	*Direct / Reversed*	Controller output direction.
Fixed output	*OFF / 100% / 75% / 50% / 25% / 0%*	Fixed output.
Deactivation	*6h / 12h / 24h / MANUAL*	Fixed output deactivation timer.

2.4.2.4 Controller menu

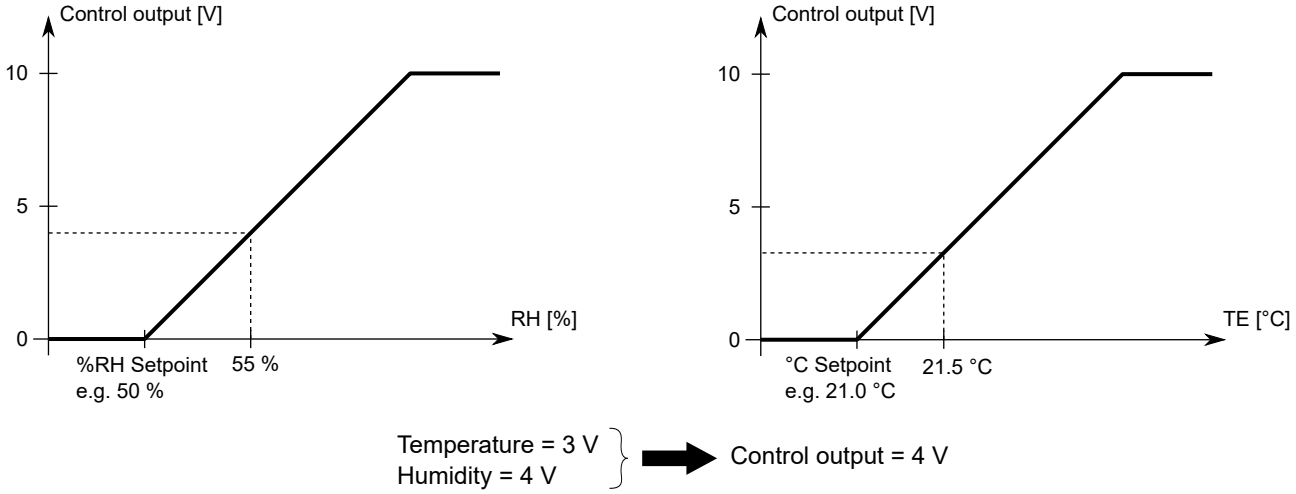
The control output can be controlled either according to a one measurement value or according to the maximum selection of all values.



Parameter	Available values	Description
Cont	*OFF / TEMPERATURE / HUMIDITY / MAXIMUM CTRL*	Controlled value. *OFF* — Controller off *TEMPERATURE* — Temperature *HUMIDITY* — Relative humidity, RH models *MAXIMUM CTRL* — Maximum selection control. See more details after the table.
Control mode	*P / PI*	Control method.
Integr. time s	*50...5000*	Integration time (s).
°C Setpoint	*0...50.0*	Set point for temperature (°C). The value can be adjusted by 0,1 °C steps.
°C Propor. band	*1.0...32.0*	Proportional band for temperature (°C). The value can be adjusted by 0,1 °C steps.
%RH Setpoint	*0...100*	Set point for humidity (%rH), RH models. The value can be adjusted by 5 % steps.
%RH Propor. band	*10...100*	Proportional band for humidity (%rH), RH models. The value can be adjusted by 5 % steps.

In the maximum selection control, the control output signal is formed according to the measurement that causes the largest control signal value. The following situation is described in the example figure:

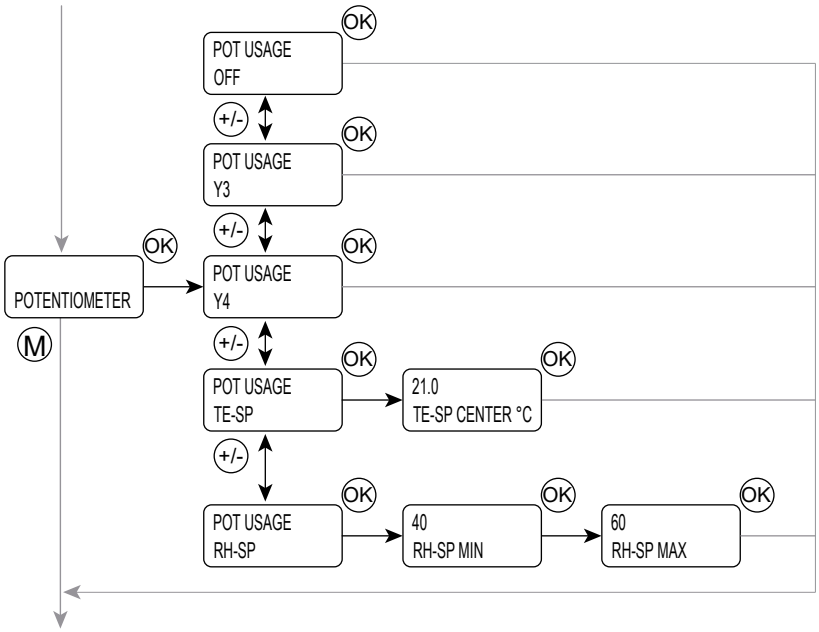
- Temperature is 21.5 °C.
- Relative humidity is 55 %.



