Data Sheet hydroTRANS H50

Humidity and Temperature Sensor for High Humidity and Chemically Polluted Conditions

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Humidity and Temperature Sensor for High Humidity and Chemically Polluted Conditions

The hydroTRANS H50 sensors are designed to meet highest demands of stable and highly accurate measurement of relative humidity (RH) and temperature (T) under most challenging conditions. hydroTRANS H50 is suitable for a wide range of applications from -80 °C to 180 °C (-112 °F to 356 °F) and 300 bar (4 350 psi).

Outstanding Measurement Performance

The heated high-end RH and T sensing element enables reliable and long-term stable measurement in extremely humid or chemically polluted environment. The monolithic structure of the RH / T sensing element, protected by the proprietary coating, allows for fast recovery after condensation or chemical contamination.

Versatile and Robust

hydroTRANS H50 versions are available with several probe and cable lengths. With various heating modes, the hydroTRANS H50 can be perfectly tailored to the specific needs of each measurement task. It features an IP65 / NEMA 4 polycarbonate or stainless-steel enclosure which can accommodate various interface modules and electrical connection options.

Outputs and Configuration

The measured data is available on two freely scalable analogue outputs, on the RS485 (Modbus RTU) or Ethernet-PoE (Modbus TCP, M12 X-coded connection) interface and on the alarm (relay) outputs. The configuration and the RH and T adjustment of the hydroTRANS H50 can be performed with the free PCS Configuration Software. An optional 3.5" colour display with push-buttons is available for configuration and visualisation.

hydroTRANS H50 with polycarbonate enclosure and display

Sensing probes

hydroTRANS H50 with stainless steel enclosure and display

Features

Measurement performance

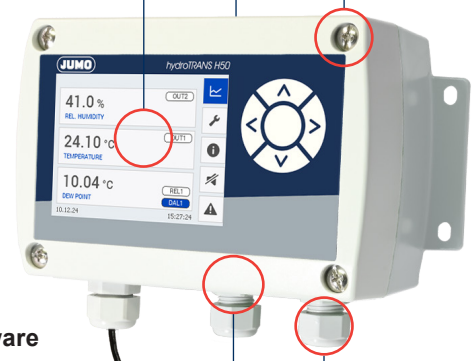
- Highest RH / T accuracy
- Working range -80...+180 °C (-112...+356 °F)
  up to 300 bar (4 350 psi)
- Designed for chemical contamination and continuous high humidity conditions
- All RH related physical quantities

3.5" TFT colour display

- Shows up to 4 measurands simultaneously
- Layout and measurands freely selectable
- Data logger for 20 000 values per measurand
- Logged data shown graphically
- Diagnosis functions
- Intuitive device setup with push-buttons

Enclosure

- IP65 / NEMA 4X protection rating
- Polycarbonate or stainless steel
- Easy mounting and service
- Versatile connection options
- Modular design

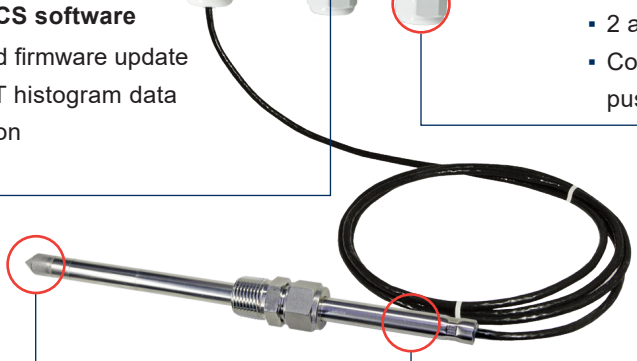


Outputs

- 2 freely scalable analogue outputs current / voltage
- Error indication according to NAMUR
- Modbus RTU / Modbus TCP
- 2 alarm outputs
- Configurable via software or push-buttons

USB service interface and PCS software

- Configuration, adjustment and firmware update
- Download eventlog and RH/T histogram data
- View sensor status information
- 5 status LEDs



RH / T sensing element

- Operating modes
  - Condensation Guard (CG)
  - High Humidity Guard (H^2G)
- Automatic ReCovery (ARC)
- Protected by:
  - Proprietary coating
  - Wide choice of filter caps

Sensing Probes

- Intelligent pluggable probe with included sensing element data
- Four probes depending on
  - T range
  - p range
  - Environmental condition
- Various probe and cable lengths

Inspection certificate

According to DIN EN 10204-3.1

Features

Smart Probe

The hydroTRANS H50 with probe connection option 7 (see order details) features an intelligent pluggable probe, which enables a plug-and-play probe exchange. Any hydroTRANS H50 Smart Probe automatically uploads its specific parameters upon connecting it to the hydroTRANS H50 electronics and can be replaced even during operation without any configuration, adjustment or calibration. This is particularly useful for excluding down time and its corresponding costs in harsh industrial environment, where the probe can get occasionally damaged.

