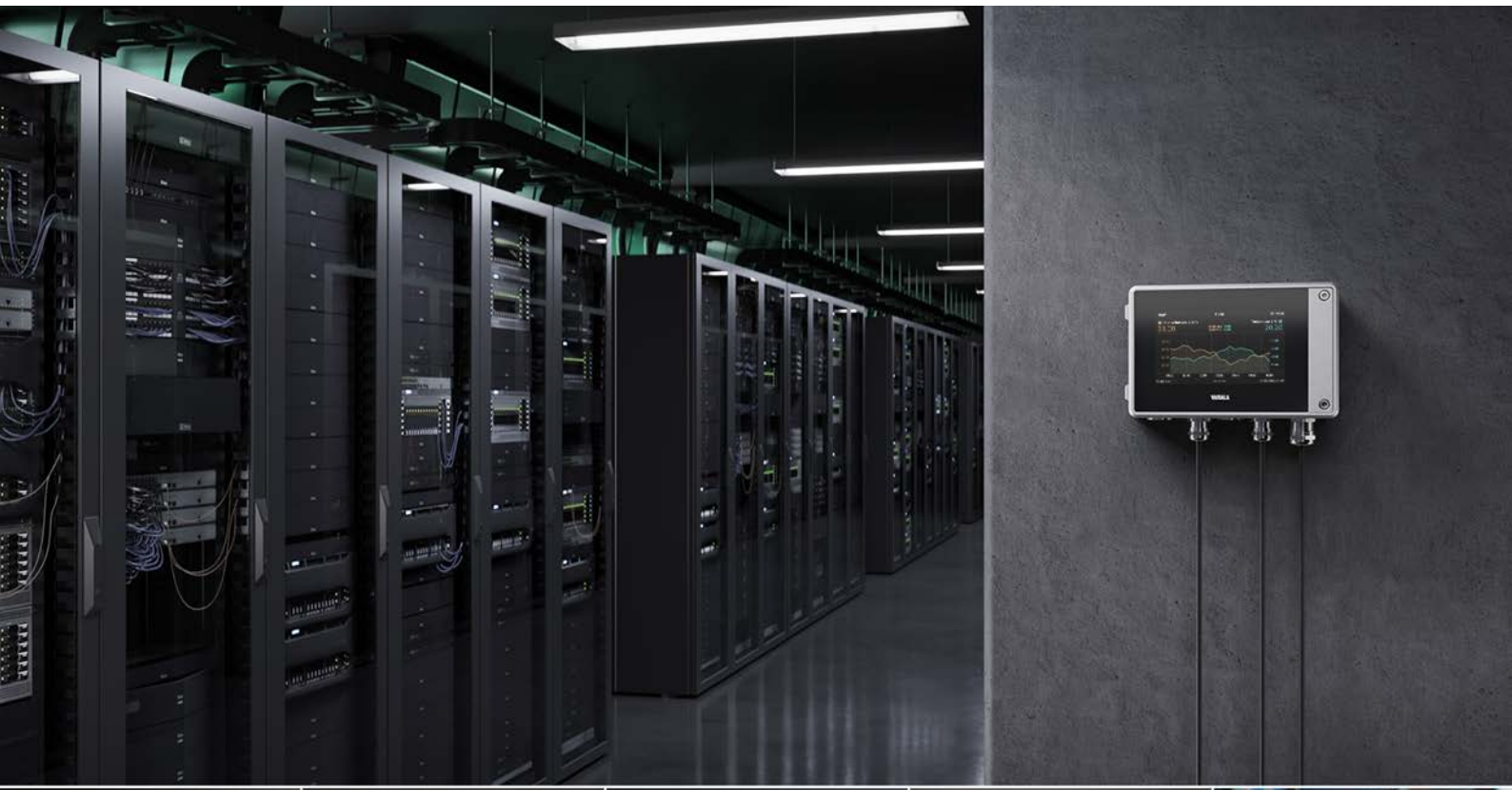
Product Catalog

Humidity · Temperature · Dew point · Carbon dioxide
Biogas quality · Moisture in oil · Hydrogen peroxide
Pressure · Liquid concentration · Weather · Service offering

INDUSTRIAL INSTRUMENTS



VAISALA
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Instruments and intelligence for industrial needs

Vaisala Industrial Measurements

Vaisala's Industrial Measurements business area provides customers with visibility into their own processes. Our products provide them with accurate and reliable measurement data which enables them to make decisions for optimized industrial processes.

Heating, ventilation, and air-conditioning (HVAC)

Vaisala offers industry benchmark HVAC transmitters for measuring humidity, temperature, and carbon dioxide indoors and outdoors. Customers use these instruments to optimize heating ventilation and air conditioning controls, for example, in offices, hospitals, data centers, factories, and cooling towers. Our transmitters help in maintaining good indoor air quality and saving costs through improved efficiency.

Liquid measurements

Vaisala's cutting-edge Polaris™ process refractometers offer unparalleled reliability and performance in liquid concentration and density measurements for industrial manufacturing. Designed for seamless inline process control, our solutions are trusted across a wide range of demanding sectors, including pulp and paper, food and sugar production, semiconductors, pharmaceuticals, chemicals, oil refining, and petrochemicals.

Life Cycle Services

Our Life Cycle Services provide comprehensive care through the life cycle of our measurement instruments. As a trusted partner to our global customers, we enable sustainable decisions by maintaining the most accurate measurement data throughout the entire product and system life cycle.

This product catalog provides an overview of our products to help you select what best suits your needs. For more information, visit us at vaisala.com or contact us at vaisala.com/requestinfo. Product user documentation is available at docs.vaisala.com.

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VAISALA

Indigo200 Series Transmitters

For Vaisala Indigo-compatible probes

Features

- Transmitter USB-C port allows connecting to Vaisala Insight PC software with a generic USB cable
- Numerical and graphical color display (optional non-display version for analog model)
- IP65 enclosure
- 24 V AC/DC power supply input
- Indigo201: 3 analog outputs (mA or V)
- Indigo202: RS-485 with Modbus® RTU
- 2 configurable relays

Vaisala Indigo200 series transmitters are host devices for displaying measurement values from Vaisala Indigo-compatible probes and transmitting measurements to automation systems through analog signals, Modbus RTU communication, or relays.

Transmitter for Vaisala Indigo-compatible probes

- HMP series humidity and temperature probes HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
- TMP1 temperature probe
- DMP series dew point probes DMP5, DMP6, DMP7, DMP8
- GMP250 series CO_2 probes GMP251, GMP252
- HPP270 series vaporized hydrogen peroxide probes HPP271, HPP272
- MMP8 moisture in oil probe

Indigo200 series transmitters are plug-and-play probe host devices for current and future Vaisala Indigo-compatible probes. The host device has a color display with numeric and graph measurement viewing options; Indigo201 is also available as a non-display version that uses an LED indicator for notifications.

Vaisala Indigo-compatible probes are connected either directly to the host or by using a cable between Indigo200 and the probe.

The surface of the Indigo200 enclosure is smooth, which makes it easy to clean. It is also resistant to dust and most chemicals, such as H_2O_2 and alcohol-based cleaning agents.

For easy access to configuration and monitoring options, Indigo200 can be connected to Vaisala Insight PC software using the USB-C port on the transmitter with any generic USB cable that has a USB-C connector.

With Insight PC software, you can configure both the host device and the probes connected to it. Insight PC software also provides options for temporary viewing of the measurement data and diagnostics.

For more information on Indigo transmitters and the Indigo product family, see www.vaisala.com/indigo.

Technical data

General

- Color display (Indigo201: optional non-display version)
- USB connection to Vaisala Insight PC software for easy access to configuration and monitoring options.

Indigo-compatible probes

Measurement type	Probe models
Humidity and temperature	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature	TMP1
Dew point	DMP1, DMP5, DMP6, DMP7, DMP8
Carbon dioxide	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Operating environment

Operating temperature	With display −20 ... +60 °C (−4 ... +140 °F) Without display −40 ... +60 °C (−40 ... +140 °F)
Storage temperature	−40 ... +70 °C (−40 ... +158 °F)
Chemical tolerance	Temporary exposure during cleaning: • H_2O_2 (6000 ppm, non-condensing) • Alcohol-based cleaning agents such as ethanol and IPA (max. 70 % concentrate)
IP rating	IP65 [1]
Indoor/outdoor use	Indoor use

1) *Note that the IP65 rating only applies when the cable gland wiring option is used, and the lead-through with the pierceable seal at the back of the transmitter is left intact. See user documentation for more information on Indigo200 wiring options.*

Inputs and outputs

Insight PC software configuration access [1]	USB-C port on transmitter (compatible with generic USB cables)
Power supply input	15–30 V DC [2] 24 V AC ±10 % 50/60 Hz
Relay contacts x 2	Max. switching current 1 A Max. switching voltage 40 V DC / 28 V AC
Indigo201 model	
Three analog outputs (voltage or current)	Voltage: 0–1 V, 0–5 V, 0–10 V, 1–5 V, scalable, min. load 1 kΩ Current: 4–20 mA, 0–20 mA, scalable, max. load 500 Ω
Accuracy of analog outputs at 20 °C	±0.1 % full scale for 0–10 V and 0–20 mA
Indigo202 model	
Digital communications	RS-485, Modbus RTU

1) *Vaisala Insight software for Windows® available at www.vaisala.com/insight.*
2) *When used with the HMP7 probe, the minimum required power supply input is 18 V DC.*

Compliance

Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Compliance marks	CE, RCM

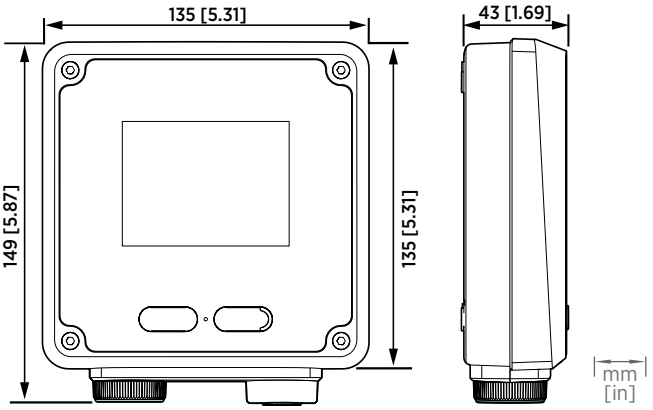
Mechanical specifications

Housing material	PC/ABS plastic
Display window material	PMMA plastic
Connection screw terminals	26–20 AWG
Weight	402 g (14.2 oz)
Dimensions (H×W×D)	149 × 135 × 43 mm (5.87 × 5.31 × 1.7 in)

Spare parts and accessories

USB-C connection cable (2 m, type C to A, for Insight PC software access) [1]	273956
Probe connection cable, 1 m (3 ft 3 in)	INDIGOCABLE1M
Probe connection cable, H_2O_2 compatible, 1 m (3 ft 3 in)	INDIGOCABLEHD1M5
Probe connection cable, 3 m (9 ft 11 in)	INDIGOCABLE3M
Probe connection cable, H_2O_2 compatible, 3 m (9 ft 11 in)	INDIGOCABLEHD3M
Probe connection cable, 5 m (16 ft 5 in)	INDIGOCABLE5M
Probe connection cable, H_2O_2 compatible, 5 m (16 ft 5 in)	INDIGOCABLEHD5M
Probe connection cable, 10 m (32 ft 10 in)	INDIGOCABLE10M
Probe connection cable, H_2O_2 compatible, 10 m (32 ft 10 in)	INDIGOCABLEHD10M
Universal mains power supply with EU/US/UK/AUS plugs	INDIGOPOWER24VSP

1) *Note that a USB-C cable is not included in Indigo200 deliveries by default. A generic USB-C cable (type C to A) can also be used.*



Indigo200 series dimensions

VAISALA

Indigo300 Transmitter

For Vaisala Indigo-compatible probes

Features

- Numerical and graphical color display for up to 3 parameters
- Non-display version with an LED status indicator also available
- IP66-rated metal housing
- Support for one Indigo-compatible probe
- Tool-free locking wheel for the probe
- 24 V AC/DC power supply input
- 3 preconfigured analog outputs (mA or V)
- Service port for connecting to Vaisala Insight PC software or Indigo80 handheld indicator

Vaisala Indigo300 Transmitter is a host device for displaying measurement values from Vaisala Indigo-compatible probes and/or transmitting them to automation systems through analog signals.

Transmitter for Vaisala Indigo-compatible probes

- HMP series humidity and temperature probes
- TMP1 temperature probe
- DMP series dew point probes
- GMP250 series carbon dioxide probes
- HPP270 series vaporized hydrogen peroxide probes
- MMP8 moisture in oil probe

The Indigo300 transmitter is a plug-and-play host device for current and future Vaisala Indigo-compatible probes. The transmitter has a numerical and graphical color display showing up to 3 measurement parameters simultaneously.

A non-display transmitter version with an LED status indicator is also available.

Simple to connect and service

Probes can be connected to the transmitter tool-free using the locking wheel of the probe connector. You can connect a probe directly or by using a cable. Instead of the locking wheel and a detachable cable, it is also possible to use a cable gland with a fixed cable.

The service port on the front can be opened with a 4-mm Allen key for access to the free Vaisala Insight PC software or Indigo80 handheld indicator.

With Insight and Indigo80, you can view live measurement data from the probe connected to the transmitter, configure both the transmitter and the probe, as well as calibrate and adjust the probe without having to detach it from the transmitter.

Robust design

The IP66-rated, corrosion-resistant metal housing of the transmitter is suitable for harsh conditions.

Versatile installation options

The mounting options include mounting through the transmitter body and mounting on a DIN rail. With an adapter plate, the transmitter can be installed to replace an HMT330, DMT340, or MMT330 series transmitter.

The transmitter can either be wired from the back, which leaves no trailing cables, or through the bottom lead-throughs.

For more information on the Indigo300 transmitter and the Indigo product family, see www.vaisala.com/indigo.

Technical data

Indigo-compatible probes

Measurement type	Probe models
Humidity and temperature	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature	TMP1
Dew point	DMP1, DMP5, DMP6, DMP7, DMP8
Carbon dioxide	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Operating environment

Operating temperature	With display: −20 ... +60 °C (−4 ... +140 °F) Without display: −40 ... +60 °C (−40 ... +140 °F)
Storage temperature	With display: −30 ... +70 °C (−22 ... +158 °F) Without display: −40 ... +70 °C (−40 ... +158 °F)
Operating humidity	0–100 %RH
Maximum operating altitude	5000 m (approx. 16 400 ft)
IP rating	IP66

Inputs and outputs

Power supply input	15–30 V DC [1] 24 V AC ±10 % 50/60 Hz
Fuse size for power supply	2.5 A
Transmitter service port connection	• Connection to Insight with USB2 and cable 262195SP [2] • Connection to Indigo80 with cable 262195SP
Analog outputs	Current or voltage
Number of analog outputs	3
Isolation	Not galvanically isolated
Selectable voltage output types	0–1 V, 0–5 V, 0–10 V, 1– 5 V, scalable, $R_L \geq 10$ kΩ
Selectable current output types	4–20 mA, 0–20 mA, scalable, $R_L \leq 500$ Ω
Accuracy of analog outputs at 20 °C (+68 °F)	±0.1 % full scale [3]
Temperature dependence	±0.005 % / °C full scale
Current consumption at 20 °C (+68 °F) (U_{in} 24 V DC)	
Minimum consumption with display off, no analog outputs active, no probe connected [4]	13 mA
Minimum consumption with display on, brightness normal mode, no analog outputs active, no probe connected	18 mA
U_{out} 0–1 V, 0–5 V, 0–10 V, 1–5 V	+ 1.8 mA per connected channel at maximum load
I_{out} 4–20 mA, 0–20 mA	+ 12.3 mA max. per connected channel

1) *When used with the HMP7 probe, the minimum required power supply input is 18 V DC.*
2) *Vaisala Insight software for Windows® available at vaisala.com/insight.*
3) *For the voltage outputs, small variation is possible around true zero.*
4) *For the current consumption of the connected probe, see the probe's user documentation at docs.vaisala.com.*

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN IEC 61326-1, industrial environment
EMC emissions	CISPR 32 / EN 55032, Class A FCC part 15 B, Class A ICES-3 / NMB-3 (Class A)
Compliance marks	CE, China RoHS, FCC, KC, RCM, UKCA

Mechanical specifications

Housing material	EN AW-6082
Connection screw terminals	Max. 1.5 mm^2 wire (16 AWG)
Cable lead-throughs for output and power cables	• M20×1.5 cable gland / conduit fitting NPT 1/2″ • M16×1.5 cable gland / conduit fitting NPT 1/2″
Cable diameter for M20×1.5 gland	7–13 mm (0.26–0.51 in)
Cable diameter for M16×1.5 gland	2–6 mm (0.08–0.24 in)
Dimensions	161 × 134 × 43.5 mm (6.34 × 5.26 × 1.71 in)
Weight	1200 g (2.65 lb)

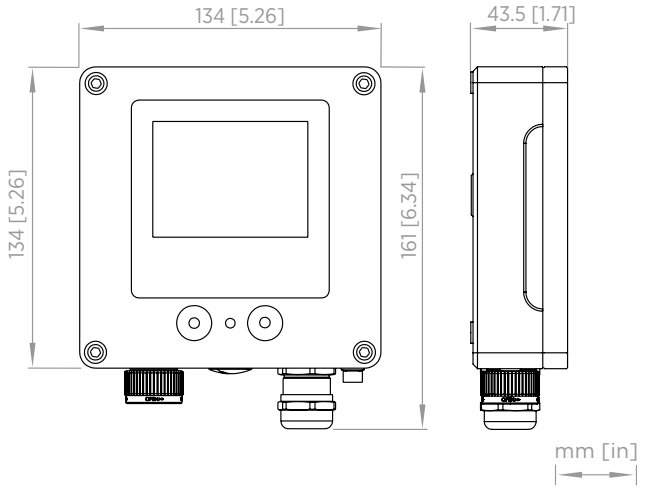
Probe connection cables

Detachable cables for use with locking wheel	
Probe connection cable, 1 m (3 ft 3 in)	INDIGOCABLE1M
Probe connection cable, H_2O_2 compatible, 1 m (3 ft 3 in)	INDIGOCABLEHD1M5
Probe connection cable, 3 m (9 ft 11 in)	INDIGOCABLE3M
Probe connection cable, H_2O_2 compatible, 3 m (9 ft 11 in)	INDIGOCABLEHD3M
Probe connection cable, 5 m (16 ft 5 in)	INDIGOCABLE5M
Probe connection cable, H_2O_2 compatible, 5 m (16 ft 5 in)	INDIGOCABLEHD5M
Probe connection cable, 10 m (32 ft 10 in)	INDIGOCABLE10M
Probe connection cable, H_2O_2 compatible, 10 m (32 ft 10 in)	INDIGOCABLEHD10M
Fixed cables for use with cable gland	
Probe connection cable, 0.3 m (12 in), open end [1]	CBL210896-03MSP
Probe connection cable, 1 m (3 ft 3 in), open end	CBL210896-1MSP
Probe connection cable, 3 m (9 ft 11 in), open end	CBL210896-3MSP
Probe connection cable, 5 m (16 ft 5 in), open end	CBL210896-5MSP
Probe connection cable, 10 m (32 ft 10 in), open end	CBL210896-10MSP

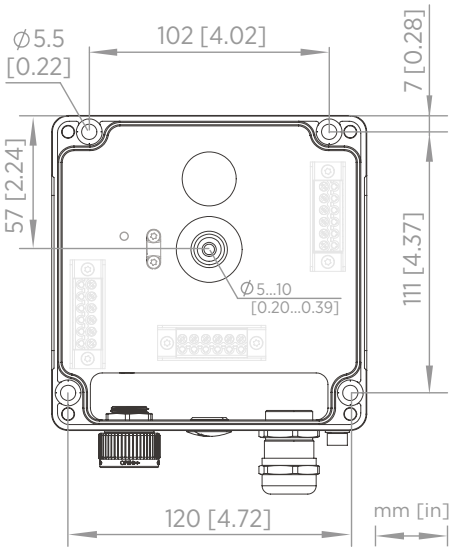
1) *The usable length outside of the transmitter enclosure is approx. 0.1 m (4 in) shorter than the total length of the cable.*

Spare parts and accessories

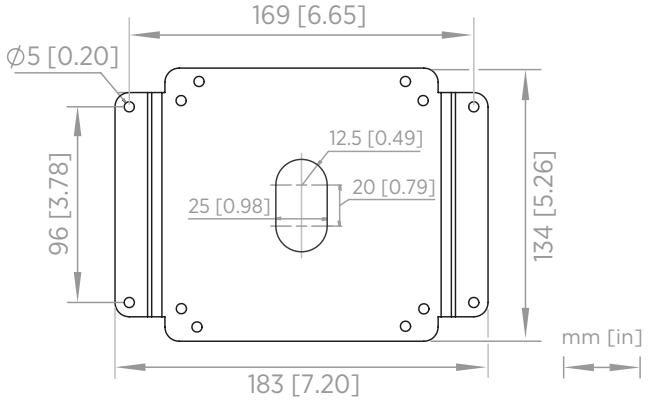
Adapter plate for replacing a Vaisala 330 series transmitter	DRW257715SP
DIN rail installation kit for 35 mm (0.11 in) wide DIN rail	ASM215071SP
Vaisala Indigo USB adapter and M12 - M8 service cable, for connecting to Insight	USB2 and 262195SP
M12 - M8 service cable 1.5 m (4.9 ft), for connecting to Indigo80	262195SP
Cable gland M20×1.5 for 7.0–13.0 mm (0.26–0.51 in) cable	253993SP
Conduit fitting M20×1.5 for NPT1/2" conduit	214780SP
Cable gland M16×1.5 for 2.0–6.0 mm (0.08–0.24 in) cable	ASM213671SP
Conduit fitting M16×1.5 for NPT1/2" conduit	210675SP
Plug for M20 lead-through	ASM213672SP
Plug for M16 lead-through	210369SP
Service port plug	DRW257660SP



Indigo300 transmitter dimensions



Indigo300 transmitter body mounting dimensions



Indigo300 adapter plate (DRW257715SP) mounting dimensions

VAISALA

Indigo510 Transmitter

For Vaisala Indigo-compatible probes

Features

- Touchscreen display (optional non-display model with LED indicator also available)
- Data logging of all measurement parameters
- IP66 rated metal enclosure
- 2 configurable galvanically isolated analog outputs
- Ethernet connection with web interface and optional Vaisala cloud connectivity for remote monitoring
- Modbus® TCP/IP protocol
- Protective extra-low voltage powering
- UL Listed in USA and Canada

Vaisala Indigo510 Transmitter is an industrial-grade, robust transmitter that accommodates 1 Vaisala Indigo-compatible probe for humidity, temperature, dew point, carbon dioxide, hydrogen peroxide, and moisture in oil measurements. The transmitter can display measurements on the spot as well as transmit them to automation systems through analog signals or Modbus TCP/IP protocol.

Variety of probe options

The Indigo500 series transmitters are the most versatile option for use with Indigo-compatible probes.

- HMP series humidity and temperature probes
- DMP series dew point probes
- GMP250 series carbon dioxide probes
- HPP270 series vaporized hydrogen peroxide probes
- MMP8 moisture in oil probe

The probes are interchangeable, self-contained measurement instruments that are easily detachable from the transmitter for calibration and maintenance. The probes are connected using a cable that can be extended with a standard instrumentation cable to allow up to 30 m (98 ft) distance between the transmitter and the probe.

The Indigo500 series transmitters can be connected to the MHT410 transmitter for display of measurement data and automation system connectivity.

Through the transmitter service port, the Indigo500 series transmitters can also be connected to the free Vaisala Insight PC Software or Indigo80 Handheld Indicator.

For more information on the Indigo product family, see vaisala.com/indigo.

Analog and digital interfaces

The Indigo510 transmitter has 2 analog channels that can be configured to mA or voltage type. Any of the output parameters from the connected probe can be assigned to control the analog channels.

The digital output protocol is Modbus TCP/IP over Ethernet. The Ethernet connection also provides a web interface and cybersecurity that meets modern standards. The Indigo500 series transmitters can be ordered with a possibility for Vaisala cloud connection for remote monitoring.

Robust design

The transmitter has a wide operating temperature range, an IP66-rated corrosion-resistant metal enclosure, and an optional touchscreen display made of strengthened (IK08) glass.

The transmitter withstands commonly used cleaning chemicals, such as isopropanol and liquid H_2O_2 (30 %), and performs even in the harshest conditions.

The standard mounting options include mounting on a wall and on a DIN rail. With a retrofit mounting plate, the transmitter can be installed to replace an HMT330, DMT340, or MMT330 series transmitter. A pole mounting kit is also available as an accessory.

Technical data

Indigo-compatible probes

Measurement type	Probe models
Humidity and temperature	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature	TMP1
Dew point	DMP1, DMP5, DMP6, DMP7, DMP8
Carbon dioxide	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Other compatible devices

Device or series	Models
Moisture, Hydrogen and Temperature Transmitter MHT410	MHT410
Indigo80 Handheld Indicator	Indigo80

Transmitter options

Display	• Capacitive touchscreen display • No display (indicator LED) [1]
Powering	Protective extra-low voltage (11–35 V DC, 24 V AC ± 20 % 50/60 Hz)

1) *Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.*

Mechanical specifications

Housing classification	IK08, DIN EN ISO 11997-1: Cycle B (VDA 621-415)
Housing material	AlSi10Mg (DIN 1725)
Display window material	Strengthened glass (IK08)
Weight	1.5 kg (3.3 lb)
Dimensions (H × W × D)	142 × 182 × 67 mm (5.63 × 7.17 × 2.64 in)
Cable diameters for cable glands	
M20×1.5 glands	5.0–9.0 mm (0.20–0.35 in)
M20×1.5 glands with split bushing	7 mm (0.28 in)
M16×1.5 glands	2.0–6.0 mm (0.08–0.24 in)

Operating environment

Operating environment	Outdoor use
Use in wet location	Yes
Operating humidity	0–100 %RH
Maximum operating altitude	4000 m (approx. 13 100 ft)
IP rating	IP66 [1]
UL 50E rating	Type 4
Operating temperature	
With display	−20 … +60 °C (−4 … +140 °F)
Without display	−40 … +60 °C (−40 … +140 °F)
Storage temperature	
With display	−30 … +60 °C (−22 … +140 °F)
Without display	−40 … +60 °C (−40 … +140 °F)

1) *Evaluated by Eurofins, not by UL.*

Powering

Operating power	
Protective extra-low voltage (PELV)	11–35 V DC, 24 V AC ±20 % 50/60 Hz, max. current 2 A (power supply is galvanically isolated) [1] Fuse size for power supply: 3 A Isolation voltage: 500 V AC, 1000 V DC
PELV power cable temp. rating	≥ +80 °C (+176 °F)
Typical current consumption at +20 °C (+68 °F) (U_{in} 24 V DC) [2]	
Base consumption (no display, analog outputs, or communication)	50 mA
With display	+ 60 mA
With voltage analog output	< 2 mA per channel
With current analog output	+ 21 mA per channel
With Ethernet cable connected	+ 15 mA

1) *The DNV type approval is valid in operating voltage range 15–35 V DC.*
2) *For the current consumption of the connected measurement device, see the device's documentation, available at docs.vaisala.com.*

Inputs and outputs

Transmitter service port connection	• Connection to Insight software with USB2 and cable 262195SP or with cable 219690 [1] • Connection to Indigo80 with cable 262195SP
Analog outputs	
Number of analog outputs	2
Isolation	Isolated from power supply
Selectable voltage output types	0–1 V, 0–5 V, 0–10 V, scalable
Selectable current output types	4–20 mA, 0–20 mA, scalable
Max. wire size	2.5 mm^2 (14 AWG)
Accuracy of analog outputs at +20 °C (+68 °F)	±0.05 % full scale
Temperature dependence	±0.005 % / °C full scale
External loads:	
Current outputs	R_L < 500 Ω
0–1 V output	R_L > 2 kΩ
0–5 V and 0–10 V outputs	R_L > 10 kΩ
Ethernet interface	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)
Vaisala cloud connectivity [2]	Requires outbound TCP port 443 and UDP port 123

1) *Vaisala Insight PC Software for Windows® available at vaisala.com/insight.*
2) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

User interfaces

User interfaces	Web interface, optional touchscreen display, optional Vaisala cloud connectivity for remote monitoring [1]
Supported languages	English, Chinese (simplified), Chinese (traditional), French, German, Japanese, Spanish
Optional display	5″ capacitive touchscreen
Integrated data logging capabilities	Non-volatile memory, at least 10 years' storage with 24 h interval logging

1) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Electrical safety	IEC/EN 61010-1
Type approvals	DNV GL certificate no. TAA000032M EU RO Mutual Recognition certificate no. MRA000004F
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	UL Listed (USA and Canada)
FCC compliance	FCC Part 15, Class B

Spare parts

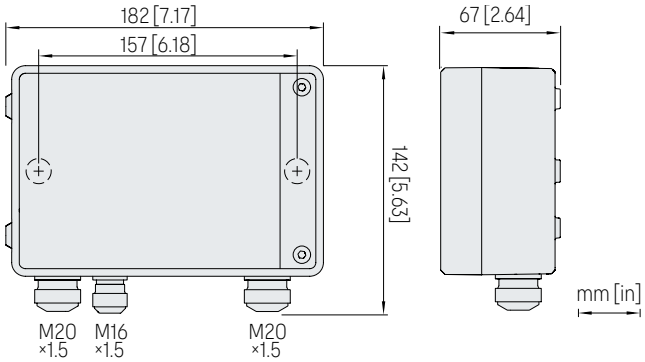
Cable gland, M20×1.5, 5.0–9.0 mm (0.20–0.35 in)	ASM213670SP
Cable gland with split bushing, M20×1.5 [1]	262632SP
Cable gland, M16×1.5, 2.0–6.0 mm (0.08–0.24 in)	ASM213671SP
Conduit fitting, M20×1.5 for NPT1/2″ conduit	214780SP

1) *With 7-mm (0.28 in) hole for cable and 14-mm (0.55 in) hole for 8P8C (RJ45) connector to pass through.*

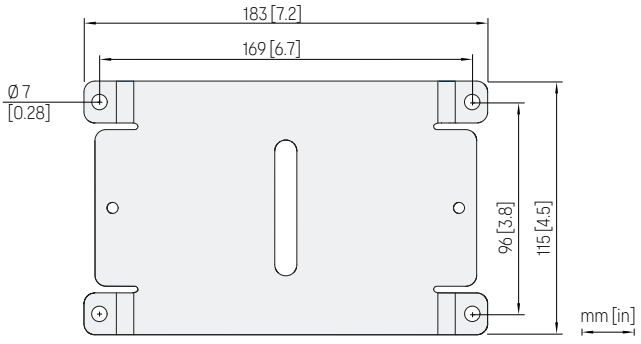
Accessories

Retrofit mounting plate	DRW252186SP
Installation kit for pole or pipeline	215108
Installation kit with weather shield	215109
Indigo500 spatter guard	ASM214526
M12 - M8 service cable 1.5 m (4.9 ft), for connecting to Indigo80	262195SP
Vaisala Indigo USB adapter and M12 - M8 service cable, for connecting to Insight software	USB2 and 262195SP
M8 - USB service cable, for connecting to Insight software	219690
Probe connection cables	
Probe connection cable, 0.3 m (approx. 12 in), open end [1]	CBL210896-03MSP
Probe connection cable, 1 m (approx. 3 ft 3 in), open end [1]	CBL210896-1MSP
Probe connection cable, 3 m (approx. 9 ft 10 in), open end [1]	CBL210896-3MSP
Probe connection cable, 5 m (approx. 16 ft 5 in), open end [1]	CBL210896-5MSP
Probe connection cable, 10 m (approx. 32 ft 10 in), open end [1]	CBL210896-10MSP

1) *The usable length outside of the transmitter enclosure is approx. 0.1 m (4 in) shorter than the total length of the cable.*



Indigo510 dimensions and lead-through sizes



Indigo500 retrofit mounting plate dimensions

VAISALA

Indigo520 Transmitter

For Vaisala Indigo-compatible probes

Features

- Supports 2 detachable measurement devices simultaneously
- Data logging of all measurement parameters
- IP66 rated metal enclosure
- 4 configurable galvanically isolated analog outputs
- 2-wire current loop analog input
- 2 relays
- Ethernet connection with web interface and optional Vaisala cloud connectivity for remote monitoring
- Displays measurements on the spot and transmits them to automation systems through analog signals, relays, or Modbus TCP/IP protocol

Vaisala Indigo520 Transmitter is an industrial-grade, robust transmitter that accommodates 1 or 2 Vaisala Indigo-compatible probes for humidity, temperature, dew point, carbon dioxide, hydrogen peroxide, and moisture in oil measurements. The transmitter can measure barometric pressure with an additional module.

Options

- Multiple powering options: Power over Ethernet, protective extra-low voltage, and AC (mains) power
- Available with Vaisala BAROCAP® barometric pressure sensor known for its high accuracy and excellent long-term stability
- Optional non-display model with LED indicator

Variety of probe options

The Indigo500 series transmitters are the most versatile option for use with Indigo-compatible probes.

- HMP series humidity and temperature probes
- DMP series dew point probes
- GMP250 series carbon dioxide probes
- HPP270 series vaporized hydrogen peroxide probes
- MMP8 moisture in oil probe

The probes are interchangeable, self-contained measurement instruments that are easily detachable from the transmitter for calibration and maintenance. The probes are connected using a cable that can be extended with a standard instrumentation cable to allow up to 30 m (98 ft) distance between the transmitter and the probe.

The Indigo500 series transmitters can be connected to the MHT410 transmitter for display of measurement data and automation system connectivity. Through the transmitter service port, the Indigo500 series transmitters can also be connected to the free Vaisala Insight PC Software or Indigo80 Handheld Indicator.

The Indigo520 transmitter can be connected to Polaris™ PR53 Process Refractometers for measuring liquid concentrations.

For more information on the Indigo product family, see vaisala.com/indigo.

Analog and digital interfaces

The Indigo520 transmitter has 4 analog channels that can be configured to mA or voltage type, and 2 configurable relays. Any of the output parameters from the connected probes can be assigned to control the analog channels and relays.

The digital output protocol is Modbus TCP/IP over Ethernet. The Ethernet connection also provides a web interface and cybersecurity that meets modern standards. The Indigo500 series transmitters can be ordered with a possibility for Vaisala cloud connection for remote monitoring.

Technical data

Indigo-compatible probes

Measurement type	Probe models
Humidity and temperature	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature	TMP1
Dew point	DMP1, DMP5, DMP6, DMP7, DMP8
Carbon dioxide	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Other compatible devices

Device or series	Models
Moisture, Hydrogen and Temperature Transmitter MHT410	MHT410
Polaris™ Process Refractometers [1]	PR53AC, PR53AP, PR53GC, PR53GP, PR53M, PR53SD, PR53W
Indigo80 Handheld Indicator	Indigo80
MGP241 Multigas Probe	MGP241
MGP260 Series Multigas Probes	MGP261, MGP262
Differential Pressure Transmitters [2]	PDT101, PDT102

1) Compatible with transmitters ordered with software configuration "L" for process refractometers.
2) PDT101 and PDT102 can be used through analog input.

Transmitter options

Display	• Capacitive touchscreen display • No display (indicator LED) [1]
Powering	• Protective extra-low voltage (15–35 V DC, 24 V AC ± 20%) • AC (mains) power (100–240 V AC 50/60 Hz) • Power over Ethernet (no analog outputs, analog input, or relays)

1) Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.

Measurement performance

Barometric pressure (optional module)	
Pressure range	500–1100 hPa
Class A:	
Linearity	±0.05 hPa
Hysteresis	±0.03 hPa
Repeatability	±0.03 hPa
Calibration uncertainty	±0.07 hPa
Accuracy at +20 °C / +68 °F	±0.10 hPa
Temperature dependence	±0.1 hPa
Total accuracy (-40 … +60 °C / -40 … +140 °F)	±0.15 hPa
Long-term stability/year	±0.1 hPa
Response time (100 % response):	
One sensor	2 s
Pressure units	hPa, mbar, kPa, Pa, inHg, mmH20, mmHg, torr, psia

Mechanical specifications

Housing classification	IK08, DIN EN ISO 11997-1: Cycle B (VDA 621-415)
Housing material	AlSi10Mg (DIN 1725)
Display window material	Strengthened glass (IK08)
Weight	1.5 kg (3.3 lb)
Dimensions (H × W × D)	142 × 182 × 67 mm (5.63 × 7.17 × 2.64 in)
Cable diameters for cable glands	
M20×1.5 glands	5.0–9.0 mm (0.20–0.35 in)
M20×1.5 glands with split bushing	7 mm (0.28 in)
M16×1.5 glands	2.0–6.0 mm (0.08–0.24 in)

Operating environment

Operating environment	Outdoor use
Use in wet location	Yes
Operating humidity	0–100 %RH
Maximum operating altitude, AC (mains) power	3000 m (approx. 9800 ft)
Maximum operating altitude, protective extra-low voltage (PELV) and Power over Ethernet (PoE)	4000 m (approx. 13 100 ft)
IP rating	IP66 [1]
UL 50E rating	Type 4
Operating temperature	
With display	−20 … +55 °C (−4 … +131 °F)
Without display	−40 … +60 °C (−40 … +140 °F)
Without display with barometer module	−40 … +55 °C (−40 … +131 °F)
Storage temperature	
With display	−30 … +60 °C (−22 … +140 °F)
Without display	−40 … +60 °C (−40 … +140 °F)

1) Evaluated by Eurofins, not by UL.

Powering

Operating power [1]	
Protective extra-low voltage (PELV) version	15–35 V DC, 24 V AC ±20 % 50/60 Hz, max. current 2 A (power supply is galvanically isolated) Fuse size for power supply: 3 A Isolation voltage: 500 V AC, 1000 V DC
PELV power cable temp. rating	≥ +80 °C (+176 °F)
AC (mains) power version	100–240 V AC 50/60 Hz, max. current 1 A (power supply is galvanically isolated) Fuse size for power supply: 10 A Isolation voltage: 1500 V AC
AC (mains) power cable length	2.5 m (approx. 8 ft 2 in)
Power over Ethernet version	Power over Ethernet (PoE) IEEE 802.3at Type 2 Class 4 Max. current 600 mA, max. power consumption 25.5 W Isolation voltage: 500 V AC, 1000 V DC
Typical current consumption at +20 °C (+68 °F) (U_{in} 24 V DC) [2]	
Base consumption (no display, analog outputs, or communication)	50 mA
With display	+ 60 mA
With voltage analog output	< 2 mA per channel
With current analog output	+ 21 mA per channel
With relays	+ 9 mA per relay
With Ethernet cable connected	+ 15 mA
With barometer module	+ 5 mA

1) *The power supply option is selected when ordering the transmitter.*
2) *For the current consumption of the connected measurement device, see the device's documentation, available at docs.vaisala.com.*

User interfaces

User interfaces	Web interface, optional touchscreen display, optional Vaisala cloud connectivity for remote monitoring [1]
Supported languages	English, Chinese (simplified), Chinese (traditional), French, German, Japanese, Spanish
Optional display	5″ capacitive touchscreen
Integrated data logging capabilities	Non-volatile memory, at least 10 years' storage with 24 h interval logging

Inputs and outputs

Transmitter service port connection	• Connection to Insight software with USB2 and cable 262195SP or with cable 219690 [1] • Connection to Indigo80 with cable 262195SP
Analog input [2]	
Available ranges	4–20 mA
Resolution	6 µA
Display resolution	0.01 mA
Accuracy	±0.05 mA
Input impedances	200 Ω
Isolation	Isolated from power supply
Overload protection	40 mA max. (reverse polarity protected)
Analog outputs [2]	
Number of analog outputs	4
Isolation	Isolated from power supply
Selectable voltage output types	0–1 V, 0–5 V, 0–10 V, scalable
Selectable current output types	4–20 mA, 0–20 mA, scalable
Max. wire size	2.5 mm^2 (14 AWG)
Accuracy of analog outputs at +20 °C (+68 °F)	±0.05 % full scale
Temperature dependence	±0.005 % / °C full scale
External loads:	
Current outputs	R_L < 500 Ω
0–1 V output	R_L > 2 kΩ
0–5 V and 0–10 V outputs	R_L > 10 kΩ
Relay outputs [2]	
Number and type of relays	2 pcs, SPDT
Max. switching power, current, voltage	30 W, 1 A, 40 V DC / 28 V AC
Max. wire size in PELV version	2.5 mm^2 (14 AWG)
Max. wire size in AC (mains) version	1.5 mm^2 (16 AWG)
Ethernet interface	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)
Vaisala cloud connectivity [3]	Requires outbound TCP port 443 and UDP port 123

1) *Vaisala Insight PC Software for Windows® available at vaisala.com/insight.*
2) *Not available in transmitters that are powered with Power over Ethernet (PoE).*
3) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) Low Voltage Directive (2014/35/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Electrical safety	IEC/EN 61010-1
Type approvals	DNV GL certificate no. TAA000032M EU RO Mutual Recognition certificate no. MRA000004F
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	UL Listed (USA and Canada)
FCC compliance	FCC Part 15, Class B

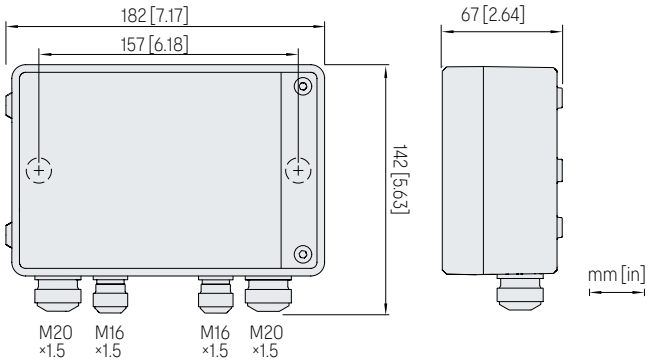
Spare parts

Cable gland, M20×1.5, 5.0–9.0 mm (0.20–0.35 in)	ASM213670SP
Cable gland, M20×1.5, 10.0–14.0 mm (0.39–0.55 in)	ASM215414
Cable gland with split bushing, M20×1.5 [1)]	262632SP
Cable gland, M16×1.5, 2.0–6.0 mm (0.08–0.24 in)	ASM213671SP
Conduit fitting, M20×1.5 for NPT1/2" conduit	214780SP
Sintered filter (for barometer module)	DRW010335SP

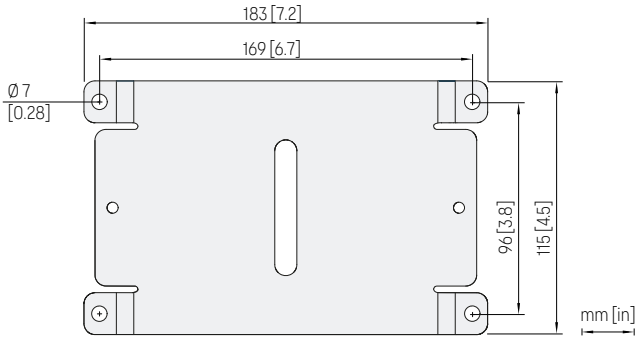
Accessories

Retrofit mounting plate	DRW252186SP
Installation kit for pole or pipeline	215108
Installation kit with weather shield	215109
Indigo500 spatter guard	ASM214526
M12 - M8 service cable 1.5 m (4.9 ft), for connecting to Indigo80	262195SP
Vaisala Indigo USB adapter and M12 - M8 service cable, for connecting to Insight software	USB2 and 262195SP
M8 - USB service cable, for connecting to Insight software	219690
Probe connection cables	
Probe connection cable, 0.3 m (approx. 12 in), open end [1)]	CBL210896-03MSP
Probe connection cable, 1 m (approx. 3 ft 3 in), open end [1)]	CBL210896-1MSP
Probe connection cable, 3 m (approx. 9 ft 10 in), open end [1)]	CBL210896-3MSP
Probe connection cable, 5 m (approx. 16 ft 5 in), open end [1)]	CBL210896-5MSP
Probe connection cable, 10 m (approx. 32 ft 10 in), open end [1)]	CBL210896-10MSP

1) *The usable length outside of the transmitter enclosure is approx. 0.1 m (4 in) shorter than the total length of the cable.*



Indigo520 dimensions and lead-through sizes



Indigo500 retrofit mounting plate dimensions

VAISALA

Indigo500MIK Meteorological Installation Kit

Features

- Outdoor installation kit for Indigo500 Series transmitters
- Supports wall and pole mounting
- Delivered pre-assembled according to selected options
- DTR502 Solar Radiation Shield option prevents temperature measurement error
- DTS1 Weather Shield option prevents a microclimate from forming around a heated probe
- SPH10 Static Pressure Head option eliminates pressure variations caused by wind

The Indigo500MIK Meteorological Installation Kit enables Vaisala Indigo500 Series transmitters to obtain professional grade outdoor measurements of environmental parameters. The kit is delivered pre-assembled with the selected options, with or without measurement equipment.