2.4.2.5 Potentiometer menu

Potentiometer menu is available in PU models. You can select the potentiometer output connector and disable the potentiometer through the menu. You can also set the potentiometer for the set point adjustment purposes. The potentiometer is connected to the Y4 output as factory setting.

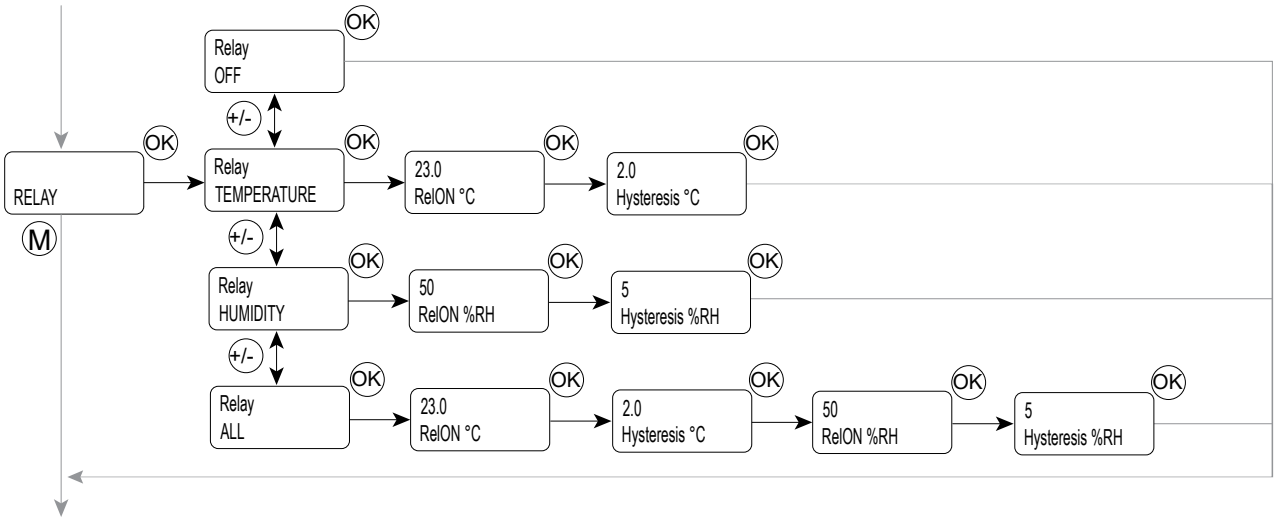
Note: The set point that is adjusted with the potentiometer cannot be adjusted via Modbus.



Parameter	Available values	Description
POT USAGE	*OFF / Y3 / Y4 / TE-SP / RH-SP*	Controlled value. *OFF* — Potentiometer is not in use. *Y3* — Potentiometer output is Y3. *Y4* — Potentiometer output is Y4. **Note:** You have to set the controller off, if the potentiometer is configured to Y4 output. *TE-SP* — Potentiometer is used to set the temperature setpoint. The potentiometer adjustment range is ±3 °C around the set point centre. *RH-SP* — Potentiometer is used to set the humidity setpoint.
TE-SP CENTER °C	*10.0...30.0 °C*	Temperature setpoint centre. The value can be adjusted by 0.1 °C steps.
RH-SP MIN	*0...100 %*	Humidity setpoint range, low limit. The value can be adjusted by 5 % steps.
RH-SP MAX	*0...100 %*	Humidity setpoint range, high limit. The value can be adjusted by 5 % steps.

