JUMO hydroTRANS S10

Humidity and temperature transmitter with optional CO_2 module, indoor version

Operating Manual

90704500T90Z001K000

V2.00/EN/00767214/2023-06-29

Further information and downloads

qr-907045-en.jumo.info

Contents

Contents

1.1 Other applicable device documentation

This document is supplemented by the documents listed below:

Product group	Document type
907045	Modbus interface description

1.2 Purpose

This documentation is part of the device and includes all information to ensure that it is used safely and as intended across all phases of the product lifecycle.

If you do not follow the documentation and safety information, this may result in risk to life and damage to property due to improper use.

- Read and follow the documentation and the safety information and warnings.
- Store the document in its entirety, in an easily accessible location, and so that it can be read in full at all times.
- Contact the manufacturer if you have any questions about the device and documentation.

1.3 Target group

This documentation is intended to be used by personnel for plant mechanical systems for sanitary, heating and air-conditioning technology, electrical engineering or mechanical and plant engineering.

1.4 Definition of terms

Use in the documentation	Definition
Device, product	Humidity and temperature transmitter
CO_2 module, CO_2 sensor	Carbon dioxide (CO_2) as a measurand
Measured value	Process value

1.5 Notes on trademark

All trademarks and trade and company names used are the property of their rightful owners or authors.

1.6 Symbols

NOTICE!

The signal word "NOTICE" indicates possible damage to property.

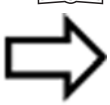
Non-observance can lead to damage to devices, systems or the environment.

▶ Observe the instructions in the note for avoiding damage!

NOTE!

This symbol is used in tables and indicates that further information is provided after the table.

REFERENCE!



This symbol refers to **further information** in other sections, chapters, or other manuals.

2 Safety

2.1 Intended use

The humidity and temperature transmitter monitors the indoor air quality.

The device is suitable for wall mounting (stationary use at weatherprotected locations).

The operating manual is part of the device. The device is only intended for use according to this operating manual.

2.2 Qualification of personnel

The personnel deployed must meet the following requirements in all phases of the product lifecycle:

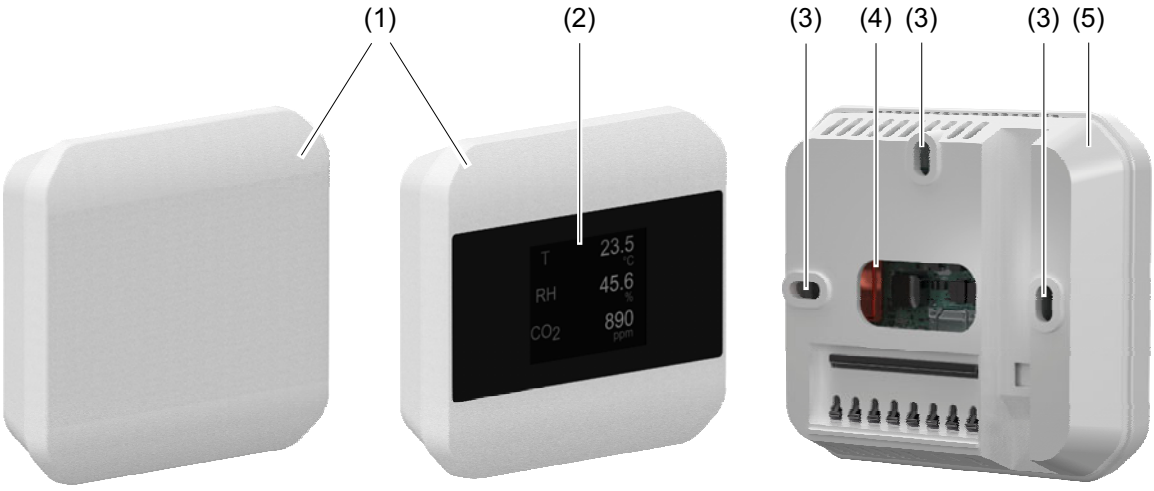
- Members of personnel have at least completed training in the field of plant mechanical systems for sanitary, heating, and air-conditioning technology or have completed a degree in electrical engineering or mechanical and plant engineering.
- Members of personnel are familiar with this documentation and the safety information and warnings it contains.

2.3 Transport and storage damage

The device can be damaged if it is insufficiently protected during transport and/or improperly stored.

- Transport the device protected from moisture and dirt in shockproof packaging.
- Also comply with the admissible storage temperatures while the device is being transported.
- Protect all electrical and mechanical connections from damage.
- Store the device in a dry and dust-free environment.
- Observe the device storage temperature range.