Protective Sensor Coating

The proprietary sensor coating is a protective layer applied to the sensing elements, their leads and soldering points. The coating substantially extends sensor lifetime and ensures optimal measurement performance in corrosive environment (salts, off-shore applications). Additionally, it improves the long term stability in dusty, dirty or oily applications by preventing stray impedance caused by deposits on the active sensor surface or on the electrical connections.

Automatic ReCovery (ARC) Function

Automatic ReCovery (ARC) is available for all hydroTRANS H50 types and is used to remove chemical pollution and thus eliminate possible drift effects of the RH / T sensing element. This is achieved with an intense heating of the sensing element. The function can be perfectly tailored to the application requirements being triggered:

- manually via PCS or display and push-buttons,
- by a certain cyclic time interval configurable via PCS,
- using RS485 or Ethernet with Modbus commands or
- using the ARC module option.

Type-specific Operating Modes

Condensation Guard (CG)

hydroTRANS H50 sensors with Condensation Guard (CG) are designed for applications with variable humidity over the full range 0...100 %RH where condensation may occur for a short time. The CG protects the RH / T sensing element by targeted heating and prevents temporary condensation and its negative effects on the measurement results. The CG heating is triggered by a predefined RH setpoint factory set according to order details. The setpoint is configurable with PCS and display and push buttons.

High Humidity Guard (H^2G)

hydroTRANS H50 sensors with High Humidity Guard (H^2G) enable accurate RH measurement even in permanent high humidity and condensing conditions. Continuous, adaptive heating of the sensing element and of the probe body (dual heating system) prevents drift effects and condensation on the sensor element. The monolithic construction of the sensing element enables fast RH response times under condensing conditions.

Operating Mode	Type Extension	Use in Environments with	Function Trigger
Condensation Guard (CG)	10 / 20 / 30	Temporary condensation	RH setpoint[1)]
High Humidity Guard (H^2G)	40	Continous high humidity and condensation	Always on

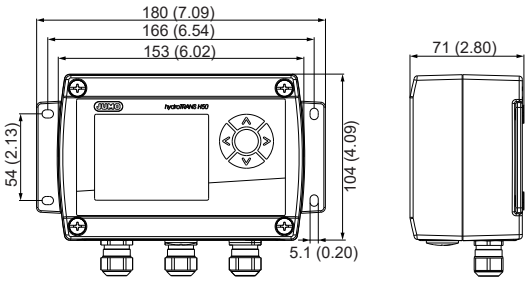
1) Factory setting: disabled

Dimensions

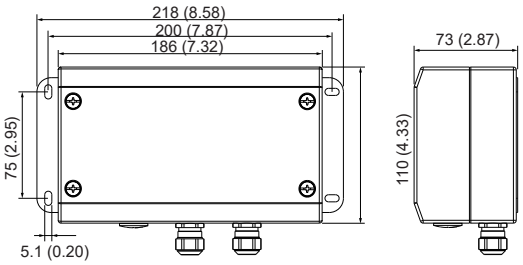
Values in mm (inch)

Enclosure

Polycarbonate (with and without display)

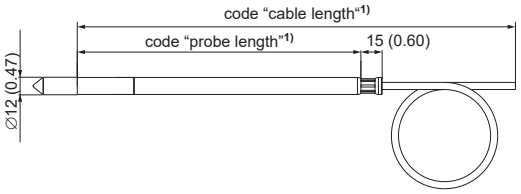


Stainless steel (with and without display)



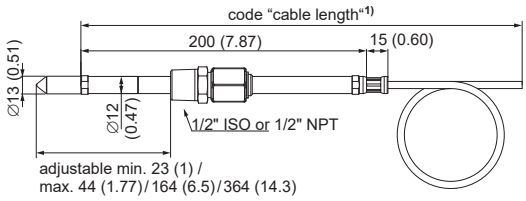
Probe Type 10

Up to 180 °C (356 °F)