2.4.2.6 Relay menu

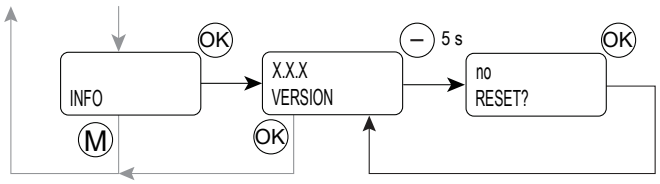
Relay menu is available in R models. The relay switching point and hysteresis can be changed through the menu.



Parameter	Available values	Description
Relay	*OFF / TEMPERATURE / HUMIDITY / ALL*	Relay control value. *OFF* — Relay not in use. *TEMPERATURE* — Temperature. *HUMIDITY* — Relative humidity. *ALL* — All measurement values. When the relay is controlled according to the all values, the relay activates when one measured value exceeds the set point.
RelON °C	*0...50.0*	Set point for temperature (°C). The value can be adjusted by 0,1 °C steps.
Hysteresis °C	*0.0...20.0*	Hysteresis for temperature (°C). The value can be adjusted by 0,1 °C steps.
RelON %RH	*0...100*	Set point for humidity (%rH). The value can be adjusted by 5 % steps.
Hysteresis %RH	*0...50*	Hysteresis for humidity (%rH). The value can be adjusted by 1 % steps.

2.4.2.7 Info menu

You can check the device software version and reset the device to factory settings through the menu.



Parameter	Available values	Description
VERSION	*X.X.X*	Device software version.
RESET?	*no / yes*	Reset to factory settings.

3 Modbus

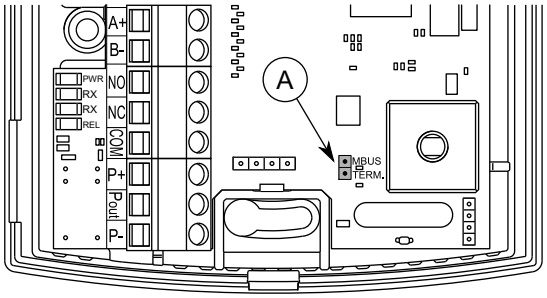
The -M models are equipped with Modbus RTU communication via RS-485 connection.

3.1 Modbus properties

Protocol	RS-485 Modbus RTU
Bus speed	9600*/14400/19200/38400/57600/115200 bit/s
Data bits	8
Parity	none*/odd/even
Stop bits	1
Modbus ID	1*
Unit load	1/4 UL
	* factory setting

3.2 Terminating Modbus

1. Disconnect the device supply voltage.
2. Open the cover.
3. Place the termination jumper.



A. Termination jumper

4. Close the cover.
5. Reconnect the device supply voltage.

3.3 Modbus function codes

The device supports the following Modbus function codes.

Decimal	Hexa-decimal	Function
1	0x01	Read Coils
2	0x02	Read Discrete Inputs
3	0x03	Read Holding Registers
4	0x04	Read Input Registers
5	0x05	Write Single Coil
6	0x06	Write Single Register
15	0x0F	Write Multiple Coils
16	0x10	Write Multiple Registers

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3.4 Modbus registers

Note: If you try to write a parameter value that is beyond the parameter value range, the value will be replaced by the nearest acceptable value.

Example:

1. The register value range is -500…500.
2. You try to write the value 600 to the register.
3. The value 500 is written to the register.

3.4.1 Coils

Regis-ter	Parameter description	Data type	Values	Range	Default
0	Y1 output overdrive activation	Bit	*0 - 1*	0. Off 1. On	*0*
1	Y2 output overdrive activation	Bit	*0 - 1*	0. Off 1. On	*0*
2	Y3 output overdrive activation	Bit	*0 - 1*	0. Off 1. On	*0*
3	Y4 output overdrive activation	Bit	*0 - 1*	0. Off 1. On	*0*
4	Relay overdrive activation	Bit	*0 - 1*	0. Off 1. On	*0*
5	Relay overdrive	Bit	*0 - 1*	0. Off 1. On	*0*
6	Controller output direction	Bit	*0 - 1*	0. Direct 1. Reversed	*0*

3.4.2 Discrete inputs

Register	Parameter description	Data type	Values	Range
0	Relay status	Bit	*0 - 1*	0. Off 1. On

3.4.3 Input registers

Register	Parameter description	Data type	Values	Range
0	Not in use	S16	-	-
1	Temperature measurement	S16	*0...500*	0.0...50.0 °C
2	Humidity measurement	S16	*0...100*	0...100 %rH
3	Y1 output voltage	U16	*0...1000*	0.00…10.00 V
4	Y2 output voltage	U16	*0...1000*	0.00…10.00 V
5	Y3 output voltage	U16	*0...1000*	0.00…10.00 V
6	Y4 output voltage	U16	*0...1000*	0.00…10.00 V
7	Active potentiometer value	U16	*0...1000*	0.00…10.00 V
8	Active potentiometer setpoint value	U16	variable	variable