Essential for critical weather measurements

Outdoor installation of measurement instruments must be done properly to avoid common sources of measurement error, and to ensure long service life. The Indigo500MIK Meteorological Installation Kit is designed to enable Indigo500 Series transmitters and compatible measurement probes to obtain reliable measurements in challenging weather conditions. The kit is recommended for use with the HMP3 and HMP7 humidity and temperature probes, and the TMP1 temperature probe.

True humidity readings in condensing conditions

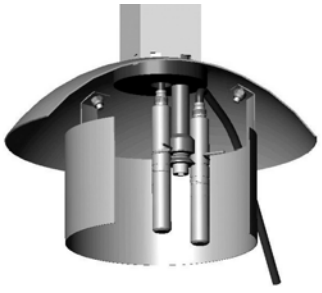
In weather observations dew formation makes reliable humidity measurement difficult. When dew has formed on the humidity sensor, it is impossible to obtain a true reading until the dew evaporates. Obtaining a true humidity reading is particularly important in traffic safety, at airports, and at sea. It is essential, for example, in fog and frost prediction.

Combining an Indigo500 Series transmitter with a HMP7 and TMP1 probes provides a solution to the problem. HMP7 utilizes probe heating for condensation prevention. When the probe head is heated, risk of dew formation on the sensor is greatly reduced. When combined with accurate temperature measurement from TMP1 probe, the Indigo500 transmitter can calculate the ambient relative humidity precisely in all conditions.

Open shield prevents microclimates

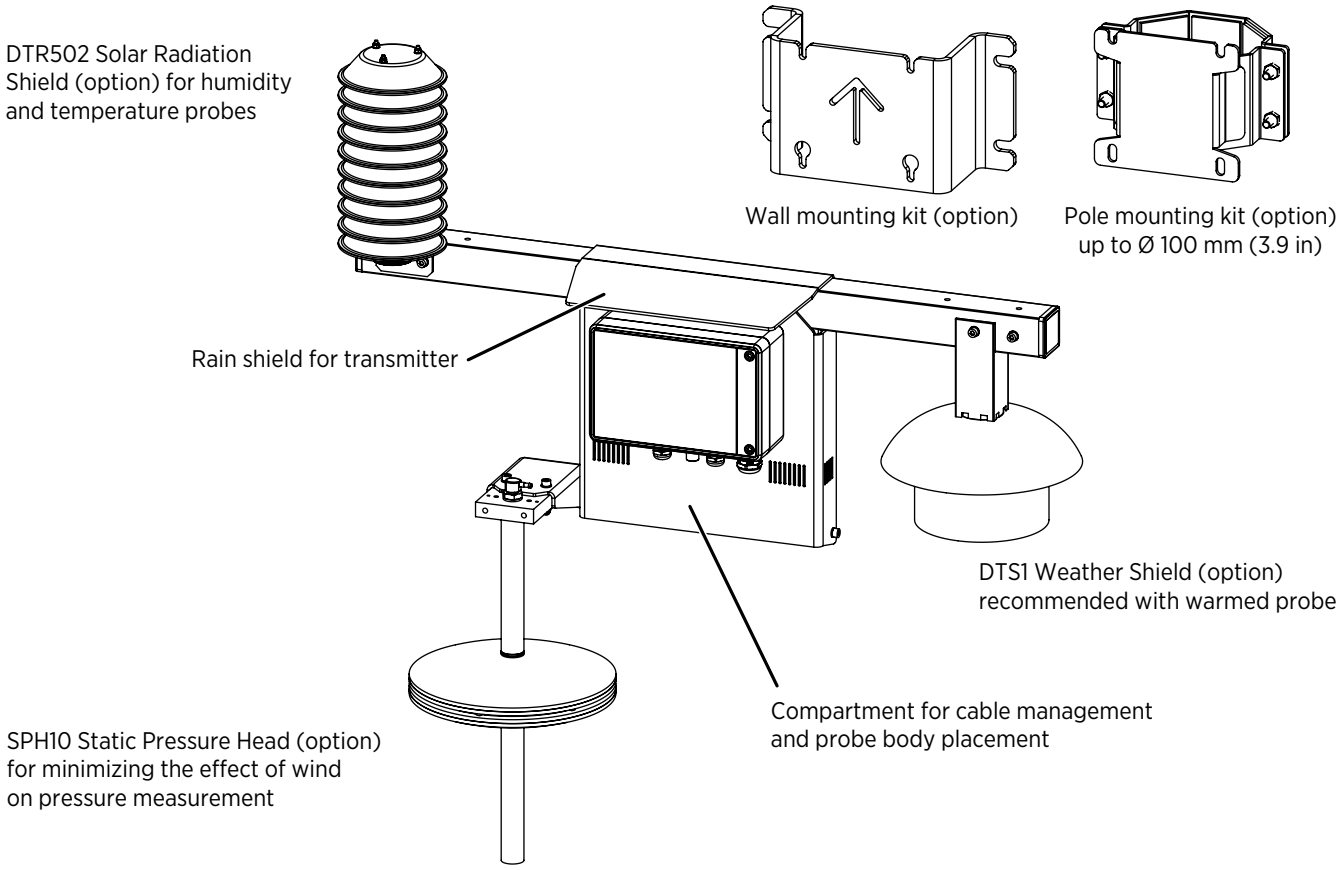
Traditional solar radiation shields are not optimal for use with heated probes, as sleet or snow can accumulate on the shield. This may prevent proper air circulation and create a humid microclimate around the probe head until the snow melts.

DTS1 Weather Shield option provides the heated HMP7 probe with appropriate protection that prevents the formation of a microclimate. The shield is open at the bottom to ensure steady air circulation to the sensor even in calm weather.



For calibration, a portable HMP77 reference probe is easy to attach beside the HMP7 probe head.

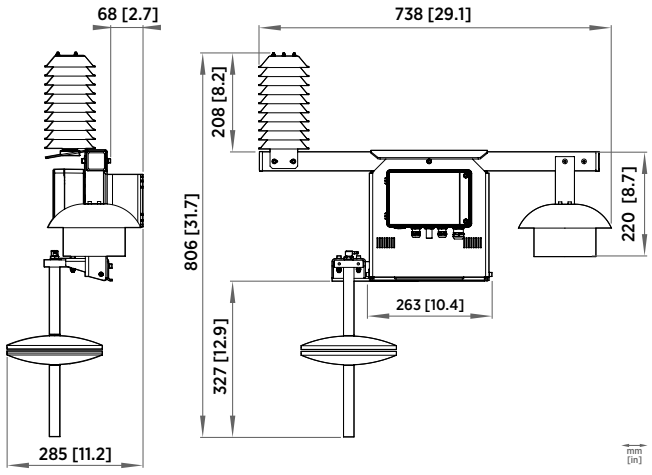
Technical data



Specifications

Compatible transmitters	Indigo510, Indigo520, HMT370EX
Compatible solar radiation shields	DTR502, DTR13, DTR250
Weather shield for heated probe	DTS1 [1)]
Static pressure head	SPH10 [1)]
Weight of mounting plate, probe compartment, and support bar	1.5 kg (3.3 lb)
Material of mounting plate, probe compartment, and support bar	Anodized marine grade aluminum

1) Attachment requires an adapter that is included when ordering the mounting kit with this option.



Indigo500MIK dimensions with wall mounting kit

VAISALA

Indigo80 Handheld Indicator

For portable diagnostics

Features

- Flexible operation with Vaisala Indigo family measurement probes and other supported Vaisala devices
- Complemented by the HMP80 and DMP80 handheld probes and the GMP80P probe with pump sampling, which are optimized for portable use cases
- Intuitive user interface available in 10 languages
- Rechargeable battery
- Robust design and modern appearance
- Logged measurement data can be transferred to PC via Vaisala Insight software

Vaisala Indigo80 Handheld Indicator is an industrial-grade portable diagnostics tool. Accommodating up to two Vaisala devices, Indigo80 is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting Indigo family measurement probes and other supported Vaisala devices.

Seamless compatibility for varied measurements

The Indigo80 indicator has two cable ports by which a combination of two compatible measurement devices can be simultaneously connected to the indicator. Indigo80 can communicate with most current and future Vaisala devices for measuring a wide range of parameters.

- Humidity and temperature
- Dew point
- Carbon dioxide
- Hydrogen peroxide vapor
- Moisture in oil
- Liquid concentration

For the full set of Vaisala devices currently compatible with Indigo80, see the following page. For more information on the Indigo product family, see vaisala.com/indigo.

Robust and reliable

The sturdy aluminum body of Indigo80 is resistant to chemicals and dust.

Indigo80 is powered by a rechargeable lithium-ion battery with a typical operation time of 10 h. During long-term logging Indigo80 can be powered by using an AC adapter.

Easy to use

Indigo80 has an intuitive user interface that guides the user if needed. The indicator is designed to be easy to use in numerous use cases and measurement environments.

To access logged data and configuration functionality, Indigo80 can be connected to Vaisala Insight PC software for Windows®. For more information, see vaisala.com/insight.

Multilingual user interface

Indigo80 has a multilingual, menu-based user interface that shows live measurement data both numerically and graphically. The Indigo80 user interface is available in 10 languages.

View live measurement data as numbers or graphs

Vaisala devices compatible with Indigo80

Vaisala devices with older firmware versions may have limited compatibility with the Indigo80 indicator. For the most up-to-date version compatibility information, see Firmware version compatibility of Indigo80-compatible devices Technical Note (M212901EN), available at docs.vaisala.com.

Vaisala Indigo-compatible probes	
HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9, HMP80L, HMP80N	Humidity and temperature
TMP1	Temperature
DMP5, DMP6, DMP7, DMP8, DMP80A, DMP80B	Dew point
GMP251, GMP252	Carbon dioxide
HPP271, HPP272	Vaporized hydrogen peroxide
MMP8	Moisture in oil

Vaisala Indigo transmitters (host devices)
Indigo300, Indigo510, Indigo520

Other Vaisala devices	
HMP60, HMP63, HMP110, HMP113, HMP115 probes HMM170 module	Humidity and temperature
HMP110T, HMP115T, TMP115 probes	Temperature
DMT143, DMT143L transmitters	Dew point
GMW90 and HMW90 series transmitters	Humidity, temperature, and carbon dioxide
MGP241 probe	Carbon dioxide
HMT370EX series transmitters	Humidity and temperature
PR53 series refractometers	Liquid concentration

Technical data

Operating environment

Operating temperature	−20 ... +50 °C (−4 ... +122 °F)
Storage temperature	−20 ... +60 °C (−4 ... +140 °F), recommended +20 °C (+68 °F)
Operating and storage humidity	20–85 %RH, when Ta ≤ +40 °C (+104 °F)
Charging temperature	0 ... +45 °C (+32 ...+113 °F) [1]
IP rating	IP40
Use in wet location	No
Operating environment	Indoor use
Pollution degree	3
Maximum operating altitude	2000 m (approx. 6500 ft)

1) *The battery will not charge at temperatures below 0 °C (+32 °F).*

Data logging and user interface specifications

Data logging capacity	Up to 5.5 million real-time data values
Logging interval	1 s – 12 h
Logging duration	1 min – memory full [1]
Alarm	Audible alarm function
Supported languages	English, Chinese, Finnish, French, German, Italian, Japanese, Portuguese, Spanish, Swedish
Display	2.7″ sunlight readable transflective TFT LCD color display with backlight and automatic brightness control

1) *For example, data logging duration for one measurement parameter with a logging interval of one second is over eight weeks. Use an AC adapter to power Indigo80 during long-term logging.*

Battery operation time

Operation time (continuous use)	10 h at +20 °C (+68 °F) [1]
Charging time	2 hours [1]

1) *Typical value. Actual performance depends on, for example, the number and type of devices connected to Indigo80 and the data logging interval.*

Mechanical specifications

Weight	385 g (14 oz)
Dimensions (H × W × D)	213 × 58 × 27 mm (8.4 × 2.3 × 1.1 in)
Materials	
Main body and rear piece	Aluminum EN AW-6082 T6
Back cover	Rubber (TPE) and polycarbonate (PC), reinforced with fiberglass Flammability rating UL94 V-1
Display	Strengthened glass with anti-fingerprint (AF) and anti-reflection (AR) coatings

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B FCC part 15 B, Class B ICES-3 / NMB-3 (Class B)
Electrical safety	IEC/EN 61010-1
Compliance marks	CE, China RoHS, FCC, RCM, UKCA

Inputs and outputs

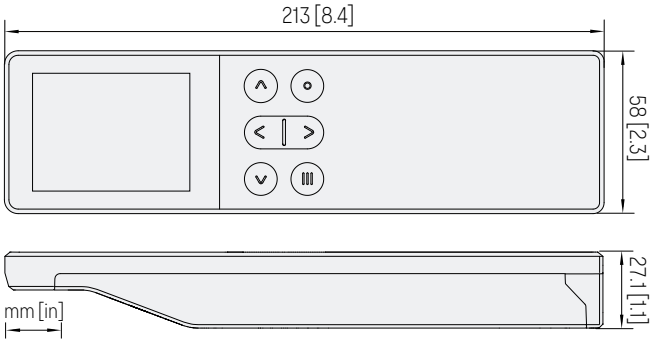
Max. number of connected devices	2
Connector type	M12 5-pin female (2 pcs)
Battery [1]	
Type	Rechargeable lithium-ion battery
Nominal voltage	7.2 V
Rated capacity	2900 mAh / 20.88 Wh
Charge limit voltage	8.4 V
AC adapter [2]	
Type	45 W USB-C AC adapter [3]
Connector type	USB-C
AC input	100-240 V AC, 1.2 A, 50-60 Hz
DC output	5.0 V/9.0 V/12.0 V/15.0 V DC, 3.0 A 20.0 V DC, 2.25 A 45 W
Insulation	Double or reinforced, indicated with the following symbol: ⧈
PC interface	Vaisala Insight PC software with USB-C cable (Windows OS). [4] Data can be logged and transferred also without Insight.

1) *The battery is not user-replaceable. Contact Vaisala Service Center for any battery-related maintenance needs.*
2) *The AC adapter is an optional accessory. If using an AC adapter not provided by Vaisala, make sure it fulfills the specifications given in this table and the safety requirements listed in Indigo80 Safety Guide (M212872EN), available at docs.vaisala.com.*
3) *45 W AC adapter recommended for optimal performance of Indigo80. An AC adapter with a lower power rating can also be used.*
4) *Insight software is available for download at vaisala.com/insight.*

Spare parts and accessories

Cables	
Cable for transmitters (M12-M8), 1.5 m (4 ft 11 in)	262195SP
Cable for probes (M12-M12), 1.5 m (4 ft 11 in)	272075SP
Flat cable for probes (M12-M12), 1 m (3 ft 3 in)	CBL210493SP
Probe connection cable (M12-M12), 10 m (32 ft 10 in)	INDIGOCABLE10M
Other	
Magnetic hanger for indicator	ASM214318SP
Weatherproof carrying case for Indigo80 and HMP80 and DMP80 series probes	ASM214759
Weatherproof carrying case for Indigo80 and a series 8 probe [1]	ASM215318
Light carrying case for HM40S or Indigo80 indicator and a compatible probe [2]	230245SP

1) *For example, MMP8, HMP8, or DMP8 with a max. 2-m (6 ft 7 in) probe connection cable.*
2) *For example, DMP80, HMP80N, or GMP252 probe with handle accessory and a max. 1.5-m (4 ft 11 in) probe connection cable.*



Indigo80 dimensions (front and side view)

VAISALA

HMP80 Series Handheld Humidity and Temperature Probes

For spot-checking applications

Features

- Portable design optimized for industrial spot-checking and field calibration
- RH accuracy up to ±0.8 %RH
- Temperature accuracy up to 0.1 °C (0.18 °F)
- Wide temperature measurement range
- Condensation-tolerant
- Sensor purge improves long-term stability and chemical resistance
- Compatible with Indigo80 handheld indicator and Insight PC software
- Calibration certificate included

Vaisala HUMICAP® Handheld Humidity and Temperature Probes HMP80 Series have been designed for portable use, especially with the Indigo80 handheld indicator. The combination of HMP80 probe and Indigo80 is ideal for spot-checking and field calibration of installed Vaisala humidity instruments.

Proven Vaisala HUMICAP performance

Vaisala is the original innovator of the thin-film capacitive humidity measurement technology, which has now become the industry standard in humidity measurement.

The HUMICAP technology results from Vaisala's 40-year experience in industrial humidity measurement, providing the best stability, fast response time, and low hysteresis in a wide range of applications.

HMP80 series probes are delivered with standard factory calibration certificates, with accredited calibration as an option. The probes can therefore be used as a working standard in field calibration.

Robust design for handheld measurements

The HMP80 series probes are available in two lengths offering similar measurement performance. The longer model (HMP80L) is designed for measurements in more extreme temperatures.

The design of the probe handle has been optimized for manual operation in versatile measurement environments. The IP66-classified probe handle offers excellent protection against moisture and dust with the probe connection cable attached. Also the cable connection is protected against mechanical stress by the robust design of the handle.

Flexible connectivity

HMP80 probes are optimized for portable spot-checking, field calibration, and data logging use with the Indigo80 handheld indicator. For easy-to-use access to device analytics and configuration, HMP80 probes can be connected to Vaisala Insight software for Windows®.

For more information, see www.vaisala.com/indigo and www.vaisala.com/insight.

Technical data

HMP80 series measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy at +23 °C (73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor	HUMICAP® R2C
Temperature	
Measurement range	HMP80N: −20 ... +60 °C (−4 ... +140 °F) HMP80L: −50 ... +120 °C (−58 ... +248 °F), short-time measurement range −50 ... +180 °C (−58 ... +356 °F)
Accuracy at +23 °C (+73.4 °F) [1] [3]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) Exposing temperature sensor to temperatures below −20 °C (−4 °F) may cause permanent additional deviation of ±0.1 °C (0.18 °F).

HMP80 series operating environment

Operating temperature of probe handle	−10 ... +60 °C (−14 ... +140 °F)
Operating temperature of probe head	HMP80N: −20 ... +60 °C (−4 ... +140 °F) HMP80L: −50 ... +120 °C (−58 ... +248 °F)
Storage temperature	−20 ... +60 °C (−4 ... +140 °F)
Measurement environment	For air, nitrogen, hydrogen, argon, helium, oxygen, and vacuum [1]
IP rating of probe handle:	
with probe connection cable connected to the probe	IP66
without cable	IP55

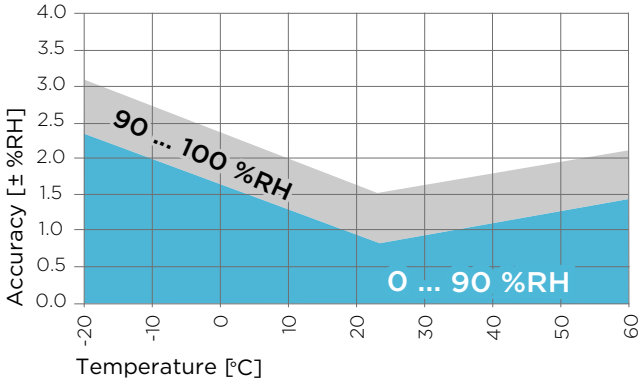
1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

HMP80 series inputs and outputs

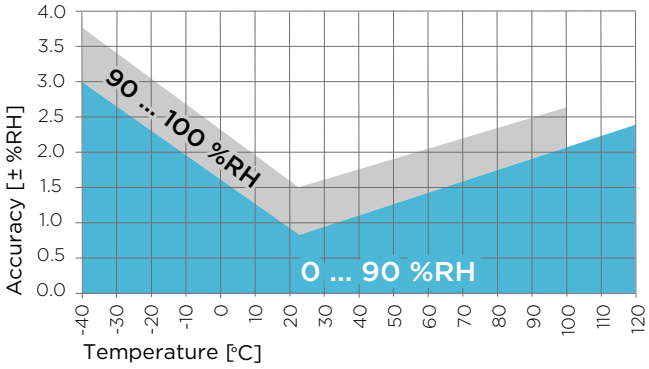
Operating voltage	15–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated

HMP80 series compliance

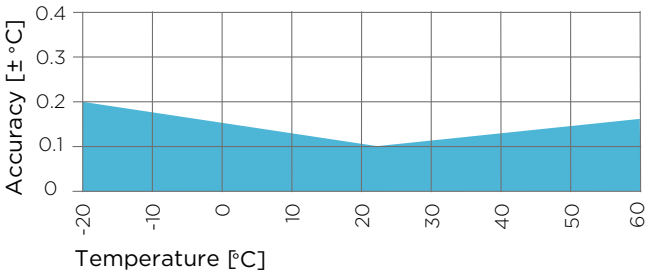
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Rough handling (excluding sensor inside probe head)	IEC 60068-2-31
Compliance marks	CE, China RoHS, RCM, UKCA



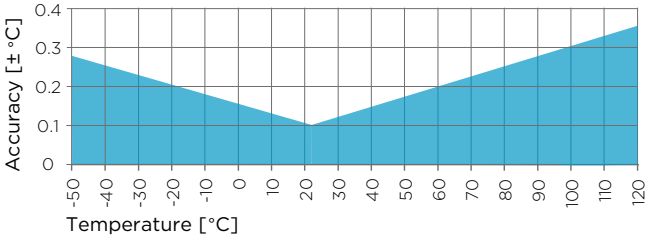
HMP80N humidity measurement accuracy as a function of temperature



HMP80L humidity measurement accuracy as a function of temperature



HMP80N temperature measurement accuracy over full range



HMP80L temperature measurement accuracy over full range

HMP80 series output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew point temperature difference (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

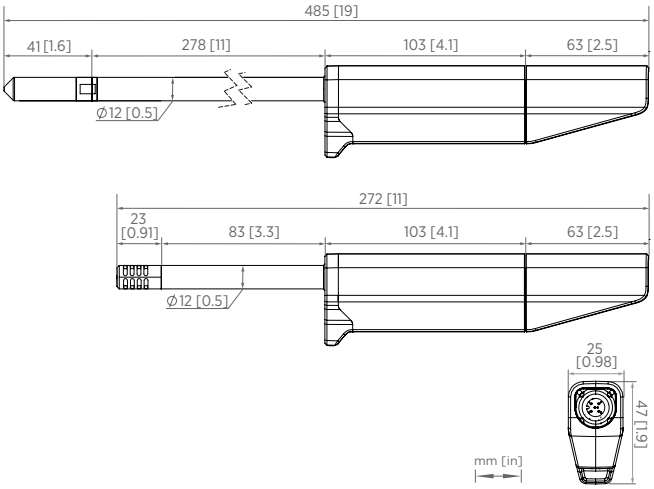
HMP80 series mechanical specifications

Connector type	M12 5-pin A-coded male
Weight	HMP80N: 200 g (7 oz) HMP80L: 300 g (10 oz)
Materials	
Probe handle	Polyamide (PA) and thermoplastic elastomer (TPE)
Probe shaft	Stainless steel (AISI 316L)
Filters	HMP80N: Stainless steel (AISI 316L) [1)] HMP80L: Porous stainless steel (AISI 316L) [2)]

1) With holes and without an additional filter membrane. Vaisala item code of filter: DRW255306SP.
2) Vaisala item code: HM47280SP

HMP80 series spare parts and accessories

Probe connection cable (M12-M12), 1.5 m (4.11 ft)	272075SP
Flat cable for probes (M12-M12), 1.0 m (3.4 ft)	CBL210493SP
Indigo USB adapter	USB2
Sintered stainless steel filter (HMP80N, HMP80L)	HM47280SP
Plastic PPS grid filter (HMP80N, HMP80L)	DRW010276SP
PPS grid with SS netting (HMP80N, HMP80L)	DRW010281SP
Slotted MIM filter (HMP80N)	DRW255306SP
Slotted MIM filter with membrane (HMP80N)	ASM214606SP



Dimensions of HMP80L (top) and HMP80N (bottom), side and bottom view

VAISALA

DMP80 Series Handheld Dew Point and Temperature Probes

For spot-checking applications

Features

- Portable design optimized for industrial spot-checking and field calibration
- Dew point measurement accuracy up to ±2 °C (±3.6 °F) $T_{d/f}$
- Wide dew point measurement range
- Sensor purge improves long-term stability and chemical resistance
- Condensation-tolerant
- Compatible with Indigo80 handheld indicator and Insight PC software
- Calibration certificate included

Vaisala DRYCAP® Handheld Dew Point and Temperature Probes DMP80 Series have been designed for portable use, especially with the Indigo80 handheld indicator. The combination of DMP80 probe and Indigo80 is ideal for spot-checking and field calibration of installed Vaisala humidity instruments.

Reliable measurements with the Vaisala DRYCAP sensor

Vaisala DRYCAP sensor is robust against particulate contamination, water condensation, oil vapor, and most chemicals. The sensor tolerates condensation and recovers perfectly if exposed to liquid water. The sensor's performance is excellent also in dynamic and low dew point applications, thanks to its fast reaction time and stability.

The probes can be inserted directly into pressurized processes, and respond rapidly from ambient to process conditions. The DMP80 probes are suitable for direct process dew point measurement in a wide temperature and pressure range.

DMP80 series probes are delivered with standard factory calibration certificates, with accredited calibration as an option. The probes can therefore be used as a working standard in field calibration.

Sensor purge minimizes effects of contaminants

In environments with high concentrations of chemicals and cleaning agents, the sensor purge option helps to maintain measurement accuracy between calibration intervals.

Sensor purge involves heating the sensor briefly to remove chemicals that could lower measurement performance and cause drifting.

Robust design for handheld measurements

The design of the probe handle has been optimized for manual operation in versatile measurement environments. The IP66-classified probe handle offers excellent protection against moisture and dust with the probe connection cable attached. Also the cable connection is protected against mechanical stress by the robust design of the handle.

Flexible connectivity

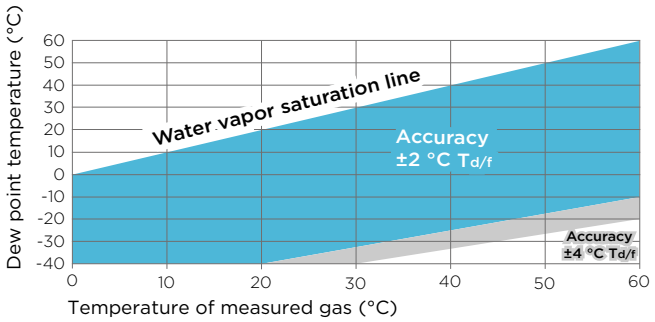
DMP80 probes are optimized for portable spot-checking, field calibration, and data logging use with the Indigo80 handheld indicator. For easy-to-use access to device analytics and configuration, DMP80 probes can be connected to Vaisala Insight software for Windows®.

For more information, see www.vaisala.com/indigo and www.vaisala.com/insight.

Technical data

DMP80A measurement performance

Dew point	
Sensor	DRYCAP® 180S
Measurement range	−40 ... +60 °C (−40 ... +140 °F) $T_{d/f}$
Accuracy	Up to ±2 °C (±3.6 °F) $T_{d/f}$
Response time 63 % [90 %]:	
From dry to wet	5 s [10 s]
From wet to dry	45 s [5 min]
Temperature	
Measurement range	0 ... +60 °C (+32 ... +140 °F)
Accuracy	±0.2 °C (±0.36 °F) at room temperature
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751
Mixing ratio	
Measurement range (typical)	0–150 g/kg (0–1050 gr/lbs)
Accuracy (typical)	±12 % of reading
Absolute humidity	
Measurement range	0–130 g/m³
Accuracy (typical)	±10 % of reading



Dew point accuracy vs. measurement conditions (DMP80A)

DMP80 series operating environment

Operating temperature range	−10 ... +60 °C (+14 ... +140 °F)
Storage temperature	−20 ... +60 °C (−4 ... +140 °F)
Operating pressure of probe head	0–20 bar (0–290 psi), absolute
Measurement environment	For air, nitrogen, hydrogen, argon, helium, and oxygen [1]
IP rating of probe handle:	
With probe connection cable connected to the probe	IP66
Without cable	IP55

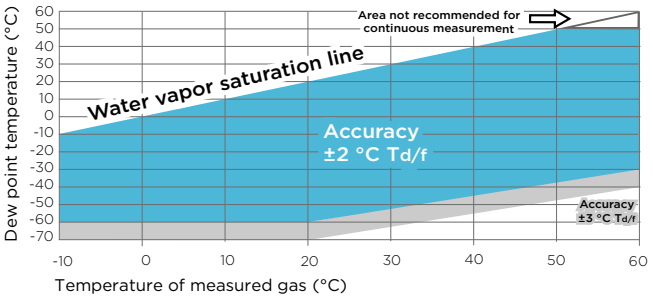
1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

DMP80 series inputs and outputs

Operating voltage	15–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated

DMP80B measurement performance

Dew point	
Sensor	DRYCAP® 180M
Measurement range	−70 ... +60 °C (−94 ... +140 °F) $T_{d/f}$
Accuracy	Up to ±2 °C (±3.6 °F) $T_{d/f}$
Response time 63 % [90 %]:	
From dry to wet	5 s [15 s]
From wet to dry	45 s [8 min]
Temperature	
Measurement range	0 ... +60 °C (+32 ... +140 °F)
Accuracy	±0.2 °C (±0.36 °F) at room temperature
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751
Relative humidity	
Measurement range	0–70 %RH
Accuracy (RH <10 %RH, at +20 °C)	±0.004 %RH + 20 % of reading
Concentration by volume (ppm)	
Measurement range (typical)	10–2500 ppm
Accuracy (at + 20 °C, 1 bar)	1 ppm + 20 % of reading



Dew point accuracy vs. measurement conditions (DMP80B)

DMP80 series mechanical specifications

Connector type	M12 5-pin A-coded male
Weight	250 g (9 oz)
Mechanical connection options	G1/2" ISO 228/1 NPT1/2"
Materials	
Probe handle	Polyamide (PA) and thermoplastic elastomer (TPE)
Probe shaft	Stainless steel (AISI 316L)
Filter	Porous stainless steel (AISI 316L) [1]

1) Vaisala item code: HM47280SP

DMP80 series output parameters

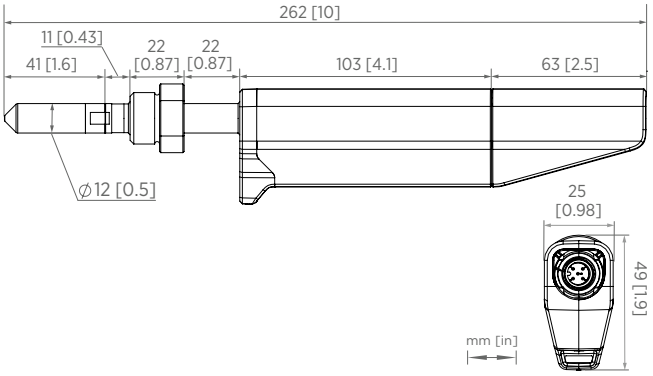
Absolute humidity (g/m³)	Relative humidity (%RH)
Absolute humidity at NTP (g/m³)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm_v)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm_w)
Dew point temperature difference (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	

DMP80 series compliance

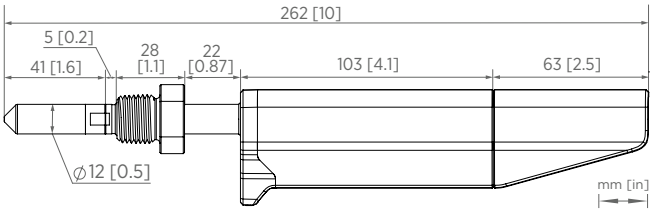
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Rough handling (excluding sensor inside probe head)	IEC 60068-2-31
Compliance marks	CE, China RoHS, RCM, UKCA

DMP80 series spare parts and accessories

Cables	
Probe connection cable (M12-M12), 1.5 m (4.11 ft)	272075SP
Flat cable for probes (M12-M12), 1.0 m (3.4 ft)	CBL210493SP
Accessories for ISO G1/2″ thread option	
Sampling cell with quick connector and leak screw	DSC74
Sampling cell with female connectors, inlet G3/8″, outlet G1/4″ ISO	DMT242SC
Sampling cell with Swagelok connectors for 1/4″ tubing	DMT242SC2
Two-pressure sampling cell	DSC74B
Two-pressure sampling cell with coil	DSC74C
Other items	
Indigo USB adapter	USB2
Sintered stainless steel filter	HM47280SP



Dimensions of DMP80 series probes with G1/2" thread, side and bottom view



Dimensions of DMP80 series probes with NPT1/2" thread

VAISALA

HM40 Series Handheld Humidity and Temperature Meter

Features

- Humidity measurement range 0 ... 100 %RH
- Temperature measurement ranges -40 ... +100 °C (-40 ... +212 °F), depending on probe model. The HM46 model can measure up to +180 °C (+356 °F) for a short period of time.
- Incorporates proven Vaisala HUMICAP® sensor technology
- Calibration reminder function
- Probes can be user calibrated using an on-site reference
- Graphical display indicates when measurement has stabilized
- Hold-button to freeze the screen and save the reading
- Multilingual user interface available in 10 languages (EN, DE, FR, JA, ZH, PT, ES, RU, FI, SV)

The easy-to-use HM40 is a compact and portable humidity meter that provides reliable measurements in a wide range of applications. It is the ideal spot-checking tool for everything from structural moisture measurement and air conditioning systems to humidity measurement in industrial production processes and life science applications. There are four different models available: HM41, HM42, HM45, and HM46.

Benefits

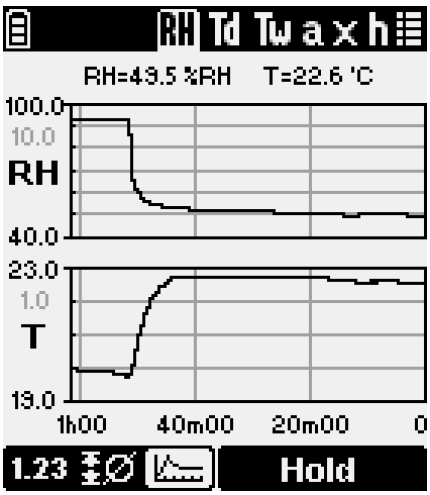
- Compact, portable, and easy to use
- Versatile meter with wide measurement range and multiple calculated parameters
- Ideal for spot-checking in a wide variety of applications

Simple and Easy to Use

HM40 has a large, user-friendly graphical display and easy-to-use push buttons. The user interface is simple and intuitive, and available in 10 languages. Also, many settings can be modified to meet users' individual needs. In addition to relative humidity and temperature, HM40 provides five calculated humidity parameters, all of which are available in metric and non-metric units. HM40 is powered by 2 AA batteries. An external USB-charger and rechargeable AA sized NiMH batteries are available as an option. Each model also comes with a handy belt clip and case.

Easy Recalibration

Calibrating HM40 is easy. The meter or the probe can be sent to a Vaisala Service Center for recalibration. Alternatively, calibration can be completed on site by users with a humidity reference such as another hand-held meter or Vaisala Humidity Calibrator HMK15. The indicator includes a calibration reminder function that can be activated by the user.

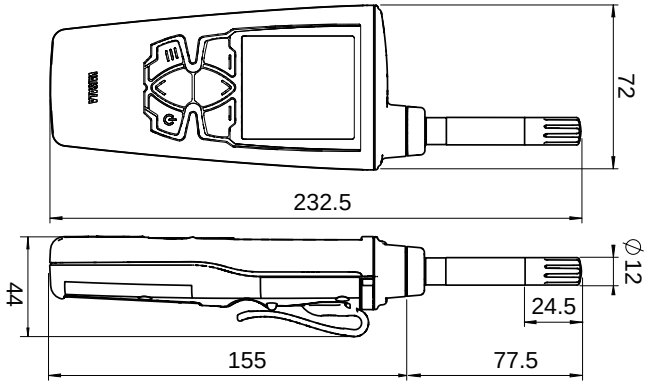


The Graph Clearly Indicates When Readings Have Stabilized.

HM40 Handheld Humidity and Temperature Meter Series

HM41 Technical Data

Humidity Measurement Accuracy (Including Non-linearity, Hysteresis, and Repeatability):	
At 0 ... +40 °C	±1.5 %RH (0 ... 90 %RH)
	±2.5 %RH (90 ... 100 %RH)
At -10 ... 0 °C and +40 ... +60 °C	±3.0 %RH (0 ... 90 %RH)
	±4.0 %RH (90 ... 100 %RH)
Humidity sensor	HUMICAP® 180R
Temperature measurement range	-10 ... +60 °C (+14 ... +140 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Measurement probe	Interchangeable HMP113 probe
Probe material	PC/ABS plastic blend (white)
IP rating	IP54
Weight (with alkaline batteries)	230 g (8.1 oz)
Filter material	PC (glass-reinforced)

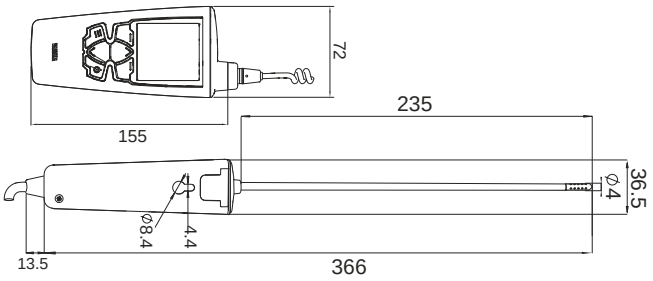


HM41 dimensions in mm

HM42 Technical Data

Humidity Measurement Accuracy (including Non-linearity, Hysteresis, and Repeatability):	
At 0 ... +40 °C	±1.5 %RH (0 ... 90 %RH)
	±2.5 %RH (90 ... 100 %RH)
At -40 ... 0 °C and +40 ... +80 °C	±3.0 %RH (0 ... 90 %RH)
	±4.0 %RH (90 ... 100 %RH)
At +80 ... +100 °C	±4.0 %RH[1)]
Humidity sensor	HUMICAP® 100R-Mini
Temperature measurement range	-40 ... +100 °C (-40 ... +212 °F)
Temperature sensor	Pt1000 RTD Class F0.3 IEC60751
Measurement probe	HM42PROBE
Probe head material	Stainless steel
IP rating	IP40 (probe), IP54 (indicator)
Weight (with alkaline batteries)	370 g (13.1 oz)
Filter material	Stainless steel and PTFE membrane
Probe cable length	1500 mm (59 in)

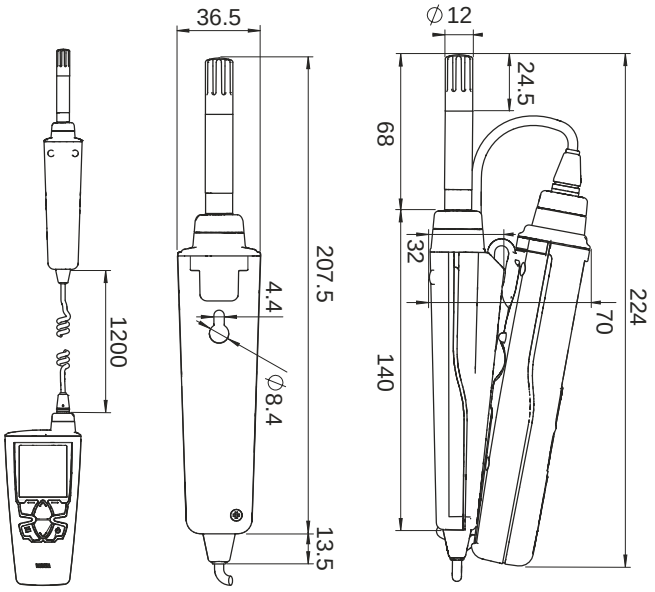
1) Not recommended for T_d > 85 °C



HM42 dimensions in mm

HM45 Technical Data

Humidity Measurement Accuracy (Including Non-linearity, Hysteresis, and Repeatability):	
At 0 ... +40 °C	±1.5 %RH (0 ... 90 %RH) ±2.5 %RH (90 ... 100 %RH)
At -40 ... 0 °C and +40 ... +60 °C	±3.0 %RH (0 ... 90 %RH) ±4.0 %RH (90 ... 100 %RH)
Humidity sensor	HUMICAP® 180R
Temperature measurement range	-40 ... +60 °C (-40 ... +140 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Measurement probe	Interchangeable HMP113 with HM40HANDLE
Probe material	PC/ABS plastic blend (white)
IP rating	IP54
Weight (with alkaline batteries)	330 g (11.6 oz)
Filter material	PC (glass-reinforced)
Probe cable length	1200 mm (47 in)

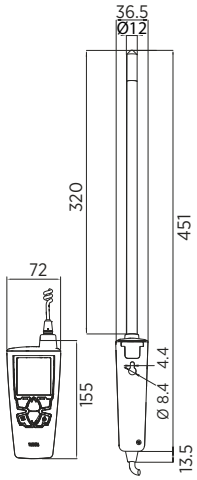


HM45 dimensions in mm

HM46 Technical Data

Humidity Measurement Accuracy (Including Non-linearity, Hysteresis, and Repeatability):	
At 0 ... +40 °C	±1.5 %RH (0 ... 90 %RH) ±2.5 %RH (90 ... 100 %RH)
At -40 ... 0 °C and +40 ... +80 °C	±3.0 %RH (0 ... 90 %RH) ±4.0 %RH (90 ... 100 %RH)
At +80 ... +100 °C	±4.0 %RH [1]
Humidity sensor	HUMICAP® 180R
Temperature measurement range	-40 ... +100 °C (-40 ... +212 °F), short-term up to +180 °C (+356 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Measurement probe	HM46PROBE
Probe head material	Stainless steel, brass filter
IP rating	IP40 (probe), IP54 (indicator)
Weight (with alkaline batteries)	490 g (17.3 oz))
Filter material	Sintered brass
Probe cable length	1500 mm (59 in)

1) Not recommended for T_d > 85 °C



HM46 dimensions in mm

HM40 Series Technical Data

Measurement Performance

Calculated parameters	Dew point, wet bulb temperature, absolute humidity, mixing ratio, enthalpy
Relative Humidity	
Measurement range	0 ... 100 %RH
Accuracy (including non-linearity, hysteresis, and repeatability) for different models at 0 ... +40 °C (+32 ... +104 °F)	±1.5 %RH (0 ... 90 %RH) ±2.5 %RH (90 ... 100 %RH)
Factory calibration uncertainty at +20 °C (+68 °F):	
HM42 and HM46	±1.5 %RH
HM41 and HM45	±1.1 %RH (0 ... 90 %RH) ±1.8 %RH (90 ... 100 %RH)
Stability	±2 %RH over 2 years
Humidity Measurement Response Time:	
(90 %) with plastic grid filter (HM41 and HM45)	17 s
(90 %) with membrane filter and steel grid (HM42)	26 s
(90 %) with brass sintered filter (HM46)	40 s
Temperature	
Accuracy over temperature range:	
At 0 ... +40 °C (+32 ... +104 °F)	±0.2 °C (0.36 °F)
At -40 ... 0 °C and +40 ... +100 °C (-40 ... +32 °F and +104 ... +212 °F)	±0.4 °C (0.72 °F)

Operating Environment

Operating temperature	
Indicator	-10 ... +60 °C (+14 ... +140 °F)
Probe handle	-40 ... +60 °C (-40 ... +140 °F)
Probe head	Range -40 ... +180 °C (-40 ... +356 °F) See probe specifications
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
EMC compliance	EN61326-1, Portable Equipment

Mechanical Specifications

Materials	
Indicator body	PC/ABS blend, acrylic display lens
Probe holder	PC/ABS blend (gray)
Probe handle	PC/ABS blend (white), PC/ABS blend (gray, HM45) or PBT (gray, HM42/46)
HMP113 probe or probe measurement head	PC/ABS blend (white, HM41/45) or stainless steel (HM42/46)
IP rating, HM40	IP54

Indicator

Display	LCD (140 x 160 pixels)
Power-up time	< 3 s
Batteries	2 × AA, 1.5 V
Operation time (typical)	100 hours (without backlight)
Menu languages	English, Chinese (simplified), Finnish, French, German, Japanese, Portuguese, Russian, Spanish, Swedish

Spare Parts and Accessories

Indicator	
Spare HM40 indicator	HM40INDI
Belt clip (3 pcs)	227710SP
Battery cover (3 pcs)	225688SP
NiMH rechargeable batteries (4 pcs)	229247SP
External battery recharger with USB connection and 4 batteries	229249SP
Case for short HM40 probes	235849SP
Case for long HM40 probes	DRW242351SP
Standard Probe (HM41)	
HMP113 probe for HM40	HMP113 (configuration: V00B2C1A0)
Plastic locking bushing (3 pcs) for attaching HMP113 probe to HM40 indicator	DRW238590SP
Plastic grid filter for HMP113 probe	DRW236214SP
Plastic grid with membrane filter for HMP113 probe	230727SP
HM42 Probe (HM42)	
Thin 4 mm diameter probe for HM40	HM42PROBE
Steel grid filter for HM42PROBE	19867HM
Membrane tube set (5 pcs) for HM42PROBE	19858HM
Rubber sleeve set (10 pcs) for HM42PROBE	19809HM
Calibration adapter for HM42PROBE	HM37067
Remote Probe (HM45)	
HMP113 probe for HM40	HMP113 (configuration: V00B2C1A0)
Plastic locking bushing (3 pcs) for attaching HMP113 probe to HM40 indicator	DRW238590SP
HM40 handle and cable	HM40HANDLE
Plastic grid filter for HMP113 probe	DRW236214SP
Plastic grid with membrane filter for HMP113 probe	230727SP
HM46 Probe (HM46)	
Stainless steel 12 mm diameter probe for HM40	HM46PROBE
Sintered filter for HM46PROBE	0195
Optional membrane filter for HM46PROBE (up to +80 °C)	10159HM
Plastic grid filter for HM46PROBE (up to +80 °C)	6221
Disposable sleeve, 50 pcs set	1558
Probe holder	HM36915

VAISALA

HUMICAP® humidity sensor for measuring relative humidity




HUMICAP sensor's unique benefits

- Excellent long-term stability and repeatability
- Insensitive to dust and most chemicals
- Fast response time
- Sensor heating
- Full recovery from condensation
- The most reliable and accurate humidity measurement

In 1973, Vaisala introduced HUMICAP, the world's first thin-film capacitive humidity sensor. Since then, Vaisala has become the market leader in relative humidity measurements, and thin-film capacitive humidity sensors have developed from one company's innovation into a global industry standard.