3.1 Design



Front view
(Device without display)

Front view
(Device with display)

Rear view

(1) Housing front
(2) Display (TFT display)
(3) Screw holes
(4) Connection opening
(5) Housing rear

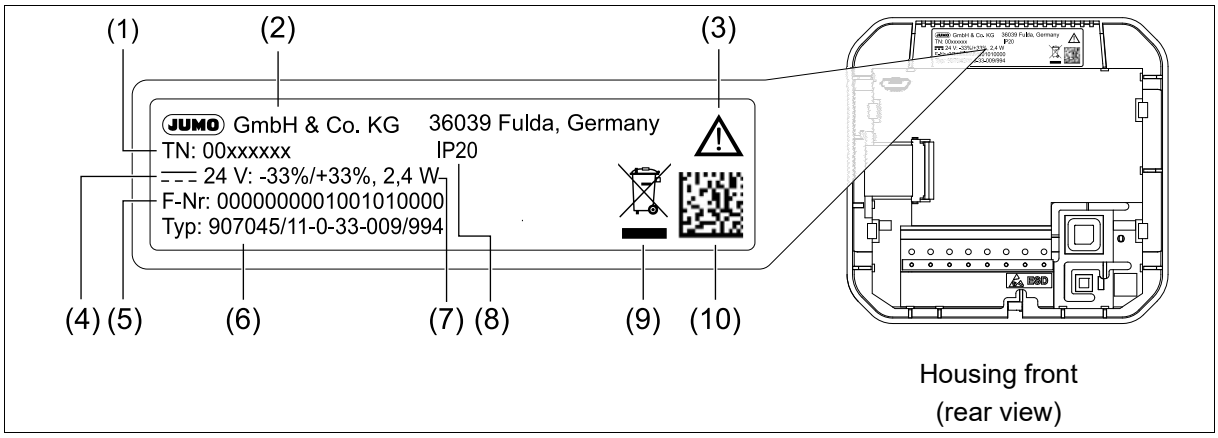
3.2 Function

Measurand	**Function principle**
Relative humidity	Capacitive measurement technology
Temperature	Semiconductor measurement technology
Carbon dioxide (CO_2)	Photoacoustic measurement technology

The process values of the measurands can be displayed on the optional display and issued to a higher-level system via the interfaces or analog outputs.

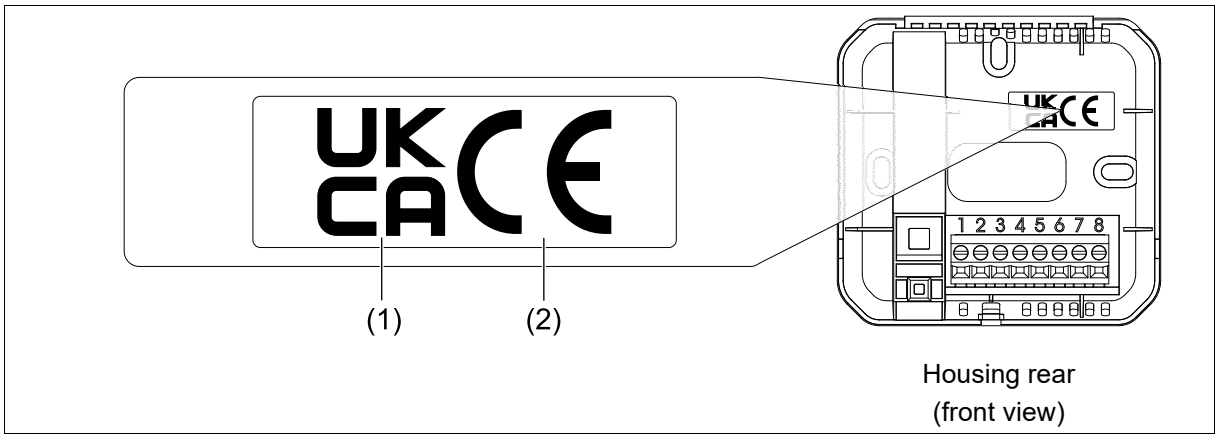
3 Description

3.3 Nameplate



Housing front
(rear view)

1	Part no.	6	Device version
2	Manufacturer and address	7	Power consumption
3	Observe device documentation!	8	Protection type according to DIN EN 60529
4	Voltage supply	9	Fabrication number as a DMC code
5	Fabrication number		



Housing rear
(front view)

1	UK conformity label	2	EU conformity label

3.4 Scope of delivery

Device in ordered version
Operating manual
3 fastening screws

4.1 Electrical data

Voltage supply	SELV, PELV
Analog output	DC 24 V, -33 %/+33 %
RS485 interface	DC 24 V, -58 %/+33 %
Power consumption	≤ 2.4 W
Protection rating	DIN EN 61140, Class III (protective low voltage)
Electrical connection	
Connection elements	Screw terminal
Connecting cable	
Conductor cross section	0.08 to 2,5mm^2 (AWG 28 to AWG 14)
Stripping length	≥ 6 mm
Temperature resistance	≥ 80 °C
Electrical safety	
Requirements	The device must be equipped with an electrical circuit that meets the requirements of DIN EN 61010-1 with regard to "Limited-energy circuits".