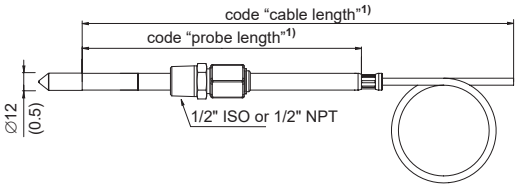
Probe Type 20

Pressure-tight up to 20 bar (300 psi) with sliding fitting



Probe Type 30

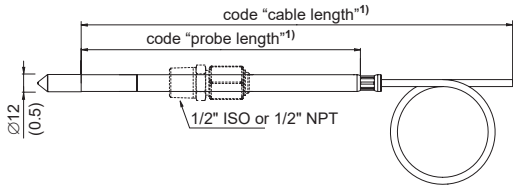
Pressure-tight up to 300 bar (4 350 psi) with cut-in fitting



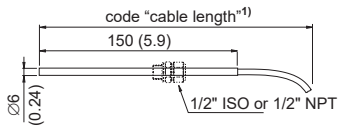
Probe Type 40

Pressure-tight up to 20 bar (300 psi) with optional cut-in fitting

RH



T



1) Refer to order details

Technical Data

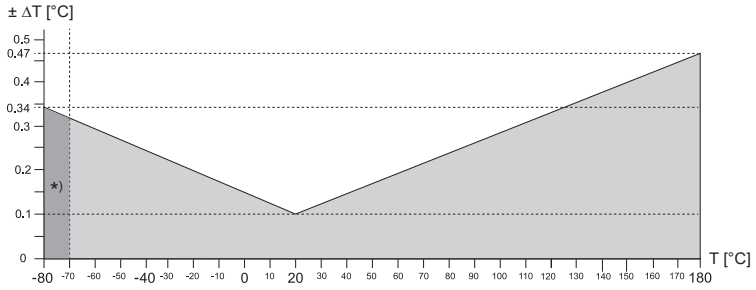
Measurands

Relative Humidity (RH)

Measuring range	0...100 %RH
Accuracy[1], incl. hysteresis, non-linearity and repeatability	
-15...+40 °C (5...104 °F) RH ≤90 %	±(0.95 + 0.0013 * mv) %RH
-15...+40 °C (5...104 °F) RH >90 %	±1.8 %RH
-25...+70 °C (-13...+158 °F)	±(1.05 + 0.0084 * mv) %RH
-40...+180 °C (-40...+356 °F)	±(1.15 + 0.013 * mv) %RH
-70... -40°C (-94...-40 °F)	±3.85 %RH mv = measured value
Factory calibration uncertainty[2]	
0...90 %RH	±(0.7 + 0.003 * mv) %RH
90...100 %RH	±1 %RH mv = measured value
Temperature dependency of electronics, typ.	±0.01 % RH / °C (0.0056 %RH / °F)
Response time t_{90} with metal grid filter at 20 °C (68 °F)	<15 s

1) Defined against calibration reference.
2) Defined at 23 °C with an coverage factor k=2, corresponding to a confidence level of 95 %.

Temperature (T)

Measuring range probe	
Probe types 10 / 20 / 30	-70...+180 °C (-94...+356 °F)
Probe type 40	-80...+180 °C (-112...+356 °F)
Accuracy[1]	 *) Probe type 40: T measurement down to -80 °C (-112 °F), RH measurement down to -70 °C (-94 °F)
Factory calibration uncertainty[2] @ 23 °C (73 °F)	±0.05 °C
Temperature dependency of electronics, typ.	±0.001 °C / °C

1) Defined against calibration reference.
2) Defined at 23 °C with an coverage factor k=2, corresponding to a confidence level of 95 %.

Calculated Physical Quantities

		from		up to		unit	
Dew point temperature[1]	Td	-80	(-112)	100	(212)	°C	(°F)
Frost point temperature[2]	Tf	-80	(-112)	0	(32)	°C	(°F)
Wet bulb temperature	Tw	-5	(23)	100	(212)	°C	(°F)
Water vapour partial pressure	e	0	(0)	1100	(15)	mbar	(psi)
Mixing ratio	r	0	(0)	999	(9999)	g/kg	(gr/lb)
Absolute humidity	dv	0	(0)	700	(300)	g/m^3	(gr/ft^3)
Specific enthalpy	h	0	(0)	2800	(1250)	kJ/kg	(BTU/lb)

1) Td accuracy according to RH and T uncertainties
2) Equals Td above 0 °C (32 °F)