Today, Vaisala is a leading provider of humidity measurement probes to multiple industries and in many applications. Relative humidity sensors are now an industry standard. Here is how it started.

We need to fix this

Up until the early 1970s, hair hygrometers were widely used despite the unreliable humidity measurements they provided. To address this, Vaisala embarked on the development of a novel humidity sensor employing semiconductors and thin-film materials.

HUMICAP is born

At the CIMO VI congress in 1973, Vaisala introduced the HUMICAP, the world's first thin-film capacitive humidity sensor. This groundbreaking innovation revolutionized humidity measurements. The HUMICAP sensor had no moving parts and thanks to the advanced utilization of semiconductor and thin-film technologies, it was amazingly small in size.

From one company's invention to a global standard

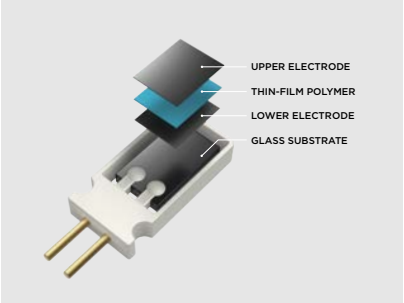
Since then, Vaisala has emerged as the market leader in relative humidity measurements, and thin-film capacitive humidity sensors have transcended being one company's invention to a global industry standard.

How it works

HUMICAP is a capacitive thin-film polymer sensor consisting of a substrate on which a thin film of polymer is deposited between two conductive electrodes.

The electrode facing ambient air is made of porous metal to protect the sensor from contamination and exposure to condensation. The substrate is typically glass or ceramic. The thin-film polymer either absorbs or releases water vapor as the relative humidity of the ambient air rises or falls.

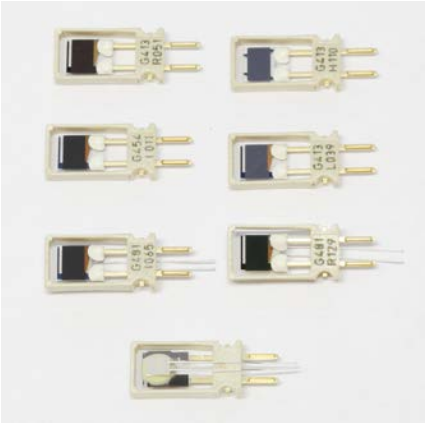
The dielectric properties of the polymer film depend on the amount of absorbed water. As the relative humidity around the sensor changes, the dielectric properties of the polymer film change, and so does the capacitance of the sensor. The instrument's electronics measure the capacitance of the sensor and convert it into a humidity reading.



Structure of the HUMICAP sensor

Constantly evolving

HUMICAP is not only a sensor, it is a solution to many challenging measurement positions and conditions. HUMICAP is in Vaisala's core and we develop it constantly.



Family of HUMICAP sensors

Condensation prevention technology with warmed probe

One of Vaisala's innovations in the humidity measurement field includes warmed probe technology for the toughest high humidity environments. Saturation in the environment causes condensation to form on all surfaces including measurement sensors, which can be fatal for some technologies. A warmed probe keeps the sensor continuously above the ambient temperature, ensuring condensation never forms. With Vaisala's solution, relative humidity measurement is possible in these conditions with an additional Indigo520 transmitter.

HUMICAP applications

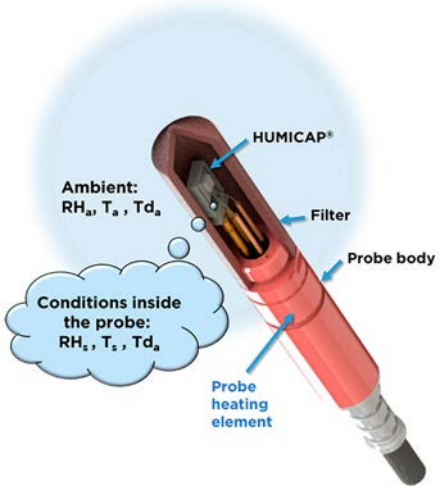
Even though the HUMICAP innovation was originally designed for a new type of a radiosonde, the word got around about reliable humidity measurements, and created a growing demand in many industries and applications. Today we offer everything you need for measuring humidity, with a wide range of humidity instruments covering applications from HVAC to the most demanding industrial applications, both indoors and outdoors.

If it works on Mars, it works anywhere

The unforgiving conditions in space pose strict demands on technology, requiring the most reliable sensors that can be trusted to endure without repair. You simply cannot venture out into these conditions with just any instrumentation. Therefore, the HUMICAP products were a natural selection to measure conditions on the planet Mars since 1990s.

VAISALA

How to select the right humidity instrument for your high-humidity application



High-humidity environments are tough for humidity measurement. Saturation in the environment causes condensation to form on all surfaces including measurement sensors, which can be fatal for some technologies. While Vaisala HUMICAP® technology can withstand condensation, it still needs time to recover from the effects of moisture before it can once again provide reliable measurements. Typical applications where high humidity or occasional condensing are expected include drying processes, test chambers, combustion air humidifiers, meteorological measurements, and fuel cells.

Keeping measurements accurate and reliable even in condensing environments calls for Vaisala's condensation prevention technology. A warmed probe keeps the sensor continuously above the ambient temperature, ensuring condensation never forms. The disadvantage of probe heating is that relative humidity can no longer be measured because the sensor is heated up above the ambient temperature. In this state, independent humidity parameters can be measured, such as dew point or mixing ratio. However, it is also possible to measure relative humidity using an additional temperature sensor with our Indigo520 transmitter.

Operating principle

The heating element inside the probe body heats the entire probe. In the illustration above, the probe and filter are glowing red to illustrate how the probe warming keeps the microclimate inside the filter at an elevated temperature. The actual temperature is only a few degrees above the ambient temperature, as seen in the following example:

Ambient conditions:

- T_a = 14 °C
- RH_a = 97 %RH
- Td_a = 13 °C

HMP7 warmed probe:

- T_s = 16 °C
- RH_s = 83 %RH
- Td_a = 13 °C (calculated)

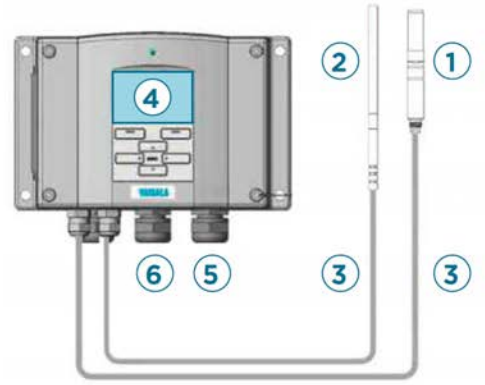
As shown in this example, heating does not affect dew point.

Dew point is the temperature where condensation begins, or where the relative humidity would be 100 %, if the air was cooled.

The 'relative' in relative humidity expresses the relation between the amount of water vapor present and the maximum amount that is physically possible at that temperature.

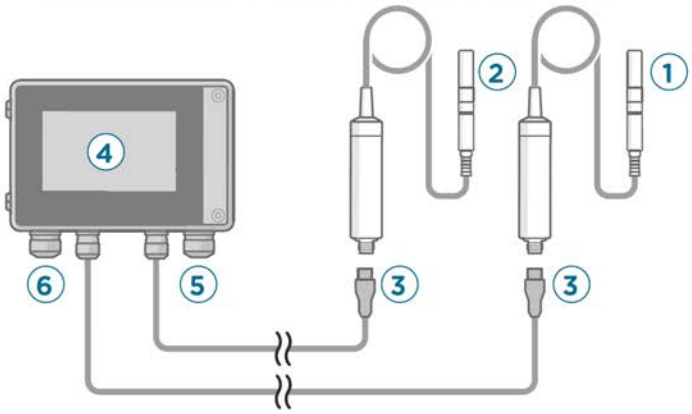
Note: The HMP7 warm probe mode when used by itself will only output dew point temperature digitally (Modbus RTU over RS-485) or offer analog outputs when combined with any Indigo Transmitter. If relative humidity and temperature are desired, then the separate ambient temperature probe (TMP1) must be ordered with the Indigo520 transmitter to calculate humidity from the dew point and temperature readings.

HMT337 Transmitter Components



1. Warmed Humidity Probe (Dew point output)
2. Temperature Probe
3. Fixed Cables from Probe to Transmitter
   - Options for 2,5,10 and 20m lengths
4. Transmitter
   - Options for display or no display
5. Input Power Cable Gland
   - Options for 24Vac/dc, 100-240 Vac
6. Output Signals Cable Gland
   - 2 or 3 Analog outputs
   - RS-232 or RS-485 or LAN
   - 2 Relays
   - HM70 Compatible service port

INDIGO520 Transmitter Components



1. HMP7 Warmed Humidity Probe (Dew point output)
2. TMP1 Temperature Probe
3. Fixed Cables from Probe to Transmitter
   - Options for 1,3,5 and 10m lengths
4. Transmitter
   - Options for display or no display
5. Input Power Cable Gland
   - Options for 24Vac/dc, 100-240 Vac, PoE+
6. Output Signals Cable Gland
   - 4 Analog outputs
   - Ethernet Modbus TCP/IP
   - 2 Relays
   - Built in Webserver
   - Service port**
   - Analog input**
   - **To be added

Conversion from HMT337WP (Warmed Probe) to an INDIGO solution

For current high humidity applications using the HMT337WP, we recommend using our Indigo520 transmitter with the TMP1 and HMP7 probes with condensation prevention mode turned on. The new Indigo platform is built on the same measurement technology as its predecessor. The most significant and widely desired feature of the Indigo platform is the interchangeability of the smart probes. Many functionalities that were traditionally inside the transmitter are now built into the smart probe instead, allowing for field swapping and cross-functional located configurations. The following pictures illustrate the basic components of the previous and new instruments. The probe head dimensions, filters, and installation accessories are identical, which means that, the measurement HMP7 humidity probe fits the same process connection as the HMT337 probe.

History of warm probe technology

Warmed probe technology was first developed by Vaisala over 25 years ago to address difficult outdoor humidity measurements for meteorological applications and then modified for industrial applications. In industrial applications with high-humidity, the temperature can change faster resulting in condensing conditions. The warmed probe technology eliminates downtime due to condensation and provides continuous measurement at condensing or saturating conditions.

Products

The Indigo520 transmitter is an industrial-grade, robust transmitter that accommodates 1 or 2 Vaisala Indigo-compatible probes for humidity, temperature, dew point, carbon dioxide, hydrogen peroxide, and moisture in oil measurements. The transmitter can measure barometric pressure with an additional module. TMP1 is designed for demanding temperature measurements in industrial applications, where accuracy and robustness are essential. HMP7 is designed for applications that involve constant high humidity or rapid changes in humidity, where measurement performance and chemical tolerance are essential. Together, this system can provide you with consistently accurate readings that you can trust. Please reference the below table that highlights their features.

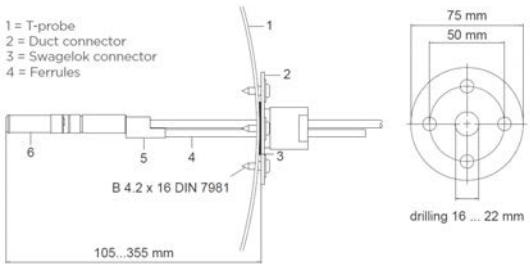
Product	HMP7 probe	TMP1 probe	Indigo201 + HMP7	Indigo520 + TMP1 & HMP7	HMT317 probe	HMM170 module
Probe warming	Yes	Used for temp. compensation	Configurable	Configurable	Configurable	Configurable
IP rating	IP66	IP66	IP65	IP66	IP66	N/A
Ambient temperature sensor allows RH calculation	[1] Possible with external temperature measurement	No	No	[2] Configurable	No	[1] Possible with external temperature measurement
Available measurement parameters	T_d, T_{df}, x, ppm, p_w [1] (RH, T, a, T_w, P_{ws}, h, dT)	T	[2] T_d, T_{df}, x, P_w	T_d, T_{df}, x, P_w [2] (RH, T, a, T_w, P_{ws}, h, dT)	T_d, T_{df}, x, p_w	T_d, T_{df}, x, ppm, p_w [1] (RH, T, a, T_w, P_{ws}, h, dT)
Supply voltage	18 … 30 V DC	10 … 35 V DC	Configurable: 10 … 35 V DC, 24 V AC	Configurable: 10 … 35 V DC, 24 V AC, 100 … 240 V AC, 50/60 Hz	10 … 35 V DC	15 … 35 V DC
Digital output	RS-485: Modbus RTU	RS-485: Modbus RTU	None	Modbus TCP/IP, web based interface	RS-232: serial ASCII	RS-485: Modbus RTU
Analog output	None	None	3 × assignable analog outputs	4 × assignable analog outputs	2 ×	3 ×
Display	No	No	Optional	Optional	No	No
Parametrization	Insight software	Insight software	273956 or USB-C	Touch screen or LAN	Terminal program (e.g. PuTTY)	Insight software
USB cable (sold separately)	242659 or USB2	242659 or USB2	None, USB-C	219690 or USB2	238607	219690

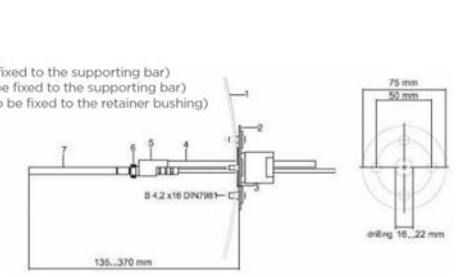
1) Relative humidity calculation is possible by writing external temperature information on a Modbus register.
2) Configurable: additional temperature probe needed.

Probe installation

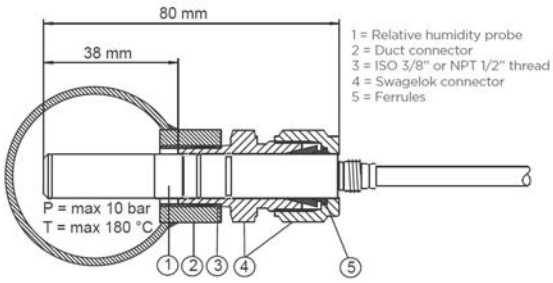
Depending on the application, there are different mounting accessories available:

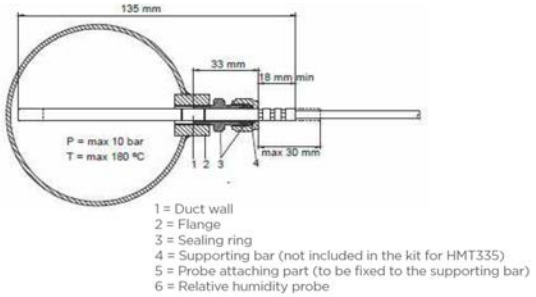
Duct Mount





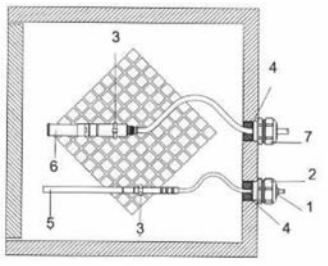
Duct installation kit 210697 (215003 for HMT337 temperature probe)

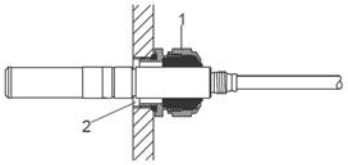


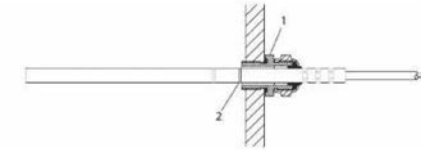


Pressure-tight Swagelok installation kits **SWG12ISO38** with ISO3/8" or **SWG12NPT12** with NPT1/2" thread (SWG6ISO18 with ISO1/8" or SWG6NPT18 with NPT1/8" thread for HMT337 temperature probe).

Example of Climate Chamber Installation







HMP247CG: Vapor-tight installation with cable gland.

Insulation and leak-proof process connections

Choosing where to install a humidity probe can be challenging when there is high humidity combined with temperature variation.

For example, in a drying application where the exhaust air humidity is close to saturation (95 %RH) and the temperature is 40 °C, what happens when the sensor head is installed so that the filter is in the process and half of the sensor is in the 25 °C ambient temperature? In this situation even probe warming may not be able to compensate for the heat loss caused by thermal conduction through the metallic probe body; the heat loss will form a cold spot on the process side and condensation will result in inaccurate measurement. The solution here is to thoroughly insulate the probe.

If the process gas is colder than the ambient air it is critical to have a tight process connection for the probe. A leaking connection will allow warm and possibly humid air into the system, which can condensate near the sensor and cause measurement problems.

Extreme conditions, such as PEM fuel cell applications

There are also extreme applications where warming just few degrees above the ambient temperature is just not enough. One example of such application is a Polymer Electrode Membrane (PEM) Fuel cell. Application specific configurations can be found in the order forms of the HMP7 and HMT310 series. These configuration versions are designed to withstand the extreme conditions by heating the probe head at a higher power. It is also possible to use HMP7 and HMM170 in these applications, since the heating functionalities are freely configurable with the Insight PC software.

Summary

Sensor saturation can be avoided in high-humidity and condensing conditions by using an instrument that has probe warming technology. In addition to this, proper insulation and leak-free installation guarantees the best possible environment for reliable humidity measurement.

The comparison table in this document will help you to choose the right product for your application. More detailed product information and features can be found in datasheets, user manuals, and order forms.

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Selecting the right filter for humidity instruments

Depending on the Vaisala product, you may have several filter options to choose from. Typically one of the options is defined as the recommended filter. The recommended filter is suitable for the majority of the applications where the specific product is designed to be used. There are, however, some exceptions where another type of filter may be the best option. This document provides some general guidelines when considering the optimal filter for a specific application.

Particulate protection

Typically the primary task of the filter is to prevent dust from entering the sensor element. Vaisala capacitive sensor technology is not sensitive to particulates as such, but dust accumulating on the sensor surface may still have an impact on the measurement performance. It may weaken the response time and particulates may also carry harmful substances, causing corrosion in certain conditions. This is why keeping the sensor clean with the proper filter is a good idea.

Stainless steel mesh and PTFE membrane are the typical filtering materials. Sintered filters offer the best protection against dust, but there are also use cases where particulate filtering is not a critical requirement, or it is considered undesirable because it slows down the response time. For example, in handheld devices it is common to use a mesh filter without the actual particulate filtering element.

Mechanical protection

Capacitive thin film sensor is a sensitive component and it does not withstand severe mechanical stress, such as physical shocks. For this reason, it needs a protective element around it. Another cause of mechanical stress is high flow speed in the measurement environment, where a simple grid is not enough to protect the sensor. Sintered filter is a good choice for high wind speeds, because the environment inside the filter stays calm.

Response time

There are two factors in a filter affecting the response time of the sensor. First, the diffusion rate. Steel mesh has much faster diffusion rate than a sintered filter, meaning that the humidity level inside the filter stabilizes faster to the same level with the surrounding environment. Another factor is thermal mass. A heavier filter will add more mass to the sensor head and thus it takes longer for the sensor to adapt into changes in temperature.

A sintered filter has the slowest response time and an open grid filter made of plastic has the fastest. This can be especially critical in applications with still air of very weak flow. A higher flow rate will balance the difference.

When is it time to replace the filter?

Filters should be visually inspected on a regular basis. Filter replacement is recommended if the filter appears clogged or there are signs of severe corrosion or mechanical damage. Keep in mind that a clogged sintered filter that is otherwise in good condition may still be reused. You may be able to clean the filter with an ultrasonic bath or an appropriate cleaning agent. Remember to dry the filter well before reinstalling it.

GENERAL PURPOSE FILTERS FOR HUMIDITY AND DEW POINT APPLICATIONS [1)]

	Plastic grid with steel mesh filter	Plastic grid with PTFE membrane filter	Stainless steel grid with PTFE membrane filter	Sintered stainless steel filter	Stainless steel grid with mesh filter
Example image					
Particulate protection	★★★☆☆	★★★★☆	★★★★☆	★★★★★	★★★☆☆
Mechanical protection	★★★☆☆	★★★☆☆	★★★★★	★★★★★	★★★★★
Response time	★★★★☆	★★★★☆	★★☆☆☆	★☆☆☆☆	★★★★☆
Typical use / Features	Industrial applications, up to 180 °C (356 °F)	Generic applications, up to 80 °C (176 °F)	Demanding applications, rugged design	Demanding industrial applications	Industrial applications
High-end probes					
HMP series, HMT330, HMT310, HMT360, HMT370EX, HMM170	**DRW010281SP**	–	–	HM47280SP	–
DMP series, DMT340	DRW010281SP	–	–	**HM47280SP**	–
Compact humidity probes					
HMP110, HMP60, HMT120, HMT130	–	**DRW010525SP**	ASM212652SP	HM46670SP	–
HMP113, HMP63, RFL100	–	**ASM210856SP**	–	HM47280SP	–
Handhelds					
HM40	–	For HM41 and HM45: ASM210856SP For HM46: 10159HM	For HMP42: 19867HM, 19858HM	For HM46: 0195 (brass)	–
HM70	For HMP77: DRW010281SP	10159HM	–	**DRW212987SP** (brass) HM47280SP	–
DM70	DRW010281SP	–	–	**HM47280SP**	–
OEM models					
DMT143	–	–	–	**DRW010335SP**	–
DMT143L	–	–	–	**HM47280SP**	–
DMT152	–	–	–	–	**220957SP**
DPT146	–	–	–	–	**220957SP**

1) Recommended filter marked in bold.

OTHER FILTERS [1)]

	Sintered PTFE filter	Plastic grid	Stainless steel grid	Stainless steel grid for high flow rate	Stainless steel grid with membrane and drain hole
Example image					
Particulate protection	★★★★★	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆	★☆☆☆☆
Mechanical protection	★★☆☆☆	★★★☆☆	★★★★★	★★★★★	★★★★★
Response time	★★★☆☆	★★★★★	★★★★★	★★★☆☆	★★★★★
Typical use / Features	Fast drying, corrosion resistant	Clean environment, fast response time	Oil measurement or vacuum	Oil measurement, high flow rate	Condensing environment, PEM fuel cells
High-end probes					
HMP series, HMT330, HMT310, HMM170	(219452SP)	DRW010276SP	HM47453SP	220752SP	214848SP
DMP series, DMT340	–	–	HM47453SP	–	–
MMP series, MMT330	–	–	**HM47453SP**	220752SP	–
Compact humidity probes					
HMP110, HMP60, HMT120, HMT130	DRW244938SP	DRW010522SP	–	–	–
HMP113, HMP63, RFL100	219452SP	DRW240185SP	–	–	–
Handhelds					
HM40	–	For HM41 and HM45: DRW240185SP	–	–	–
HM70	–	For HMP75: **6221**	–	–	–
DM70	–	–	HM47453SP	–	–
MM70	–	–	**HM47453SP**	220752SP	–
OEM models					
DMT143	–	–	HM47453SP	–	–
DMT143L	–	–	HM47453SP	–	–

1) Recommended filter marked in bold.

VAISALA

HMP1 Wall-Mounted Humidity and Temperature Probe

Vaisala HUMICAP® Humidity and Temperature Probe HMP1 is designed for ambient measurement in indoor spaces. Its probe head and body are integrated into a single unit with no cable between them. HMP1 can be directly connected to Indigo300 and Indigo200 series transmitters to form a single wall-mounted unit.

Features

- Compact size
- RH accuracy up to ±1.0 %RH
- Temperature accuracy up to ±0.2 °C (0.36 °F)
- Temperature measurement range −40 ... +60 °C (−40 ... +140 °F)
- Sensor purge improves long-term stability and chemical resistance
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable calibration certificate: 6 points for humidity, 1 point for temperature

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

For more information on the Indigo product family, see www.vaisala.com/indigo.

Sensor purge minimizes effects of contaminants

In environments with high concentrations of chemicals and cleaning agents, the sensor purge option helps to maintain measurement accuracy between calibration intervals.

Sensor purge involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Mounting with probe holder

HMP1 probe is delivered with a probe holder for wall mounting. The probe holder provides a secure attachment that allows the probe to be removed without removing the base of the holder.

Probe holder

Use with Indigo transmitters

With an Indigo300 or Indigo200 series transmitter, HMP1 forms a single wall-mounted unit with no probe cable or probe holder needed. Just push the probe directly into the connector on the transmitter and turn the locking wheel to hold the probe in place. Probe settings can be configured through the transmitter.

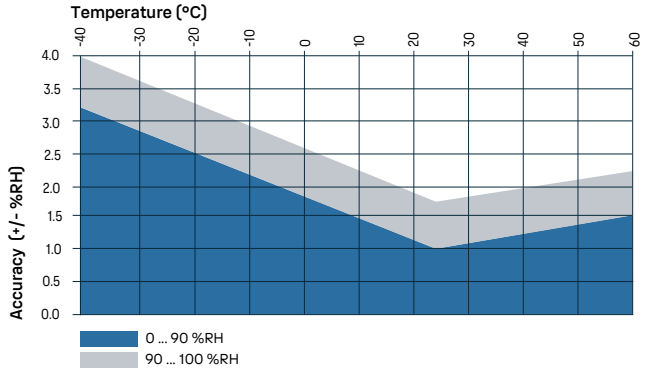
HMP1 with Indigo200 series

Technical data

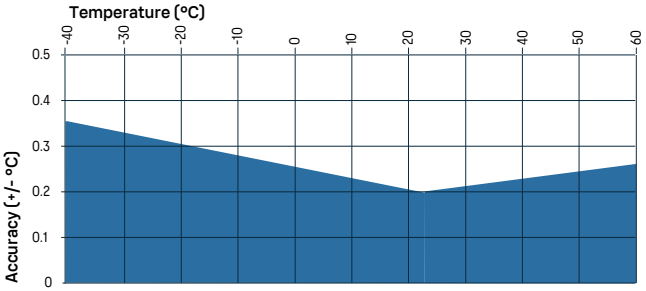
Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy at +23 °C (+73.4 °F) [1) 2)]	±1.0 %RH (0–90 %RH)
Factory calibration uncertainty [3)]	±0.7 %RH (0–40 %RH) ±1 %RH (40–95 %RH)
T_{63} response time [4)]	21 s
Sensor	HUMICAP® I
Temperature	
Measurement range	−40 … +60 °C (−40 … +140 °F)
Accuracy at +23 °C (+73.4 °F) [1) 2)]	±0.2 °C (±0.36 °F)
Factory calibration uncertainty [3)]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
T_{63} response time [4)]	70 s

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) In typical room conditions.
3) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
4) In still air.



HMP1 humidity measurement accuracy as a function of temperature



HMP1 temperature measurement accuracy over full range

Operating environment

Operating temperature	−40 … +60 °C (−40 … +140 °F)
Storage temperature	−40 … +60 °C (−40 … +140 °F) For
Measurement environment	air, nitrogen, hydrogen, argon, helium, and oxygen [1)]
IP rating	IP50

1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

Inputs and outputs

Operating voltage	15–30 V DC
Current consumption	2 mA typical, 200 mA max.
Digital output	RS-485, non-isolated
Protocol	Modbus RTU

Output parameters

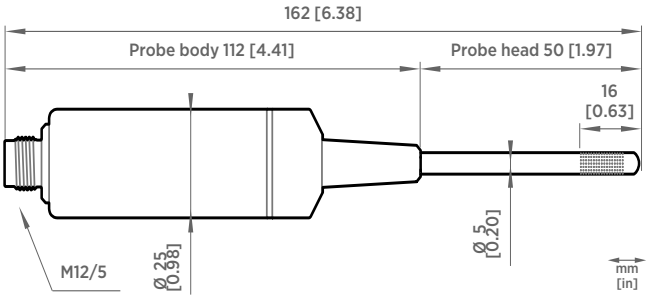
Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm_v)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm_w)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

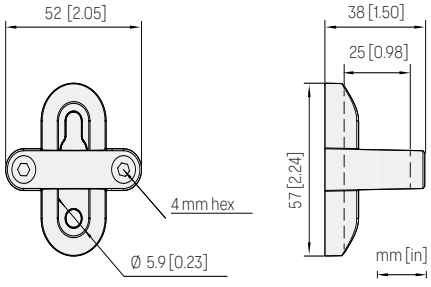
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Compliance marks	CE, China RoHS, RCM

Mechanical specifications

Connector	M12 5-pin A-coded male
Weight	38 g (1.34 oz)
Materials	
Probe	AISI 316L
Probe body	PBT



HMP1 probe dimensions



Probe holder ASM213582 dimensions

Accessories

Indigo USB adapter [1)]	USB2

1) Vaisala Insight software for Windows available at www.vaisala.com/insight.

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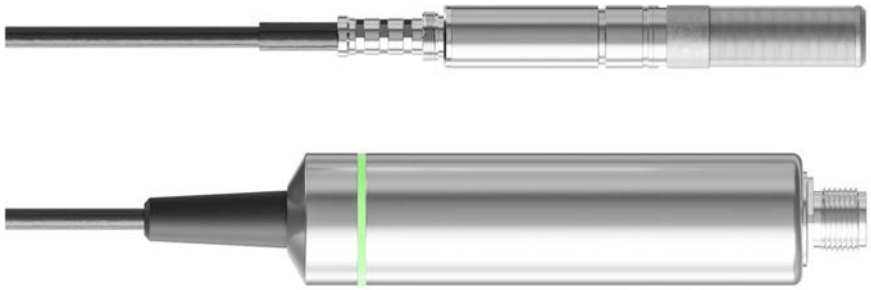
HMP3 General Purpose Humidity and Temperature Probe



Features

- Available with field-replaceable HUMICAP® R2 sensor
- RH accuracy up to 0.8 %RH
- Temperature accuracy up to 0.1 °C (0.18 °F)
- Temperature measurement range −40 ... +120 °C (−40 ... +248 °F)
- Sensor purge improves long-term stability and chemical resistance
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software

Vaisala HUMICAP® Humidity and Temperature Probe HMP3 is a general-purpose probe designed for various industrial processes. The probe structure allows for replacing the sensor without tools, making the probe suitable for applications such as paint booths and other industrial applications where periodic recalibration alone is not sufficient for maintaining the probe performance. Other applications include, for example, industrial HVAC systems, cleanrooms, and environmental chambers.

Designed for field maintenance

Probe design allows for several operating environments and flexible field maintenance. Filter and HUMICAP® R2 sensor element are field replaceable for applications that require frequent replacements. Calibration and adjustment of humidity measurement is also needed if the HUMICAP® R2 sensor is replaced. The following filter types are recommended for HMP3:

- Stainless steel mesh filter (12 µm mesh size) for typical applications such as air handling units
- Sintered stainless steel filter for applications where maximal protection from dust ingress is essential
- PPS plastic grid filter for best humidity response time

Sensor purge available with composite sensors

If purchased with a composite sensor instead of the field-replaceable HUMICAP® R2 sensor, HMP3 can use the sensor purge feature. In environments with high concentrations of chemicals and cleaning agents, sensor purge helps to maintain measurement accuracy between calibration intervals.

Sensor purge involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

Vaisala Indigo product family

Indigo transmitters extend the capabilities of Indigo-compatible measurement probes. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, digital outputs, and relays. Cable length between probe and transmitter can be extended to up to 30 meters.

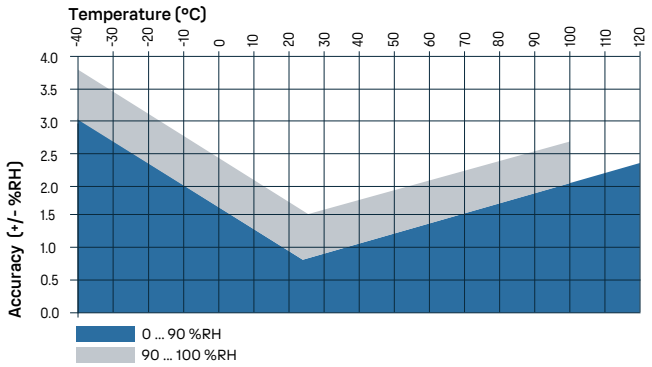
The Indigo80 handheld indicator is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting the probe. For more information, see www.vaisala.com/indigo.

Technical data

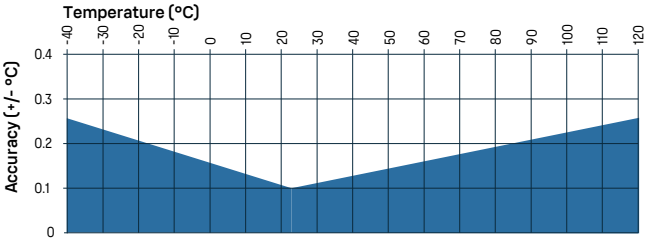
Measurement performance

Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2 HUMICAP® R2C [3] HUMICAP® 180VC [3] [4]
Temperature	
Sensor	Pt100 RTD Class F0.1 IEC 60751
Measurement range	−40 ... +120 °C (−40 ... +248 °F)
Accuracy [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) Sensor purge feature available with this sensor.
4) H_2O_2 resistant. With HUMICAP® 180VC sensor, accuracy is not specified below −20 °C (−4 °F) operating temperature.



HMP3 humidity measurement accuracy as a function of temperature



HMP3 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +80 °C (−40 ... +176 °F)
Operating temperature of probe head	−40 ... +120 °C (−40 ... +248 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	−40 ... +80 °C (−40 ... +176 °F)
Operating environment	Suitable for outdoor use
Measurement environment	For air, nitrogen, hydrogen, argon, helium, and oxygen [1]
IP rating of probe body	IP66

1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

Inputs and outputs

Operating voltage	15–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated
Protocols	Modbus RTU

Output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Type approvals	DNV GL certificate no. TAA00002YT
Compliance marks	CE, China RoHS, RCM

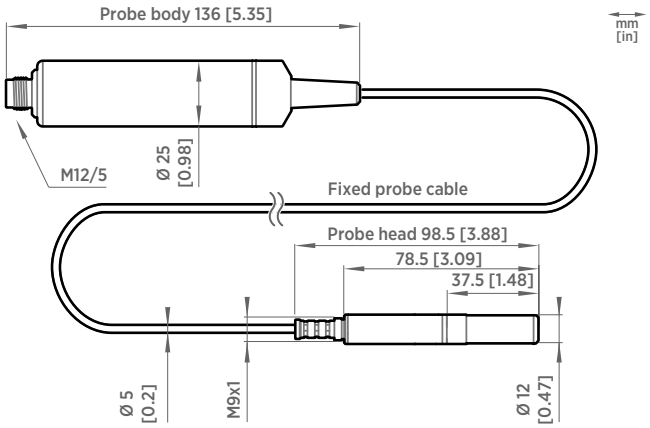
Mechanical specifications

Connector	M12 5-pin A-coded male
Weight (with a 2-m cable)	302 g (10.65 oz)
Probe cable length	0.15 m (0.49 ft), 2 m (6.56 ft), 5 m (16.40 ft) or 10 m (32.80 ft)
Materials	
Probe	AISI 316L
Probe body	AISI 316L
Cable jacket	FEP

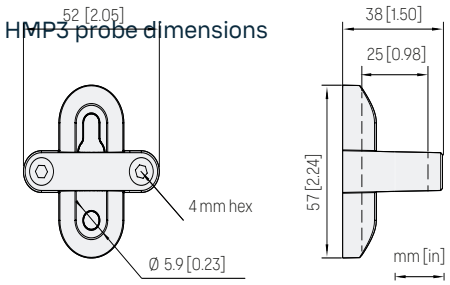
Accessories

Duct installation kit for humidity probe	210697
Solar radiation shield DTR502B	DTR502B
Cable gland M20×1.5 with split seal	HMP247CG
Magnetic probe holder for Ø 12 mm probe heads [1]	ASM213382SP
Indigo USB adapter [2]	USB2

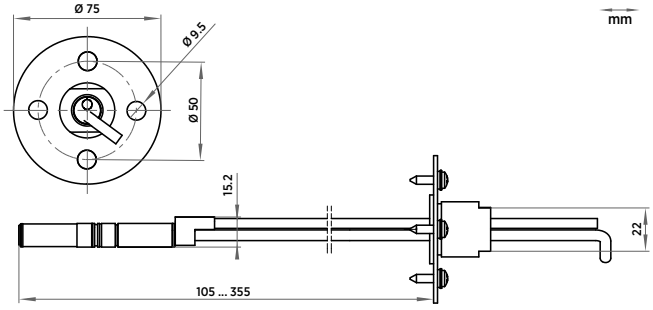
1) Not suitable for use at extreme temperatures.
2) Vaisala Insight software for Windows available at www.vaisala.com/insight.



HMP3 probe dimensions



Probe holder ASM213582 dimensions



Duct installation kit 210697 dimensions with probe

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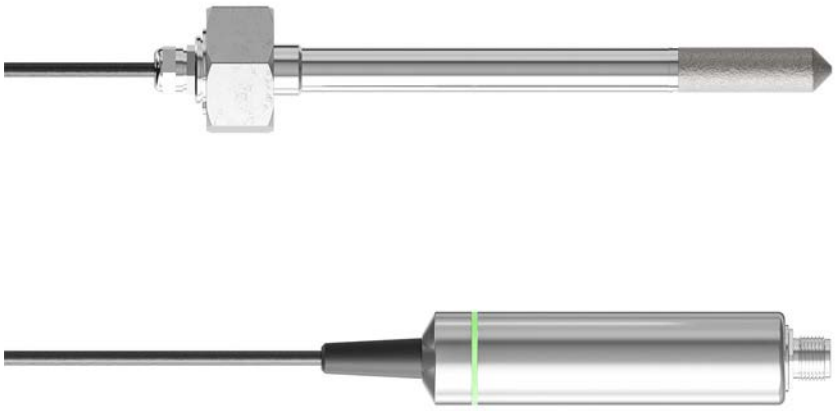
HMP4 Relative Humidity and Temperature Probe

For pressurized and vacuum processes



Features

- RH accuracy up to ±0.8 %RH
- Temperature accuracy up to ±0.1 °C (±0.18 °F)
- Temperature measurement range −70 ... +180 °C (−94 ... +356 °F)
- Operating pressure 0–100 bar
- Sensor purge improves long-term stability and chemical resistance
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable calibration certificate: 6 points for humidity, 1 point for temperature

Vaisala HUMICAP® Humidity and Temperature Probe HMP4 is designed for high-pressure applications such as compressed air systems in maritime, breathing air, and industrial applications, where measurement performance and chemical tolerance are essential.

Proven Vaisala HUMICAP® performance

Vaisala is the original innovator of the thin-film capacitive humidity measurement technology, which has now become the industry standard in humidity measurement.

HUMICAP® technology results from Vaisala's 40-year experience in industrial humidity measurement, providing the best stability, fast response time, and low hysteresis in a wide range of applications.

Sensor purge minimizes effects of contaminants

In environments with high concentrations of chemicals and cleaning agents, the sensor purge option helps to maintain measurement accuracy between calibration intervals.

The sensor purge involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

Vaisala Indigo product family

Indigo transmitters extend the capabilities of Indigo-compatible measurement probes. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, digital outputs, and relays. Cable length between probe and transmitter can be extended to up to 30 meters.

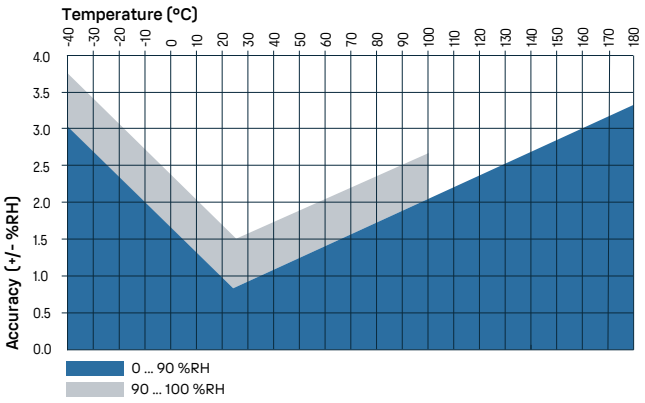
The Indigo80 handheld indicator is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting the probe. For more information, see www.vaisala.com/indigo.

Technical data

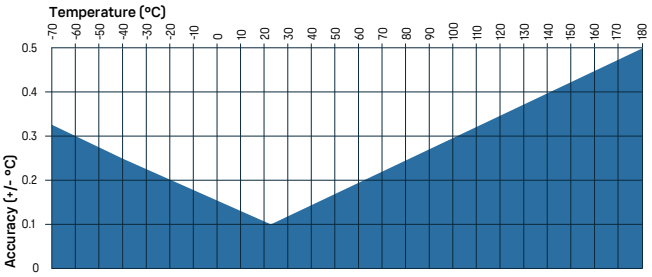
Measurement performance

Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2 HUMICAP® R2C [3]
Temperature	
Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Accuracy [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) Sensor purge feature available with this sensor.