4.2 Inputs

4.2.1 Measurands

Relative humidity

Measuring range	0 to 100 % RH
With CO_2 module	0 to 95 % RH
Accuracy	
Typical	±2.0 % RH
Max.	±2.5 % RH
Sampling rate	1 s

Temperature

Measuring range	-5 to +55 °C
Accuracy	±0.4 °C
Sampling rate	1 s

Carbon dioxide (CO_2)

Measuring range	400 to 10000 ppm
Accuracy	±(50 ppm + 5 % of the measured value)
Reference conditions	
Ambient temperature	25 °C
Air pressure	1013 hPa
Humidity	50 % RH
Measuring range	400 to 2000 ppm
Sampling rate	30 s

4 Technical data

4.3 Outputs

4.3.1 Analog outputs

Current output

Signal range	4 to 20 mA
Output signal limits	0 to 22 mA
Accuracy	≤±0.05 % in relation to the end of the signal range (20 mA)
Temperature influence	±50 ppm/K
Burden influence	≤±0.02 % per 100 Ω
Burden	≤ 500 Ω

Voltage output

Signal range	0 to 10 V
Output signal limits	0 to 11 V
Accuracy	≤ ±0.05 % in relation to the end of the signal range (10 V)
Temperature influence	50 ppm/K
Load influence	≤±15 mV
Load	≥ 10 kΩ

4.4 Interfaces

RS485

Galvanic isolation	Functional
Data transmission	Serial
Data format	8-1-none[a] 8-1-odd 8-1-even 8-2-none
Transmission protocol	Modbus RTU
Data transfer rate	9600 baud 19200 baud 38400 baud[a] 57600 baud 115200 baud
Function	Transfer of process data, configuration data, and device information

[a] Default setting

USB

Transmission standard	USB 2.0
Connector type	Micro-B
Power requirement	≤ 500 mA
Cable length	≤ 5 m
Function	Transfer of configuration data and device information

4.5 Display

Type	TFT display
Size	
Display area	35.04 mm × 28.03 mm
Screen size (diagonal)	1.77"
Resolution	128 × 160 px RGB
Brightness	11 levels (configurable)

4.6 Environmental influences

Admissible ambient temperature	-5 to +55 °C
Admissible storage temperature	-25 to +60 °C
Protection type	DIN EN 60529 IP20 (front)
Site altitude max.	2,000 m abouve sea level
Climatic conditions	DIN EN IEC 60721-3-3
Climate class	3K22
Relative humidity	≤ 90 % without condensation, non-condensing
Electromagnetic compatibility (EMC)	DIN EN 61326-1:2022
Interference emission	Class B[a]
Interference immunity	Industrial requirement
Vibration[b]	DIN EN 60068-2-6
Amplitude	0.15 mm from 10 to 58.1 Hz
Acceleration	2 g from 58.1 to 150 Hz
Shock[b]	DIN EN 60068-2-27
Peak acceleration	15 g
Shock duration	11 ms

[a] The product is suitable for industrial use as well as for households and small businesses.

[b] The CO_2 module is sensitive to vibrations. In the event of vibrations, the measurement results could change on account of the design.