Technical Data

Outputs

Analogue

Two freely selectable and scalable analogue outputs	0 - 1 / 5 / 10 V -1 mA < I_L < 1 mA I_L = load current 0 - 20 mA / 4 - 20 mA (3-wire) R_L < 500 Ω R_L = load resistance Both outputs have the same electrical quantity (voltage, current)
Accuracy @23 °C (68 °F)	±0.05 % FS FS = full scale (20 mA, 10 V)
Temperature dependency[1]	±0.005 % FS / °C FS = full scale (20 mA, 10 V)
Two alarm outputs with alarm output option 2[2]	2x changeover contact 250 V AC / 6 A 28 V DC / 6 A Measurand, threshold and hysteresis configurable via PCS or display and push-buttons

1) Deviating from 23 °C (68 °F), defined at 12 mA or 5 V, respectively
2) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3 000 m (9 843 ft)

Digital

Digital interface **Protocol** **Factory settings** **Supported Baud rates**	RS485 (hydroTRANS H50 = 1 unit load) Modbus RTU 9600 Baud, parity even, 1 stop bit, Modbus address 230 9600, 19200, 38400, 57600 and 76800
Digital interface **Electrical Connection** **Protocol** **Factory settings**	Ethernet-PoE M12 X-coded, socket, IEEE 802.3af, class 1 or higher Modbus TCP IP address 192.168.0.64 (static)

General

Power supply class III USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	8 - 35 V DC 12 - 30 V AC 100 - 240 V AC, 50/60 Hz with integrated power supply option[1] PoE with digital interface option 4
Current consumption, (typ.) @ 24 V DC / AC **2 voltage outputs** **2 current outputs** **additionally for display** **additionally for Ethernet**	 40 mA / 80 mA_{rms} 80 mA / 160 mA_{rms} 50 mA / 150 mA_{rms} 30 mA / 90 mA_{rms}
Electrical connection	Screw terminals max. 1.5 mm^2 (AWG 16)
Cable glands **for polycarbonate enclosure** **for metal enclosure**	 M16x1.5, for cable Ø3...7 mm (0.12...0.28") M16x1.5, for cable Ø4.5...10 mm (0.18...0.39")
Pressure range for pressure-tight probe **Probe type 20 / 40** **Probe type 30**	 0.01...20 bar (0.15...300 psi) 0.01...300 bar (0.15...4350 psi)
Temperature range electronics board operation and storage **without display** **with display**	 -40...+60 °C (-40...+140 °F) -20...+50 °C (-4...+122 °F)
Probe body **Material** **Protection rating**	 Stainless steel 1.4404 / AISI 316L IP65
Enclosure **Material** **Protection rating**	 Polycarbonate, UL94 V-0 approved or Stainless steel 1.4404 / AISI 316 L IP65 / NEMA 4X
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial Environment FCC Part15 ClassA ICES-003 ClassA
Conformity	CE UKCA
Configuration **Software** **Interface**	 PCS Configuration Software 30068830 (free download from our product website) USB-C, configuration cable 30067139

1) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft)

Order Details

	Feature	Description	Code			
Hardware Configuration	Basic type		907055			
	Basic type extension	High temperatures up to 180 °C (356 °F)	10			
		Medium pressure up to 20 bar (300 psi) and 180 °C (356 °F)		20		
		High pressure up to 300 bar (4 350 psi) and 180 °C (356 °F)			30	
		High humidity and extra T probe up to 20 bar (300 psi) and 180 °C (356 °F)				40
	Enclosure	PC (Polycarbonate)	0			
		Stainless steel	2			
	Filter	Stainless steel sintered	4	4	4	
		PTFE (Polytetraflouroethylene)	5	5	5	5
		Stainless steel grid, stainless steel body (180 °C / 356 °F)	9	9	9	9
		PTFE membrane, stainless steel body				8
	Probe cable length	2 m (6.6 ft)	02	02	02	02
		5 m (16.4 ft)	05	05	05	05
		10 m (32.8 ft)	10	10	10	10
	Probe length	65 mm (2.56")	065			065
		80 mm (3.15")		080		
		200 mm (7.87")	200	200	200	200
		400 mm (15.75")	400	400		400
	Process connection	G1/2" ISO - sliding fitting, Ø13 mm (0.51")		23		
		1/2" NPT - sliding fitting, Ø13 mm (0.51")		25		
		G1/2" ISO - cut-in fitting, Ø12 mm (0.47")			20	
		1/2" NPT - cut-in fitting, Ø12 mm (0.47")			22	
	Electrical connection	Standard[1]	0			
		1 x plug for power supply and outputs	4			
		2 x plugs for power supply + outputs and RS485	6			
	Digital Interface	Without digital interface	0			
		RS485 with Modbus RTU	3			
		Ethernet-PoE with Modbus TCP[2)3)]	4			
	Display	Without display	0			
		3.5" TFT display with integrated data logger	2			
	Probe connection	Fixed	0			
		Intelligent pluggable probe (plug-and-play)	7	7		7[5)]
	Additional module	Without additional module	0			
		ARC module for external trigger of sensor heating[3)4)]	1			
		Alarm output with relay[3)]	2			
		Integrated power supply 100 - 240 V AC 50/60 Hz[3)]	3			
Software Setup Analogue Outputs	Output signal[6)]	0 - 1 V	1			
		0 - 5 V	2			
		0 - 10 V	3			
		0 - 20 mA	5			
		4 - 20 mA	6			
	Output 1	Relative humidity RH (0...100 %)	00			
		Dew point Td (-80 ...+100°C)	52			
		Mixing ratio r (0...800 g/kg)	60			
		Absolute humidity dv (0...700 g/m^3)	56			
		Wet bulb temperatureTw (-5...+100 °C)	54			
		Water vapour partial pressure e (0...1 100 mbar)	50			
		Specific enthalpy h (0...2 800 kJ/kg)	62			
	Output 2	Temperature T (-70...+180°C)	00			
		Temperature T (-60...+140°C)	01			
		Temperature T (-20...+180°C)	02			
		Dew point Td (-80 ...+100°C)	52			
		Mixing ratio r (0...800 g/kg)	60			
		Absolute humidity dv (0...700 g/m^3)	58			
		Wet bulb temperatureTw (-5...+100 °C)	54			
		Water vapour partial pressure e (0...1 100 mbar)	50			
		Specific enthalpy h (0...2 800 kJ/kg)	62			