HMP4 humidity measurement accuracy as a function of temperature



HMP4 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +80 °C (−40 ... +176 °F)
Operating temperature of probe head	−70 ... +180 °C (−94 ... +356 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	−40 ... +80 °C (−40 ... +176 °F)
Operational pressure	< 100 bar
Operating environment	Suitable for outdoor use
Measurement environment	For air, nitrogen, hydrogen, argon, helium, oxygen, and vacuum [1]
IP rating of probe body	IP66

1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

Inputs and outputs

Operating voltage	15–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated
Protocols	Modbus RTU

Output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Type approvals	DNV GL certificate no. TAA00002YT
Compliance marks	CE, China RoHS, RCM

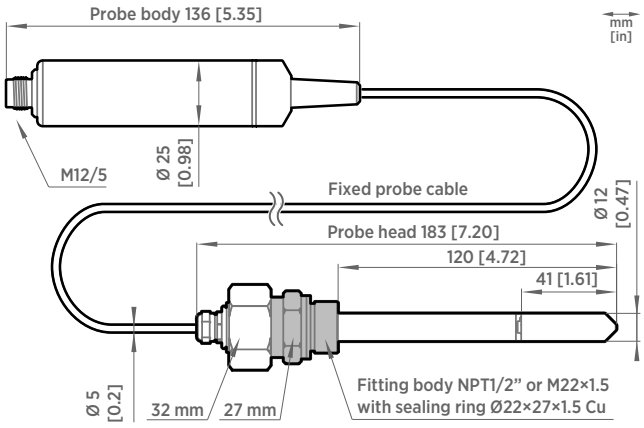
Mechanical specifications

Connector	M12 5-pin A-coded male
Fitting body	M22×1.5 or NPT1/2"
Weight (with a 2-m cable)	530 g (18.7 oz)
Probe cable length	2 m (6.56 ft)
Materials	
Probe	AISI 316
Probe body	AISI 316
Cable jacket	FEP

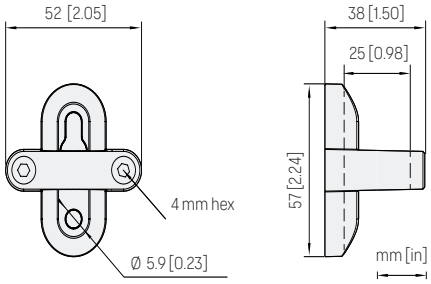
Accessories

Indigo USB adapter [1]	USB2
Calibration adapter for HMK15	211302SP

1) Vaisala Insight software for Windows available at www.vaisala.com/insight.



HMP4 probe dimensions



Probe holder ASM213582 dimensions

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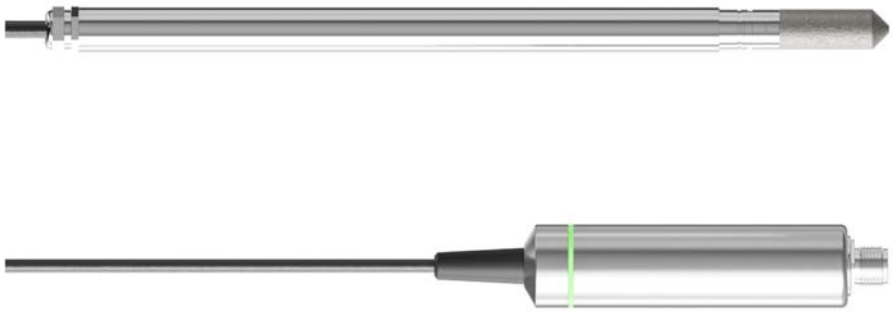
HMP5 Relative Humidity and Temperature Probe

For high temperatures



Features

- RH accuracy up to ±0.8 %RH
- Temperature accuracy up to ±0.1 °C (±0.18 °F)
- Temperature measurement range −70 ... +180 °C (−94 ... +356 °F)
- Operating temperature of probe body −40 ... +80 °C (−40 ... +176 °F)
- Sensor purge improves long-term stability and chemical resistance
- Modbus® RTU over RS-485
- 250-mm (9.84 in) probe allows easy process installation through insulation
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable calibration certificate: 6 points for humidity, 1 point for temperature

Vaisala HUMICAP® Humidity and Temperature Probe HMP5 is designed for high-temperature applications such as baking ovens, pasta dryers, and industrial drying kilns, where measurement performance and chemical tolerance are essential.

Proven Vaisala HUMICAP® performance

Vaisala is the original innovator of the thin-film capacitive humidity measurement technology, which has now become the industry standard in humidity measurement.

HUMICAP® technology results from Vaisala's 40-year experience in industrial humidity measurement, providing the best stability, fast response time, and low hysteresis in a wide range of applications.

Sensor purge minimizes effects of contaminants

In environments with high concentrations of chemicals and cleaning agents, the sensor purge option helps to maintain measurement accuracy between calibration intervals.

Sensor purge involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

Vaisala Indigo product family

Indigo transmitters extend the capabilities of Indigo-compatible measurement probes. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, digital outputs, and relays. Cable length between probe and transmitter can be extended to up to 30 meters.

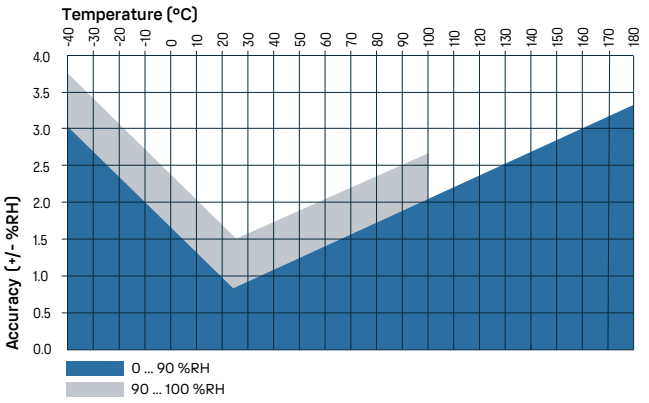
The Indigo80 handheld indicator is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting the probe. For more information, see www.vaisala.com/indigo.

Technical data

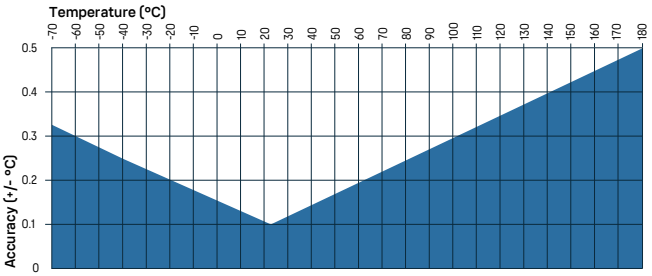
Measurement performance

Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2 HUMICAP® R2C [3]
Temperature	
Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Accuracy at +23 °C (+73.4 °F) [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) Sensor purge feature available with this sensor.



HMP5 humidity measurement accuracy as a function of temperature



HMP5 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +80 °C (−40 ... +176 °F)
Operating temperature of probe head	−70 ... +180 °C (−94 ... +356 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	−40 ... +80 °C (−40 ... +176 °F)
Operating environment	Suitable for outdoor use
IP rating of probe body	IP66

Inputs and outputs

Operating voltage	15–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated
Protocols	Modbus RTU

Output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Type approvals	DNV GL certificate no. TAA00002YT
Compliance marks	CE, China RoHS, RCM

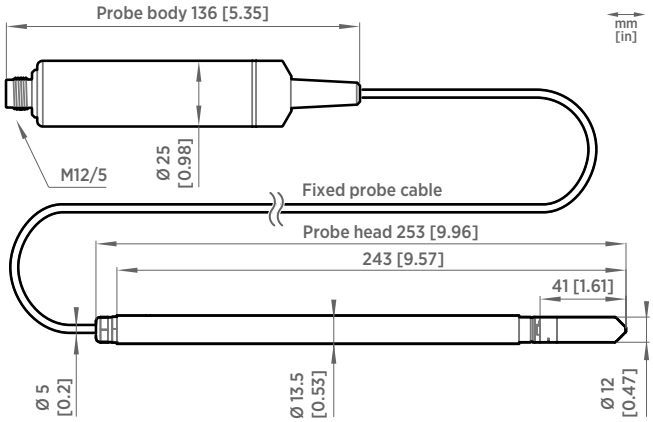
Mechanical specifications

Connector	M12 5-pin A-coded male
Weight (with a 2-m cable)	436 g (15.37 oz)
Probe cable length	2 m (6.56 ft) or 10 m (32.8 ft)
Materials	
Probe	AISI 316L
Probe body	AISI 316L
Cable jacket	FEP

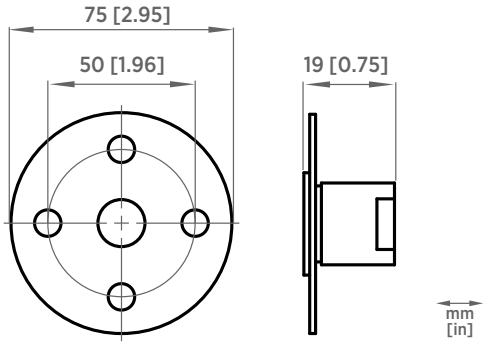
Accessories

Mounting flange	210696
Indigo USB adapter [1]	USB2
Calibration adapter for HMK15	211302SP

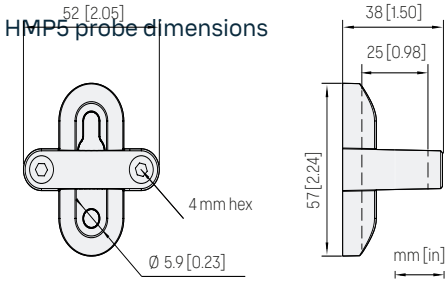
1) Vaisala Insight software for Windows available at www.vaisala.com/insight.



HMP5 probe dimensions



Mounting flange 210696 dimensions

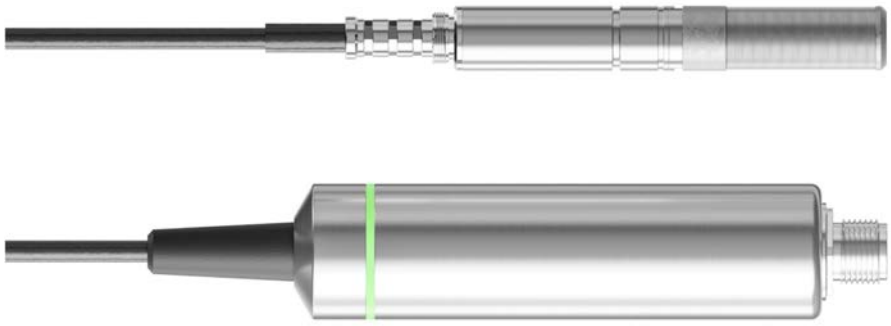


Probe holder ASM213582 dimensions

VAISALA

HMP7 Relative Humidity and Temperature Probe

For high humidities



Features

- RH accuracy up to ±0.8 %RH
- Temperature accuracy up to ±0.1 °C (±0.18 °F)
- Temperature measurement range −70 ... +180 °C (−94 ... +356 °F)
- Vapor and pressure proof construction
- Condensation prevention with probe heating
- Sensor purge improves long-term stability and chemical resistance
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable calibration certificate: 6 points for humidity, 1 point for temperature

Vaisala HUMICAP® Humidity and Temperature Probe HMP7 is designed for applications that involve constant high humidity or rapid changes in humidity, such as drying and test chambers, combustion air, and other humidifiers and meteorological measurements, where measurement performance and chemical tolerance are essential.

Proven Vaisala HUMICAP® performance

Vaisala is the original innovator of the thin-film capacitive humidity measurement technology, which has now become the industry standard in humidity measurement.

HUMICAP® technology results from Vaisala's 40-year experience in industrial humidity measurement, providing the best stability, fast response time, and low hysteresis in a wide range of applications.

Avoiding condensation at extreme humidity

Probe heating functionality heats up not only the sensor, but the whole probe head. When probe temperature is heated above dew point temperature, condensation on the probe can be avoided while measuring the dew point temperature of the process. By setting the temperature compensation value obtained, for example, with the TMP1 temperature probe, true relative humidity at process temperature can be measured while avoiding condensation by elevated probe temperature.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

Vaisala Indigo product family

Indigo transmitters extend the capabilities of Indigo-compatible measurement probes. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, digital outputs, and relays. Cable length between probe and transmitter can be extended to up to 30 meters.

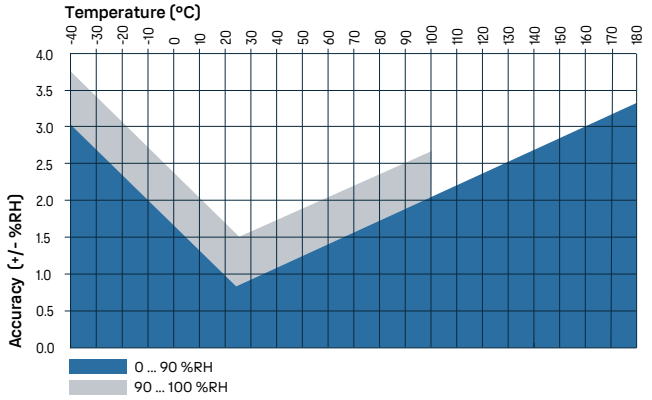
The Indigo80 handheld indicator is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting the probe. For more information, see www.vaisala.com/indigo.

Technical data

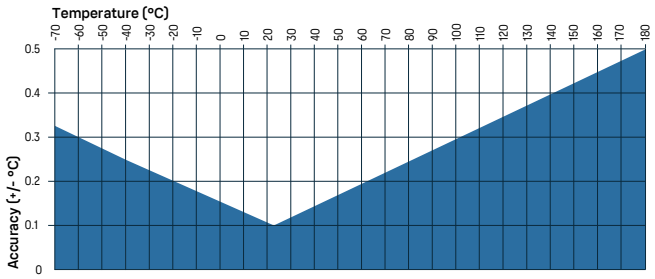
Measurement performance

Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2 HUMICAP® R2C [3] HUMICAP® 180VC [3] [4]
Temperature	
Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Accuracy at +23 °C (+73.4 °F) [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751

1) *Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.*
2) *Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.*
3) *Sensor purge feature available with this sensor.*
4) *H_2O_2 resistant. With HUMICAP® 180VC sensor, accuracy is not specified below −20 °C (−4 °F) operating temperature.*



HMP7 humidity measurement accuracy as a function of temperature



HMP7 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +80 °C (−40 ... +176 °F)
Operating temperature of probe head	−70 ... +180 °C (−94 ... +356 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	−40 ... +80 °C (−40 ... +176 °F)
Operational pressure	< 10 bar
Operating environment	Suitable for outdoor use
Measurement environment	For air, nitrogen, hydrogen, argon, helium, oxygen, and vacuum [1]
IP rating of probe body	IP66

1) *Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.*

Inputs and outputs

Operating voltage	18–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated
Protocols	Modbus RTU

Output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Type approvals	DNV GL certificate no. TAA00002YT
Compliance marks	CE, China RoHS, RCM

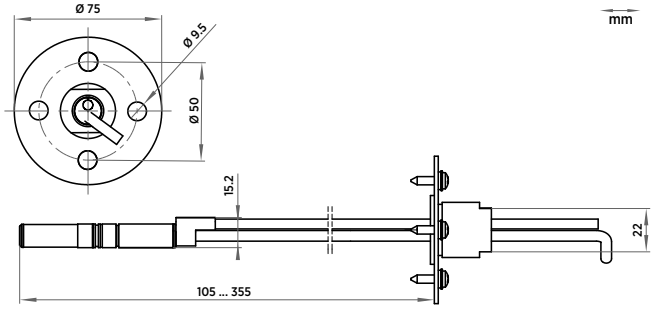
Mechanical specifications

Connector	M12 5-pin A-coded male
Weight (with a 2-m cable)	310 g (10.9 oz)
Probe cable length	0.15 m (0.49 ft), 2 m (6.56 ft) or 10 m (32.80 ft)
Materials	
Probe	AISI 316L
Probe body	AISI 316L
Cable jacket	FEP

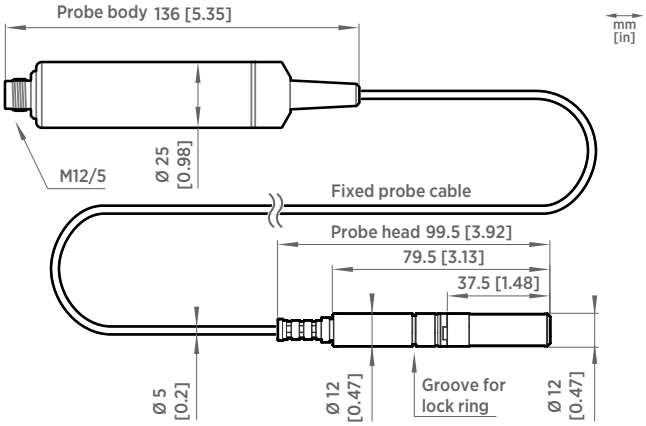
Accessories

Duct installation kit for humidity probe	210697
Solar radiation shield DTR502B	DTR502B
Warmed probe accessory	HMT330WPA
Cable gland M20×1.5 with split seal	HMP247CG
Swagelok® for 12 mm probe, 1/2" ISO thread	SWG12ISO12
Swagelok® for 12 mm probe, 3/8" ISO thread	SWG12ISO38
Swagelok® for 12 mm probe, 1/2" NPT thread	SWG12NPT12
Magnetic probe holder for Ø 12 mm probe heads [1]	ASM213382SP
Indigo USB adapter [2]	USB2
Calibration adapter for HMK15	211302SP

1) Not suitable for use at extreme temperatures.
2) Vaisala Insight software for Windows available at www.vaisala.com/insight.



Duct installation kit 210697 dimensions with probe

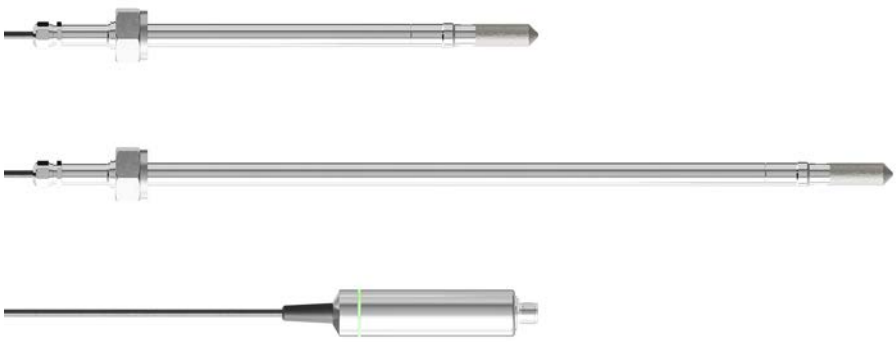


HMP7 probe dimensions

VAISALA

HMP8 Relative Humidity and Temperature Probe

For pressurized and vacuum processes



Features

- RH accuracy up to ±0.8 %RH
- Temperature accuracy up to ±0.1 °C (±0.18 °F)
- Operating pressure 0–40 bar
- Temperature measurement range −70 ... +180 °C (−94 ... +356 °F)
- Sensor purge improves long-term stability and chemical resistance
- Two lengths available for the probe head: 268 mm and 454 mm
- Probe installation depth can be freely adjusted and probe can be hot-swapped from pressurized pipelines with an optional ball valve kit
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable calibration certificate: 6 points for humidity, 1 point for temperature

Vaisala HUMICAP® Humidity and Temperature Probe HMP8 is designed for pressurized applications in compressed air systems, refrigerant dryers, and other pressurized industrial applications, where easy insertion and removal of the probe and adjustable installation depth into the pipeline are needed.

Proven Vaisala HUMICAP® performance

Vaisala is the original innovator of the thin-film capacitive humidity measurement technology, which has now become the industry standard in humidity measurement.

HUMICAP® technology results from Vaisala's 40-year experience in industrial humidity measurement, providing the best stability, fast response time, and low hysteresis in a wide range of applications.

Sensor purge minimizes effects of contaminants

In environments with high concentrations of chemicals and cleaning agents, the sensor purge option helps to maintain measurement accuracy between calibration intervals.

Sensor purge involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

Vaisala Indigo product family

Indigo transmitters extend the capabilities of Indigo-compatible measurement probes. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, digital outputs, and relays. Cable length between probe and transmitter can be extended to up to 30 meters.

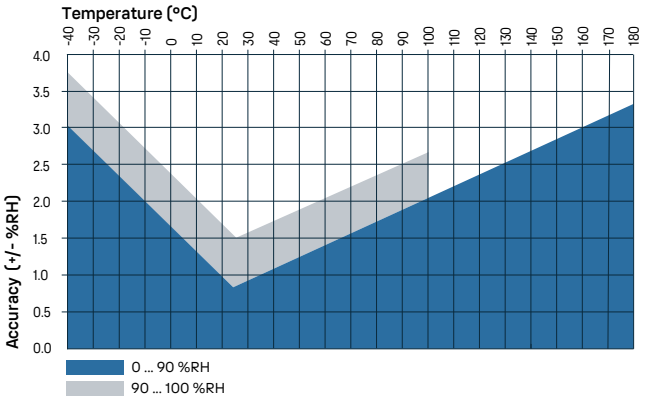
The Indigo80 handheld indicator is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting the probe. For more information, see www.vaisala.com/indigo.

Technical data

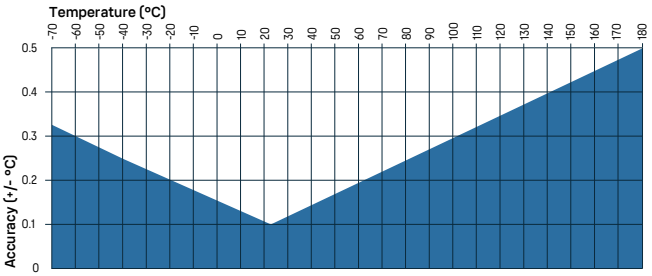
Measurement performance

Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2 HUMICAP® R2C [3]
Temperature	
Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Accuracy at +23 °C (+73.4 °F) [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) Sensor purge feature available with this sensor.



HMP8 humidity measurement accuracy as a function of temperature



HMP8 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +80 °C (−40 ... +176 °F)
Operating temperature of probe head	−70 ... +180 °C (−94 ... +356 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	−40 ... +80 °C (−40 ... +176 °F)
Operational pressure	< 40 bar
Operating environment	Suitable for outdoor use
Measurement environment	For air, nitrogen, hydrogen, argon, helium, oxygen, and vacuum [1]
IP rating of probe body	IP66
Ball valve	
Operating temperature	Up to +100 °C (+212 °F)
Operating pressure	Up to 40 bar (580 psi), absolute

1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

Inputs and outputs

Operating voltage	15–30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated
Protocols	Modbus RTU

Output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Type approvals	DNV GL certificate no. TAA00002YT [1]
Compliance marks	CE, China RoHS, RCM

1) DNV GL certificate applies to the 268-mm-long HMP8 model only, not to the 454-mm-long model.

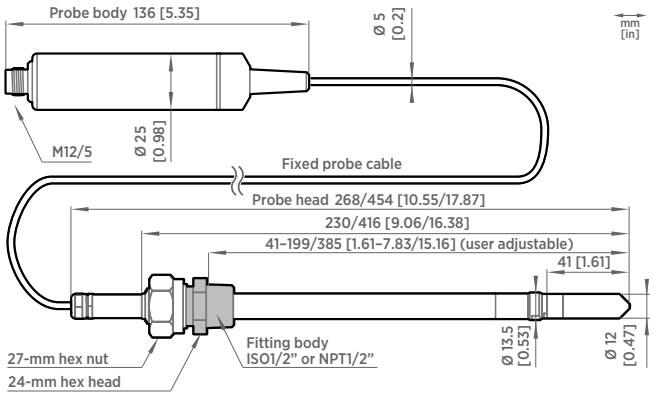
Mechanical specifications

Connector	M12 5-pin A-coded male
Probe fitting	ISO1/2" and NPT1/2" fittings included
Weight (with a 2-m cable)	268-mm-long HMP8: 512 g (18.1 oz) 454-mm-long HMP8: 612 g (21.6 oz)
Probe cable length	2 m (6.56 ft) or 10 m (32.80 ft)
Adjustable installation depth	268-mm-long HMP8: 41–199 mm (1.61–7.83 in) 454-mm-long HMP8: 41–385 mm (1.61–15.16 in)
Materials	
Probe	AISI 316L
Probe body	AISI 316L
Cable jacket	FEP

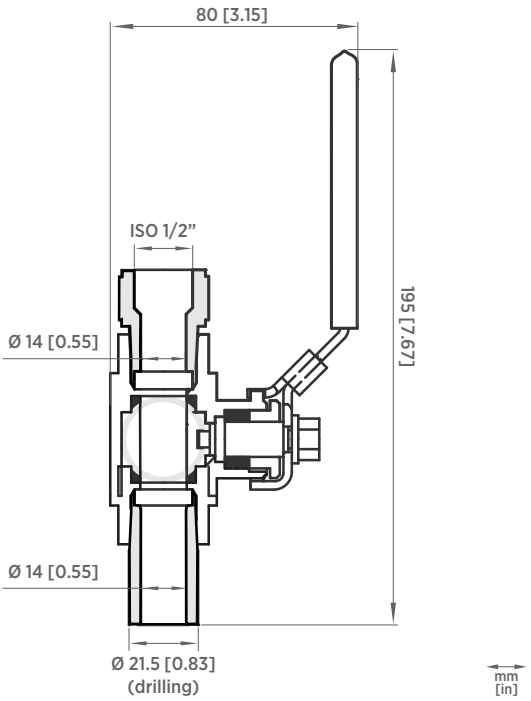
Accessories

Ball valve kit ISO 1/2" with welding joint	BALLVALVE-1
Indigo USB adapter [1]	USB2
Calibration adapter for HMK15	211302SP
Weatherproof carrying case for Indigo80 and a series 8 probe [2]	ASM215318

1) Vaisala Insight software for Windows available at www.vaisala.com/insight.
2) For example, MMP8, HMP8, or DMP8 with a max. 2-m (6.6-ft) probe connection cable.



HMP8 probe dimensions



Ball valve kit dimensions

VAISALA

HMP9 Compact Humidity and Temperature Probe

Features

- Miniature probe head with low thermal mass for superior response time
- RH accuracy up to 0.8 %RH
- Temperature accuracy up to 0.1 °C (0.18 °F)
- Temperature measurement range −40 ... +120 °C (−40 ... +248 °F)
- Sensor purge improves long-term stability and chemical resistance
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable calibration certificate: 6 points for humidity, 1 point for temperature
- M10×1.5 cable gland included for mounting the probe head

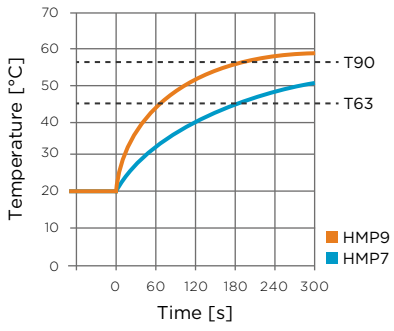
Vaisala HUMICAP® Humidity and Temperature Probe HMP9 is designed for easy installation into rapidly changing environments where fast response time, measurement performance, and chemical tolerance are essential.

Miniature probe head with HUMICAP® performance

The main feature of HMP9 is its 5 mm (0.2 in) diameter miniature probe head. Despite the small footprint, the probe head contains a HUMICAP® sensor that provides its industry-standard humidity measurement performance.

HMP9 has great stability, fast response time, and low hysteresis in a wide range of applications. This makes it the superior choice in applications where the mechanical properties or replaceable filters of heavier probes are not needed.

Measurement environments where occasional condensation is present are not a problem as long as the probe is protected from exposure to liquid water. For continuously condensing environments, use HMP7 with probe heating instead.



HMP9 T response time compared to HMP7

Sensor purge minimizes effects of contaminants

In environments with high concentrations of chemicals and cleaning agents, the sensor purge option helps to maintain measurement accuracy between calibration intervals.

Sensor purge involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

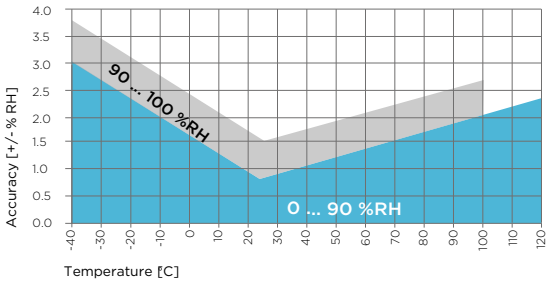
For more information on the Indigo product family, see www.vaisala.com/indigo.

Technical data

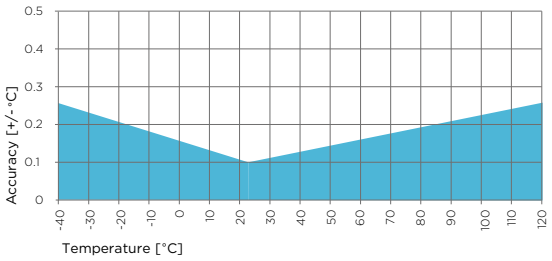
Measurement performance

Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.7 %RH (0–40 %RH) ±1 %RH (40–95 %RH)
T_{63} response time [3]	15 s
Sensor	HUMICAP® I
Temperature	
Measurement range	−40 ... +120 °C (−40 ... +248 °F)
Accuracy at +23 °C (+73.4 °F) [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
T_{63} response time [3]	70 s

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) In still air.



HMP9 humidity measurement accuracy as a function of temperature



HMP9 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +60 °C (−40 ... +140 °F)
Operating temperature of probe head	−40 ... +120 °C (−40 ... +248 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	−40 ... +60 °C (−40 ... +140 °F)
Operating environment	Suitable for outdoor use when protected from rain
Measurement environment	For air, nitrogen, hydrogen, argon, helium, and oxygen [1]
IP rating of probe body	IP65

1) Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.

Inputs and outputs

Operating voltage	15–30 V DC
Current consumption	5 mA typical, 400 mA max.
Digital output	RS-485, non-isolated
Default serial settings	19200 bps N 8 2
Protocol	Modbus RTU

Output parameters

Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew/frost point depression (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	Wet-bulb temperature (°C)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Compliance marks	CE, China RoHS, RCM

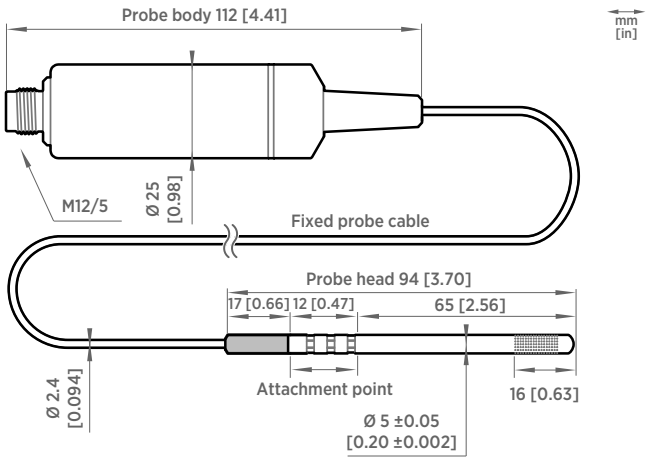
Mechanical specifications

Connector	M12 5-pin A-coded male
Weight (with a 2-m cable)	68 g (2.40 oz)
Probe cable length	2 m (6.56 ft)
Materials	
Probe	AISI 316L
Probe body	PBT
Cable overmolds	FEP

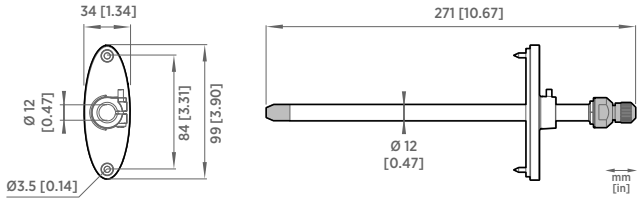
Accessories

HMP9 calibration adapter for HMK15	ASM213801
HMP9 duct installation kit	ASM214055
Solar radiation shield DTR502B with sensor head support 215130	DTR502B and 215130
Indigo USB adapter [1]	USB2

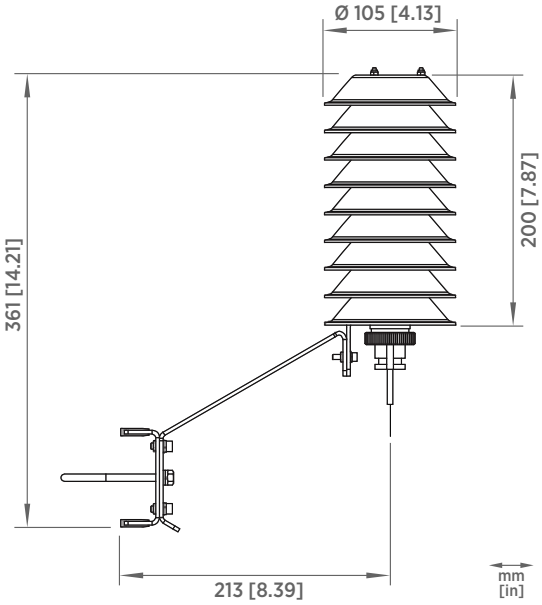
1) Vaisala Insight software for Windows available at www.vaisala.com/insight.



HMP9 probe dimensions



HMP9 Duct Installation Kit ASM214055 dimensions



Solar Radiation Shield DTR502B dimensions

VAISALA

TMP1 Temperature Probe

Features

- Temperature accuracy up to ±0.1 °C (±0.18 °F)
- Temperature measurement range −70 ... +180 °C (−94 ... +356 °F)
- Modbus® RTU over RS-485
- Compatible with Vaisala Indigo products and Insight PC software
- Traceable 2-point calibration certificate with calibration points at +20 and +70 °C (+68 and +158 °F)

Vaisala Temperature Probe TMP1 is designed for demanding temperature measurements in industrial applications such as pharmaceutical industry and calibration laboratories, where accuracy and robustness are essential.

Flexible connectivity

The probe can be used as a standalone digital Modbus RTU transmitter over an RS-485 serial bus, and it can also be connected to Indigo transmitters and the Indigo80 handheld indicator. For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight.

Vaisala Indigo product family

Indigo transmitters extend the capabilities of Indigo-compatible measurement probes. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, digital outputs, and relays. Cable length between probe and transmitter can be extended to up to 30 meters.

The Indigo80 handheld indicator is ideal for spot-checking and process monitoring, as well as for configuring, troubleshooting, calibrating, and adjusting the probe. For more information, see www.vaisala.com/indigo.

Relative humidity measurements in high humidities

When the TMP1 probe is connected to a control system in parallel with HMP7 Relative Humidity and Temperature Probe, it is possible to have relative humidity measurement in actual process temperature while using probe heating in the relative humidity probe. Probe heating helps to avoid condensation in situations where the dew point temperature of the process is close to the ambient temperature.

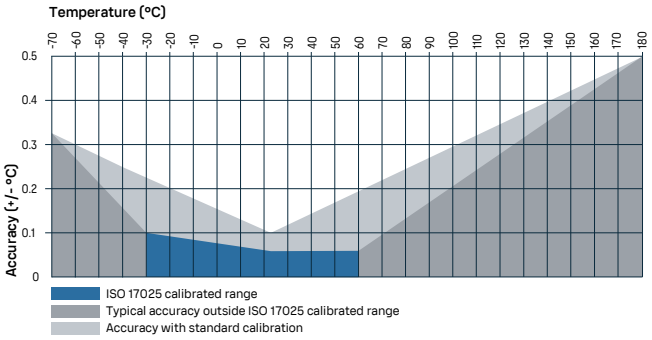
When the humidity probe is heated above dew point temperature, condensation can be avoided and the relative humidity in the actual process temperature can be back-calculated based on the true process temperature measurement received from TMP1.

Technical data

Measurement performance

Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751
Standard calibration [1]	
Accuracy at +23 °C (+73.4 °F)	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Optional ISO 17025 calibration [3]	
Accuracy at +23 °C (+73.4 °F) [1]	±0.06 °C (±0.108 °F)
Calibration uncertainty [2]	±0.03 °C (±0.054 °F)

1) Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.
2) Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.
3) Accuracy depends on selected calibration points. Accuracy with ISO 17025 calibration is defined here using a 5-point calibration in the following points: −30, −10, 0, +30, and +60 °C. For more information on calibration services offered by Vaisala, see vaisala.com/calibration.



TMP1 temperature measurement accuracy over full range

Operating environment

Operating temperature of probe body	−40 ... +80 °C (−40 ... +176 °F)
Operating temperature of probe head	−70 ... +180 °C (−94 ... +356 °F)
Storage temperature	−40 ... +80 °C (−40 ... +176 °F)
Operating environment	Suitable for outdoor use
IP rating	
Probe body	IP66
Probe head and cable	IPX8/IPX9

Inputs and outputs

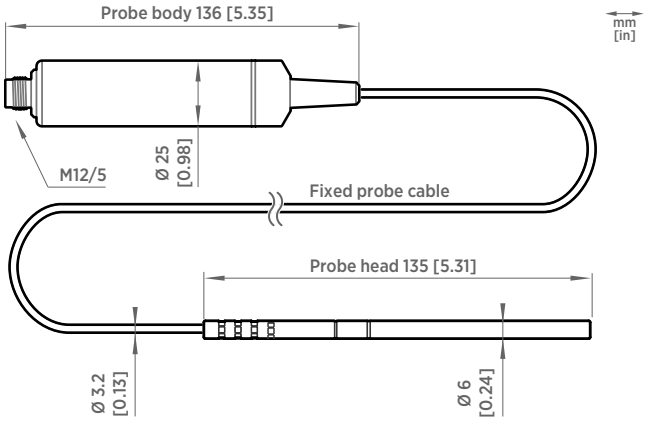
Operating voltage	15–30 V DC
Current consumption	10 mA typical
Digital output	RS-485, non-isolated
Protocols	Modbus RTU
Output parameters	Temperature (°C) Water vapor saturation pressure (hPa)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Type approvals	DNV GL certificate no. TAA00002YT
Compliance marks	CE, China RoHS, RCM

Mechanical specifications

Connector	M12 5-pin A-coded male
Weight (with a 2-m cable)	224 g (7.9 oz)
Probe cable length	2 m (6.56 ft) or 10 m (32.8 ft)
Materials	
Probe	AISI 316L
Probe body	AISI 316L
Cable jacket	FEP



TMP1 probe dimensions

Accessories

Duct installation kit for temperature probe	215003
Swagelok® for 6 mm probe, 1/8" ISO thread	SWG6ISO18
Swagelok® for 6 mm probe, 1/8" NPT thread	SWG6NPT18
Indigo USB adapter [1]	USB2

1) Vaisala Insight software for Windows available at www.vaisala.com/insight.

VAISALA

HMT370EX Series Intrinsically Safe Humidity and Temperature Transmitters

For operation in up to Zone 0 / 20

Features

- Intrinsically safe (Ex i) for operation in up to Zone 0 / 20
- Measures RH and T, and outputs an extensive range of calculated parameters
- Designed for harsh conditions
- Temperature range between −70 ... +180 °C (−94 ... +356 °F) depending on the probe option
- Vaisala HUMICAP® sensor features high accuracy, excellent long-term stability, and negligible hysteresis
- Display options: graphical LCD display and non-display model
- Traceable calibration (certificate included)
- Compatible with Vaisala Insight PC software and Vaisala Indigo80 handheld indicator

Vaisala HMT370EX Series HUMICAP® Humidity and Temperature Transmitters are the ideal solution for measuring humidity in hazardous areas. The intrinsically safe and robust transmitter operates safely and reliably even in the most hazardous classifications, such as Zone 0. The HMT370EX transmitter series can be used as a replacement of the long-running HMT360 transmitter series.

Interchangeable probes and detachable probe module

HMT370EX offers several probe options for different applications:

- HMP371 — wall mount
- HMP373 — confined spaces
- HMP374 — pressurized spaces
- HMP375 — high temperature
- HMP377 — high humidity
- HMP378 — pressurized pipelines

For information on the HMP378F and HMP378H probe variants for oil and JET A-1 fuel moisture and temperature measurement, see HMP378F and HMP378H Datasheet (B212512EN). HMP371 and HMP373 can be ordered as temperature-only versions.

Thanks to the detachable probe module, probes can be easily replaced and removed for calibration outside the hazardous area without removing the entire transmitter. Attaching new probes involves minimal reconfiguration, as up-to-date settings can be restored from the transmitter.

Intrinsically safe and robust

The entire HMT370EX transmitter can be installed directly in hazardous areas. It can withstand continuous exposure to potentially explosive environments that contain flammable gases or dust. Operation in either gas or dust environments requires no additional protective enclosures. A rugged design, combined with trouble-free operation, ensures a long-term solution for monitoring humidity and dew point in potentially explosive environments.

Easy configuration access with local display and Insight PC software

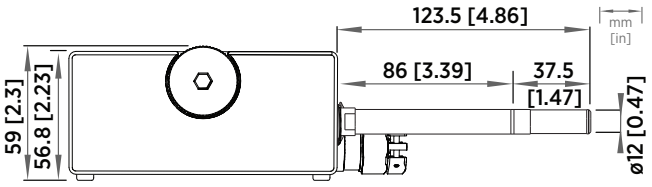
Output configuration and measurement calibration and adjustment can be carried out directly on the local display interface. For additional configuration and monitoring options, you can connect the transmitter to Vaisala Insight PC software with an accessory USB cable. The probe and transmitter body can be connected to Insight for configuration either together as one unit or separately.

Interchangeable probes for HMT370EX intrinsically safe humidity and temperature transmitter

HMP371 for wall mounting

Temperature range	-40 ... +60 °C (-40 ... +140 °F)
Probe diameter	12 mm (0.47 in)

HMP371 probe shown with a stainless steel netting filter

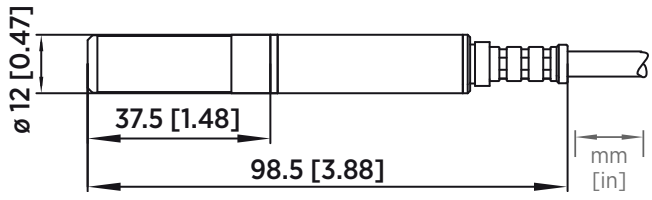


HMP371 dimensions

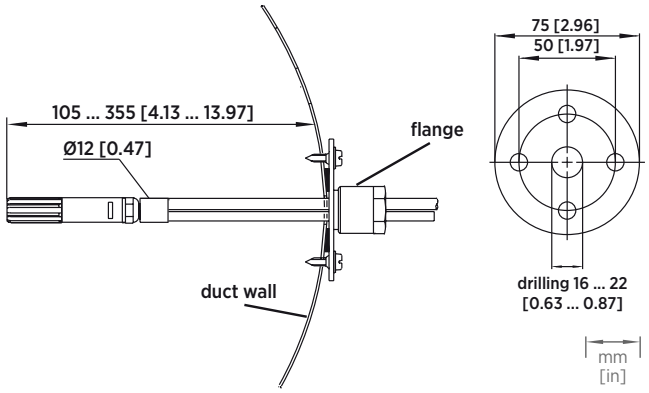
HMP373 for confined spaces

Temperature range with Teflon cable	-40 ... +120 °C (-40 ... +248 °F)
Temperature range with rubber cable	-40 ... +80 °C (-40 ... +176 °F)
Probe cable length	2, 5, or 10 meters (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Probe diameter	12 mm (0.47 in)
Installation	
Duct installation kit	210697
Cable gland M20x1.5 with splitting seal	HMP247CG
Swagelok for 12mm probe, 1/2" NPT thread	SWG12NPT12

The small-sized HMP373 probe fits into tight spaces: shown connected with a Teflon cable



HMP373 dimensions

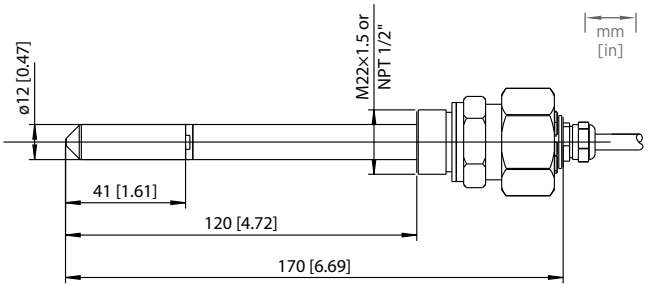


Left: Installation kit for duct mounting dimensions. Right: Installation flange dimensions. Aluminum or stainless steel.