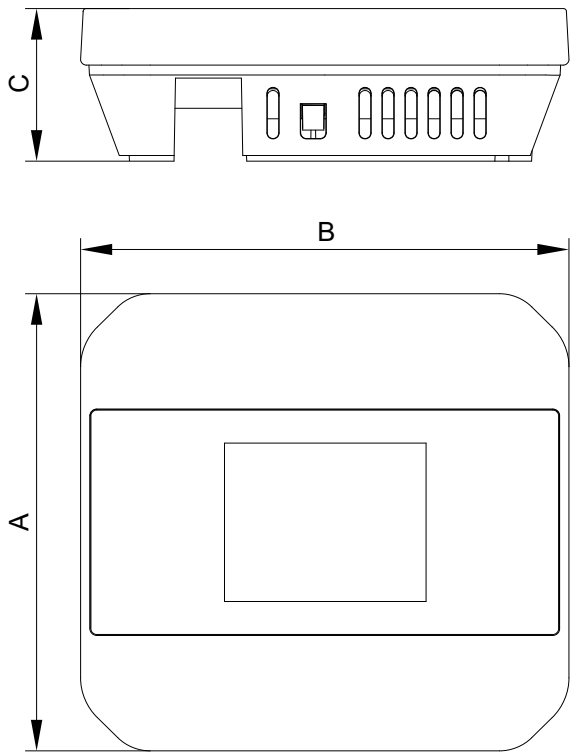
4.7 Mechanical features

Materials	
Housing	Plastic (PC)
Display cover	Plastic (PMMA)
Weight	Approx. 81 g

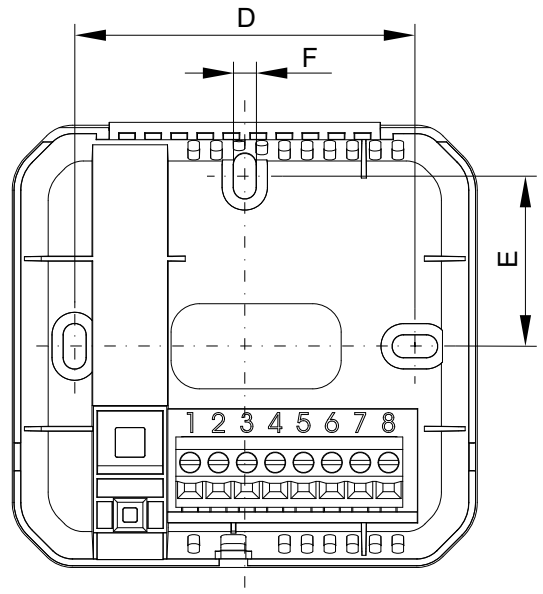
4 Technical data

4.8 Dimensions

Device with display



Screw holes (housing rear)



Device version	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
Device without display	81	85	25	60	30	4
Device with display			27			

Aids	Cross-headed screwdriver
Materials	3 fastening screws

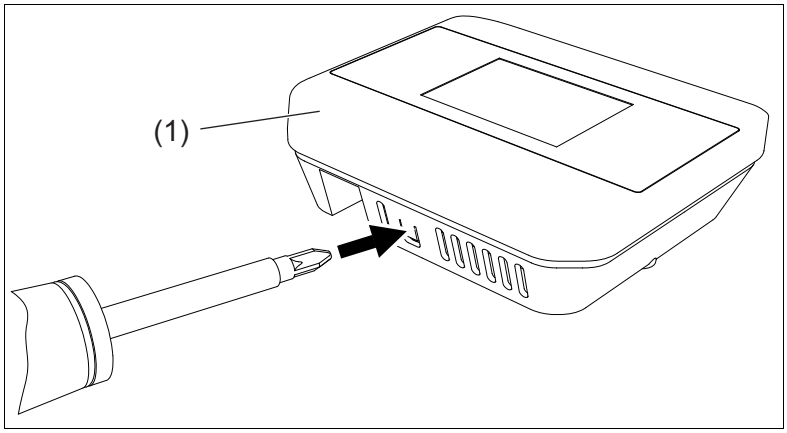
Requirements:

- The system has been de-energized and secured against being switched on again.
- The mounting holes have been drilled.
  ⇨ chapter 4.8 "Dimensions", Page 12

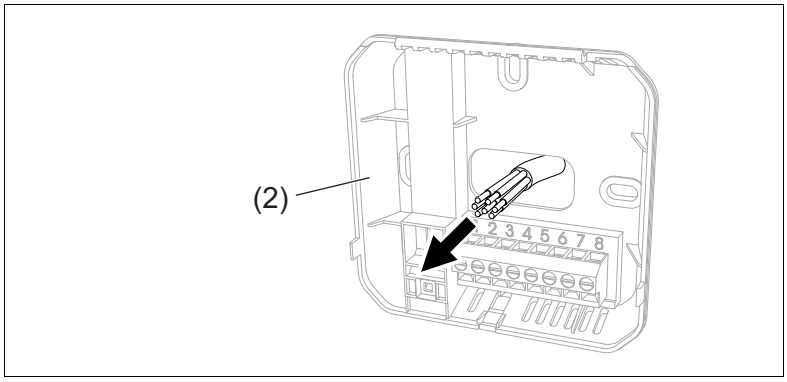
Procedure:

1. Unlock the snap-in hook on the housing front (1).

2. Remove the housing front and place it down, taking care to protect it from pollutants.

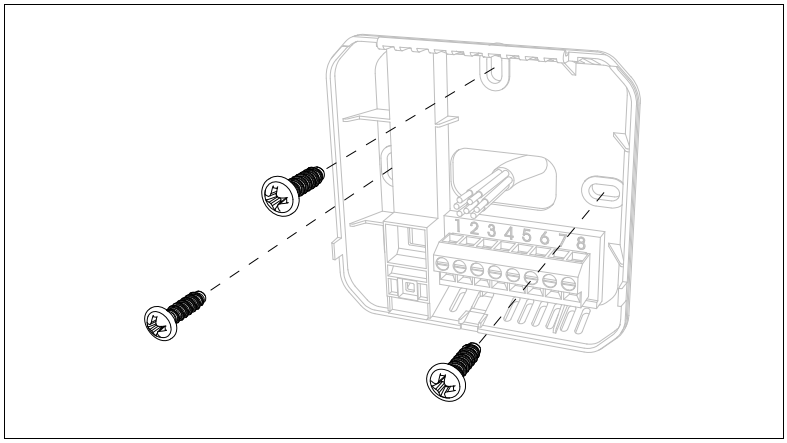


3. Guide the connecting cable through the connection opening on the housing rear (2).



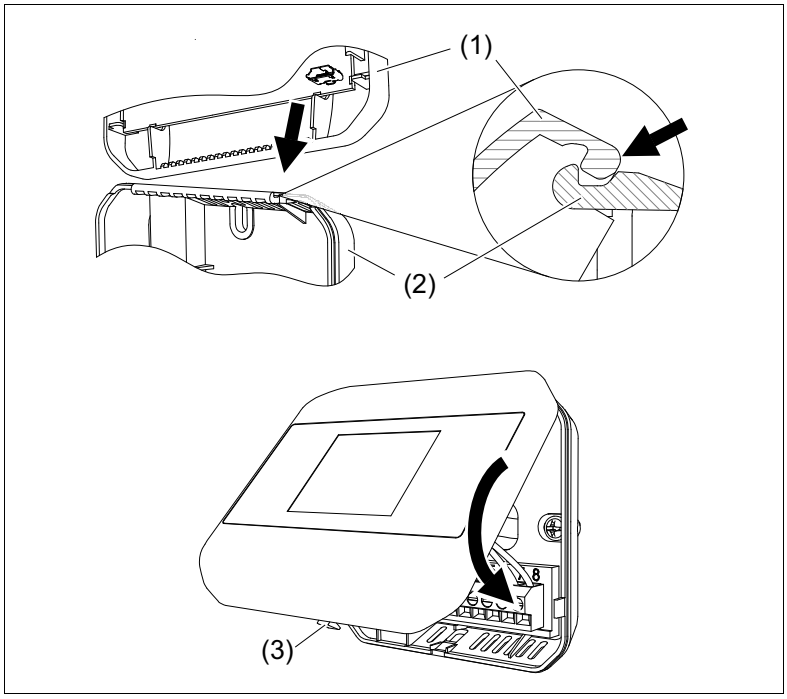
4. Mount the housing rear to the wall. Tighten the fastening screws.
   Tightening torque: < 0.5 Nm

   CAUTION!**Risk of incorrect measurement results due to ingress of air through the connection opening on the device.**
   When mounting the device on a flush-mounted box, seal the connection opening air-tight using suitable sealing material.



5. Complete the electrical connection.
   ⇨ chapter 6 "Electrical connection", Page 15

6. Insert the housing front (1) into the housing rear (2) and fold it forward so that you can hear the snap-in hook (3) engage.



7. Remove the protective film.

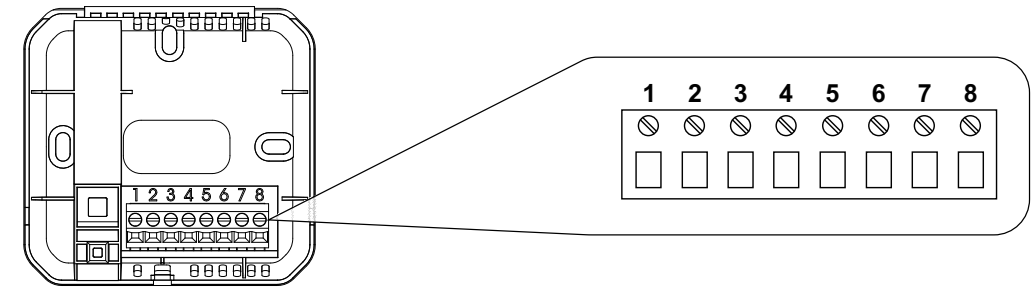
The device is ready for operation as soon as the voltage supply is established.

6.1 Preparing the electrical connection

Requirements:

- The system has been de-energized and secured against being switched on again.
- The connections for the voltage supply and signal processing have been correctly prepared.

6.2 Connection elements



Housing rear (front view) Screw terminal

6.2.1 Terminal assignment

Screw terminal

Designation	Description	Assignment
Analog output	–	1
	–	2
	Analog output 3[a]	3
	Analog output 2[a]	4
	Analog output 1[a]	5
	Analog output GND	6
	GND	7
	DC 24 V	8

Designation	Description	Assignment
RS485	RS485 A (D+)	1
	RS485 B (D-)	2
	RS485 GND[b]	3
	RS485 A (D+)	4
	RS485 B (D-)	5
	RS485 GND[b]	6
	GND	7
	DC 24 V	8