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3.4.4 Holding registers

Register	Parameter description	Data type	Values	Range	Default
0	Y1 output overdrive	S16	*0...1000*	0...10.00 V	*0*
1	Y2 output overdrive	S16	*0...1000*	0...10.00 V	*0*
2	Y3 output overdrive	S16	*0...1000*	0...10.00 V	*0*
3	Y4 output overdrive	S16	*0...1000*	0...10.00 V	*0*
4	Not in use	S16	-	-	*0*
5	Temperature measurement tuning (offset)	S16	*-30...30*	-3.0...3.0 °C	*0*
6	Humidity measurement tuning (offset)	S16	*-5...5*	-5...5 %rH	*0*
7	Control method	S16	*0 - 1*	0. P 1. PI	*1*
8	Controller output	S16	*0 - 1 - 2 - 3 - 4*	0. Off 1. Not in use 2. Temperature 3. Humidity 4. Maximum selection	*0*
9	Not in use	S16	-	-	*700*
10	Set point, temperature	S16	*0...500*	0.0...50.0 °C	*210*
11	Set point, humidity	S16	*0...100*	0...100 %rH	*50*
12	Not in use	S16	-	-	*500*
13	Proportional band, temperature	S16	*10...320*	1.0...32.0 °C	*20*
14	Proportional band, humidity	S16	*10...100*	10...100 %rH	*50*
15	Integration time	S16	*50…5000*	50…5000 s	*300*
16	Active potentiometer usage	S16	*0 - 1 - 2 - 3 - 4*	0. Off 1. Y3 2. Y4 3. Temperature setpoint 4. Humidity setpoint	*2*
17	Not in use	S16	-	-	*1100*
18	Not in use	S16	-	-	*5*
19	Not in use	S16	-	-	*750*
20	Not in use	S16	-	-	*1250*
21	Value shown on the display	S16	*0 - 1 - 2 - 3*	0. Not in use 1. Temperature 2. Humidity 3. Scrolling	*3*
22	Not in use	S16	-	-	*1*
23	Not in use	S16	-	-	*0*
24	Relay set point, temperature	S16	*0...500*	0.0...50.0 °C	*230*
25	Relay hysteresis, temperature	S16	*0...200*	0.0...20.0 °C	*20*
26	Relay set point, humidity	S16	*0...100*	0...100 %rH	*50*
27	Relay hysteresis, humidity	S16	*0...50*	0...50 %rH	*5*

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Regis-ter	Parameter description	Data type	Values	Range	Default
28	Relay function	S16	*0 - 1 - 2 - 3 - 4*	0. Off 1. Not in use 2. Temperature 3. Humidity 4. Temperature, humidity	*3*
29	Potentiometer temperature setpoint centre	S16	*100...300*	10.0...30.0 °C	*210*
30	Potentiometer humidity setpoint low limit	S16	*0...100*	0...100 %	*40*
31	Potentiometer humidity setpoint high limit	S16	*0...100*	0...100 %	*60*
32	Not in use	S16	-	-	*600*
33	Not in use	S16	-	-	*1200*
34	Not in use	S16	-	-	*1*
35	Not in use	S16	-	-	*1*
36	Not in use	S16	-	-	*2*
37	Y1…Y4 output range	S16	*0 - 1 - 2*	0. 0...10 V 1. 2...10 V 2. 0...5 V	*0*
38	Fixed control output	S16	*0 - 1 - 2 - 3 - 4 - 5*	0. Off 1. 100 % 2. 75 % 3. 50 % 4. 25 % 5. 0 %	*0*
39	Fixed control output timer	S16	*0 - 1 - 2 - 3*	0. 6 h 1. 12 h 2. 24 h 3. Manual	*1*

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4 Disposal

The device is considered as electrical and electronic equipment for disposal in terms of the applicable European Directive. At the end of life the product must enter the recycling system at an appropriate collection point.

- The device must be disposed through channels provided for this purpose.
- The disposal must be completed according to the local and currently applicable laws and regulations.

Generally all metals can be recycled as material. Plastics and cardboard packaging material can be used in energy recovery. Printed circuit boards need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code. Contact your local distributor for further information on environmental aspects and recycling instructions for professional recyclers.



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