HMP374 for high pressure

Temperature range	-70 ... +180 °C (-94 ... +356 °F)
Pressure range	0–10 MPa
Probe cable length	2, 5, or 10 meters (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Probe diameter	12 mm (0.47 in)
Fitting body M22x1.5	17223
Fitting body NPT1/2	17225

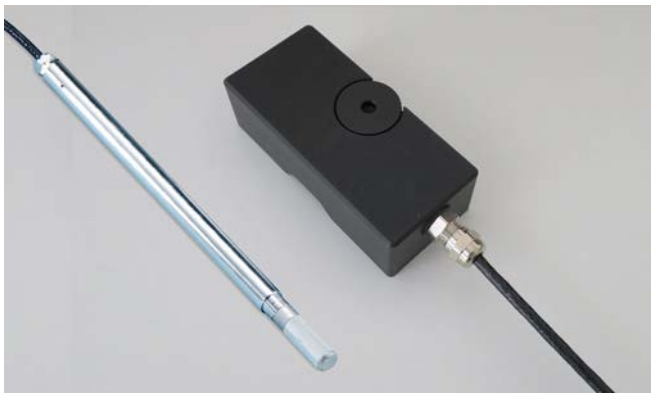
HMP374 is designed for measurement in pressurized spaces or vacuum chambers



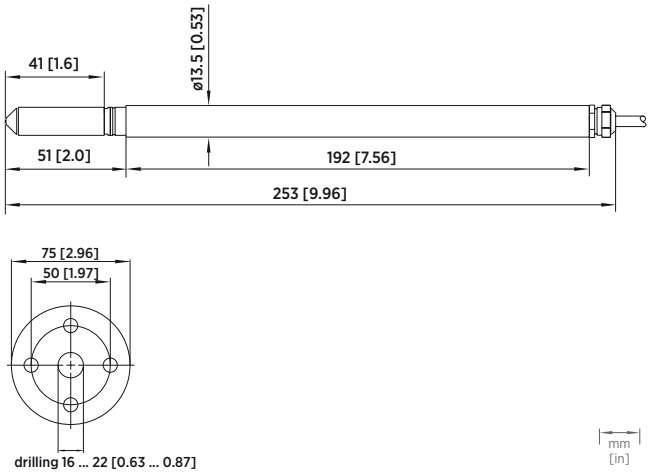
HMP374 dimensions

HMP375 for high temperature

Temperature range	-70 ... +180 °C (-94 ... +356 °F)
Probe cable length	2, 5, or 10 meters (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Probe diameter	13.5 mm (0.53 in)
Installation	
Mounting flange	210696
Cable gland M20x1.5 with splitting seal	HMP247CG



HMP375 is designed for high temperature environments

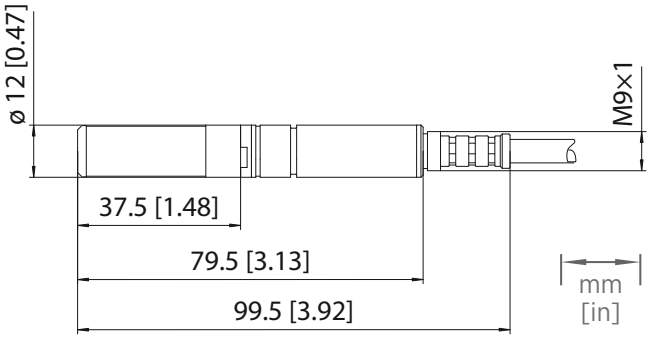


HMP375 probe and stainless steel installation flange dimensions

HMP377 for high humidities

Temperature range	-70 ... +180 °C (-94 ... +356 °F)
Pressure range	0–1 MPa
Probe cable length	2, 5, or 10 meters (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Probe diameter	12 mm (0.47 in)
Installation	
Duct installation kit	210697
Cable gland M20x1.5 with splitting seal	HMP247CG
Swagelok for 12 mm probe, 3/8" ISO thread	SWG12ISO38
Swagelok for 12 mm probe, 1/2" NPT thread	SWG12NPT12

HMP377 is constructed to be installed in environments with high humidities

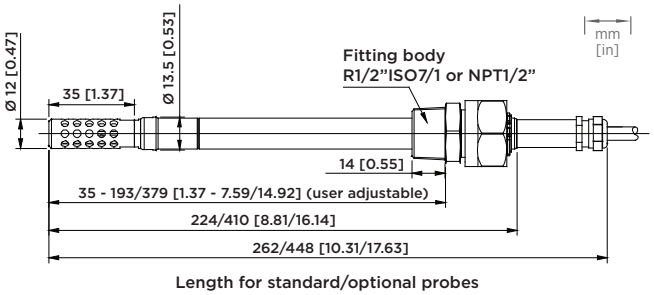


HMP377 dimensions

HMP378 for pressurized pipelines

Temperature range	-70 ... +180 °C (-94 ... +356 °F)
Pressure range	0–4 MPa
Probe cable length	2, 5, or 10 meters (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Probe diameter	13.5 mm / 12 mm (0.53 in / 0.47 in)
Available probe lengths	262 mm / 448 mm (10.31 in / 17.6 in)
Installation	
Fitting body ISO1/2 solid structure	DRW212076SP
Fitting body NPT1/2 solid structure	NPTFITBODASP
Ball valve ISO 1/2 with welding joint	BALLVALVE-1

HMP378 enables flexible installation in pressurized pipelines



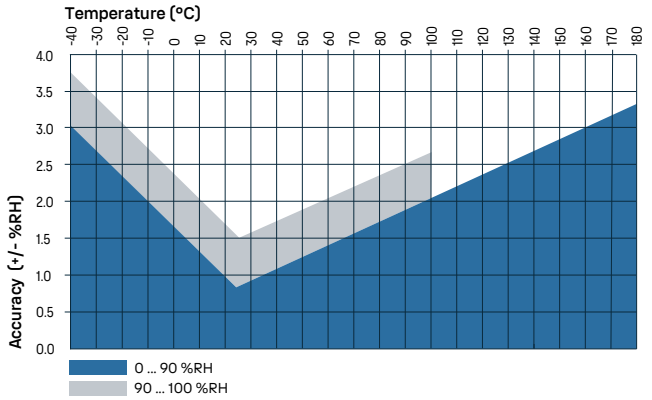
HMP378 dimensions

Technical data

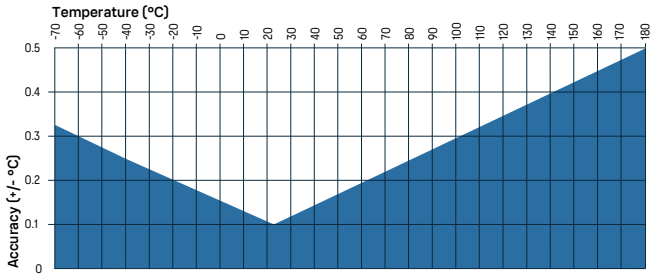
Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2
Temperature	
Measurement range	–70 ... +180 °C (–94 ... +356 °F)
Accuracy at +23 °C (+73.4 °F) [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt1000 RTD Class F0.1 IEC 60751
Other available measurement parameters [3]	
Dew point temperature, dew point / frost point temperature, absolute humidity, mixing ratio, wet-bulb temperature, water concentration, water vapor pressure, water vapor saturation pressure, enthalpy, dew point temperature difference, absolute humidity at NTP, water mass fraction	

1) *Defined against calibration reference. Including non-linearity, hysteresis, and repeatability.*
2) *Defined as ±2 standard deviation limits. Small variations possible; see calibration certificate.*
3) *Parameter options depend on selected probe variant. For specifications, see HMT370EX User Guide (M212305EN).*



Humidity measurement accuracy as function of temperature



Temperature measurement accuracy over full range

Operating environment

Operating temperature for electronics	-40 ... +60 °C (-40 ... +140 °F)
Operating temperature with display	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Pressure range	See probe specifications
Note: Do not install the LCD display model in a location where the transmitter is exposed to direct sunlight.	

Compliance

Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Compliance marks	CE, China RoHS, RCM

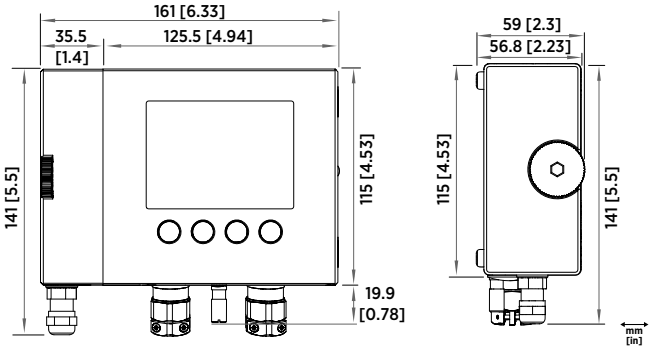
Inputs and outputs

Operating voltage	12–28 V
Analog outputs	2 outputs (two-wire, 4–20 mA) Connection via safety barriers
Typical accuracy of analog outputs at +20 °C	±0.0625 % full scale
Typical temperature dependence of analog outputs	0.005 % / °C (0.005 % / °F) full scale
Transmitter service port connection	USB cable *219690*
Probe service port connection	USB cable *USB2*
Display options	• Graphical LCD display • Model without display [1]

1) *Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.*

Mechanical specifications

Connections	Screw terminals, 0.33–2.0 mm² wires (AWG 14-22)
Cable glands	M20×1.5
Conduit fitting	NPT 1/2" and M16
Housing material	EN AW-6082
Housing weight	LCD transmitter: 1500 g (3.3 lb) LED transmitter: 1520 g (3.35 lb) HMP371 fixed probe: 320 g (0.7 lb)
IP rating	With probe connected to the transmitter: **IP66** With probe detached from the transmitter: **IP54**



HMT370EX transmitter dimensions

Ex classifications by region

NOTE: The Ex classifications show the highest level of compliance. Although lower compliance levels are not shown in the classification, they are also included in the classification. For example, compliance with Division 1 also means compliance with Division 2, and compliance with Zone 0 also means compliance with Zone 1 and Zone 2.	
Europe (ATEX)	
Gas classification EU (2014/34/EU)	II 1 G Ex ia IIC T4 Ga
Dust classification	II 1 D Ex ia IIIC T_{200} 85 °C Da
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 12.1 nF, P_i = 700 mW, L_i = 16 µH
Environmental specifications	
T_{amb}	-40 ... +60 °C (-40 ... +140 °F)
P_{amb}	0.8 ... 1.1 bar
International (IECEx)	
Gas classification	Ex ia IIC T4 Ga
Dust classification	II 1 D Ex ia IIIC T_{200} 85 °C Da
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 12.1 nF, P_i = 700 mW, L_i = 16 µH
Environmental specifications	
T_{amb}	-40 ... +60 °C (-40 ... +140 °F)
P_{amb}	0.8 ... 1.1 bar
Japan (CML)	
Ex classification	Ex ia IIC T4 Ga Ex ia IIIC T_{200} 85°C Da CML 21JPN2417X
China (NEPSI)	
Ex classification	Ex ia IIC T3-T6 Ga GYJ21.1325X
Korea (KCs)	
Ex classification	Ex ia IIC T4 Ga Ex ia IIIC T200 85 °C Da -40 °C ≤ Tamb ≤ +60 °C IECEx EESF 20.0044.X 21-KA4BO-0891X, 24-KA4BO-0509X
US (FM)	
Ex classification	Class I, Zone 0, AEx ia IIC T4 Ga Zone 20, AEx ia IIIC T85°C Da IS Class I, Division 1, Groups A, B, C, and D T4 IS Class II, III, Division 1, Groups E, F, and G T85°C
CAN (FM)	
HMT370EX equipment rating	Intrinsically safe for: Class I, II, III Division 1, Groups A, B, C, D, E, F, and G, T4 Class I, Zone 0, Ex ia IIC T4 Zone 20, Ex ia IIIC Temperature Code T85°C Ta: -40 °C to +60 °C; IP54 (transmitter alone) IP66 (transmitter with the probe body attached)
UK (UKEX)	
Ex classification	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T200 85 °C Da −40 °C ≤ Tamb ≤ +60 °C CML 21UKEX2316X

Transmitter accessory availability

Accessory	Item code	Compatible models
Cable lead-through accessories		
Cable gland M20 x 1.5 for Ø 5–11 mm cable	265207SP	All models
Cable gland M20 x 1.5 for Ø 10–14 mm cable	265208SP	All models
Conduit fitting M16	265243SP	All models
Conduit fitting NPT1/2"	265240SP	All models
Dummy plug (Ex, 2 pcs)	254931SP	All models
Mounting, wiring, cable, and adapter accessories		
HMT360 retrofit mounting plate	DRW253246SP	All models
Turbine mounting kit	HMT300TMK	All models
Outdoor installation kit (weather shield)	215109	All models
USB service cable for transmitter	219690	All models
Indigo80 handheld indicator connection cable (M12-M8) for transmitter	262195SP	All models
Zener barrier for 1 channel (with 2 channels, order 2 pcs)	210664	All models
Galvanic isolator for 1 channel	212483	All models
Galvanic isolator for 1 channel	272886SP	All models
Galvanic isolator for 2 channels	272887SP	All models
Calibration adapter for HMK15	211302	HMP371, HMP373, HMP374, HMP377

Probe spare parts and accessories

Accessory	Item code	Compatible models
M12 Indigo USB Adapter cable accessory for connecting HMT370EX probes to Insight	USB2	All models
Indigo80 handheld indicator connection cable (M12-M12) for probes	272075SP	All models
Ball valve ISO 1/2 with welding joint • Pressure range at +100 °C (+212 °F) 0–40 bar (0–580 psi absolute) (during installation max. 10 bar (145 psi absolute))	BALLVALVE-1	HMP378
Duct installation kit	210697	HMP373, HMP377
Mounting flange	210696	HMP375
Washer set for pressure-tight installation (3 pcs)	4PROBESETSP	HMP374
Cable gland M20×1.5 with split seal	HMP247CG	HMP373, HMP375, HMP377
Fitting body M22×1.5	17223SP	HMP374
Fitting body NPT1/2	17225SP	HMP374
Fitting body ISO1/2 solid structure	DRW212076SP	HMP378
Fitting body NPT1/2 solid structure	212810SP	HMP378
Swagelok fitting for 12 mm probe, 1/2" NPT thread	SWG12NPT12	HMP377
Swagelok fitting for 12 mm probe, 3/8" ISO thread	SWG12ISO38	HMP377
Swagelok fitting for 12 mm probe, 1/2" ISO thread	SWG12ISO12	HMP377
Thread adapter ISO 1/2" to NPT 1/2"	210662SP	All models
Manual press	HM36854SP	HMP378/F/H
Metallized PPS plastic filter grid with stainless steel mesh, for general use (pore size 15 µm)	DRW010281SP	All models
Stainless steel sintered filter, for general use (pore size 38 µm)	HM47280SP	All models
Metallized PPS plastic filter grid, for fast response in clean environments (6.5 mm gaps)	DRW010276SP	All models
Stainless steel filter for high oil flow applications	220752SP	HMP378/F/H
Stainless steel filter with PTFE membrane	214848SP	All models
Stainless steel filter for oil and vacuum environments	HM47453SP	All models

VAISALA

HMT310 Series Humidity and Temperature Transmitters

For demanding industrial applications

Features

- 4th generation Vaisala HUMICAP® sensor for superior accuracy and stability
- Full 0–100 %RH measurement, temperature range up to +180 °C (+356 °F), depending on model
- Small size, easy to integrate
- Insensitive to dust and most chemicals
- Two analog signals and RS-232 ASCII output
- Pressure tolerance up to 100 bar

HMT310 incorporates the latest generation Vaisala HUMICAP® sensor. The sensor is a capacitive thin-film polymer sensor providing high accuracy, excellent long-term stability, and negligible hysteresis. It is insensitive to dust, particulate dirt, and most chemicals. HMT310 has various options for different environments and measurements.

Several outputs, one connector

HMT310 is powered up with 10–35 VDC. It has two analog outputs and an RS-232 serial output in one M12 8-pin connector. The output signal and the supply power travel in the same cable, the only cable connected to the unit.

Chemical purge

Chemical purge helps to maintain measurement accuracy between calibration intervals. It involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

A variety of features to choose from

The following optional features and accessories are available for the HMT310 series:

- Warmed probe and sensor heating for high humidity conditions
- Chemical purge for applications risking an interference with chemicals in the measuring environment
- Calculated humidity quantities
- Sensor protection options and probe cable lengths
- Mounting kits
- Rain shield

Six models for demanding applications

The HMT310 series includes:

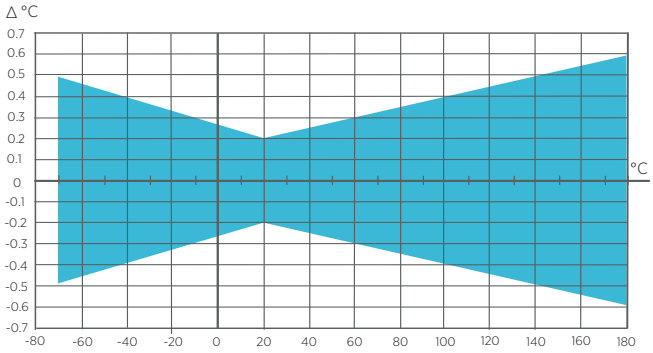
- HMT311 for wall mounting
- HMT313 for duct mounting and tight spaces
- HMT314 for high pressures up to 100 bar and vacuum conditions
- HMT315 for high temperatures
- HMT317 for high humidity applications, warmed probe option
- HMT318 for pressurized pipelines up to 40 bar

Technical data

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Response time (90 %) at +20 °C (+68 °F) in 0.1 m/s air flow	17 s with grid filter 50 s with grid and steel, netting filter 60 s with sintered filter
Factory calibration uncertainty (+20 °C)	±0.6 %RH (0–40 %RH)[1)] ±1.0 %RH (40–97 %RH)[1)]
Accuracy [2) 3)]	
at +15 ... +25 °C (+59 ... +77 °F)	±1 %RH (0–90 %RH) ±1.7 %RH (90–100 %RH)
at −20 ... +40 °C (−4 ... +104 °F)	±(1.0 + 0.008 x reading) %RH
at −40 ... +180 °C (−40 ... +356 °F)	±(1.5 + 0.015 x reading) %RH
Humidity sensor types	
HUMICAP® 180R	Typical applications
HUMICAP® 180RC	Applications with chemical purge/ warmed probe
HUMICAP® 180V	Catalytic sensor for H_2O_2 environments
HUMICAP® 180VC	Catalytic sensor with chemical purge for H_2O_2 environments
Temperature	
HMT311	−40 ... +60 °C (−40 ... +140 °F)
HMT313	−40 ... +80 °C (−40 ... +176 °F) or −40 ... +120 °C (−40 ... +248 °F)
HMT314, HMT315, HMT317, HMT318	−70 ... +180 °C (−94 ... +356 °F)
Typical accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751

1) Defined as ±2 standard deviation limits. Small variations possible, see also calibration certificate.
2) Including non-linearity, hysteresis, and repeatability.
3) With HUMICAP® 180V and 180VC sensors, accuracy is not specified below −20 °C (−4 °F) operating temperature.



Accuracy over temperature range

Operating environment

Operating temperature for electronics	−40 ... +60 °C (−40 ... +140 °F)
Storage temperature	−55 ... +80 °C (−67 ... +176 °F)
Operating pressure	
HMT314	0–100 bar
HMT318	0–40 bar
HMT315, HMT317	0–10 bar
EMC compliance	EN61326-1, Industrial environment

Inputs and outputs

Two analog outputs, selectable and scalable	0–20 mA or 4–20 mA 0–5 V or 0–10 V 1–5 V available through scaling
Typical accuracy of analog output at +20 °C	±0.05 % full scale
Typical temperature dependence of analog output	0.005 %/°C (0.003 %/°F) of full scale
Serial output	RS-232C
Connections	M12 8-pin male connector with RS-232C, current/voltage outputs (two channels) and U_{in}
Operating voltage	10–35 V DC
External load	R_L < 500 Ω
Startup time after power-up	3 s
Minimum operating voltage	
RS-232C output	10 V DC
Analog output	15 V DC
Probe heating and chemical purge	15 V DC
Pressures above 10 bara (145 psia)	24 V DC
Power consumption	
RS-232	12 mA
U_{out} 10 V (10 kΩ) channel 1 & channel 2	12 mA
I_{out} 20 mA (load 511 Ω) channel 1 & channel 2	50 mA
Chemical purge at 24 V DC	+ 220 mA
Warmed probe at 24 VDC	+ 240 mA

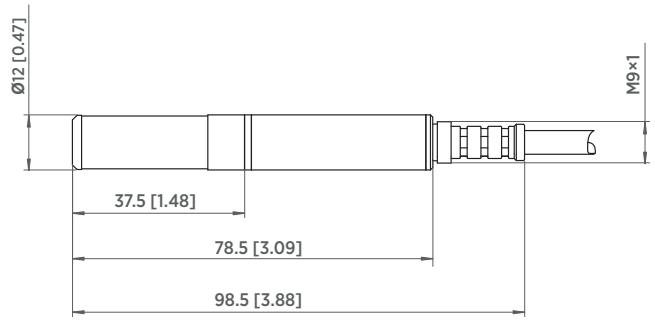
Mechanical specifications

Transmitter housing material	G-AlSi10Mg
Transmitter base material	PPS
IP rating	IP66
Probe cable length	2, 5, or 10 m (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Cable feed through alternatives	M12 8-pin male connector with 5 m cable, or 8-pin female screw terminal connector for 4–8 mm cable diameter
Sensor protection	PPS grid with stainless steel net PPS grid Sintered filter Membrane stainless steel filter H_2O_2 filter

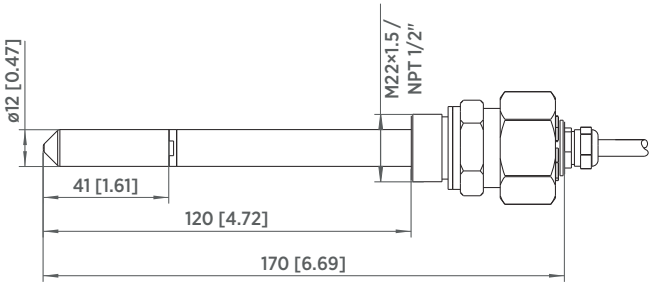
Spare parts and accessories

Rain shield	ASM211103
USB cable	238607
PPS plastic grid with stainless steel netting	DRW010281SP
PPS plastic grid filter	DRW010276SP
Sintered filter AISI 316L	HM47280SP
Stainless steel filter	HM47453SP
Stainless steel filter with membrane	214848SP
Catalytic H_2O_2 filter	231865

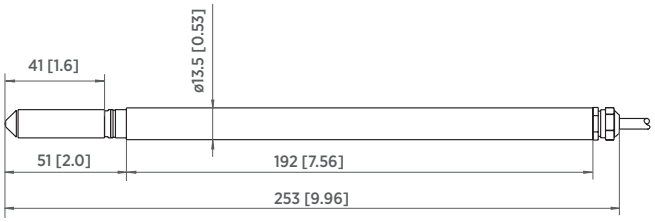
Dimensions in mm [in]



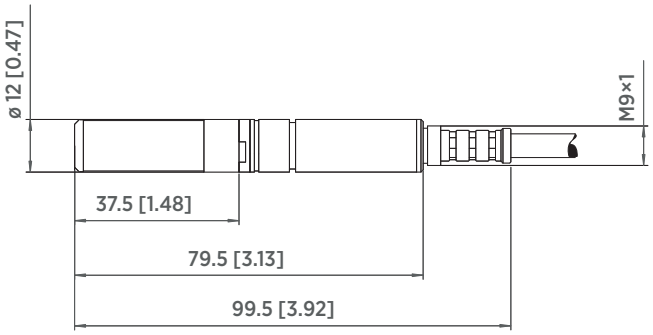
HMT313 probe



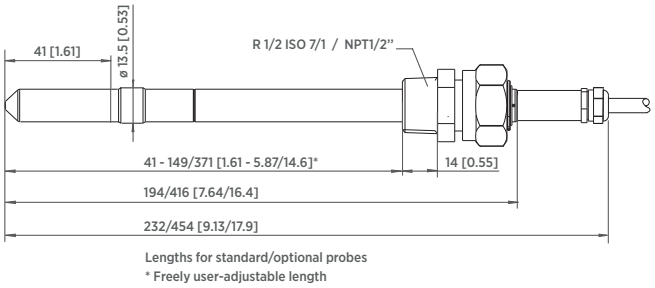
HMT314 probe



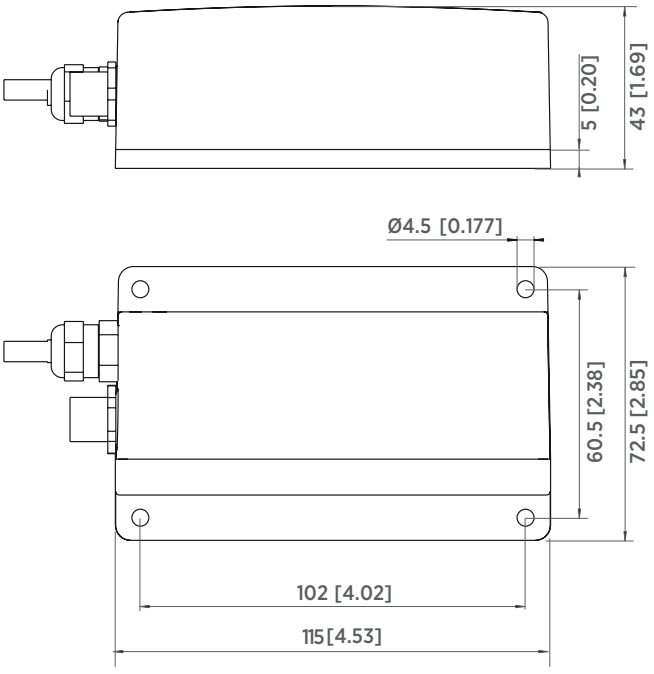
HMT315 probe



HMT317 probe



HMT318 probe



HMT310 transmitter body

VAISALA

HMT120 and HMT130 Humidity and Temperature Transmitters

Features

- Accurate and reliable measurement with Vaisala HUMICAP® humidity sensor technology
- Interchangeable probe, easy field calibration
- Resistant to dust and most chemicals
- Enclosure IP65
- Traceable calibration certificate: 3 points for humidity, 1 point for temperature
- Suitable for cleanrooms and other demanding HVAC and light industrial applications

Vaisala HUMICAP® Humidity and Temperature Transmitters HMT120 and HMT130 are designed for humidity and temperature monitoring in cleanrooms and are also suitable for other demanding HVAC and light industrial applications.

Options

- Humidity parameter options: relative humidity, dew point/frost point, wet bulb temperature, enthalpy, absolute humidity, mixing ratio, vapor pressure, and saturation vapor pressure
- 2-wire loop-powered or 3-wire voltage output configurations
- Optional LCD display
- Wall-mounted transmitter with a fixed or remote probe
- Constant output probe available
- Can be mounted outdoors using a Vaisala installation kit and Vaisala Radiation Shield DTR504A

Performance

The HMT120 and HMT130 transmitters incorporate Vaisala HUMICAP® humidity sensor technology that measures relative humidity accurately and reliably. Vaisala HUMICAP® sensors are resistant to dust and most chemicals.

The HMT120 and HMT130 transmitter enclosure is optimized for use in cleanrooms. The smooth surface of the enclosure makes it easy to clean and the enclosure material is chosen to tolerate cleaning agents. Furthermore, cabling can be done through the back wall of the transmitter.

Interchangeable probe

The HMT120 and HMT130 transmitters use a fully interchangeable relative humidity probe. The probe can be easily removed and replaced with a new one without having to adjust the transmitter, which allows for easy and quick recalibration of the transmitter. The probe can be adjusted using one of Vaisala's handheld meters as a reference.

Also available is a constant output probe with fixed RH and T output for convenient inspection of the monitoring system and signal transfer line.

Available options

The HMT120 and HMT130 transmitters are available as wall mounted with a fixed or remote probe. For high temperature applications or where space is limited, the remote probe is ideal.

The optional LCD display shows the measurement values of the selected parameters in selected units. The parameters are displayed simultaneously on two separate rows on the display.

Technical data

Models

Model	Measured parameters	Probe options	Output
HMT120	RH + T	HMP110, HMP113	2 analog outputs, 4–20 mA (loop-powered)
HMT130	RH + T	HMP110, HMP113	2 analog outputs, 0–1 V, 0–5 V, 0–10 V, or user-defined between 0–10 V

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy [1) 2)]	
At 0 … +40 °C (+32 … +104 °F)	±1.5 %RH (0–90 %RH) ±2.5 %RH (90–100 %RH)
With HMP110 probe: At −40 … 0 °C and +40 … +80 °C (−40 … +32 °F and +104 … +176 °F) With HMP113 probe: At −40 … 0 °C and +40 … +60 °C (−40 … +32 °F and +104 … +140 °F)	±3.0 %RH (0–90 %RH) ±4.0 %RH (90–100 %RH)
Factory calibration uncertainty at +20 °C (+68 °F)	±1.1 %RH (0–90 %RH) ±1.8 %RH (90–100 %RH)
Humidity sensor types	HUMICAP® 180R HUMICAP® 180V [3)]
Stability	±2 %RH over 2 years
Stability in typical HVAC applications	±0.5 %RH per year
Temperature	
Measurement range	HMP110: −40 … +80 °C (−40 … +176 °F) HMP113: −40 … +60 °C (−40 … +140 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Accuracy over temperature range:	
HMP110:	
At +15 … +25 °C (+59 … +77 °F)	±0.1 °C (±0.18 °F)
At 0 … +15 °C and +25 … +40 °C (+32 … +59 °F and +77 … +104 °F)	±0.15 °C (±0.27 °F)
At −40 … +0 °C and +40 … +80 °C (−40 … +32 °F and +104 … +176 °F)	±0.4 °C (±0.72 °F)
HMP113:	
At 0… +40 °C (+32 … +104 °F)	±0.2 °C (±0.36 °F)
At −40 … 0 °C and +40 … +60 °C (−40 … +32 °F and +104 … +140 °F)	±0.4 °C (±0.72 °F)
Other output parameters (optional)	
Dew point/frost point, wet bulb temperature, enthalpy, absolute humidity, mixing ratio, vapor pressure, saturation vapor pressure	

1) Including non-linearity, hysteresis, and repeatability.
2) With HUMICAP® 180V sensor, accuracy is specified only in operating temperature −20 … +80 °C (−4 … +176 °F).
3) Not available with HMP113.

Operating environment

IP rating (transmitter body)	IP65 [1)]
Operating temperature of transmitter body, no display	−40 … +60 °C (−40 … +140 °F)
Operating temperature of transmitter body with display	−20 … +60 °C (−4 … +140 °F)
Operating temperature, probe	HMP110: −40 … +80 °C (−40 … +176 °F) HMP113: −40 … +60 °C (−40 … +140 °F)
Storage temperature	−50 … +70 °C (−58 … +158 °F)

1) IP65 for the HMP110 probe only when using stainless steel sintered filter (HM46670SP) or PTFE sintered filter (item code DRW244938SP).

Inputs and outputs

HMT120 2-wire transmitter (loop-powered)	
Current output signals	4–20 mA
External loop voltage	10–30 V DC (R_L = 0 Ω) 20–30 V DC (R_L < 500 Ω)
HMT130 3-wire transmitter	
Voltage output signals	0–1 V, 0–5 V, 0–10 V or user-defined between 0–10 V
Min. output resistance	1 kΩ
Serial output	RS-485, non-isolated
Relay output	1 relay (max. 50 V DC, 200 mA)
Supply voltage	10–35 V DC 15–35 V DC (when output 0–10 V) 24 V AC (±20 %)
Current consumption at 24 V DC	8 mA, if relay closed 15 mA
Max. additional error caused by the analog outputs after calibration at +20 °C (+68 °F) ambient temperature	±0.1 % of FS output signal
Temperature dependence of the analog outputs	±0.005 % of FS output signal

Mechanical specifications

Weight	270 g (9.5 oz)
Probe connection cable lengths	3 m, 5 m, 10 m - up to 50 m (9.8 ft, 16 ft, 33 ft - up to 164 ft)
Display (optional)	128 × 64 resolution full graphics B&W display without backlight
Material	
Transmitter housing	PBT plastic
Display window	PC plastic
Probe body	HMP110: Stainless steel (AISI 316) HMP113: PC/ABS blend
Probe grid filter	HMP110: Chrome coated ABS plastic HMP113: PC (glass reinforced)
Connections	
Inputs and outputs	Screw terminals 0.5–1.5 mm^2 (AWG 20–AWG 15)
Probe interface	4-pin M8 female panel connector

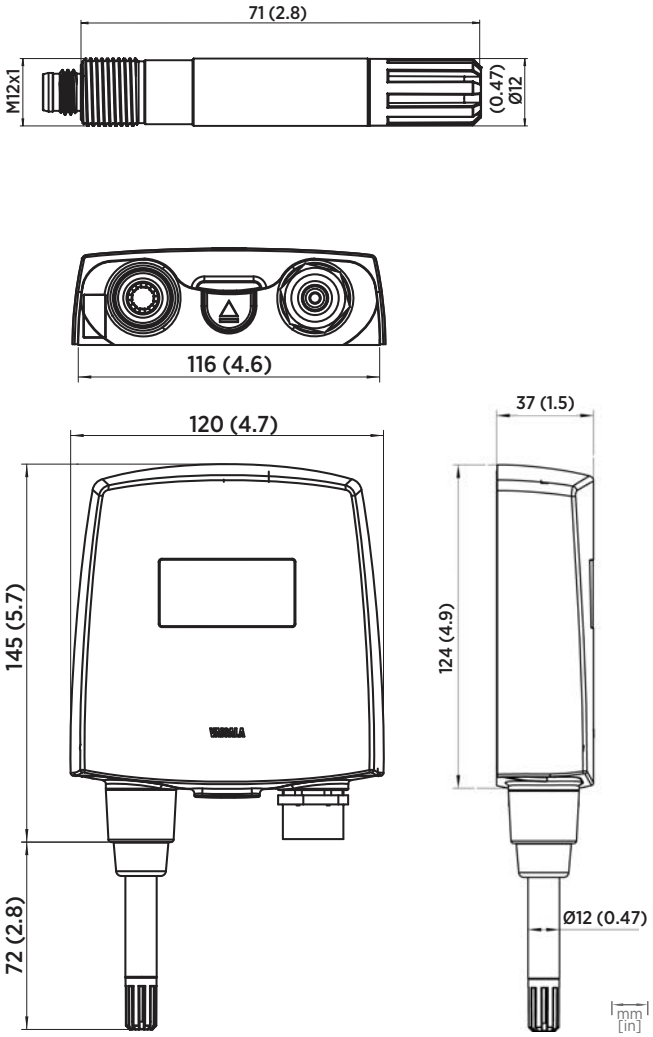
Compliance

EU directives and regulations	EMC, RoHS
Electromagnetic compatibility (EMC)	EN 61326-1, basic electromagnetic environment
	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM

Spare parts and accessories

Probes [1]	
Humidity and temperature probe	HMP110
Constant output probe	HMP110REF
Humidity and temperature probe	HMP113
Sensors	
HMP110 and HMP113 probes:	
Standard humidity sensor	HUMICAP180R
Catalytic humidity sensor for H_2O_2	HUMICAP180V [2]
Sensor protection	
HMP110 probe:	
Plastic grid filter	DRW010522SP
Plastic grid with membrane filter	DRW010525SP
Stainless steel sintered filter	HM46670SP
PTFE membrane filter with stainless steel grid	ASM212652SP
PTFE sintered filter	DRW244938SP
HMP113 probe:	
Plastic grid filter	DRW240185SP
Plastic grid with membrane filter	ASM210856SP
Stainless steel sintered filter	HM47280SP
Porous PTFE filter	219452SP
Probe installation	
HMP110 and HMP113 (remote probe models):	
Probe mounting clamp, 1 pc	225501
Probe mounting clamps, 10 pcs	226067
Probe mounting flange	226061
Probe holder, 5 pcs	ASM213382SP
Probe connection cables [3]	
Probe connection cable 3 m (9.8 ft)	HMT120Z300
Probe connection cable 5 m (16 ft)	HMT120Z500
Probe connection cable 10 m (33 ft)	HMT120Z1000
Probe connection cable 20 m (66 ft)	HMT120Z2000
Probe connection cable 5 m (16 ft), plenum-rated	HMT120Z500CMP
Probe connection cable 10 m (33 ft), plenum-rated	HMT120Z1000CMP
Probe connection cable 20 m (66 ft), plenum-rated	HMT120Z2000CMP
Other cables	
HM70 connection cable	211339
USB serial interface cable	219685
Transmitter protection and installation	
Radiation shield [3]	DTR504A
Rain shield with installation kit	215109
Duct installation kit [3]	215619

1) See the separate HMP110 and HMP113 order forms.
2) Not available with HMP113.
3) For use with remote probe models.



Dimensions of HMP110 remote probe (top image) and HMT120 and HMT130 transmitters

VAISALA

TMT120 and TMT130 Temperature Transmitters

Features

- Platinum RTD temperature sensor for outstanding measurement stability and accuracy
- Interchangeable probe, easy field calibration
- Resistant to dust and most chemicals
- Enclosure IP65
- Traceable calibration certificate: 1 point for temperature
- Suitable for cleanrooms and other demanding HVAC and light industrial applications

Vaisala Temperature Transmitters TMT120 and TMT130 are designed for temperature monitoring in cleanrooms and are also suitable for other demanding HVAC and light industrial applications.

Options

- 2-wire loop-powered or 3-wire voltage output configurations
- Extended temperature range with the TMP115 wide-range temperature probe
- Optional LCD display
- Wall-mounted transmitter with a fixed or remote probe
- Can be mounted outdoors using a Vaisala installation kit and Vaisala Radiation Shield DTR504A

Performance

The TMT120 and TMT130 transmitters incorporate platinum RTD temperature sensor technology for outstanding measurement stability and accuracy.

The TMT120 and TMT130 transmitter enclosure is optimized for use in cleanrooms. The smooth surface of the enclosure makes it easy to clean and the enclosure material is chosen to tolerate cleaning agents. Furthermore, cabling can be done through the back wall of the transmitter.

Interchangeable probe

The TMT120 and TMT130 transmitters use a fully interchangeable temperature probe. The probe can be easily removed and replaced with a new one without having to adjust the transmitter, which allows for easy and quick recalibration of the transmitter. The probe can be adjusted using one of Vaisala's handheld meters as a reference.

Available options

The TMT120 and TMT130 transmitters are available as wall mounted with a fixed or remote probe. For high temperature applications or where space is limited, the remote probe is ideal.

For an extended temperature range, the transmitter can be optionally ordered with TMP115, a wide-range temperature probe, which includes a 3-m (9.8 ft) sensor cable. The length includes the probe body and sensor tip.

The optional LCD display shows the measurement values in selected units.

Technical data

Models

Model	Measured parameters	Probe options	Output
TMT120	T	HMP110T, TMP115 [1]	1 analog output, 4–20 mA (loop-powered)
TMT130	T	HMP110T, TMP115 [1]	1 analog output, 0–1 V, 0–5 V, 0–10 V, or user-defined between 0–10 V

1) TMP115 with a 3 m (9.8 ft) cable. Length includes the TMP115 probe body and sensor tip.

Measurement performance

Temperature	
Measurement range	HMP110T: −40 ... +80 °C (−40 ... +176 °F) TMP115: −196 ... +150 °C (−320 ... +302 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Accuracy over temperature range:	
HMP110T:	
At +15 ... +25 °C (+59 ... +77 °F)	±0.1 °C (±0.18 °F)
At 0 ... +15 °C and +25 ... +40 °C (+32 ... +59 °F and +77 ... +104 °F)	±0.15 °C (±0.27 °F)
At −40 ... +0 °C and +40 ... +80 °C (−40 ... +32 °F and +104 ... +176 °F)	±0.4 °C (±0.72 °F)
TMP115:	
at −196 ... −90 °C (−320 ... −130 °F)	±2.5 °C (±4.5 °F)
at −90 ... −30 °C (−130 ... −22 °F)	±0.75 °C (±1.35 °F)
at −30 ... 0 °C (−22 ... +32 °F)	±0.5 °C (±0.9 °F)
at 0 ... +50 °C (+32 ... +122 °F)	±0.25 °C (±0.45 °F)
at +50 ... +90 °C (+122 ... +194 °F)	±0.75 °C (±1.35 °F)
at +90 ... +150 °C (+194 ... +302 °F)	±2.5 °C (±4.5 °F)

Operating environment

IP rating (transmitter body)	IP65 [1]
Operating temperature of transmitter body, no display	−40 ... +60 °C (−40 ... +140 °F)
Operating temperature of transmitter body with display	−20 ... +60 °C (−4 ... +140 °F)
Operating temperature, probe	HMP110T: −40 ... +80 °C (−40 ... +176 °F) TMP115, sensor tip: −196 ... +150 °C (−320 ... +302 °F) TMP115, probe body: −40 ... +60 °C (−40 ... +140 °F)
Storage temperature	−50 ... +70 °C (−58 ... +158 °F)

1) IP65 for the HMP110T probe only when using stainless steel sintered filter (HM46670SP) or PTFE sintered filter (item code DRW244938SP).

Inputs and outputs

TMT120 2-wire transmitter (loop-powered)	
Current output signals	4–20 mA
External loop voltage	10–30 V DC (R_L = 0 Ω) 20–30 V DC (R_L < 500 Ω)
TMT130 3-wire transmitter	
Voltage output signals	0–1 V, 0–5 V, 0–10 V or user-defined between 0–10 V
Min. output resistance	1 kΩ
Serial output	RS-485, non-isolated
Relay output	1 relay (max. 50 V DC, 200 mA)
Supply voltage	10–35 V DC 15–35 V DC (when output 0–10 V) 24 V AC (±20 %)
Current consumption at 24 V DC	8 mA, if relay closed 15 mA
Max. additional error caused by the analog outputs after calibration at +20 °C (+68 °F) ambient temperature	±0.1 % of FS output signal
Temperature dependence of the analog outputs	±0.005 % of FS output signal

Mechanical specifications

Weight	270 g (9.5 oz)
Probe connection cable lengths	3 m, 5 m, 10 m - up to 50 m (9.8 ft, 16 ft, 33 ft - up to 164 ft)
Display (optional)	128 × 64 resolution full graphics B&W display without backlight
Material	
Transmitter housing	PBT plastic
Display window	PC plastic
HMP110T probe body	Stainless steel (AISI 316)
HMP110T probe grid filter	Chrome coated ABS plastic
TMP115 probe body	PC/ABS blend
TMP115 probe cable	FEP
TMP115 sensor tip	Stainless steel (AISI 316)
Connections	
Inputs and outputs	Screw terminals 0.5–1.5 mm^2 (AWG 20–AWG 15)
Probe interface	4-pin M8 female panel connector

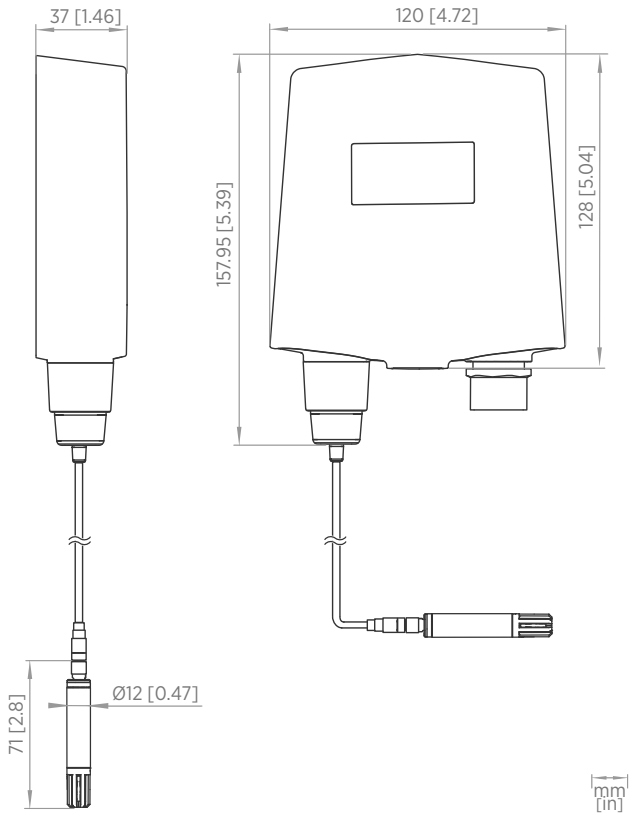
Compliance

EU directives and regulations	EMC, RoHS
Electromagnetic compatibility (EMC)	EN 61326-1, basic electromagnetic environment CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM

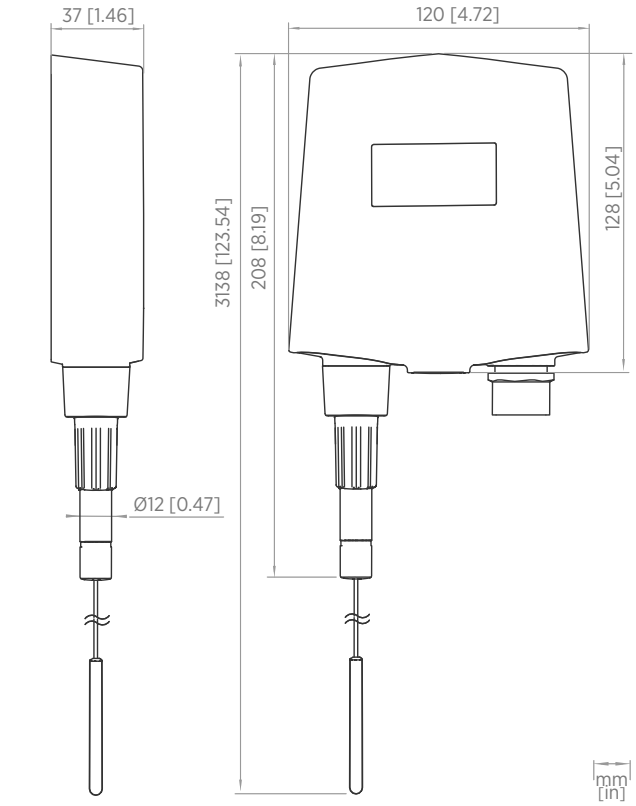
Spare parts and accessories

Probes [1]	
Temperature-only probe	HMP110T
Wide-range temperature probe	TMP115 with a 3 m (9.8 ft) cable [2]
Sensor protection	
HMP110T probe:	
Plastic grid filter	DRW010522SP
Plastic grid with membrane filter	DRW010525SP
Stainless steel sintered filter	HM46670SP
PTFE membrane filter with stainless steel grid	ASM212652SP
PTFE sintered filter	DRW244938SP
Probe installation	
Remote probe models with HMP110T:	
Probe mounting clamp, 1 pc	225501
Probe mounting clamps, 10 pcs	226067
Probe mounting flange	226061
Probe holder, 5 pcs	ASM213382SP
Fixed probe models with TMP115:	
Probe nut, 5 pcs	DRW257207SP
Thermal dampener block	236310SP
Probe connection cables [3]	
Probe connection cable 3 m (9.8 ft)	HMT120Z300
Probe connection cable 5 m (16 ft)	HMT120Z500
Probe connection cable 10 m (33 ft)	HMT120Z1000
Probe connection cable 20 m (66 ft)	HMT120Z2000
Other cables	
HM70 connection cable	211339
USB serial interface cable	219685
Transmitter protection and installation	
Radiation shield [3]	DTR504A
Rain shield with installation kit	215109
Duct installation kit [3]	215619

1) See the separate HMP110 and TMP115 order forms.
2) Length includes the TMP115 probe body and sensor tip.
3) For use with remote probe models.