[a] Standard

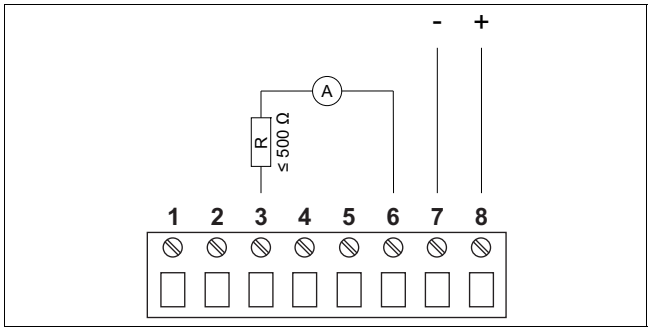
[b] Optional extra

6.3 Connection diagram

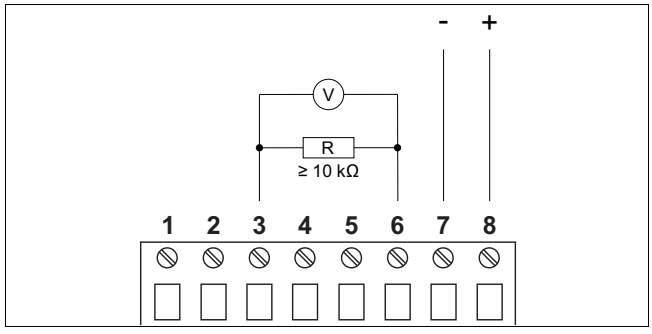
Analog outputs

The connection examples for analog output 3 also apply to analog outputs 1 and 2.

Current output



Voltage output

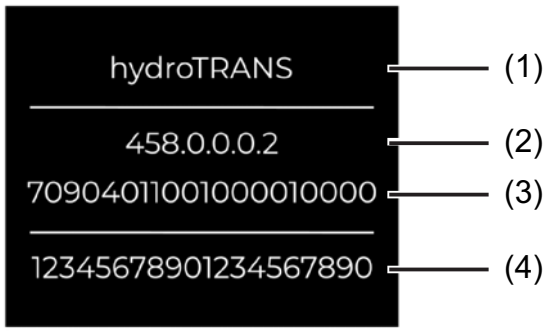


7 Operation

7.1 Display elements

7.1.1 Startup display

The startup display appears as soon as the voltage supply to the device is established. The startup display switches to the process value display after approximately five seconds.



Pos.	Designation	Description
1	Startup display	Shows the device name.
2		Shows the device software version.
3		Shows the device hardware version.
4		Shows the device TAG number.

7.1.2 Process display

Pos.	Designation	Description
1	Process display	Shows the following values and messages: • Up to three process values • Error messages, ⇨page 24
2	Process value display	Shows the following values: • The formula symbol • The process value (measured or calculated value) • The system unit

The setup program is used to configure the devices and can be downloaded free of charge from the product website of the manufacturer.

The configuration data that is created can be saved in a file and transferred between the device and set-up program.
The data is transferred serially via the USB interface. The USB interface must have a 500-mA host.

Connection of the USB interface

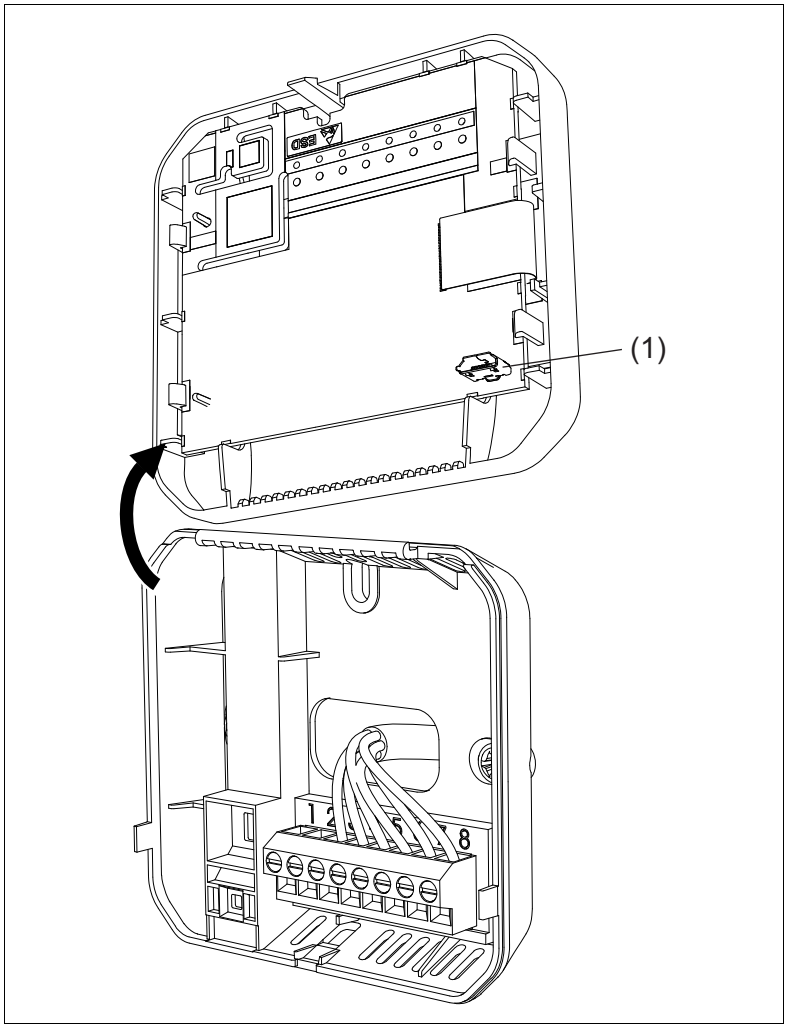
Aids	Screwdriver
Materials	USB cable, connector type A to Micro-B

Requirements:

- The system has been de-energized and secured against being switched on again.