1) Standard = 2 x M16 cable glands, except for additional module option 3: 2 plugs for power supply and outputs
2) No Additional Module available.
3) With electrical connection standard only (no plug options possible), no combination with other additional modules (additional module option 1, 2, 3, digital interface option 4) possible.
4) Sensor needs to be supplied with 24V AC/DC ±20 %
5) RH probe pluggable, T probe fixed
6) Applies to both outputs

Order Example

907055/20-2-9-02-200-23-6-3-2-0-0-6-00-00

Feature	Code	Description
Type	**20**	Medium pressure up to 20 bar (300 psi) and 180 °C (356 °F)
Enclosure material	**2**	Stainless steel
Filter	**9**	Stainless steel grid, stainless steel body (180 °C / 356 °F)
Probe cable length	**02**	2 m (6.6 ft)
Probe length	**200**	200 mm (7.87")
Process connection	**23**	G1/2" ISO - sliding fitting, Ø13 mm (0.51")
Electrical connection	**6**	2 x plugs for power supply + outputs and RS485
Digital interface	**3**	RS485 with Modbus RTU
Display	**2**	3.5" display with integrated data logger
Probe connection	**0**	Fixed
Additional module	**0**	Without additional module
Output signal	**6**	4 - 20 mA
Output 1	**00**	Relative humidity RH (0...100 %)
Output 2	**00**	Temperature T (-70...+180°C)

Accessories

Designation		Part No.
Configuration Software (free download from our product website)		**30068830**
USB configuration cable for PC connection (USB-C to USB-A)		**30067139**
Stainless steel mounting flange Ø12 mm (0.47")		**00371193**
Stainless steel mounting flange for Ø6 mm (0.24") T probe		**00662045**
Stainless steel wall mounting clip Ø12 mm (0.47")		**00763785**
Pressure-tight feedthrough For probe assembly up to 20 bar (300 psi)		
	G1/2" ISO Ø12 mm	**00529328**
	1/2" NPT Ø12 mm	**00529334**
	G1/2" ISO Ø6 mm	**00675492**
	1/2" NPT Ø6 mm	**30067154**
Conduit adapter M16x1.5 to NPT 1/2"		**30067158**
Drip water protection		**00566286**
Radiation shield for RH probe		**00573116**
Radiation shield for T probe		**00628684**
Mounting set for mast with Ø34 - 54 mm (1.3 - 2.1")		**30067162**
Bracket for DIN rail mounting[1)]		**00448810**
Wall Mounting Clip Ø12 mm (0.47")		**30067169**
Immersion well, stainless steel Ø6x135 mm (0.25 x 5.4")	**1/2" ISO** **1/2" NPT**	**00786573** **30067165**
RS485 kit for retrofitting		**30067193**

1) For polycarbonate enclosure only. Two pieces are necessary for each hydroTRANS H50.

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