Dimensions of TMT120 and TMT130 transmitter, remote probe model with HMP110T probe



Dimensions of TMT120 and TMT130 transmitter, fixed probe model with a TMP115 probe

VAISALA

HMW90 Series Humidity and Temperature Transmitters

For high-performance HVAC applications

Features

- Both analog and field bus communication (Modbus® RTU)
- Easy installation, configuration, and field adjustment
- Humidity parameter options: relative humidity, dew point, mixing ratio, enthalpy, wet bulb temperature, dew point depression, and absolute humidity
- Full 0 ... 100 %RH measurement range
- Up to ±1.7 %RH accuracy
- User exchangeable humidity and temperature module
- Traceable calibration (certificate included)
- Available in two colors

Wall-mounted Vaisala HMW90 Series HUMICAP® Humidity and Temperature Transmitters measure relative humidity and temperature in indoor HVAC applications, where high accuracy, stability, and reliable operation are required.

The flexible HMW90 series offers a variety of options and features. Transmitters include a display and a sliding cover with either an opening for the display or a solid front. Both analog and field bus communication options, including special scalings and calculated parameters, are available.

Quick and easy to install

HMW90 series transmitters are quick and easy to install. The wiring is connected through the back plate and the electronics with the sensors can be snapped on easily after the wiring is complete. The transmitter is configured using DIP switches, which are accessible when the enclosure is open.

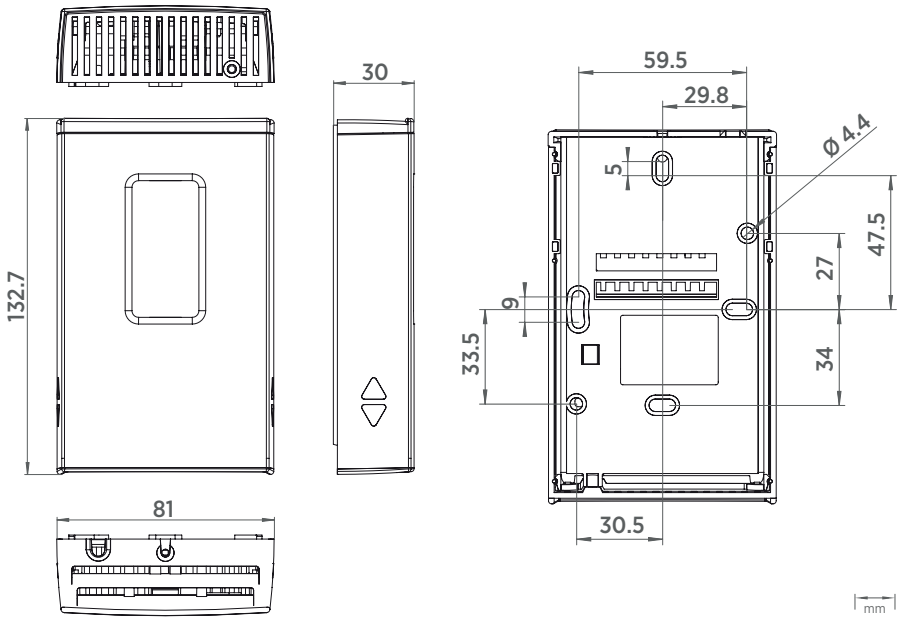
Digital communication brings benefits

The introduction of Modbus® RTU communication to field level devices brings many advantages. For example, all sensors can be centrally accessed and their performance can be easily monitored. Wiring is simple when multiple sensors are installed on the same bus. Sensors can be set up using standardized tools, and the system can be expanded with additional sensors quickly and conveniently. In addition, parameters influencing measurements, such as pressure or site elevation, can be centrally set and updated.

Choose from a wide variety of calibration options

On-site calibration and adjustment is exceptionally easy. The sliding cover exposes offset trimmers for one-point calibration without disturbing measurement. The display instantly indicates the effects of changes, making it clear and convenient to make adjustments. A service port enables two-point calibration, using either a PC or Vaisala HUMICAP® Handheld Humidity and Temperature Meter HM70. HMW90 series transmitters include a user-exchangeable measurement module, which can be ordered as a spare part.

HMW90 dimensions and models



Dimensions of HMW90 series transmitter cover (left) and mounting base (right)

Models

Model	Measurements	Output
TMW92	T-only	2-wire current output
TMW93	T-only	3-wire voltage output
TMW90	T-only	Analog output (configurable)
HMW92	RH+T	2-wire current output
HMW92D	RH+T	2-wire current output, model with display
HMW93	RH+T	3-wire voltage output
HMW93D	RH+T	3-wire voltage output, model with display
HMW90	RH+T	Analog/Modbus RTU output (configurable)
HMW95	RH+T	Modbus RTU output
HMW95D	RH+T	Modbus RTU output, model with display

Technical data

Measurement performance

Relative humidity	
Measurement range	0 ... 100 %RH, non-condensing
Accuracy at temperature range +10 ... +40 °C (+50 ... +104 °F):	
0 ... 90 %RH	±1.7 %RH
90 ... 100 %RH	±2.5 %RH
Accuracy at temperature range −5 ... +10 °C, +40 ... + 55 °C (+23 ... +50 °F, +104 ... +131 °F):	
0 ... 90 %RH	±3 %RH
90 ... 100 %RH	±4 %RH
Stability in typical HVAC applications	±0.5 %RH/year
Humidity sensor	HUMICAP® 180R
Temperature	
Measurement range	−5 ... +55 °C (+23 ... +131 ºF)
Accuracy at +20 ... +30 °C (+68 ... +86 °F)	±0.2 °C (± 0.36 °F)
Accuracy at +10 ... +20 °C, +30 ... +40 °C (+50 ... +68 °F, +86 ... +104 °F)	±0.3 °C (± 0.54 °F)
Accuracy at −5 ... +10 °C, +40 ... +55 °C (+23 ... +50 °F, +104 ... +131 °F)	±0.5 °C (± 0.90 °F)
Temperature sensor	Digital temperature sensor

Inputs and outputs

Service port	RS-485 line for temporary service use
Current output models	
Outputs	2 × 4 ... 20 mA, loop powered
Loop resistance	0 ... 600 Ω
Supply voltage	20 ... 28 VDC at 500 Ω load 10 ... 28 VDC at 0 Ω load
Isolation between output channels	500 VDC
Voltage output models	
Outputs	2 × 0 ... 5 V or 2 × 0 ... 10 V
Load resistance	10 kΩ min.
Supply voltage	18 ... 35 VDC, 24 VAC ±20 % 50/60 Hz
Max. current consumption	12 mA Max. with relay 25 mA
Relay	1 pc (max 50 VDC/50 VAC, 500 mA)
Field bus models	
Supply voltage	18 ... 35 VDC, 24 VAC ± 20 % 50/60 Hz
Max. current consumption (with 120 Ω termination)	30 mA at 24 VDC
Output type	RS-485 (galvanic isolation, 1.5 kV)
RS-485 end of line termination	Enable with jumper, 120 Ω
Supported protocol	Modbus RTU
Modbus RTU address range	1 ... 247

Operating environment

Operating temperature	−5 ... +55 °C (+23 ... +131 °F)
Storage temperature	−30 ... +60 °C (−22 ... +140 °F)
IP rating	IP30

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM

Mechanical specifications

Weight	155 g (5.5 oz)
Standard housing color	White (RAL9003 [1])
Optional housing color (configurable models only)	Black (RAL9005 [1])
Housing material	ABS/PC, UL-V0 approved
Output connector	Screw terminals Max. wire size 2 mm^2 (AWG14)
Service port connector	4-pin M8

1) RAL code is only indicative with potential small variations in color shade.

Spare parts and accessories

Humidity and temperature module	HTM10SP
Temperature module (for T-only models)	TM10SP
Decorative cover set (10 pcs)	236285
Connection cable for HM70 handheld meter	219980
USB cable for PC connection	219690

VAISALA

HMD60 Series Humidity and Temperature Transmitters

For demanding HVAC and light industrial applications

Features

- Measurement accuracy up to ±1.5 %RH and ±0.1 °C (±0.18 °F)
- 4 ... 20 mA analog outputs: HMD62 (RH and T) and TMD62 (T-only)
- 0 ... 10 V analog outputs: HMD65 (RH and T)
- BACnet MS/TP and Modbus RTU: HMD65
- All common humidity parameters available, including RH, dew point, enthalpy, and wet bulb temperature
- Resistant to chemicals and dust
- IP66-rated body
- Traceable calibration certificate
- Easy field adjustment and output configuration with quick access to electronics also when installed
- Compatible with Vaisala Insight PC software

The duct mounted HMD60 series HUMICAP® transmitters HMD62, TMD62, and HMD65 are designed for light industrial applications and demanding HVAC applications such as museums, cleanrooms, and laboratories.

Analog or Digital Output with 3 Transmitter Options

HMD60 series transmitter options:

- HMD62: RH and T measurement, 4 ... 20 mA analog output
- TMD62: T-only transmitter, 4 ... 20 mA analog output
- HMD65: RH and T measurement, 0 ... 10 V analog output, Modbus RTU, and BACnet MS/TP

Robust Design, Stability, and Reliability

The all-metal body is suitable for building sites and industrial settings. HMD60 series transmitters provide state-of-the-art stability and environmental resistance, thanks to the Vaisala HUMICAP® R2 sensor.

For applications where hydrogen peroxide disinfection is used, the HUMICAP® 180V catalytic sensor option provides improved stability during H_2O_2 exposure.

Traceable Accuracy

HMD60 series transmitters are always delivered with a traceable (ISO9001) calibration certificate. Upon request, accredited (ISO17025) calibration certificates can also be provided.

Field Configurable Outputs

The analog HMD62 and TMD62 transmitter models use floating 4 ... 20 mA loop powered outputs. The HMD65 model has two 0 ... 10 V outputs in addition to BACnet MS/TP and Modbus RTU interfaces (RS-485). The analog outputs are field configurable with easy humidity parameter selection using DIP switches.

For special scaling and other additional configuration and adjustment options, you can use the convenient Vaisala Insight PC software for Windows® (see www.vaisala.com/insight).

When required, HMD60 series transmitters can also be intuitively field adjusted using trimmers or with the Vaisala HM70 handheld meter.

Technical Data

Relative humidity measurement performance

Humidity sensor options	
HUMICAP® R2	Latest generation industrial sensor with improved corrosion resistance
HUMICAP® 180V	Humidity sensor with a catalytic surface for processes with H_2O_2
Measurement range	0 ... 100 %RH
Stability	±0.5 %RH/year in typical HVAC applications
Accuracy at 0 ... +40 °C (+32 ... +104 °F) [1]	
0 ... 90 %RH	±1.5 %RH
90 ... 100 %RH	±2.5 %RH
Accuracy at +40 ... +80 °C (+104 ... +176 °F) and −40 ... 0 °C (−40 ... +32 °F) [1] [2]	
0 ... 90 %RH	±2.5 %RH
90 ... 100 %RH	±3.5 %RH
Factory calibration uncertainty	±1.0 %RH
Start-up and response time	
Start-up time at +20 °C (+68 °F)	8 s
Response time (T63) at +20 °C (+68 °F)	15 s
Calculated humidity parameters (default analog output scale)	
Dew point	−40 ... +80 °C (−40 ... +176 °F)
Dew point / frost point	−40 ... +80 °C (−40 ... +176 °F)
Absolute humidity	0 ... 300 g/m³ (0 ... 131.1 gr/ft³)
Wet bulb temperature	−40 ... +80 °C (−40 ... +176 °F)
Enthalpy	−40 ... 1600 kJ/kg (−9.5 ... 695.6 Btu/lb)
Mixing ratio	0 ... 600 g/kg (0 ... 4200 gr/lb)

1) Including non-linearity, hysteresis, and repeatability
2) With HUMICAP® 180V sensor, accuracy is not specified below −20 °C (−4 °F) operating temperature

Temperature measurement performance

Temperature sensor	Pt1000 RTD Class F 0.1 IEC 60751
Measurement range	−40 ... +80 °C (−40 ... +176 °F)
Default analog output scale	−20 ... +80 °C (−4 ... +176 °F)
Accuracy at +20 °C (+68 °F)	±0.1 °C (0.18 °F)
Temperature dependence	±0.005 °C/°C
Factory calibration uncertainty	±0.1 °C (0.18 °F)
Response time (T63) with free convection	8 min

Analog output performance

Accuracy at +20 °C (68 °F):	±0.01 mA (HMD62 and TMD62) ±5 mV (HMD65)
Temperature dependence	±0.0008 mA/°C (HMD62 and TMD62) ±0.2 mV/°C (HMD65)

Operating environment

Operating temperature, electronics	−40 ... +60 °C (−40 ... +140 °F)
Operating temperature, probe	−40 ... +80 °C (−40 ... +176 °F)
Storage temperature range	−40 ... +80 °C (−40 ... +176 °F)
Maximum flow speed	50 m/s with sintered filter
Electromagnetic compatibility	EN61326-1, Industrial Environment

Inputs and outputs

Power supply input	HMD62 and TMD62: 10 ... 35 VDC (RL = 0 Ω) 20 ... 35 VDC (RL = 600 Ω) HMD65: 15 ... 35 VDC 16 ... 24 VAC
Power consumption (HMD65)	1.0 W (typical, for both AC and DC)
Analog outputs	TMD62: 1 × T output 4 ... 20 mA HMD62: 1 × RH output 4 ... 20 mA, 1 × T output 4 ... 20 mA [1] HMD65: 1 × RH output 0 ... 10 V, 1 × T output 0 ... 10 V [1] (load resistance: 10 kΩ min.)
Digital output (RS-485)	HMD65: Isolated, supports Modbus RTU and BACnet MS/TP protocols
BACnet MS/TP	Address range: 0 ... 127 (master mode only)
Modbus RTU	Address range: 1 ... 247
Service port	M8 4-pin male connector: • MI70 handheld indicator (requires cable 219980SP) • Vaisala Insight PC software [2] (requires USB cable 219690)
Screw terminal wire size	0.5 ... 2.5 mm²

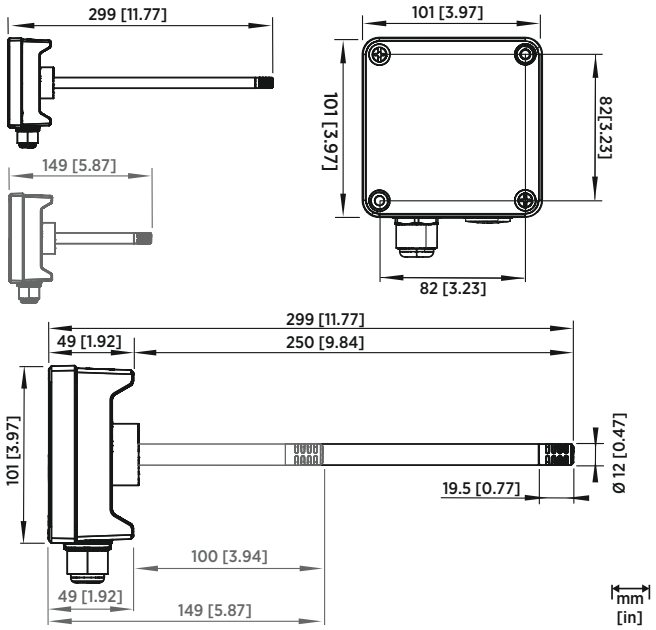
1) Calculated output parameters for HMD62 and HMD65 include T_d, T_{df}, A, X, T_w, and H.
2) Vaisala Insight software for Windows® available at www.vaisala.com/insight.

Spare parts and accessories

USB cable for PC operation (Vaisala Insight software)	219690
Connection cable for HM70 (MI70) handheld meter	219980SP
Membrane filter	ASM212652SP
Sintered filter	HM46670SP
Sintered teflon filter	DRW244938SP
Conduit fitting and O-ring (M16×1.5 / NPT1/2")	210675SP

Mechanical specification

Housing material	Cast aluminum
Probe material	Stainless steel
IP rating	IP66 (NEMA 4X)
Weight	511 g (18 oz)



HMD60 Dimensions (Long and Short Probe Options)

VAISALA

HMDW110 Series Humidity and Temperature Transmitters

For high-accuracy measurements in HVAC applications

Features

- Accurate humidity and temperature transmitters for measurements in HVAC applications
- Proven Vaisala HUMICAP® 180R humidity sensor for superior long-term stability
- ±2 %RH accuracy
- 3-point traceable calibration (%RH), 1-point traceable calibration (T), certificate included
- Analog (4–20 mA) and Modbus® RTU output options
- Display and non-display options
- M12 connector option

The high-accuracy transmitters HMD110/112 and HMW110/112 are designed for measuring humidity and temperature in HVAC applications. Calculated humidity parameters are also conveniently available, including dew point temperature, wet bulb temperature, and enthalpy. The measurement is highly accurate to enable precise and reliable control of HVAC systems. Options also include temperature transmitter models.

The transmitters belong to Vaisala HMDW110 Transmitter Series, which includes transmitters for duct mounting, IP65-rated wall transmitters, immersion temperature transmitters, and outdoor transmitters with integrated radiation shields. Display and non-display options are available.

Highly accurate, proven Vaisala HUMICAP performance

The highly accurate HMD110/112 and HMW110/112 transmitters are designed for measuring humidity and temperature in various HVAC applications. The high accuracy and reliability of the measurement enable precise and reliable controls of HVAC systems.

The transmitters are equipped with the trusted HUMICAP 180R humidity sensor, which is the robust sensor designed for industrial applications. The sensor's superior long-term stability allows for unbeatable long-term accuracy of the instrument and minimizes maintenance needs throughout the transmitter's lifetime.

Optional output parameters include dew point temperature, wet bulb temperature, and enthalpy, which are selectable with Vaisala Insight PC software.

Excellent choice for challenging conditions

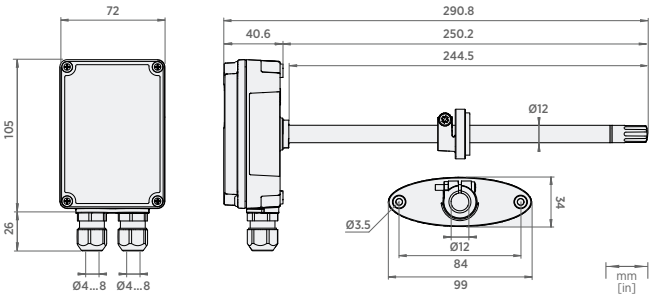
The IP65-rated HMD110/112 and HMW110/112 transmitters are optimal for even challenging conditions, such as cleanrooms, data centers and other industrial settings. The transmitters can also be ordered with the catalytic HUMICAP 180V humidity sensor. The catalytic sensor improves stability especially in hydrogen peroxide sterilized environments where repeated condensation can be expected.

Traceable accuracy

The instruments are individually adjusted and delivered with a traceable (ISO 9001) calibration certificate. If required later on, the transmitter can be easily field-calibrated using Vaisala Handheld Humidity and Temperature Meter HM70 or Vaisala Insight PC software.

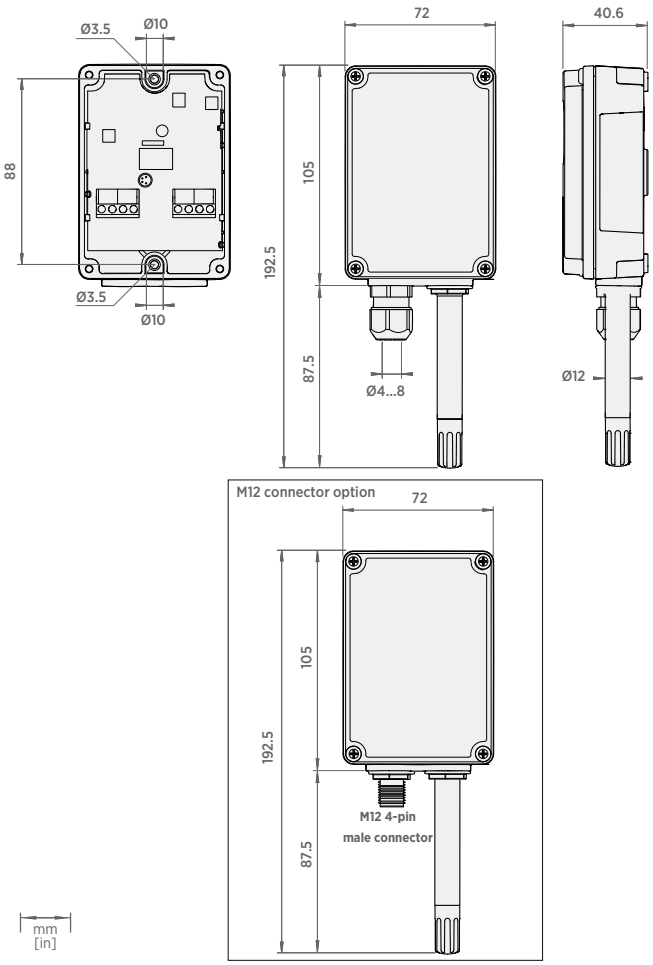
Technical data

HMD110/112 RH+T transmitters for ducts. Model options also include a display version and the TMD110 temperature transmitter.



Dimensions in mm

HMW110/112 wall-mount RH+T transmitters with IP65 rating. Model options also include a display version and the TMW110 temperature transmitter. HMW110 and TMW110 transmitters can be ordered either with a cable gland and screw terminal wiring, or with an M12 connector.



Dimensions in mm

Models

Model	Type	Output	Special features
HMW110	Wall-mount, RH+T	2-wire current or Modbus RTU output	Configurable model [1] Optional display M12 connector option
HMW112	Wall-mount, RH+T	2-wire current output	
TMW110	Wall-mount, T	2-wire current output or Modbus RTU output	Configurable model [1] Optional display M12 connector option
HMD110	Duct-mount, RH+T	2-wire current or Modbus RTU output	Configurable model [1] Optional display
HMD112	Duct-mount, RH+T	2-wire current output	
TMD110	Duct-mount, T	2-wire current output or Modbus RTU output	Configurable model [1] Optional display

1) *Delivered with customer specific output settings, including calculated humidity parameters and custom scaling of outputs.*

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy: [1]	
at +10 … +30 °C (+50 … +86 °F)	±2 %RH (0–90 %RH) ±3 %RH (90–100 %RH)
at −20 … +10 °C, +30 … +60 °C (−4 … +50 °F, +86 … +140 °F)	±3 %RH (0–90 %RH) ±4 %RH (90–100 %RH)
at −40 … −20 °C (−40 … −4 °F)	±4 %RH (0–100 %RH)
Stability in typical HVAC applications	±0.5 %RH/year
Humidity sensor types	HUMICAP® 180R HUMICAP® 180V
Temperature	
Measurement range	−40 … +60 °C (−40 … +140 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Temperature dependence	±0.01 °C/°C
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Factory calibration uncertainty at +20 °C (+68 °F)	±1.5 %RH/±0.2 °C

1) *With HUMICAP® 180V humidity sensor, accuracy is not specified below −20 °C (−4 °F) operating temperature.*

Calculated parameters

Measurement range	
Dew point temperature and wet bulb temperature	−40 … +80 °C (−40 … +176 °F)
Enthalpy	−40 … 1530 kJ/kg (−9.6 … 648 BTU/lb)
Accuracy [1] [2]	
Dew point	±0.7 °C (1.2 °F)
Wet bulb temperature	±0.5 °C (0.9 °F)
Enthalpy	±1.6 kJ/kg (0.7 BTU/lb)

1) *At +20 °C (+68 °F) and 80 %RH.*
2) *Accuracy of the calculated parameters should be calculated at the actual condition based on the RH and temperature specification.*

Inputs and outputs

Devices ordered with analog output	
Outputs	4–20 mA, loop powered
Loop resistance	0–600 Ω
Supply voltage	20–28 V DC at 600 Ω load 10–28 V DC at 0 Ω load
Devices ordered with Modbus output	
Interface	RS-485, not isolated, no line termination
Default serial settings	19200 bps N 8 2
Protocols	Modbus® RTU
Supply voltage	10–28 V DC

Mechanical specifications

Screw terminal wire size	Max. 1.5 mm^2 (AWG 16)
Standard housing color	White (RAL9003)
Housing material	PC + 10 %GF (UL-V0 approved)

Operating environment

Operating temperature:	
with display	−5 … +60 °C (+23 … +140 °F)
without display	−40 … +60 °C (−40 … +140 °F)
Operating humidity	0–100 %RH
Maximum wind / flow speed	30 m/s
Storage temperature	−40 … +60 °C (−40 … +140 °F)
Storage temperature:	
with display	−5 … +60 °C (+23 … +140 °F)
without display	−40 … +60 °C (−40 … +140 °F)
IP rating	IP65

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electrical safety	EN 61326-1, industrial environment [1]
EMC emissions	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM

1) *HMDW110 series probes (HMD110/112, TMD110, HMW110/112, TMW110, and HMS110/112) fulfill the requirements for industrial electromagnetic environment, considering that a maximum permissible electrostatic air discharge of ±7 kV has been specified for this product.*

Spare parts and accessories

Conduit fitting + O-ring (M16 × 1.5 / NPT1/2")	210675SP
Conduit fitting + O-ring (M16 × 1.5 / PG9, RE-MS)	210674SP
Fastening flange assembly (screws included)	ASM210771SP
Porous PTFE filter	DRW239993SP
Membrane filter	ASM210856SP
Terminal block, blue	236620SP
USB cable for PC connection	219690
Connection cable (M12-4F / M8-4M), length 1.2 m	279222SP
Connection cable for HM70 handheld meter	219980SP
HUMICAP® 180R humidity sensor	HUMICAP180R
HUMICAP® 180V humidity sensor (catalytic)	HUMICAP180V

VAISALA

TMI110 Temperature Transmitter

For high-accuracy measurements in HVAC applications

Features

- Accurate temperature measurement of liquids and air
- Very fast response time
- 1-point traceable calibration (certificate included)
- Analog (4–20 mA) and Modbus® RTU output options
- Installed in a thermowell for measurement in liquids
- Optimized for building automation and HVAC process control
- Available with a display or as a non-display model
- Several probe length options

The high-accuracy immersion temperature transmitter TMI110 is designed for measuring cooling/heating water temperatures in HVAC automation systems. TMI110 can also be used for air temperature measurements in air ventilation ducts. The transmitter has a fast response time, enabling precise and reliable control of HVAC systems.

The TMI110 transmitter belongs to the Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMDW110, which includes transmitters for duct mounting, IP65-rated wall transmitters, immersion temperature transmitters, and outdoor transmitters with integrated radiation shields.

Highly accurate

The highly accurate TMI110 measures the temperature of liquid in cooling/heating systems, and the temperature of air in ventilation ducts. When measuring the temperature of liquid, the transmitter is installed in a thermowell. For air temperature measurements, the transmitter can be installed in a duct.

Temperature is measured with a Pt1000 sensor element (class A). The high accuracy and quick response time of the measurement enable precise and reliable control of HVAC systems.

Fast response time

Fast response time of measurement is a top priority in the design of TMI110, enabling instant response in the control loop. Speed and reliability are key factors in the measurement of cooling and heating processes, thus the capabilities of TMI110 are a significant advantage. The transmitter is optimal for building automation and HVAC process control.

Traceable accuracy

All TMI110 transmitters are individually adjusted and delivered with a traceable (ISO 9001) calibration certificate. If required later on, the transmitter can also be field-calibrated using a Vaisala handheld meter or Vaisala Insight PC software.

Technical data

Measurement performance

Temperature	
Measurement range	−40 … +120 °C (−40 … +248 °F)
Accuracy at +20 °C (+68 °F)	±0.1 °C (±0.18 °F)
Temperature dependence	±0.01 °C/°C
Response time (T63) at +20 °C (+68 °F)	< 8 s typical
Temperature sensor	Pt1000 RTD Class A, IEC 60751
Factory calibration uncertainty at +20 °C (+68 °F)	±0.1 °C (±0.18 °F)

Operating environment

Operating environment, probe	−40 … +120 °C (−40 … +248 °F)
Operating environment, electronics	Without display: −40 … +60 °C (−40 … +140 °F) With display: −5 … +60 °C (+23 … +140 °F)
Storage temperature	Without display: −40 … +60 °C (−40 … +140 °F) With display: −5 … +60 °C (+23 … +140 °F)
IP rating	IP65
UL 50E/NEMA rating	Type 4

Spare parts and accessories

Conduit fitting + O-ring (M16×1.5 / NPT1/2")	210675SP
Conduit fitting + O-ring (M16×1.5 / PG9, RE-MS)	210674SP
Thermowell ISO 7 - R 1/2", for 50 mm probe	ASM216268
Thermowell ISO 7 - R 1/2", for 100 mm probe	ASM214691
Thermowell ISO 7 - R 1/2", for 150 mm probe	279722
Thermowell ISO 7 - R 1/2", for 200 mm probe	279723
Thermowell 1/2" - 14 NPT, for 50 mm probe	ASM216270
Thermowell 1/2" - 14 NPT, for 100 mm probe	ASM214707
Thermowell 1/2" - 14 NPT, for 150 mm probe	279724
Thermowell 1/2" - 14 NPT, for 200 mm probe	279725
Welded thermowell (no thread), for 50 mm probe	ASM216267
Welded thermowell (no thread), for 100 mm probe	ASM216119
Terminal block, blue	236620SP
USB cable for PC connection	219690
Connection cable for HM70 handheld meter	219980SP

Compliance

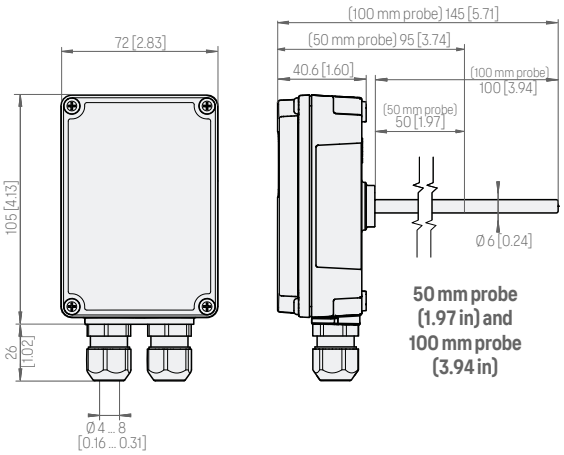
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electrical safety	EN 61326-1, industrial environment
EMC emissions	CISPR 22 / EN 55022, Class B
Compliance marks	CE, RCM

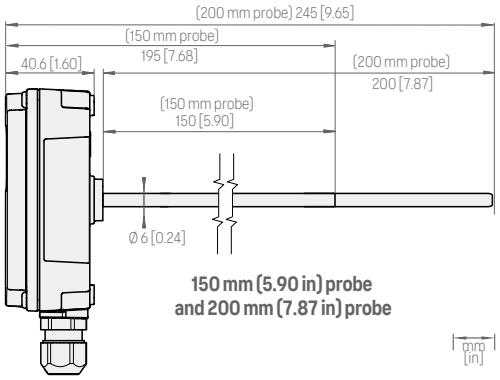
Mechanical specifications

Probe material	Stainless steel
Probe diameter	6 mm (0.24 in)
Probe length options	• 50 mm (1.97 in) • 100 mm (3.94 in) • 150 mm (5.91 in) • 200 mm (7.87 in)
Screw terminal wire size	Max. 1.5 mm^2 (AWG 16)
Standard housing color	White (RAL9003)
Housing material	PC + 10 %GF (UL-V0 approved)

Inputs and outputs

Devices ordered with analog output	
Outputs	4–20 mA, loop powered
Loop resistance	0–600 Ω
Supply voltage	20–28 V DC at 600 Ω load 10–28 V DC at 0 Ω load
Devices ordered with Modbus output	
Interface	RS-485, not isolated, no line termination
Default serial settings	19200 bps N 8 2
Protocol	Modbus RTU
Supply voltage	10–28 V DC





VAISALA

HMS110 Series Humidity and Temperature Transmitters

For high-accuracy outdoor measurements in building automation applications

Features

- Reliable outdoor transmitters with integrated radiation shields
- ±2 %RH accuracy
- Proven HUMICAP® 180R sensor for long-lasting accuracy
- 3-point traceable calibration (certificate included)
- Default output parameters are relative humidity and temperature. Dew point temperature, wet bulb temperature, and enthalpy outputs selectable with a PC connection
- Current output (4 ... 20 mA) and Modbus RTU
- On-site calibration with HM70 Hand-Held Meter or PC connection
- Ingress protection IP65
- Compatible with Vaisala Insight PC software

Vaisala HMS110 Series HUMICAP® Humidity and Temperature Transmitters are designed for demanding outdoor measurements in building automation applications. These ±2 % transmitters include an integrated radiation shield to reduce the influence of solar radiation on temperature and humidity measurements.

Proven Vaisala HUMICAP® performance for outdoor measurements

HMS110 transmitters are equipped with the trusted HUMICAP® 180R – a robust, general-purpose humidity sensor that functions well in high humidity. The sensor's superior stability ensures long-lasting accuracy and minimal maintenance throughout the transmitter's lifetime.

The integrated radiation shield allows unrivaled measurement performance, reducing the impact of sunshine on temperature and humidity measurements and ensuring measurement accuracy in outdoor conditions.

Easy installation and maintenance

HMS110 transmitters are easy to install. They can be mounted directly onto a wall or pole without any extra accessories. There are no loose parts, screws are retained in the enclosure, all connectors are clearly labeled, and the connectors are within easy reach.

The HUMICAP® sensor's excellent long-term stability and high-quality materials ensure minimal need for maintenance. If necessary, the transmitter can be field-calibrated using either HM70 Hand-Held Humidity and Temperature Meter, or a PC connection. For easy-to-use access to configuration and calibration options, the transmitter can be connected to Vaisala Insight PC software.

Technical data

Models

Model	Type	Output	IP rating
HMS110	Outdoor, RH+T	2-wire, current output Modbus RTU (configurable model)	IP65
HMS112	Outdoor, RH+T	2-wire, current output	IP65

Inputs and outputs

Devices ordered with analog output	
Analog outputs	4 ... 20 mA, loop powered
Loop resistance	0 ... 600 Ω
Supply voltage	20 ... 28V DC at 600 Ω load 10 ... 28V DC at 0 Ω load
Devices ordered with Modbus output	
Interface	RS-485, not isolated, no line termination
Default serial settings	19200 bps N 8 2
Protocols	Modbus® RTU
Supply voltage	10 ... 28 V DC

Measurement performance

Relative humidity	
Measurement range	0 ... 100 %RH
Stability in typical HVAC applications	±0.5 %RH/year
Humidity sensor	Vaisala HUMICAP® 180R
Accuracy at temperature range +10 ... +30 °C (+50 ... +86 °F):	
0 ... 90 %RH	±2 %RH
90 ... 100 %RH	±3 %RH
Accuracy at temperature range -20 ... +10 °C, +30 ... +60 °C (-4 ... +50 °F, +86 ... +140 °F):	
0 ... 90 %RH	±3 %RH
90 ... 100 %RH	±4 %RH
Accuracy at temperature range -40 ... -20 °C (-40 ... -4 °F):	
0 ... 100%RH	±4 %RH
Temperature	
Measurement range	-40 ... +60 °C (-40 ... +140 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Temperature dependence	±0.01 °C/°C
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Calculated parameters	
Factory calibration uncertainty at 20 °C (+68 °F)	±1.5 %RH/±0.2 °C
Measurement range for dew point temperature and wet bulb temperature	-40 ... +60 °C (-40 ... +140 °F)
Measurement range for enthalpy	−40 ... 1530 kJ/kg (−9.6 ... 648 BTU/lb)
Accuracy of the calculated parameters should be calculated at the actual condition based on the RH and temperature specification.	
Accuracy at 20 °C (68 °F) and 80 %RH:	
Dew point	±0.7 °C (1.2 °F)
Wet bulb temperature	±0.5 °C (0.9 °F)
Enthalpy	±1.6 kJ/kg (0.7 BTU/lb)

Operating environment

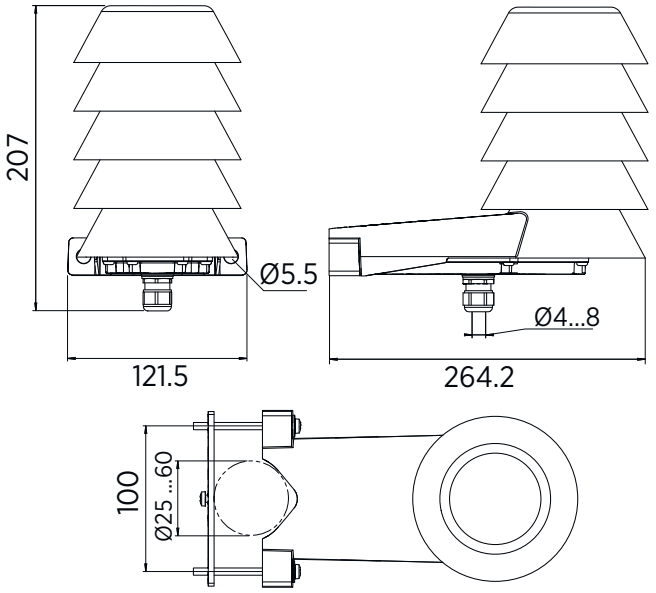
Operating temperature	-40 ... +60 °C (-40 ... +140 °F)
Operating humidity	0 ... 100 %RH
Maximum wind/flow speed	30 m/s (67 mph)
Storage temperature	-40 ... +60 °C (-40 ... +140 °F)

Compliance

Property	Value/Description
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electrical safety	EN 61326-1, industrial environment
EMC emissions	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM

Mechanical specifications

Max. wire size	1.5 mm^2 (AWG 16)
Standard housing color	White (RAL9003)
Housing material	PC + 10 %GF (UL-V0 approved)



Dimensions (in mm)

Spare parts and accessories

Conduit fitting + O-ring (M16 × 1.5 / NPT1/2 Inch)	210675SP
Conduit fitting + O-ring (M16 × 1.5 / PG9, RE-MS)	210674SP
Fastening set HMS110	237805
Membrane filter	ASM210856SP
Terminal block, blue	236620SP
USB cable for PC connection	219690 [1)]
Connection cable for HM70 hand-held meter	219980SP
HUMICAP® 180R sensor	HUMICAP180R

1) Vaisala Insight PC software for Windows available www.vaisala.com/insight.

VAISALA

HMDW80 Series Humidity and Temperature Transmitters

For building automation applications

Features

- Reliable transmitters for basic HVAC humidity measurements
- ±3.0 %RH accuracy
- Full 0–100 %RH measurement range
- Optimized for easy installation and low maintenance
- User exchangeable INTERCAP® sensor for easy field replacement
- UL-V0 flammability rating
- Output parameters: relative humidity and temperature with optional dew point temperature, wet bulb temperature and enthalpy parameters

Vaisala HMDW80 Series INTERCAP® Humidity and Temperature Transmitters measure relative humidity and temperature in various building automation applications. HMDW80 series transmitters combine easy installation and reliable operation with a low requirement for maintenance.

Typical installation locations

- Ventilation ducts
- Walls
- Wash-down areas
- Outdoor locations

The versatile HMDW80 series includes transmitters for wall and duct mounting, IP65-classified transmitters for humid areas, and transmitters with a radiation shield for outdoor use. It also includes temperature-only transmitters and transmitters with an optional display.

Calculated humidity parameters – dew point temperature, wet bulb temperature, and enthalpy – are also available.

Easy installation

HMDW80 series transmitters are optimized for easy installation. There are no loose parts, screws are retained in the enclosure, all connectors are clearly labeled, and the connectors are within easy reach.

The duct mount transmitters are well suited to a variety of duct sizes, the outdoor transmitters can be mounted directly onto a wall or pole without any extra accessories, and the wall mount transmitters can be installed without the need to make holes in the transmitter enclosure.

Reliable operation

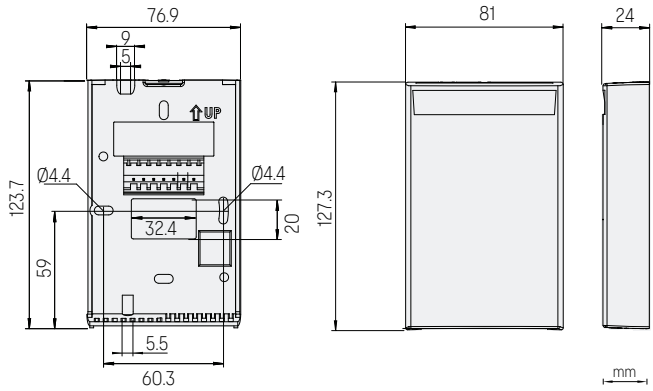
HMDW80 series transmitters require minimal maintenance thanks to their excellent sensor stability and high-quality materials. If necessary, the INTERCAP® sensor can be easily exchanged in the field with minimum downtime.