Procedure:

1. Unlock the snap-in hook on the top section of the housing.
2. Remove the housing front.
3. Connect the USB cable (1) and connect it to the end device.
4. Start the setup program and configure the relevant settings.
5. Remove the USB cable once the data transfer is complete.
6. Insert the housing front into the housing rear and fold it forward so that you can hear the snap-in hook engage.



9 Configuration

The default settings are shown in **bold** in the following tables.

Before configuring the settings, perform a data transfer from the device.

9.1 File info

In the **File info** menu you can enter information about the configuration file.

9.2 Device version

The **Device version** menu provides an overview of the device hardware installed.

9.3 System data

Parameter	Value	Description
Language	**German**, English, French, Spanish	National language for the device texts of the process display.
Temperature	**°C**, °F	System units of the process values shown in the process value display.
Absolute humidity	**g/m³**, g/ft³	
Mixing ratio	**g/kg**, gr/lb	
Partial water vapor pressure	**mbar**, psi	
Specific enthalpy	**kJ/kg**, BTU/lb	
TAG number		For categorization purposes, e.g. to identify the installation location.
Altitude 📖	**0** m	Refers to standard elevation zero (NHN).

Altitude

The parameter is used to calculate the ambient pressure based on the barometric formula and affects the calculation of the CO_2 concentration, mixing ratio, and specific enthalpy.

9.4 Display

Value 1st, 2nd, 3rd line > Analog selector

Parameter	Value	Description
No selection		The process value is not shown.
Measured values	Relative humidity (RH), Temperature (T), Carbon dioxide (CO2)	Process values
Calculated values	Dew point (Td), Mixing ratio (x), Absolute humidity (a), Specific enthalpy (h), Wet-bulb temperature (Tw), Frost point (Tf), Partial water vapor pressure (Pw)	Process values
Brightness	0 to 10 (**5**)	Brightness of the process display backlight.

9.5 Measurand correction

Parameter	Value	Description
Relative humidity	Offset	–
Temperature	Offset	–
Carbon dioxide	Offset, Automatic self-calibration	–

Relative humidity

Parameter	Value	Description
Offset	Input range: -15 to 15 % (**0**)	Process value correction, also affects the calculated values.

Temperature

Parameter	Value	Description
Offset	Input range: -15 to 15 °C (**0**)	Process value correction, also affects the calculated values.

Carbon dioxide

Parameter	Value	Description
Offset	Input range: -500 to +500 ppm (**0**)	Process value correction, also affects the calculated values.
Automatic self-calibration	**Active**, inactive	–

9.6 Analog outputs

Analog output 1/2/3 > Source > Analog selector

Parameter	Value	Description
No selection		Analog output 3
Measured values	**Relative humidity (RH)**	Analog output 1
	Temperature (T)	Analog output 2
	Carbon dioxide (CO2)	–
Calculated values	Dew point (Td), Mixing ratio (x), Absolute humidity (a), Specific enthalpy (h), Wet-bulb temperature (Tw), Frost point (Tf), Partial water vapor pressure (Pw)	–

Analog output 1/2/3 > Source > Analog selector > Measured values > Relative humidity (RH)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 % (**0**)	–
Scale end	Input range: -99999 to 99999 % (**100**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	

Analog output 1/2/3 > Source > Analog selector > Measured values > Temperature (T)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 °C (**-5**)	–
Scale end	Input range: -99999 to 99999 °C (**55**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Measured values > Carbon dioxide (CO_2)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 ppm (**400**)	–
Scale end	Input range: -99999 to 99999 ppm (**5000**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Calculated values > Dew point (Td)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 °C (**-40**)	–
Scale end	Input range: -99999 to 99999 °C (**60**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Calculated values > Mixing ratio (x)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 g/kg (**0**)	–
Scale end	Input range: -99999 to 99999 g/kg (**160**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Calculated values > Absolute humidity (a)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 g/m^3 (**0**)	–
Scale end	Input range: -99999 to 99999 g/m^3 (**150**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Calculated values > Specific enthalpy (h)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 kJ/kg (**-40**)	–
Scale end	Input range: -99999 to 99999 kJ/kg (**500**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	

Analog output 1/2/3 > Source > Analog selector > Calculated values > Wet-bulb temperature (Tw)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 °C (**0**)	–
Scale end	Input range: -99999 to 99999 °C (**60**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Calculated values > Frost point (Tf)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 °C (**-40**)	–
Scale end	Input range: -99999 to 99999 °C (**0**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

Analog output 1/2/3 > Source > Analog selector > Calculated values > Partial water vapor pressure (Pw)

Parameter	Value	Description
Signal type	**4 to 20 mA**, 0 to 10 V	–
Scale start	Input range: -99999 to 99999 mbar (**0**)	–
Scale end	Input range: -99999 to 99999 mbar (**200**)	–
Response at error	**Replacement value**, High, Low	–
Replacement value	Input range: **3.4** to 22 mA, 0 to 11 V	–

9.7 Serial interface

Parameter	Value	Description
Baud rate	9600, 19200, **38400**, 57600, 115200	–
Data format	**8-1-none**, 8-1-odd, 8-1-even, 8-2-none	–
Minimum response time	-999 to 999 ms (**0**)	–

Modbus slave

Parameter	Value	Description
Device address	Input range: 1 to 254 (**1**)	–
Temperature	**°C**, °F	System units of the process values transferred via the Modbus interface.
Absolute humidity	**g/m^3**, g/ft^3	
Mixing ratio	**g/kg**, gr/lb	
Partial water vapor pressure	**mbar**, psi	
Specific enthalpy	**kJ/kg**, BTU/lb	

9.8 Online parameters

This function requires an active connection between the setup program and device.

Parameter	Description
Hardware/software	Version of the device hardware and software
Measurands	Test of sensor functions
Display	Test of color reproduction
Calibration constants	Calibration constants of analog outputs
Analog outputs	Test of analog outputs Measure the signal at the relevant output.

10 Troubleshooting

10.1 Process value error

With error messages in line with the NAMUR classification NE 107, process value errors are supplemented by symbols and a two-line message (alternating with the process display).

Error message	Possible cause	Remedy
<<<<<	The measuring range was undershot.	Operate the device within the device specification.
>>>>>	The measuring range was exceeded.	
-----	No valid input value	
	Incorrect mathematical value	

10.2 Error messages in line with NAMUR

Error messages in line with NAMUR classification NE 107 are displayed by symbols and a two-line message (alternating with the process display).

Symbol	Designation
	**Error/failure**

Error message	Possible cause	Remedy
Configuration faulty	The checksum of the configuration data is faulty (CRC).	Transfer the configuration data to the device again.
Calibration data faulty	The checksum of the calibration data is faulty (CRC).	Contact the manufacturer.
Device not calibrated	The calibration flag has not been set.	
	There is no calibration data.	
Humidity/temperature invalid	The humidity and temperature sensor is faulty.	
	The communication to the sensor is impaired.	
CO_2 invalid	The CO_2 sensor is faulty.	
	The communication to the sensor is impaired.	

11 Maintenance and cleaning

The device is maintenance-free.

Clean the device with a cloth dampened with water.

12 Shutdown

12.1 Dismounting

Aids	Screwdriver

Requirements:

- The system has been de-energized and secured against being switched on again.

Procedure:

1. Unlock the snap-in hook on the housing front.
2. Remove the housing front and place it down, taking care to protect it from pollutants.
3. Disconnect the electrical connection.
4. Undo the fastening screws.
5. Remove the housing rear.

12.2 Returns

Procedure:

1. The supplementary sheet for product returns must first be completed correctly and signed. Then enclose it with the shipping documents and attach it to the packaging, ideally on the outside.
2. Use the original packaging or a suitably secure container for sending the device.

12.3 Disposal

DISPOSAL

- Do not dispose of the device or replacement parts in the trash bin after use.
- Delete programs and data stored on the device.
- Remove any inserted batteries if that is possible without damaging the device.
- Dispose of the device as well as packaging properly and in an environmentally friendly manner.
- Observe country-specific laws and regulations for waste management and disposal.

According to Directive 2012/19/EU on Waste Electrical and Electronic Equipment, manufacturers are required to offer the option of returning old equipment. Contact the manufacturer for a return.

13 Accessories

Designation	Part no.
USB cable, A to Micro-B	00616250
JUMO hydroTRANS setup program	00775170

14 Open-source software

The software of device and/or components of the device was developed using open-source software.

Insofar as the respectively applicable license terms justify a claim on the provision of source code or other information, JUMO GmbH & Co. KG will provide the source code and the license texts on a conventional data carrier at the cost incurred for the provision of the data carrier.

This offer is valid for three years after the software is made available. This offer is valid beyond that time to the extent specified in the license terms.

For questions related to open source software, please contact:

Address JUMO GmbH & Co. KG
License Compliance
Moritz-Juchheim-Straße 1
36039 Fulda, Germany

Email licensecompliance@jumo.net

JUMO GmbH & Co. KG
Street address:
Moritz-Juchheim-Straße 1
36039 Fulda, Germany
Delivery address:
Mackenrodtstraße 14
36039 Fulda, Germany
Postal address:
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
Email: mail@jumo.net
Internet: www.jumo.net

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex, CM20 2DY, UK
Phone: +44 1279 63 55 33
Fax: +44 1279 62 50 29
Email: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
6724 Joy Road
East Syracuse, NY 13057, USA
Phone: +1 315 437 5866
Fax: +1 315 437 5860
Email: info.us@jumo.net
Internet: www.jumousa.com