Model number	Type	Output	Special features	IP rating
TMW82	Wall-mount, T-only	2-wire, current output		IP30
HMW82	Wall-mount, RH+T	2-wire, current output		IP30
HMW82P100	Wall mount, RH+T	2-wire, current output	Additional Pt100 sensor	IP30
HMW83	Wall-mount, RH+T	3-wire, voltage output		IP30
XMW85 [1)]	Wall-mount, RH+T or RH+T+CO_2	Modbus® RTU output	Configurable model with own Order Form [2)] Optional display	IP30
TMW88	Wall-mount, T-only	2-wire, current output		IP65
HMW88	Wall-mount, RH+T	2-wire, current output	Calculated parameters [3)]	IP65
HMW88D	Wall-mount, RH+T	2-wire, current output	Display, calculated parameters [3)]	IP65
HMW89	Wall-mount, RH+T	3-wire, voltage output	Calculated parameters [3)]	IP65
HMW89D	Wall-mount, RH+T	3-wire, voltage output	Display, calculated parameters [3)]	IP65
TMD82	Duct-mount, T-only	2-wire, current output		IP65
HMD82	Duct-mount, RH+T	2-wire, current output	Calculated parameters [3)]	IP65
HMD82D	Duct-mount, RH+T	2-wire, current output	Display, calculated parameters [3)]	IP65
HMD83	Duct-mount, RH+T	3-wire, voltage output	Calculated parameters [3)]	IP65
HMD83D	Duct-mount, RH+T	3-wire, voltage output	Display, calculated parameters [3)]	IP65
HMS82	Outdoor, RH+T	2-wire, current output	Radiation shield, calculated parameters [3)]	IP65
HMS82C	Outdoor, RH+T	2-wire, current output	HMS82 with NPT ½" conduit fitting [3)]	IP65
HMS83	Outdoor, RH+T	3-wire, voltage output	Radiation shield, calculated parameters [3)]	IP65
HMS83C	Outdoor, RH+T	3-wire, voltage output	HMS83 with NPT ½" conduit fitting [3)]	IP65
TMS82	Outdoor, T-only	2-wire, current output	Radiation shield	IP65

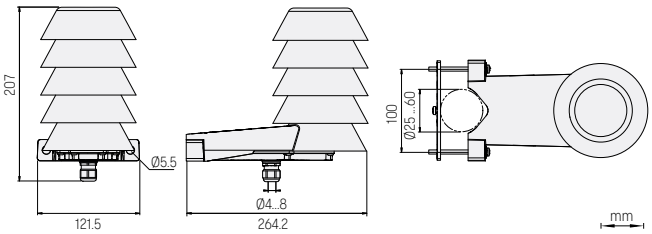
1) For more information, see the XMW85 Series Datasheet, available at docs.vaisala.com.
2) XMW85 Order Form available at docs.vaisala.com.
3) Output parameters for humidity: relative humidity, dew point temperature, wet bulb temperature, and enthalpy.

Dimensions

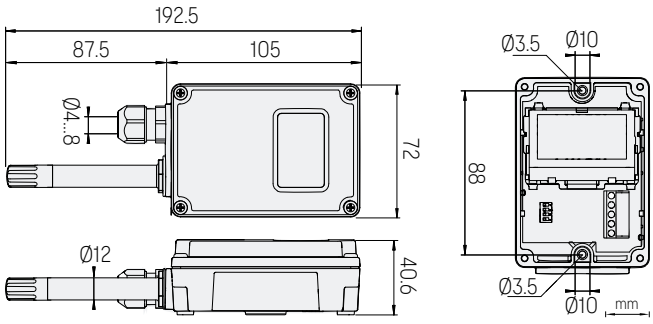
HMW82/83 RH+T and TMW82 T-only transmitters for wall-mounting



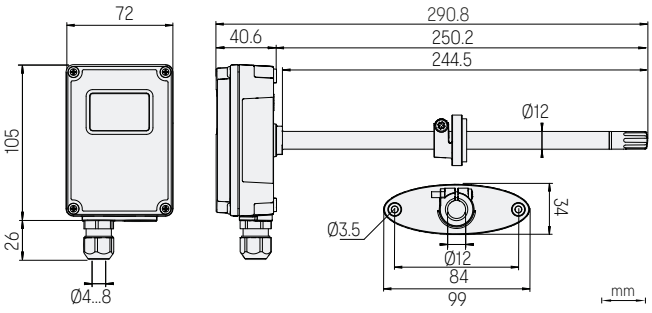
HMS82/83 RH+T and TMS82 T-only transmitters for outdoor measurements



HMW88/89(D) RH+T and TMW88 T-only transmitters for measurements in wet areas



HMD82/83(D) RH+T and TMD82 T-only transmitters for ducts



Technical data

Measurement performance, models HMW82/83 and TMW82

Relative humidity	
Measurement range	0–100 %RH
Accuracy in temperature range +10 … +30 °C (+50 … +86 °F)	±3 %RH (0–70 %RH) ±5 %RH (70–100 %RH)
Accuracy in temperature range −5 … +10 °C, +30 … +55 °C (+23 … +50 °F, +86 … +131 °F)	±7 %RH (0–100 %RH)
Stability in typical HVAC applications	±2 %RH over 2 years
Humidity sensor	Vaisala INTERCAP®
Temperature	
Measurement range	−5 … +55 °C (+23 … +131 °F)
Accuracy at +10 … +30 °C (+50 °F … +86 °F)	±0.5 °C (±0.9 °F)
Accuracy at −5 … +10 °C, +30 … +55 °C (+23 … +50 °F, +86 … +131 °F)	±1.0 °C (±1.8 °F)
Temperature sensor	Digital temperature sensor
Temperature sensor HMW82P100	Pt100 Class F 0.1 IEC 60751, 3-wire connection

Measurement performance, models HMD82/83, TMD82, HMW88/89, TMW88, HMS82/83, and TMS82

Relative humidity	
Measurement range	0–100 %RH
Accuracy in temperature range +10 … +30 °C (+50 … +86 °F)	±3 %RH (0–90 %RH) ±5 %RH (90–100 %RH)
Accuracy in temperature range −20 … +10 °C, +30 … +60 °C (−4 … +50 °F, +86 … +140 °F)	±5 %RH (0–90 %RH) ±7 %RH (90–100 %RH)
Accuracy in temperature range −40 … −20 °C (−40 … −4 °F)	±7 %RH (0–100 %RH)
Stability in typical HVAC applications	±2 %RH over 2 years
Humidity sensor	Vaisala INTERCAP®
Temperature	
Measurement range	−40 … +60 °C (−40 … +140 °F)
Accuracy at +20 °C (+68 °F)	±0.3 °C (±0.54 °F)
Temperature dependence	±0.01 °C/ °C
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Calculated parameters Measurement range for dew point temperature and wet bulb temperature Measurement range for enthalpy	−40 … +60 °C (−40 … +140 °F) −40 … 460 kJ/kg (−10 … +190 BTU/lb)

Operating environment

Maximum wind/flow speed	30 m/s
Storage temperature	−40 … +60 °C (−40 … +140 °F)
IP rating	See the table on p. 2 of this document
Operating temperature	
HMW82/83 and TMW82	−5 … +55 °C (+23 … +131 °F)
HMD82/83, TMD82, HMW88/89, TMW88, HMS82/83, and TMS82	−40 … +60 °C (−40 … +140 °F)
HMD82/83D and HMW88/89D	−5 … +60 °C (+23 … +140 °F)
Operating humidity	
HMD82/83, TMD82, HMW88/89, TMW88, HMS82/83, and TMS82	0–100 %RH
HMW82/83, TMW82, HMD82/83D and HMW88/89D	0–100 %RH, non-condensing

Measurement performance, models HMD82/83D and HMW88/89D

Relative humidity	
Measurement range	0–100 %RH
Accuracy in temperature range +10 … +30 °C (+50 … +86 °F)	±3 %RH (0–90 %RH) ±5 %RH (90–100 %RH)
Accuracy in temperature range −5 … +10 °C, +30 … +60 °C (+23 … +50 °F, +86 … +140 °F)	±5 %RH (0–90 %RH) ±7 %RH (90–100 %RH)
Stability in typical HVAC applications	±2 %RH over 2 years
Humidity sensor	Vaisala INTERCAP®
Temperature	
Measurement range	(Analog output scaling) −40 … +60 °C (−40 … +140 °F)
Accuracy at +20 °C (+68 °F)	±0.3 °C (±0.54 °F)
Temperature dependence	±0.01 °C/ °C
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Calculated parameters	
Measurement range for dew point temperature and wet bulb temperature	−40 … +60 °C (−40 … +140 °F) −40 … 460 kJ/kg (−10 … +190 BTU/lb)
Measurement range for enthalpy	

Inputs and outputs

Current output models (2-wire)	
Outputs	4–20 mA, loop powered
Loop resistance	0–600 Ω
Supply voltage	20–28 V DC at 600 Ω load 10–28 V DC at 0 Ω load
Voltage output models (3-wire)	
Outputs	0–10 V
Load resistance	10 kΩ min
Supply voltage	18–35 V DC 24 V AC ±20 % 50/60 Hz

Mechanical specifications

Max. wire size	1.5 mm^2 (AWG 16)
Standard housing color	White (RAL9003)
Housing material	
HMW82/83, TMW82	ABS/PC (UL-V0 approved)
HMW88/89(D), HMD82/83(D), TMW88, TMD82, HMS82/83, TMS82	PC + 10 %GF (UL-V0 approved)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, basic electromagnetic environment
EMC emissions	CISPR 32 / EN 55032, Class B FCC part 15 B, Class B ICES-3 / NMB-3 (Class B)
Compliance marks	CE, China RoHS, RCM, UKCA

Spare parts and accessories

INTERCAP sensor	15778HM
10 pcs of INTERCAP sensors	INTERCAPSET-10PCS
Conduit fitting + O-ring (M16×1.5 / NPT ½")	210675SP
Conduit fitting + O-ring (M16×1.5 / PG9, RE-MS)	210674SP
Fastening set HMS80	237805
Porous PTFE filter	DRW239993SP
Membrane filter	ASM210856SP
Terminal block, blue	236620SP
HMD80 display lid	ASM210793SP

VAISALA

HMS80 Series Humidity and Temperature Transmitters

For outdoor measurements in building automation applications

Features

- Reliable outdoor transmitters with integrated radiation shields
- ±3 %RH accuracy
- User-exchangeable INTERCAP® sensor for easy field replacement
- Default output parameters are relative humidity and temperature. Dew point temperature, wet bulb temperature, and enthalpy outputs selectable using DIP switches
- Options for both current and voltage outputs
- Ingress protection IP65

Vaisala HMS80 Series INTERCAP® Humidity and Temperature Transmitters are designed for outdoor measurements in various building automation applications. These ±3 % transmitters include an integrated radiation shield to reduce the influence of solar radiation on temperature and humidity measurements.

Easy Installation

HMS80 transmitters are easy to install. They can be mounted directly onto a wall or pole without any extra accessories. There are no loose parts, screws are retained in the enclosure, all connectors are clearly labeled, and the connectors are within easy reach.

For fast and convenient configuration, the most popular control parameters in free cooling control – dew point temperature, wet bulb temperature, and enthalpy – are selectable using DIP switches.

Low Maintenance

HMS80 series transmitters require minimal maintenance thanks to their excellent sensor stability and high-quality materials. If necessary, the INTERCAP® sensor can easily be replaced in the field with minimum downtime.

Technical Data

Models

Model	Type	Output	IP Rating
HMS82	Outdoor, RH+T	2-wire, current output	IP65
HMS83	Outdoor, RH+T	3-wire, voltage output	IP65

Measurement Performance

Relative Humidity	
Measurement range	0 ... 100 %RH
Accuracy at temperature range +10 ... +30 °C (+50 ... +86 °F):	
0 ... 90 %RH	±3 %RH
90 ... 100 %RH	±5 %RH
Accuracy at temperature range -20 ... +10 °C, +30 ... +60 °C: (-4 ... +50 °F, +86 ... +140 °F)	
0 ... 90 %RH	±5 %RH
90 ... 100 %RH	±7 %RH
Accuracy in temperature range -40 ... -20 °C (-40 ... -4 °F):	
0 ... 100 %RH	±7 %RH
Stability in typical HVAC applications	±2 %RH over 2 years
Humidity sensor	Vaisala INTERCAP®
Temperature	
Measurement range	-40 ... +60 °C (-40 ... +140 °F)
Accuracy at +20 °C (+68 °F)	±0.3 °C (±0.54 °F)
Temperature dependence	±0.01 °C/°C
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Calculated Parameters [1]	
Measurement range for dew point temperature and wet bulb temperature	-40 ... +60 °C (-40 ... +140 °F)
Measurement range for enthalpy	-40 ... 460 kJ/kg (-10 ... +190 BTU/lb)
Accuracy at 20 °C (68 °F) and 80 %RH	Dew point: ±0.9 °C (1.6 °F) Wet bulb temperature: ±0.7 °C (1.3 °F) Enthalpy: ±2 kJ/kg (0.9 BTU/lb)

1) *Accuracy of the calculated parameters should be calculated at the actual condition based on the relative humidity and temperature specification.*

Inputs and Outputs

Current Output Model HMS82 (2-wire)	
Outputs	4 ... 20 mA, loop powered
Loop resistance	0 ... 600 Ω
Supply voltage	20 ... 28 VDC at 600 Ω load 10 ... 28 VDC at 0 Ω load
Voltage Output Model HMS83 (3-wire)	
Outputs	0 ... 10 V
Load resistance	10 kΩ min
Supply voltage	18 ... 35 VDC 24 VAC ±20 % 50/60 Hz

Operating Environment

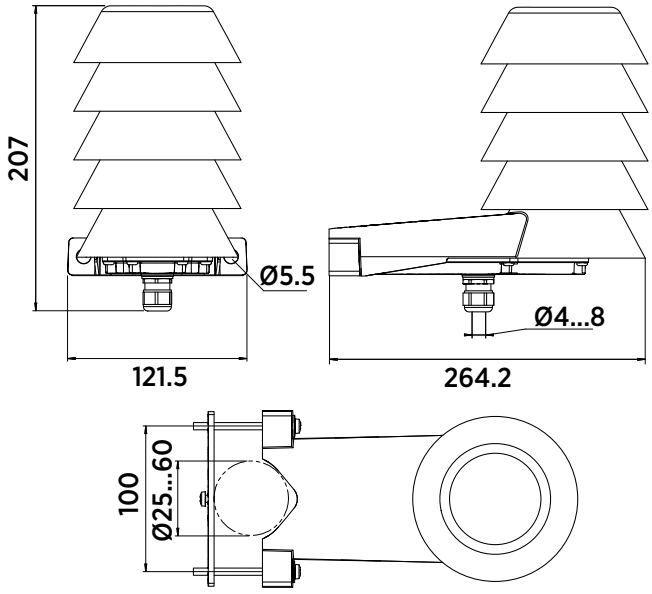
Operating temperature	-40 ... +60 °C (-40 ... +140 °F)
Operating humidity	0 ... 100 %RH
Maximum wind/flow speed	30 m/s (67 mph)
Storage temperature	-40 ... +60 °C (-40 ... +140 °F)
EMC compliance	EN61326-1, Industrial Environment

Mechanical Specifications

Max. wire size	1.5 mm^2 (AWG 16)
Standard housing color	White (RAL9003)
Housing material	PC + 10 %GF (UL-V0 approved)

Spare Parts and Accessories

INTERCAP® sensor	15778HM
10 pcs of INTERCAP® sensors	INTERCAPSET-10PCS
Conduit fitting + O-ring (M16 × 1.5 / NPT1/2 Inch)	210675SP
Conduit fitting + O-ring (M16 × 1.5 / PG9, RE-MS)	210674SP
Fastening set HMS80	237805
Membrane Filter	ASM210856SP
Terminal Block, Blue	236620SP



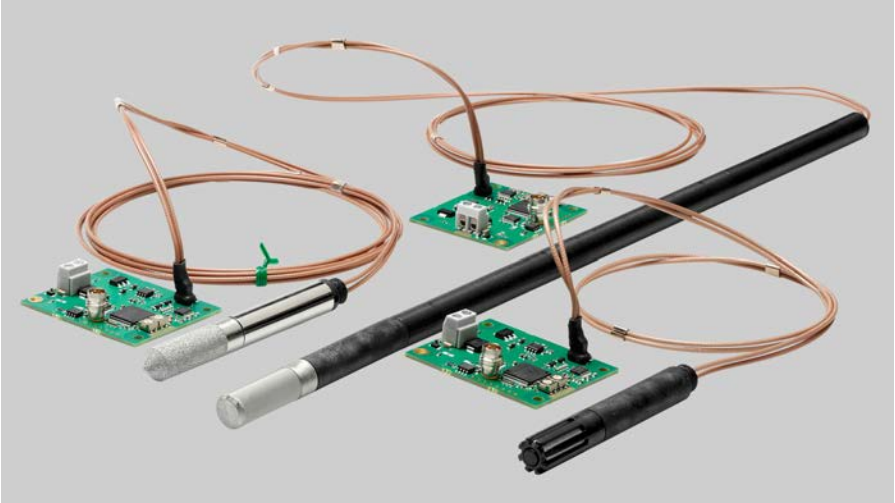
Dimensions in mm

CE

VAISALA

HMM100 Humidity Module

For environmental chambers



Features

- Full temperature compensation over the operating temperature range of -70 °C ... +180 °C (-94 °F ... +356 °F)
- High temperature tolerance, also suitable for heat sterilization
- Vaisala HUMICAP® 180R sensor
- Easy field calibration by trimmers
- Applications: test chambers, incubators

Vaisala HUMICAP® Humidity Module HMM100 is an open frame module for integration into environmental chambers. The module provides a single analog output channel for relative humidity (RH) or dew point (T_d).

Benefits

- Excellent measurement accuracy
- Low-maintenance
- Easy to install
- Durable

Two types of probes are available, one made of stainless steel, the other of plastics. The plastic probe comes in two sizes, a standard one and an extended 400-mm-long option. Several cable lengths up to 3 meters are available. Both probes use the Vaisala HUMICAP® 180R sensor which ensures excellent measurement accuracy.

Robust and Reliable

The HMM100 probe works in freezing conditions (-70 °C (-94 °F)) and also in temperatures up to +180 °C (+356 °F). HMM100 is easy to install and the probe can be freely placed in a test chamber as the speed of airflow does not affect the measurement.

Low-Maintenance

Compared to psychrometers, HMM100 requires very little maintenance. There is no wick that needs changing and there is no need for a water tank or water pump. Thus, environmental stress screening can be done reliably.

Accessories

The accessories available are a component board mounting bracket with a lid, probe clamp, USB cable for service use, a module housing, and a probe mounting flange.

Technical Data

Measurement Performance

Relative Humidity	
Measurement range	0 ... 100 %RH
Factory calibration uncertainty (+20 °C / +68 °F)	±1.5 %RH
Humidity sensor types	HUMICAP® 180R HUMICAP® 180
Accuracy [1]	
at −20 ... +40 °C (−4 ... +104 °F)	±2 %RH (0 ... 90 %RH) ±3 %RH (90 ... 100 %RH)
at −40 ... −20 °C and +40 ... +180 °C (−40 ... −4 °F and +104 ... +356 °F)	±2.5 %RH (0 ... 90 %RH) ±3.5 %RH (90 ... 100 %RH)
Dew Point Temperature	
Measurement range	−20 ... +100 °C (−4 ... +212 °F) T_d
Accuracy [2]	±2 °C (±3.6 °F) T_d

1) Including non-linearity, hysteresis, and repeatability.
2) Including non-linearity, hysteresis, and repeatability, when dew point depression is < +20 °C (+68 °F) (ambient temperature - dew point).

Operating Environment

EMC compliance	Applicable parts of EN61326-1, generic environment
Operating Temperature	
Component board	−5 ... +55 °C (+23 ... +131 °F)
Stainless steel probe	−70 ... +180 °C (−94 ... +356 °F)
Plastic probe (standard body)	−70 ... +180 °C (−94 ... +356 °F)
Plastic probe (extended 400-mm (16-in) body)	−70 ... +120 °C (−94 ... +248 °F)
Plastic grid and membrane filter	−20 ... +80 °C (−4 ... +176 °F)
Porous PTFE, stainless steel sintered, and PPS plastic grid with stainless steel net filter	−70 ... +180 °C (−94 ... +356 °F)

Mechanical Specifications

Service cable connector	M8 4-pin male
Probe diameter	12 mm (0.5 in)
Probe Cable Lengths	
Stainless steel probe	0.6/1.55/2.9 m (2/5.1/9.5 ft)
Plastic probe (standard body)	0.6/1.55/2.9 m (2/5.1/9.5 ft)
Plastic probe (extended 400-mm (16-in) body)	1.55 m (5.1 ft)
Probe Material	
Stainless steel probe	AISI316/PPS
Plastic probe	PPS
Extension tube for 400-mm probe	POM
Probe mounting clamp	AISI316
Mounting Bracket Material	
Lid	ABS/PC
Bottom plate	Al
Module housing material	ABS/PC (cover)

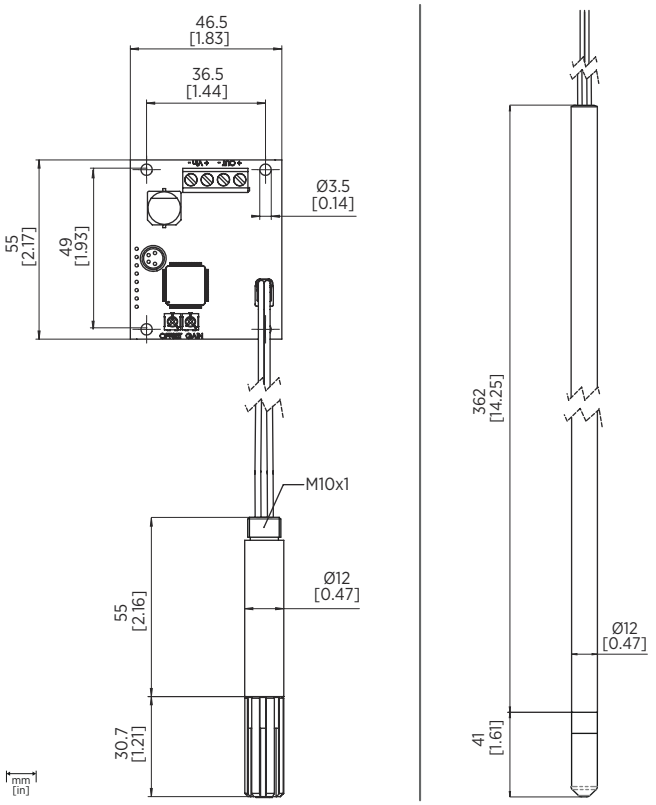
Inputs and Outputs

Power consumption	6 mA
Operating Voltage	
2-wire model	24 VDC
3-wire model	10 ... 35 VDC or 24 VAC ±20 % 15 ... 35 VDC or 24 VAC ±20 % when 0 ... 10 V output is used
Analog Output Types (1 Output Selectable)	
2-wire model	4 ... 20 mA (loop-powered)
3-wire model	0 ... 20 mA, 0 ... 1/5/10 V, 1 ... 5 V
Max. wire size	0.5 ... 1.5 mm² (AWG)
Service port	M8 connector for USB cable

Spare Parts and Accessories

HUMICAP® 180R sensor	HUMICAP180R
HUMICAP® 180 sensor [1]	15778HM
Plastic grid filter	6221
Membrane filter	10159HM
Porous PTFE filter	219452SP
Stainless steel sintered filter	HM47280SP
PPS plastic grid with stainless steel net filter	DRW010281SP
Mounting bracket with lid	225979
Module housing (IP65)	226060
Probe mounting flange	226061
Probe mounting clamp set (10 pcs)	226067
USB cable	226068

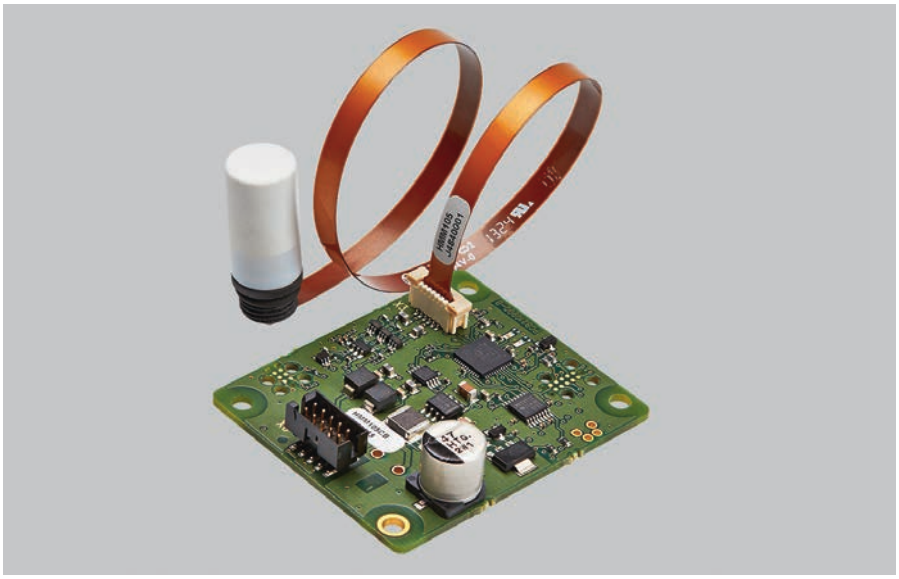
1) Spare part item name: Vaisala INTERCAP® humidity sensor.



VAISALA

HMM105 Digital Humidity Module

For OEM applications



Features

- Digital I²C communication interface available
- Full temperature compensation over the operating temperature range of -40 °C ... +180 °C
- High temperature tolerance, suitable for heat sterilization up to +200 °C
- Vaisala HUMICAP® 180R sensor
- Detachable probe assembly
- Probe head with M10x1 threads
- Applications: test chambers, incubators

Vaisala HUMICAP® Digital Humidity Module HMM105 is an open frame module for integration into environmental chambers. The modules provide an I²C output for relative humidity (RH) or dew point (T_d).

Benefits

- Easy installation
- Excellent measurement accuracy
- Maintenance-free

The module consists of a detachable probe assembly – a probe head with M10x1 threads and a flex cable – and the module circuit board. The probe assembly is 30 cm in length. The module incorporates the Vaisala HUMICAP® 180R sensor which ensures excellent measurement accuracy.

Reliable for OEM's

The HMM105 probe head works in freezing conditions (-40 °C) and also in temperatures up to +180 °C in continuous use. In short term use, the probe head can be exposed to temperatures up to +200 °C. HMM105 is intended for OEM chamber manufacturers for integration into test chambers and incubators.

Maintenance-free

Compared to psychrometers, HMM105 is practically maintenance free. There is no wick that needs changing and there is no need for a water tank or water pump. Thus, environmental stress screening can be done reliably.

I2C interface for better usability

HMM105 has an I²C interface for communicating with the incubator's controller. HMM105 implements I²C slave functionality, with the incubator's controller acting as the master. The interface can be used to read measurement values and status information, set operation parameters, and make adjustments.

Technical Data

Relative Humidity

Measurement range	0 ... 100 %RH
Factory calibration uncertainty (+20 °C)	±1.5 %RH
Humidity sensor	Vaisala HUMICAP® 180R
Accuracy (incl. Non-Linearity, Hysteresis and Repeatability)	
Temperature	-20 ... +40 °C
0 ... 90 %RH	±2 %RH
90 ... 100 %RH	±3 %RH
Temperature	-40 ... -20 °C, +40 ... +180 °C
0 ... 90 %RH	±2.5 %RH
90 ... 100 %RH	±3.5 %RH

Dew Point Temperature

Measurement range	-20 ... +100 °C (-4 ... +212 °F)T_d
Accuracy (incl. non-linearity, hysteresis and repeatability) when dew point depression < 20 °C (Ambient temperature - dew point)	±2 °C T_d

Operating Environment

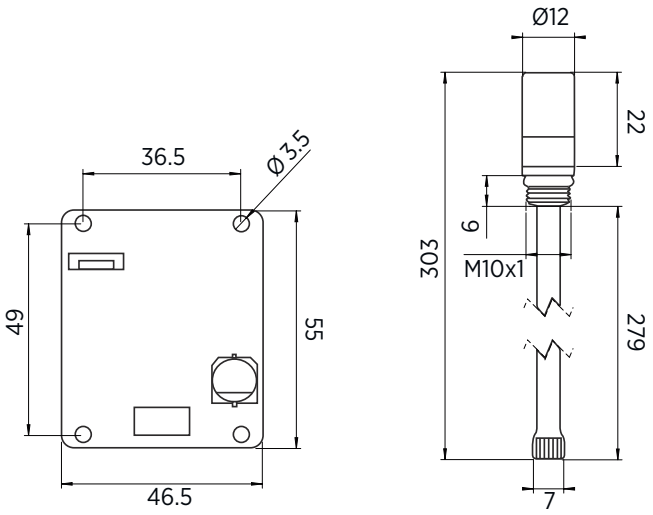
EMC compliance	Applicable parts of EN61326-1, Industrial Environment
Storage temperature	-40 ... +75 °C (-40 ... +167 °F)
Operating Temperature	
Component board	-5 ... +55 °C (+23 ... +131 °F)
Probe (continuous use)	-40 ... +180 °C (-40 ... +356 °F)
Probe (short term peak)	+200 °C (+392 °F)
Plastic grid, membrane filter	-20 ... +80 °C (-4 ... +176 °F)
PTFE sintered filters, stainless steel sintered filter	-40 ... +200 °C (-40 ... +392 °F)

Inputs and Outputs

Supply voltage	10 ... 35 VDC, 24 VAC (±20 %)
Output voltage	I^2C 5 V
Power consumption (DC/AC)	< 15/25 mA
Connector for supply voltage and I^2C bus	Molex 87832-1007, 10-pin header

Mechanical Specifications

Probe diameter	12 mm
Probe flex cable length	0.3 m
Probe lead-through material	PPS plastic



Dimensions in millimeters

Spare Parts and Accessories

Humidity sensor	HUMICAP® 180R
Short PTFE sintered filter	DRW239993SP
Plastic grid filter	6221
Plastic grid and membrane filter	10159HM
PTFE sintered filter	219452SP
Stainless steel sintered filter	HM47280SP
0.6 m cable with Molex milli-grid connectors	ASM210962SP

CE

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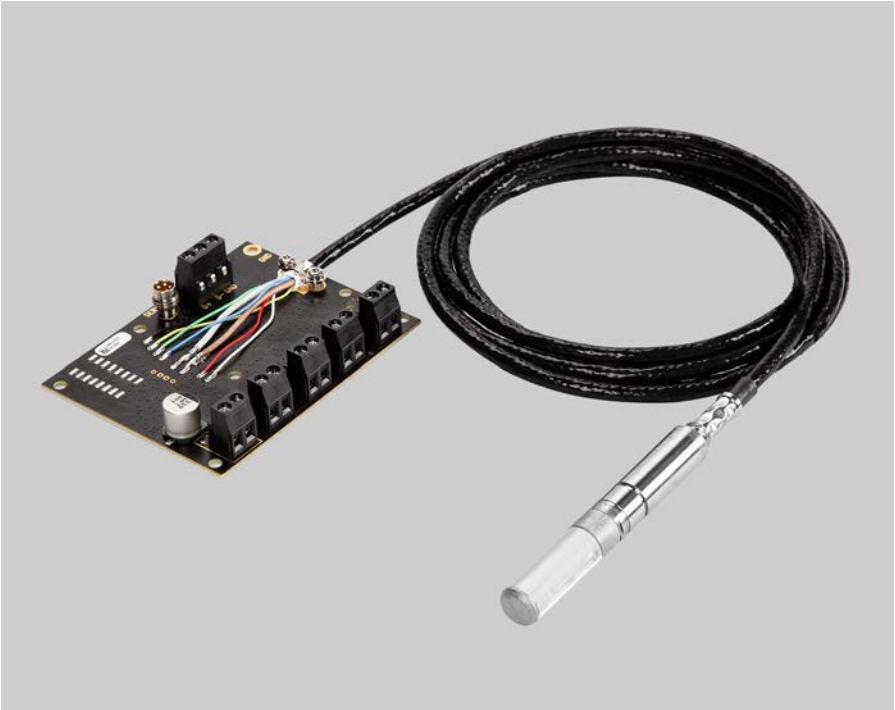
HMM170 Humidity and Temperature Module

For environmental chambers



Features

- Warmed sensor and probe for condensation prevention
- Chemical purge for maintaining sensor performance
- Suitable for use in high humidity environments, vacuum, and pressurized chambers
- Temperature measurement range −70 … +180 °C (−94 … +356 °F)
- Sensor options for corrosion tolerance, H_2O_2 tolerance, and moisture-in-oil measurement
- 3 analog output channels
- Modbus RTU over RS-485
- Several output parameters available
- 3 probe cable length options
- Compatible with Insight PC software

Vaisala HUMICAP® Humidity and Temperature Module HMM170 is an open frame OEM module for integration into demanding environmental chambers and harsh conditions. The module provides a digital RS-485/Modbus RTU output and three freely configurable analog output channels. The module provides relative humidity, temperature, dew point, and other calculated parameters.

Designed for harsh environments

HMM170 probe covers the full temperature range −70 … +180 °C (−94 … +356 °F) used in climate chambers and the whole humidity range up to condensation. The small probe and compact component board offer easy and flexible installation. The probe cable options (2, 5, or 10 m (6.5, 16.4, or 32.8 ft)) offer excellent cost optimization and flexibility to any OEM application. By ordering HMM170 with the appropriate sensor, you can use the module in environments that are frequently sterilized with vaporized hydrogen peroxide (H_2O_2) or to measure humidity in oil medium, for example, for transformer and engine monitoring applications.

Robust sensor technology

The latest general purpose HUMICAP® R2 sensor has improved corrosion resistance. The sensor can tolerate typical chemicals, such as cleaning agents used in climate chambers. The automatic sensor chemical purge function keeps the sensor clean from typical chemical fumes and the additional probe warming function prevents condensation. In case HMM170 gets in contact with water, the automatic heating rapidly dries the sensor to enable fast and accurate humidity measurement.

Convenient to use

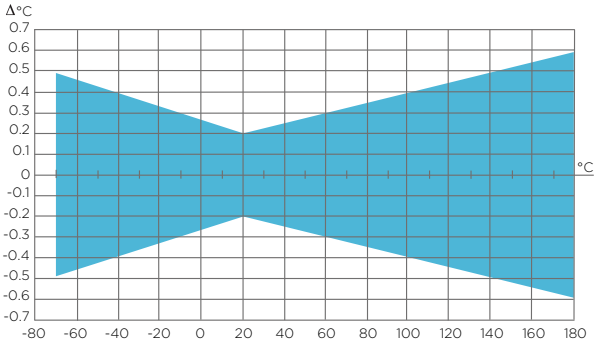
HMM170 is easy to install and convenient to use. It provides both digital and analog outputs for multiple needs. An integrated service port enables a quick and simple way to configure, check, and calibrate the module with the help of a USB cable and Vaisala Insight PC software. In addition, the footprint of the HMM170 component board enables easy update for Vaisala HMM100 users.

Technical data

Measurement performance

Relative humidity	
Measurement range	0 ... 100 %RH
Accuracy [1) 2)]	
at +15 ... +25 °C (59 ... +77 °F)	±1 %RH (0 ... 90 %RH) ±1.7 %RH (90 ... 100 %RH)
at −20 ... +40 °C (−4 ... +104 °F)	± (1.0 + 0.008 × reading) %RH
at −40 ... +180 °C (−40 ... +356 °F)	± (1.5 + 0.015 × reading) %RH
Factory calibration uncertainty at +20 °C (+68 °F) [3)]	±0.6 %RH (0 ... 40 %RH) ±1.0 %RH (40 ... 90 %RH) ±1.1 %RH (90 ... 95 %RH)
Humidity sensor types	HUMICAP® R2C HUMICAP® 180L2 HUMICAP® 180VC
T_{90} response time [4)]	50 s with steel mesh filter 60 s with sintered filter
Temperature	
Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751
Typical accuracy at +20 °C (+68 °F)	±0.2 °C (± 0.36 °F)

1) Including non-linearity, hysteresis and repeatability.
2) With HUMICAP® 180VC sensor, accuracy is not specified below −20 °C (−4 °F) operating temperature.
3) Defined as ±2 standard deviation limits. Small variations possible; see also calibration certificate.
4) At +20 °C (+68 °F) in 0.1 m/s air flow with Vaisala HUMICAP® R2C sensor.



Temperature measurement accuracy over temperature range

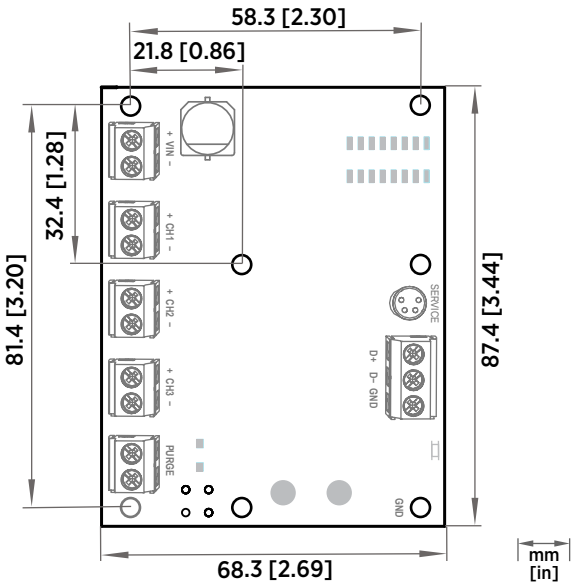
Operating environment

Operating temperature for component board	−40 ... +60 °C (−40 ... +140 °F)
Operating humidity for component board	0 ... 100 %RH, non-condensing
Storage temperature	−55 ... +80 °C (−67 ... +176 °F)
Operating pressure	0 ... 10 bar

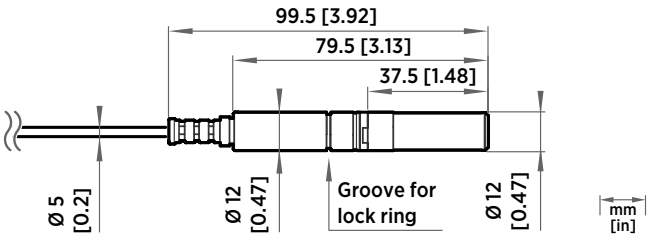
Accessories

USB cable for PC connection [1)]	219690
Cable gland M20×1.5 for probe cable	HMP247CG
Swagelok NPT 1/2" adapter for probe	SWG12NPT12
Swagelok ISO 1/2" adapter for probe	SWG12ISO12
Duct installation kit for probe	210697

1) Vaisala Insight software for Windows available at www.vaisala.com/insight



HMM170 component board dimensions



HMM170 probe head dimensions

Inputs and outputs

Three analog outputs (selectable and scalable)	0 – 20 mA, 4 – 20 mA 0 – 1 V, 0 – 5 V, 1 – 5 V, or 0 – 10 V
Typical accuracy of analog output at +20 °C (+68 °F)	±0.05 % full scale
Typical temperature dependence of analog output	0.005 %/°C (0.003 %/°F) full scale
External load	R_L < 500 Ω
Digital output	RS-485 serial, Modbus
Service port	M8 connector for USB cable
Start-up time	3 s at power-up
Wire size	0.5 ... 1.5 mm² (20 ... 16 AWG)
Supply voltage	
when condensation prevention and chemical purge features are not used	12 – 35 V DC
all features available	18 – 35 V DC or 24 V AC ±10 %
Power consumption	
Analog outputs	12 mA (voltage), 50 mA (current)
Chemical purge at 24 V DC	+220 mA
Warmed probe at 24 V DC	+240 mA

VAISALA

HMP60 Humidity and Temperature Probe

Features

- Miniature-size humidity probe
- Low power consumption
- Measurement range: 0–100 %RH; −40 ... +60 °C (−40 ... +140 °F)
- Cable detachable with standard M8 connector
- Rugged metal housing
- Interchangeable Vaisala INTERCAP® sensor
- Compatible with Vaisala Insight PC software and Vaisala Indigo80 Handheld Indicator
- Optional RS-485 digital output supports Modbus® RTU
- Optional dew/frost point, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy output

Vaisala INTERCAP® Humidity and Temperature Probe HMP60 is a simple, durable and cost-effective humidity probe. It is suitable for volume applications, integration into other manufacturers' equipment, incubators, glove boxes, greenhouses, fermentation chambers, and data loggers.

Easy installation

The probe cable has a screw-on quick connector for easy installation. Different cable lengths are available. Also other compatible M8 series cables can be used. Accessories are available for different installation needs.

Low current consumption

HMP60 is suitable for battery-powered applications because of its very low current consumption.

Several outputs

Temperature measurement is a standard feature in HMP60, with dew point temperature, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy as optional calculated parameters. Four voltage output ranges are available. An optional RS-485 output with Modbus support is also available.

Flexible connectivity

In addition to analog and digital (Modbus) output options, the probe can also be used with Vaisala Indigo80 Handheld Indicator. For easy-to-use access to configuration and device analytics functionalities, the probe can be connected to Vaisala Insight PC software for Windows®. For more information, see vaisala.com/indigo80 and vaisala.com/insight.

Rugged design

HMP60 is designed for extreme conditions. The stainless steel body of HMP60 is classified as IP65. The probe has a sealed structure and the sensor is protected by a membrane filter and a plastic grid, or optionally by a stainless steel filter.

Recalibration not needed

The Vaisala INTERCAP® sensor is interchangeable. No recalibration is required; the sensor can simply be replaced, also in the field.

Technical data

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Typical accuracy:	
at 0 ... +40 °C (+32 ... +140 °F)	±3 %RH (0–90 %RH) ±5 %RH (90–100 %RH)
at −40 ... 0 °C and +40 ... +60 °C (−40 ... +32 °F and +104 ... +140 °F)	±5 %RH (0–90 %RH) ±7 %RH (90–100 %RH)
Humidity sensor	Vaisala INTERCAP®
Temperature	
Measurement range	−40 ... +60 °C (−40 ... +140 °F)
Accuracy:	
at +10 ... +30 °C (+50 ... +86 °F)	±0.5 °C (±0.9 °F)
at −40 ... +10 and +30 ... +60 °C (−40 ... +50 and +86 ... +140 °F)	±0.6 °C (±1.08 °F)
Analog outputs	
Accuracy at +20 °C (+68 °F)	±0.2 % of FS
Temperature dependence	±0.01 % of FS/°C (±0.006 % of FS/°F)

Inputs and outputs

Power consumption	1 mA average, max. peak 5 mA
Operating voltage [1]	
With 1 V / 2.5 V output	5–28 V DC
With 5 V output	8–28 V DC
With loop power converter	8–28 V DC
With digital output	5–28 V DC
Start-up time	
Probes with analog output	4 s at operating voltage 13.5–16.5 V DC 2 s at other valid operating voltages
Probes with digital output	1 s
Outputs	
2 channels	0–1 V DC / 0–2.5 V DC / 0–5 V DC / 1–5 V DC
1-channel loop-power converter (separate module, compatible with humidity accuracy only)	4–20 mA
Digital output (optional)	RS-485 2-wire half duplex, supports Modbus RTU
External loads	
0–1 V	R_L min. 10 kΩ
Other voltage outputs	R_L min. 50 kΩ
Output parameters	
Relative humidity, temperature, dew/frost point temperature, wet bulb temperature, absolute humidity, mixing ratio, enthalpy	

1) Use lowest available operating voltage to minimize heating.

Operating environment

Operating temperature	−40 ... +60 °C (−40 ... +140 °F)
IP rating [1]	IP65

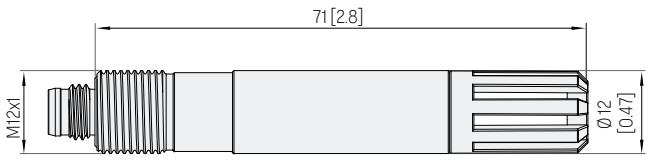
1) Not applicable with the plastic grid filter.

Mechanical specifications

Body thread	MI2×1 / 10 mm (0.4 in)
Cable connector	4-pin M8 (IEC 60947-5-2)
Materials	
Body	Stainless steel (AISI 316)
Grid filter	Chrome coated ABS plastic
Cable	Polyurethane or FEP
Weight	
Probe	17 g (0.6 oz)
Probe with 0.3 m (1 ft) cable	28 g (1 oz)

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
EMC emissions	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM, UKCA



Dimensions in mm (inches)

Spare parts and accessories

Sensors	
Vaisala INTERCAP® sensor, 1 pc	15778HM
Vaisala INTERCAP® sensor, 10 pcs	INTERCAPSET-10PCS
Sensor protection	
Plastic grid filter	DRW010522SP
Membrane filter	DRW010525SP
Stainless steel sintered filter	HM46670SP
PTFE membrane filter with stainless steel grid	ASM212652SP
PTFE sintered filter	DRW244938SP
Probe installation	
Duct installation kit	215619
Probe mounting clamp set, 10 pcs	226067
Probe mounting flange	226061
Probe holder, 5 pcs	ASM213382SP
Plastic M12 installation nuts, pair	18350SP
Flat extension cable 1 m (3 ft) [1)]	CBL210649SP
Connection adapters	
4–20 mA loop power converter	UI-CONVERTER-1CB
Mounting bracket for converter	225979
USB cable for PC connection	219690
Connection cable for Indigo80 handheld indicator	262195SP
Connection cable for MI70 indicator	219980SP
Connection cables with open wires	
+60 °C 0.3 m (+140 °F 1 ft)	HMP50Z032SP
+60 °C 1.2 m (+140 °F 4 ft)	HMP50Z120
+60 °C 3 m (+140 °F 9.8 ft)	HMP50Z300SP
+80 °C 1.5 m (+176 °F 5 ft)	225777SP
+80 °C 3 m (+176 °F 10 ft)	225229SP
+180 °C 1.5 m (+356 °F 5 ft) FEP	238025
+180 °C 3 m (+356 °F 10 ft) FEP	226902SP

1) Connection cable 219980SP is also needed if this cable is used with MI70 indicator.

VAISALA

HMP63 Humidity and Temperature Probe

Features

- Fast thermal response time
- Low power consumption
- Start-up time < 2 s
- Measurement range: 0–100 %RH; −40 ... +60 °C (−40 ... +140 °F)
- Cable detachable with standard M8 connector
- IP54-rated plastic housing
- Interchangeable Vaisala INTERCAP® humidity sensor
- Compatible with Vaisala Insight PC software and Vaisala Indigo80 Handheld Indicator
- Optional RS-485 digital output supports Modbus® RTU
- Optional dew/frost point, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy output
- Temperature-only model HMP63T with digital output also available

Vaisala INTERCAP® Humidity and Temperature Probe HMP63 is a cost-effective humidity probe with a plastic housing. It is designed for non-condensing indoor environments or integration into other manufacturers' equipment.

Easy installation

The probe fits into tight spaces. The cable has a threaded M8 connector for easy installation. Different cable lengths are available and other compatible M8-series cables can also be used. Accessories are available for different installation needs.

Low power consumption

HMP63 is suitable for battery-powered applications thanks to its very low power consumption and fast start-up time.

Several output options

Temperature measurement is a standard feature in HMP63, with dew point temperature, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy as optional calculated parameters. Four voltage output ranges are available. An alternative RS-485 output with Modbus support is also available.

Output type, channel assignment of measurement parameters, and other probe features are configured when the probe is ordered.

Flexible connectivity

In addition to analog and digital (Modbus) output options, the probe can also be used with Vaisala Indigo80 Handheld Indicator. For easy-to-use access to configuration and device analytics functionalities, the probe can be connected to Vaisala Insight PC software for Windows®. For more information, see vaisala.com/indigo80 and vaisala.com/insight.

Fast thermal response time

HMP63 has a PC/ABS plastic enclosure. It is ideal for environments with fast temperature changes where standard measurement accuracy is sufficient.

No recalibration required

HMP63 includes an interchangeable Vaisala INTERCAP® humidity sensor. No recalibration is required – the humidity sensor can simply be replaced, even in the field.

Technical data

Models

Model	Measurement	Special features
HMP63	RH + T	INTERCAP® humidity sensor
HMP63T	T	Digital output only, for use with CWL100 data logger

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Typical accuracy:	
at 0 … +40 °C (+32 … +140 °F)	±3 %RH (0–90 %RH) ±5 %RH (90–100 %RH)
at −40 … 0 °C and +40 … +60 °C (−40 … +32 °F and +104 … +140 °F)	±5 %RH (0–90 %RH) ±7 %RH (90–100 %RH)
Humidity sensor	Vaisala INTERCAP®
Temperature	
Measurement range	−40 … +60 °C (−40 … +140 °F)
Accuracy:	
at +10 … +30 °C (+50 … +86 °F)	±0.5 °C (±0.9 °F)
at −40 … +10 and +30 … +60 °C (−40 … +50 and +86 … +140 °F)	±0.6 °C (±1.08 °F)
Analog outputs	
Accuracy at 20 °C (+68 °F)	±0.2 % of FS
Temperature dependence	±0.01 % of FS/°C (±0.006 % of FS/°F)

Inputs and outputs

Power consumption	1 mA average, max. peak 5 mA
Operating voltage[1)]	
With 1 V / 2.5 V output	5–28 V DC
With 5 V output	8–28 V DC
With loop-power converter	8–28 V DC
With digital output	5–28 V DC
Start-up time	
Probes with analog output	4 s at operating voltage 13.5–16.5 V DC 2 s at other valid operating voltages
Probes with digital output	1 s
Outputs	
2 channels	0–1 V DC / 0–2.5 V DC / 0–5 V DC / 1–5 V DC
1-channel loop-power converter (separate module, compatible with humidity accuracy only)	4–20 mA
Digital output (optional)	RS-485 2-wire half duplex, supports Modbus RTU
External loads	
0–1 V	R_L min. 10 kΩ
Other voltage outputs	R_L min. 50 kΩ
Output parameters	
Relative humidity, temperature, dew/frost point temperature, wet bulb temperature, absolute humidity, mixing ratio, enthalpy	

1) Use lowest available operating voltage to minimize heating.

Operating environment

Operating temperature	−40 … +60 °C (−40 … +140 °F)
IP rating [1)]	IP54

1) Not applicable with the plastic grid filter.

Mechanical specifications

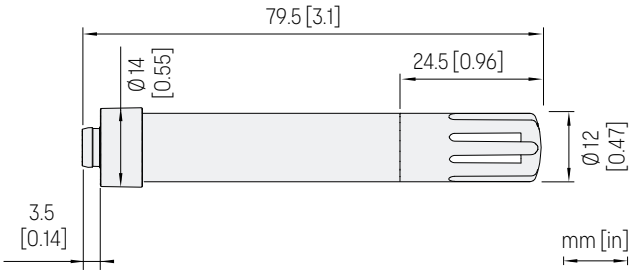
Cable connector	4-pin M8 (IEC 60947-5-2)
Materials	
Body	PC/ABS blend
Grid filter	PC (glass reinforced)
Cable	Polyurethane or FEP
Weight	
Probe	9 g (0.3 oz)
Probe with 0.3 m (1 ft) cable	20 g (0.7 oz)

Compliance

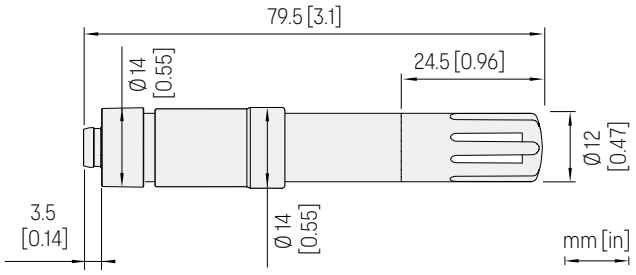
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, basic electromagnetic environment
EMC emissions	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM, UKCA

Spare parts and accessories

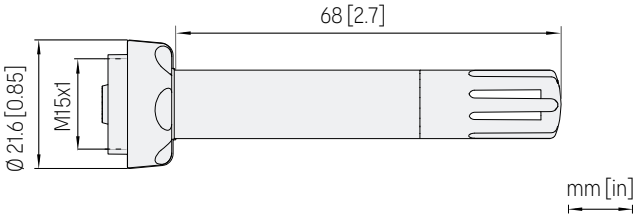
Sensors	
Vaisala INTERCAP® sensor, 1 pc	15778HM
Vaisala INTERCAP® sensor, 10 pcs	INTERCAPSET-10PCS
Sensor protection	
Plastic grid filter	DRW240185SP
Plastic grid with membrane filter	ASM210856SP
Stainless steel sintered filter	HM47280SP
Porous PTFE filter	219452SP
Probe installation	
Probe mounting clamp set, 10 pcs	226067
Probe mounting flange	226061
Probe holder, 5 pcs	ASM213382SP
Plastic locking bushing (3 pcs) for attaching probe to HM40	DRW238590SP
Connection adapters	
4–20 mA loop power converter	UI-CONVERTER-1CB
Mounting bracket for converter	225979
USB cable for PC connection	219690
Connection cable for Indigo80 handheld indicator	262195SP
Connection cable for HM70	219980SP
Connection cables with open wires	
+60 °C 0.3 m (+140 °F 1 ft)	HMP50Z032SP
+60 °C 1.2 m (+140 °F 4 ft)	HMP50Z120
+60 °C 3 m (+140 °F 9.8 ft)	HMP50Z300SP
+80 °C 1.5 m (+176 °F 5 ft)	225777SP
+80 °C 3 m (+176 °F 10 ft)	225229SP
+180 °C 1.5 m (+356 °F 5 ft) FEP	238025
+180 °C 3 m (+356 °F 10 ft) FEP	226902SP



HMP63 probe dimensions



HMP63 and HMP63T probe dimensions with sleeve for CWL100 data logger



HMP63 probe dimensions with plastic locking bushing

VAISALA

HMP110 Humidity and Temperature Probe

Features

- Miniature-size humidity transmitter
- Low power consumption and fast start-up for battery-powered applications
- Measurement range: 0–100 %RH; −40 ... +80 °C (−40 ... +176 °F)
- Cable detachable with standard M8 quick connector
- IP65 metal housing
- Compatible with Vaisala Insight PC software and Vaisala Indigo80 handheld indicator
- Optional RS-485 digital output supports Modbus® RTU
- ±1.5 %RH measurement accuracy (0–90 %RH)
- Temperature-only model HMP110T also available

Vaisala HUMICAP® Humidity and Temperature Probe HMP110 is a trouble-free and cost-effective humidity transmitter with high accuracy and good stability. It is suitable for volume applications or integration into other manufacturers' equipment. HMP110 is also suitable for glove boxes, greenhouses, fermentation and stability chambers, data loggers, and incubators.

Benefits

- Latest generation Vaisala HUMICAP® 180R sensor for best stability and high chemical tolerance
- Comes with calibration certificate
- Optional dew/frost point, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy calculation

Easy installation

The probe cable has a screw-on quick connector for easy installation. Different cable lengths and accessories are available.

Low current consumption

HMP110 is suitable for battery-powered applications because of its very low current consumption. It also has a fast start-up time.

Several outputs

Temperature measurement is a standard feature in the HMP110, with dew/frost point temperature, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy as optional calculated parameters. Three standard voltage outputs are available. An optional RS-485 output with Modbus support is also available.

Flexible connectivity

In addition to analog and digital (Modbus) output options, the probe can also be used with the Vaisala Indigo80 handheld indicator. For easy-to-use access to configuration and device analytics functionalities, the probe can be connected to Vaisala Insight software for Windows®. For more information, see www.vaisala.com/insight and www.vaisala.com/indigo80.

Robust design

The stainless steel body of HMP110 is classified as IP65, making it ideal for rough conditions. HMP110 has high chemical tolerance thanks to the HUMICAP® 180R sensor.

Technical data

Models

Model	Output	Special features
HMP110	RH+T	–
HMP110T	T	–
HMP110REF	–	Fixed output probe for validation of HMT120 and HMT130 transmitters

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy: [1] [2]	
at 0 … +40 °C (+32 … +104 °F)	±1.5 %RH (0–90 %RH) ±2.5 %RH (90–100 %RH)
at −40 … 0 °C (−40 … +32 °F) and +40 … +80 °C (+104 … +176 °F)	±3.0 %RH (0–90 %RH) ±4.0 %RH (90–100 %RH)
Factory calibration uncertainty at +20 °C (+68 °F)	±1.1 %RH (0–90 %RH) ±1.8 %RH (90–100 %RH)
Humidity sensor types	HUMICAP® 180R HUMICAP® 180V
Stability	±2 %RH over 2 years
T_{90} response time	With plastic grid filter: approx. 17 s With membrane filter: approx. 20s With stainless steel sintered filter: approx. 60 s
Temperature	
Measurement range	−40 … +80 °C (−40 … +176 °F)
Accuracy (probes with analog output):	
at 0 … +40 °C (+32 … +104 °F)	±0.2 °C (±0.36 °F)
at −40 … 0 °C (−40 … +32 °F) and +40 … +80 °C (+104 … +176 °F)	±0.4 °C (±0.72 °F)
Accuracy (probes with digital output):	
at +15 … +25 °C (+59 … +77 °F)	±0.1 °C (±0.18 °F)
at 0 … +15 °C (+ 32 … +59 °F) and +25 … +40 °C (+77 … +104 °F)	±0.15 °C (±0.27 °F)
at −40 … 0 °C (−40 … +32 °F) and +40 … +80 °C (+104 … +176 °F)	±0.4 °C (±0.72 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Analog outputs	
Accuracy at +20 °C (+68 °F)	±0.2 % of FS
Temperature dependence	±0.01 % of FS/°C (±0.006 % of FS/°F)

1) *Including non-linearity, hysteresis, and repeatability.*
2) *With HUMICAP® 180V sensor, accuracy is not specified below −20 °C (−4 °F) operating temperature.*

Operating environment

Operating temperature	−40 … +80 °C (−40 … +176 °F)
IP rating [1]	IP65

1) *Not applicable with the plastic grid filter.*

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
EMC emissions	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM, UKCA

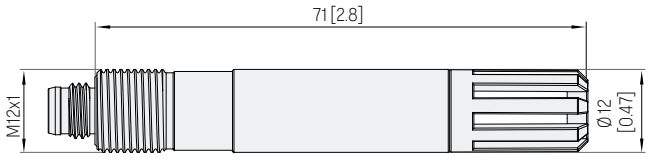
Inputs and outputs

Power consumption	1 mA average, max. peak 5 mA
Operating voltage [1]	
With 1 V / 2.5 V output	5–28 V DC
With 5 V output	8–28 V DC
With loop power converter	8–28 V DC
With digital output	5–28 V DC
Start-up time	
HMP110 probes with analog output	4 s at operating voltage 13.5–16.5 V DC 2 s at other valid operating voltages
HMP110 probes with digital output	1 s
Outputs	
2 channels	0–1 V DC / 0–2.5 V DC / 0–5 V DC / 1–5 V DC
1-channel loop-power converter (separate module, compatible with humidity accuracy only)	4–20 mA
Digital output (HMP110 probes with digital output)	RS-485 2-wire half duplex, supports Modbus RTU
External loads	
0–1 V	R_L min. 10 kΩ
Other voltage outputs	R_L min. 50 kΩ
Output parameters	
Relative humidity, temperature, dew/frost point temperature, wet bulb temperature, absolute humidity, mixing ratio, enthalpy	

1) *Use lowest available operating voltage to minimize heating.*

Mechanical specifications

Body thread	MI2×1 / 10 mm (0.4 in)
Cable connector	M8 4-pin female (IEC 60947-5-2)
Materials	
Body	Stainless steel (AISI 316)
Grid filter	Chrome coated ABS plastic
Cable	Polyurethane or FEP
Weight	
Probe	17 g (0.6 oz)
Probe with 0.3 m (1 ft) cable	28 g (1 oz)



HMP110 and HMP110T probe dimensions

Spare parts and accessories

Sensors	
Vaisala HUMICAP® 180R	HUMICAP180R
Vaisala HUMICAP® 180V	HUMICAP180V
Sensor protection	
Plastic grid filter	DRW010522SP
Membrane filter	DRW010525SP
Stainless steel sintered filter	HM46670SP
PTFE membrane filter with stainless steel grid	ASM212652SP
PTFE sintered filter	DRW244938SP
Probe installation	
Duct installation kit	215619
Probe mounting clamp set, 10-pcs	226067
Probe mounting flange	226061
Probe holder, 5 pcs	ASM213382SP
Plastic M12 installation nuts, pair	18350SP
Flat extension cable 1 m (3 ft) [1)]	CBL210649SP
Connection adapters	
4–20-mA loop power converter	UI-CONVERTER-1CB
Mounting bracket for converter	225979
USB cable for PC connection	219690
Connection cable for Indigo80 handheld indicator	262195SP
Connection cable for MI70 indicator	219980SP
Connection cables with open wires	
+60-°C 0.3-m (+140-°F 1-ft)	HMP50Z032SP
+60-°C 1.2-m (+140-°F 4-ft)	HMP50Z120
+60-°C 3-m (+140-°F 9.8-ft)	HMP50Z300SP
+80-°C 1.5-m (+176-°F 5-ft)	225777SP
+80-°C 3-m (+176-°F 10-ft)	225229SP
+180-°C 1.5-m (+356-°F 5-ft) FEP	238025
+180-°C 3-m (+356-°F 10-ft) FEP	226902SP

1) Connection cable 219980SP is also needed if this cable is used with MI70 indicator.

VAISALA

HMP113 Humidity and Temperature Probe

Features

- Fast thermal response time
- Low power consumption and fast start-up for battery-powered applications
- Measurement range: 0–100 %RH; −40 ... +60 °C (−40 ... +140 °F)
- Detachable cable with standard 4-pin M8 connector
- Plastic enclosure with IP54 classification
- Proven Vaisala HUMICAP® 180R sensor for excellent stability
- Compatible with Vaisala Insight PC software, Vaisala Indigo80 Handheld Indicator, and Vaisala HM40 Handheld Meter
- Optional RS-485 digital output supports Modbus® RTU
- Comes with calibration certificate: ±1.5 %RH measurement accuracy (0–90 %RH)

Vaisala HUMICAP® Humidity and Temperature Probe HMP113 is a highly accurate and cost-effective humidity probe with plastic enclosure. It is designed for indoor environments, integration into other manufacturers' equipment, or use with Vaisala HUMICAP® Handheld Humidity and Temperature Meter HM40.

Easy installation

The compact probe fits into tight spaces. The cable has a threaded M8 connector for easy installation. Different cable lengths and a selection of accessories are available.

Low power consumption

HMP113 is suitable for battery powered applications due to its very low power consumption. It also has an extremely fast start-up time.

Several outputs

Temperature measurement is a standard feature in HMP113, with dew point temperature, wet bulb temperature, absolute humidity, mixing ratio, and enthalpy as optional calculated parameters. Four voltage output ranges are available. An optional RS-485 output with Modbus support is also available.

Flexible connectivity

In addition to analog and digital (Modbus) output options, the probe can also be used with the Vaisala Indigo80 Handheld Indicator and the Vaisala HM40 Handheld Meter. For easy-to-use access to configuration and device analytics functionalities, the probe can be connected to Vaisala Insight software for Windows®. For more information, see vaisala.com/insight and vaisala.com/indigo80.

High performance

HMP113 has a PC/ABS plastic enclosure and is suitable for non-condensing environments with fast temperature changes and a need for high-accuracy measurements with traceability. HMP113 also has a high chemical tolerance thanks to the proven Vaisala HUMICAP® 180R sensor.

Variety of calibration options

A quick field calibration can easily be carried out using a handheld device, for example the Indigo80 Handheld Indicator or the HM40 Handheld Meter. Alternatively, the probe can be calibrated using a PC with USB cable, or sent to a Vaisala Service Center.

Technical data

Measurement performance

Relative humidity	
Measurement range	0–100 %RH
Accuracy (incl. non-linearity, hysteresis, and repeatability):	
at 0 … +40 °C (+32 … +104 °F)	±1.5 %RH (0–90 %RH) ±2.5 %RH (90–100 %RH)
at −40 … 0 °C (−40 … +32 °F) and +40 … +60 °C (+104 … +140 °F)	±3.0 %RH (0–90 %RH) ±4.0 %RH (90–100 %RH)
Factory calibration uncertainty at +20 °C (+68 °F):	±1.1 %RH (0–90 %RH) ±1.8 %RH (90–100 %RH)
Humidity sensor	HUMICAP® 180R
Stability	±2 %RH over 2 years
Temperature	
Measurement range	−40 … +60 °C (−40 … +140 °F)
Accuracy (probes with analog output):	
at 0 … +40 °C (+32 … +104 °F)	±0.2 °C (±0.36 °F)
at −40 … 0 °C (−40 … +32 °F) and +40 … +60 °C (+104 … +140 °F)	±0.4 °C (±0.72 °F)
Accuracy (probes with digital output):	
at +15 … +25 °C (+59 … +77 °F)	±0.1 °C (±0.18 °F)
at 0 … +15 °C (+ 32 … +59 °F) and +25 … +40 °C (+77 … +104 °F)	±0.15 °C (±0.27 °F)
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751
Analog outputs	
Accuracy at +20 °C (+68 °F)	±0.2 % of FS
Temperature dependence	±0.01 % of FS/°C (±0.006 % of FS/°F)

Operating environment

Operating temperature	−40 … +60 °C (−40 … +140 °F)
IP rating [1]	IP54

1) Not applicable with the plastic grid filter.

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, basic electromagnetic environment
EMC emissions	CISPR 32 / EN 55032, Class B
Compliance marks	CE, RCM, UKCA

Inputs and outputs

Power consumption	1 mA average, max. peak 5 mA
Operating voltage [1]	
With 1 V / 2.5 V output	5–28 V DC
With 5 V output	8–28 V DC
With loop power converter	8–28 V DC
With digital output	5–28 V DC
Start-up time	
Probes with analog output	4 s at operating voltage 13.5–16.5 V DC 2 s at other valid operating voltages
Probes with digital output	1 s
Outputs	
2 channels	0–1 V DC / 0–2.5 V DC / 0–5 V DC / 1–5 V DC
1-channel loop-power converter (separate module, compatible with humidity accuracy only)	4–20 mA
Digital output (optional)	RS-485 2-wire half duplex, supports Modbus RTU
External loads	
0–1 V	R_L min 10 kΩ
Other voltage outputs	R_L min 50 kΩ
Output parameters	
Relative humidity, temperature, dew/frost point temperature, wet bulb temperature, absolute humidity, mixing ratio, enthalpy	

1) Use lowest available operating voltage to minimize heating.

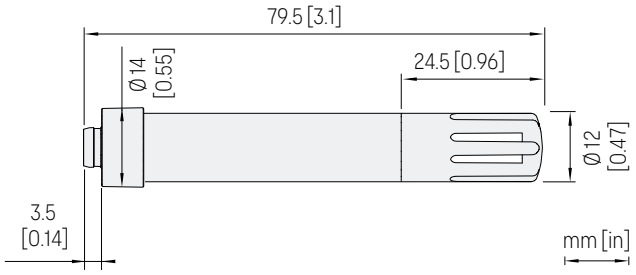
Mechanical specifications

Cable connector	4-pin M8 (IEC 60947-5-2)
Materials	
Body	PC/ABS blend
Grid filter	PC (glass reinforced)
Cable	Polyurethane or FEP
Weight	
Probe	9 g (0.3 oz)
Probe with 0.3 m (1 ft) cable	20 (0.7 oz)

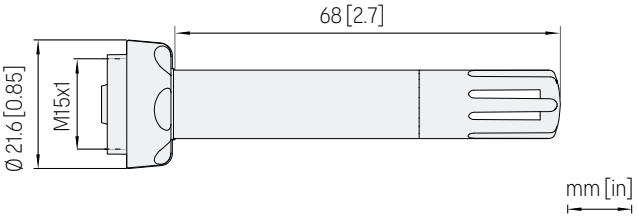
Spare parts and accessories

Sensors	
Vaisala HUMICAP® 180R	HUMICAP180R
Vaisala HUMICAP® 180V	HUMICAP180V
Sensor protection	
Plastic grid filter	DRW240185SP
Plastic grid with membrane filter	ASM210856SP
Stainless steel sintered filter	HM47280SP
Porous PTFE filter	219452SP
Probe installation	
Probe mounting clamp set, 10 pcs	226067
Probe mounting flange	226061
Probe holder, 5 pcs	ASM213382SP
Plastic locking bushing (3 pcs) for attaching probe to HM40	DRW238590SP
Connection adapters [1]	
4–20 mA loop power converter	UI-CONVERTER-1CB
Mounting bracket for converter	225979
USB cable for PC connection	219690
Connection cable for Indigo80 handheld indicator	262195SP
Connection cable for MI70 indicator	219980SP
Connection cables with open wires	
+60 °C 0.3 m (+140 °F 1 ft)	HMP50Z032SP
+60 °C 1.2 m (+140 °F 4 ft)	HMP50Z120
+60 °C 3 m (+140 °F 9.8 ft)	HMP50Z300SP
+80 °C 1.5 m (+176 °F 5 ft)	225777SP
+80 °C 3 m (+176 °F 10 ft)	225229SP
+180 °C 1.5 m (+356 °F 5 ft) FEP	238025
+180 °C 3 m (+356 °F 10 ft) FEP	226902SP

1) No separate adapter is needed for HM40 compatibility.



HMP113 dimensions



HMP113 dimensions with plastic locking bushing

VAISALA

SHM40 Structural Humidity Measurement Kit

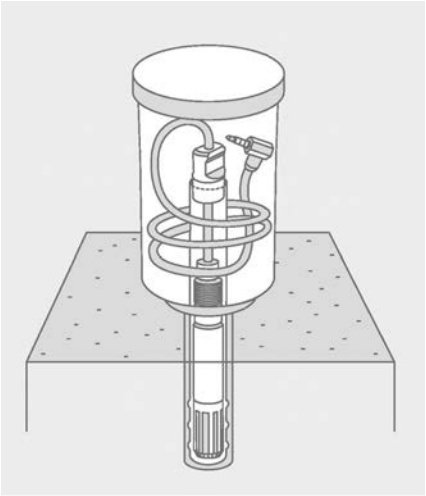
Features

- Truly interchangeable measurement probes
- Accurate measurement data in numeric, statistic, or graph views
- Conforms to ASTM standard F2170
- IP65-rated measurement probe and case
- Standard contents of SHM40:
  - HM40 indicator with adapter
  - 1 pc HMP40S RH&T probe with cable
  - 12 pcs plastic tubes
  - 12 pcs rubber plugs
  - 3 pcs protective covers with lid
  - Traceable calibration certificate
  - Weather-proof carrying case with shoulder strap

Vaisala HUMICAP® Structural Humidity Measurement Kit SHM40 offers an easy and reliable solution for humidity measurements in concrete and other structures.

Measuring Humidity Under the Surface

Concrete dries unevenly and is usually drier on the surface. Consequently, it is important to measure beneath the surface conditions. The borehole method provides information about the humidity profile under the surface. In this method, a humidity probe is left in the borehole until the humidity in the hole has reached an equilibrium state and the stabilized values can be read.



Borehole in concrete and an HMP40S measurement probe inserted in it.

SHM40 is All You Need for Borehole Humidity Measurement

The Vaisala HUMICAP® Structural Humidity Measurement Kit SHM40 is an ideal solution for the borehole method. The starter kit is comprised of an HMP40S probe, HM40 indicator, and accessories for the borehole method in a weather-proof case, optimized for use in harsh and humid construction sites.

Additional accessories for the SHM40 can be used to prepare a moisture measurement hole in fresh concrete. Pre-formed holes eliminate the need for drilling and the risk of damaging heating elements or tubing embedded in the concrete.

SHM40 Structural Humidity Measurement Kit

Easy Measurement with Multiple HMP40S Probes and Quick Connectors

HMP40S measurement probes are interchangeable. The probes connect easily to the HM40 indicator with a snap-on connector enabling convenient use of multiple probes with one indicator. The measurement data can be displayed in numeric, statistic, or graph views.

Snapping a connector to the HM40 indicator to read the measurement results.

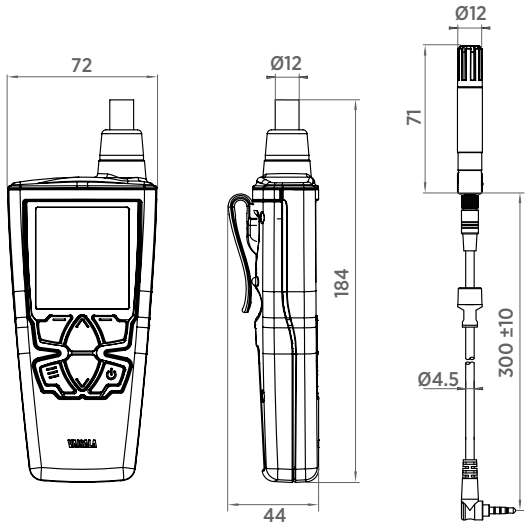
Technical Data

HMP40S Probe Measurement Performance

Relative Humidity	
Measurement range	0 ... 100 %RH
Accuracy (incl. non-linearity, hysteresis, and repeatability) over temperature range:	
0 ... +40 °C	0 ... 90 %RH: ±1.5 %RH 90 ... 100 %RH: ±2.5 %RH
−40 ... 0 °C and +40 ... +80 °C	0 ... 90 %RH: ±3.0 %RH 90 ... 100 %RH: ±4.0 %RH
Factory calibration uncertainty at +20 °C:	
0 ... 90 %RH	±1.1 %RH
90 ... 100 %RH	±1.8 %RH
Humidity sensor	HUMICAP® 180R
Stability	±2 %RH over 2 years
Temperature	
Measurement range	−40 ... +80 °C
Accuracy over temperature range:	
0 ... +40 °C	±0.2 °C
−40 ... 0 °C, +40 ... +80 °C	±0.4 °C
Temperature sensor	Pt1000 RTD Class F0.1 IEC 60751

HMP40S Probe Mechanical Specifications

Probe weight with standard cable	31 g
Probe housing material	Stainless steel
Probe filter and sensor protection	Membrane filter with chrome coated ABS plastic
Cable material	Wire PVC / Jacket PU
Cable connector	TRRS male 3.5 mm
Probe housing IP rating	IP65
Borehole diameter needed	16 mm
Measurement depth with standard accessories	Min. 30 mm, max. 90 mm



Dimensions in mm

Operating Environment

Operating temperature range for probe	−40 ... +80 °C
Operating temperature range for indicator	−10 ... +60 °C
Storage temperature range	−30 ... +70 °C

HM40 Indicator Mechanical Specifications

Weight	
Indicator with adapter	240 g
SHM40 case with standard content	3.7 kg
Indicator materials	PC/ABS blend, acrylic display lens
Indicator adapter materials	Nickel plated brass and plastic overmolding
Indicator housing IP rating	IP54
Mechanical drop endurance	1.0 m without the probe

HM40 Indicator General Specifications

Power-up time	< 3 s
Alkaline batteries	2 × AA size, 1.5V (LR6)
Operation time (alkaline batteries)	Typical 100 hours (without backlight)
Calculated variables	Td, Tw, a, x, h
Menu languages	English, German, French, Finnish, Spanish, Swedish, Chinese (simplified), Russian, Japanese
Display	LCD (140 × 160 pixels)
Electromagnetic compatibility (EMC)	EN 61326-1, Portable equipment

Spare Parts and Accessories

HM40 indicator with adapter and cable probe	HM40S
RH&T probe with cable	HMP40S
HM40 indicator with adapter	HM40SINDI
Quick connection adapter	HM40SADAPTER
Cable for RH&T probe	HMP40SCABLE
Long cable (2.7 m) for RH&T probe	HMP40SCABLE2
Plastic tube set (12 pcs)	19266HM
Long (200 mm) plastic tube set (12 pcs)	245789
Rubber plugs (12 pcs)	233976
Protective cover with lid (3 pcs)	19268HM
Weather-proof carrying case for SHM40 kit	CASEFORSHM40SP
USB recharger for HM40 indicator batteries	229249SP
Plastic grid with membrane filter for HMP40S probe	DRW010525SP
Accessories for Wet Concrete	
Plastic flange set (12 pcs)	26529HM
Long rubber plug for wet concrete (12 pcs)	26530HM

CE

VAISALA

HMK15 Humidity Calibrator

Features

- Easy and reliable calibration of humidity probes and transmitters
- Based on saturated salt solutions
- Fast temperature equilibration
- No external power required
- Suitable for laboratory use and on-site checks
- Chambers and transit covers make HMK15 easy to transport
- Pre-measured certified salts available
- Vaisala Service Centers offer accredited calibrations for humidity, temperature, and barometric pressure

No measuring instrument stays accurate by itself. It is essential that the functioning of an instrument is periodically checked against a reference. Vaisala has developed Vaisala Humidity Calibrator HMK15 to make calibration and spot-checking of humidity probes and transmitters easy and reliable.

Benefits

- Easy to use
- Reliable calibration
- Certified and pre-measured salts available on order form of HMK15

Reliable calibration method

The operating principle of HMK15 is based on the fact that a saturated salt solution generates a certain relative humidity in the air above it. The reading of the humidity probe or transmitter can then be adjusted accordingly. Many calibration laboratories use this generally accepted and reliable method to calibrate humidity instruments. Usually two or three different salt solutions are used. Salts are chosen according to the application. Available salts and their reference humidities:

- Lithium chloride LiCl (11 %RH)
- Magnesium chloride $MgCl_2$ (33 %RH)
- Sodium chloride NaCl (75 %RH)
- Potassium chloride KCl (85 %RH)
- Potassium sulphate K_2SO_4 (97 %RH)

Certified salts

HMK15 can be ordered with certified and pre-measured salts. A sample calibration is made from each salt batch in Vaisala's Measurement Standards Laboratory (MSL).

FINAS accredited measurement standards laboratory

Vaisala's Measurement Standards Laboratory is a FINAS accredited calibration laboratory. FINAS is a member of the EA (the European Cooperation for Accreditation).

FINAS
Finnish Accreditation Service
K008 (EN ISO/IEC 17025)

Technical data

Operating environment

Operating temperature range	+0 ... +50 °C (+32 ... +122 °F)

Mechanical specifications

Dimensions (H × W × L)	90 × 230 × 200 mm (3.54 × 9.06 × 7.87 in)
Weight	1 kg (2.20 lb) without salt solutions
Material (metal parts)	Anodized aluminum

Parts

Standard contents of HMK15 calibrator
Base plate
Two salt chambers with basic lids and transit covers
Thermometer
Measurement cup and mixing spoon
Calibration adapter (Ø13.5 mm) for Ø12 mm probes with long sensor legs
Calibration adapter (Ø13.5 mm) for Ø12 mm probes with short sensor legs
Optional items
See table *Spare parts and accessories*

Spare parts and accessories

Rubber plug set	19746HM
O-ring set	218096
Ion exchanged water	19767HM
Thermometer with red capillary liquid	25130HM
Transit bag	HM27032
Salt chambers and lids	
HMK15 basic lid	271549
HMK15 universal lid	271550
HMK15 custom lid for 4 × HMP110 with filter on	253277SP
HMK15 custom lid for DMT132 and HMP60/HMP110 with filter on	230914
HMK15 salt chamber with basic lid and transit cover	DRW255417SP
HMK15 salt chamber with universal lid and transit cover	19766HM
Calibration adapters	
Calibration adapter for HMP9 probe	ASM213801
Calibration adapter (Ø13.5 mm) for Ø12 mm probes with long sensor legs	211302SP
Calibration adapter (Ø13.5 mm) for Ø12 mm probes with short sensor legs	218377SP
Calibration adapter for HMP42 probe	HM37067
Certified and ready-dosed salts [1]	
Ready-dosed LiCl salt package (LiCl salt 11 %RH, total uncertainty ±1.3 %RH) [2]	19729HM
Ready-dosed $MgCl_2$ salt package ($MgCl_2$ salt 33 %RH, total uncertainty ±1.2 %RH) [2]	19730HM
Ready-dosed NaCl salt package (NaCl salt 75 %RH, total uncertainty ±1.5 %RH) [2]	19731HM
Ready-dosed KCl salt package (KCl salt 85 %RH, total uncertainty ±2.0 %RH) [2]	251377HM
Ready-dosed K_2SO_4 salt package (K_2SO_4 salt 97 %RH, total uncertainty ±2.0 %RH) [2]	19732HM

1) Calibration certificate included with each salt package.
2) Uncertainties given at +20 °C (+68 °F).

VAISALA

HMP155 Humidity and Temperature Probe

HMP155 with an additional temperature probe and optional Stevenson screen installation kit.

Features

- Vaisala HUMICAP®180R sensor: superior long-term stability
- Optional warmed humidity probe and chemical purge
- Plug-and-play
- USB connection for service use
- Use with DTR13 and DTR503 radiation shields and a Stevenson screen
- Weather-proof housing IP66
- Optional, fast temperature probe
- Different output possibilities: voltage, RS-485, resistive Pt100
- Applications: meteorology, aviation and road weather, instrumentation

Vaisala HUMICAP® Humidity and Temperature Probe HMP155 provides reliable humidity and temperature measurement. It is designed especially for demanding outdoor applications.

Long-term stability

HMP155 uses the proven Vaisala HUMICAP®180R sensor that has excellent stability and withstands well harsh environments. The probe structure is solid and the sensor is protected by default with a sintered teflon filter, which gives maximum protection against water, dust, and dirt.

Warmed probe and high-humidity environment

Measuring humidity reliably is challenging in environments where humidity is near saturation. Measurements may be corrupted by fog, mist, rain, and heavy dew. A wet probe may not give an accurate measurement in the ambient air.

This is an environment to which Vaisala has designed this patented, warmed probe for reliable measurements. As the sensor head is warmed continuously, the humidity level inside it stays below the ambient level. Thus, it also reduces the risk of condensation forming on the probe.

Fast measurements

With its fast response time, the additional temperature probe for HMP155 is ideal for measuring in environments with changing temperatures. The membrane filter speeds up the relative humidity measurement.

Long lifetime

Protecting the sensor from precipitation, and scattered and direct solar radiation increases its lifetime. Thus, Vaisala recommends installing HMP155 in one of the following radiation shields: DTR503, DTR13, or Stevenson screen. For the additional temperature probe, an installation kit is available for Vaisala DTR502 Radiation Shield.

Calibration

The probe can be calibrated using a computer with a USB cable, with the push buttons, or with the MI70 indicator.

Technical Data

Humidity measurement performance

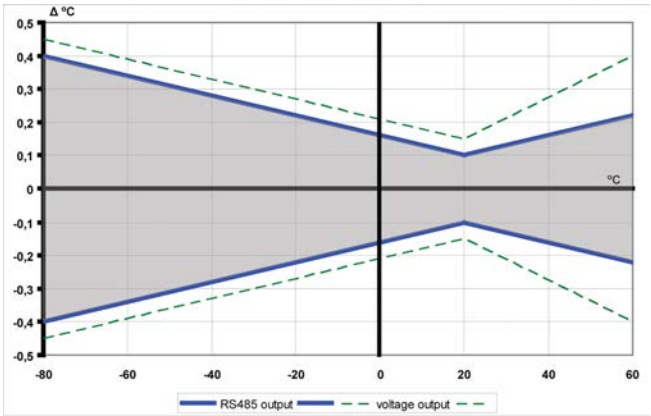
Sensor	HUMICAP®R2, 180R and INTERCAP for typical applications HUMICAP®R2C, 180RC, and INTERCAPC for applications with chemical purge and/or warmed probe
Observation range	0–100 %RH
Response time at +20 °C (+68 °F) in still air with sintered Teflon filter	63 %: 20 s 90 %: 60 s
Factory calibration uncertainty at +20 °C (+68 °F)[1)]	±0.6 %RH (0–40 %RH) ±1.0 %RH (40–95 %RH)
Accuracy (including non-linearity, hysteresis, and repeatability)	
At +15 … +25 °C (+59 … +77 °F)	±1 %RH (0–90 %RH) ±1.7 %RH (90–100 %RH)
At −20 … +40 °C (−4 … +104 °F)	±(1.0 + 0.008 × reading) %RH
At −40 … −20 °C (−40 … −4 °F)	±(1.2 + 0.012 × reading) %RH
At +40 … +60 °C (+104 … +140 °F)	±(1.2 + 0.012 × reading) %RH
At −60 … −40 °C (−76 … −40 °F)	±(1.4 + 0.032 × reading) %RH

1) Defined as ±2 standard deviation limits. Small variations possible (see also the calibration certificate).

Temperature measurement performance

Sensor	Pt100 RTD element, Class F 0.1 IEC 60751
Observation range	−80 … +60 °C (−112 … +140 °F)
Response time for additional temperature probe in 3 m/s (7 mph) air flow	63 %: < 20 s 90 %: < 35 s
Other measured variables	Dew point / Frost point temperature, wet bulb temperature, mixing ratio
Accuracy with voltage output	
At −80 … +20 °C (−112 … +68 °F)	±(0.226 − 0.0028 × temperature) °C
At +20 … +60 °C (+68 … +140 °F)	±(0.055 + 0.0057 × temperature) °C
Accuracy with passive (resistive) output	
According to Tolerance Class AA IEC 60751 [1)]	±(0.1 + 0.0017 × |temperature|) °C
Accuracy with RS-485 output	
At −80 … +20 °C (−112 … +68 °F)	±(0.176 − 0.0028 × temperature) °C
At +20 … +60 °C (+68 … +140 °F)	±(0.07 + 0.0025 × temperature) °C

1) Tolerance Class AA IEC 60751 corresponds to IEC 751 1/3 Class B.



HMP155 accuracy over temperature range: voltage and RS-485

Operating environment

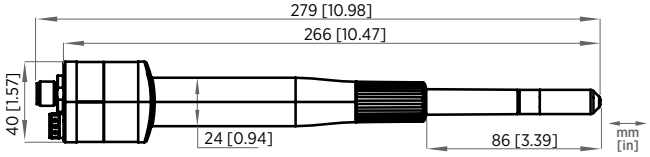
Operating temperature for humidity measurement	−80 … +60 °C (−112 … +140 °F)
Storage temperature	−80 … +60 °C (−112 … +140 °F)
Operating humidity	0–100 %RH
IP rating	IP66

Inputs and outputs

Operating voltage	7–28 V DC
Minimum operating voltage	0–1 V output or RS-485: 7 V 0–5 V output, or warmed probe: 12 V 0–10 V output, chemical purge, or XHEAT: 16 V
Outputs	Voltage output: 0–1 V, 0–5 V, 0–10 V Resistive Pt100 4-wire connection RS-485
Average power consumption (+15 V DC, load 100 kΩ)	0–1 V output: < 3 mA 0–10 V output: +0.5 mA RS-485: < 4 mA During chemical purge: Maximum 110 mA With warmed probe: Maximum 150 mA
Settling time at startup	Voltage output: 2 s RS-485: 3 s

Mechanical specifications

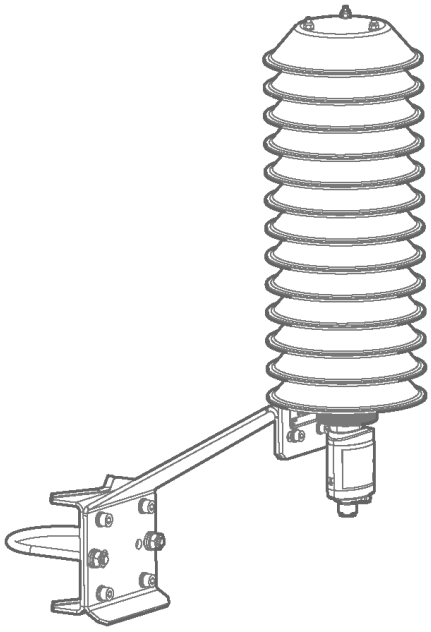
Dimensions (H × W)	279 × 40 mm (10.9 × 1.6 in)
Weight	93 g (3.25 oz)
Length of additional T-probe cable	2 m (6 ft 7 in)
Connection	8-pin male M12 connector
Connection cables	3.5 m (11 ft 6 in), 10 m (32 ft 10 in), 30 m (98 ft 5 in)
Maximum wire size	0.129 mm^2 (26 AWG)
Service cables	USB connection cable MI70 connection cable
Materials	
Filter	Sintered Teflon or membrane
Housing	Polycarbonate (PC)
Additional temperature probe	Stainless steel AISI 316L
Cable	PUR



Dimensions in mm (inches)

VAISALA

DTR500 Solar Radiation and Precipitation Shields



Vaisala Radiation Shield Series DTR500 are solar radiation and precipitation shields supporting humidity probe installations in outdoor applications.

Features

- Protection for temperature and humidity probes from scattered and direct solar radiation and rain
- Maintenance-free
- Naturally ventilated
- Easy to install on a vertical pole, horizontal beam, or flat surface
- Suitable for a wide selection of applications
- Choice of shields and mounting accessories

Sensor protection

The maintenance-free DTR500 series shields protect the humidity and temperature sensors from solar radiation and precipitation. They provide excellent ventilation while blocking both direct and reflected solar radiation.

The special plastic used in the plates has excellent thermal characteristics: the white outer surface reflects radiation, and the black inside absorbs accumulated heat. The shields can be easily installed on a vertical pole, horizontal beam, or flat surface.

The DTR shields can be used with the following Vaisala products:

DTR502(A) with adapter 221072

Vaisala HUMICAP® Humidity and Temperature Probe HMP155's additional temperature sensor

DTR502B

Vaisala HUMICAP® Humidity and Temperature Transmitters HMT333, HMT337, HMT373, and HMT377

Vaisala HUMICAP® Humidity and Temperature Probes HMP3 and HMP7

Vaisala Combined Pressure, Humidity and Temperature Transmitters PTU303 and PTU307

DTR503(A)

Vaisala HUMICAP® Humidity and Temperature Probe HMP155

DTR504(A)

Vaisala HUMICAP® Humidity and Temperature Transmitters HMT120/130

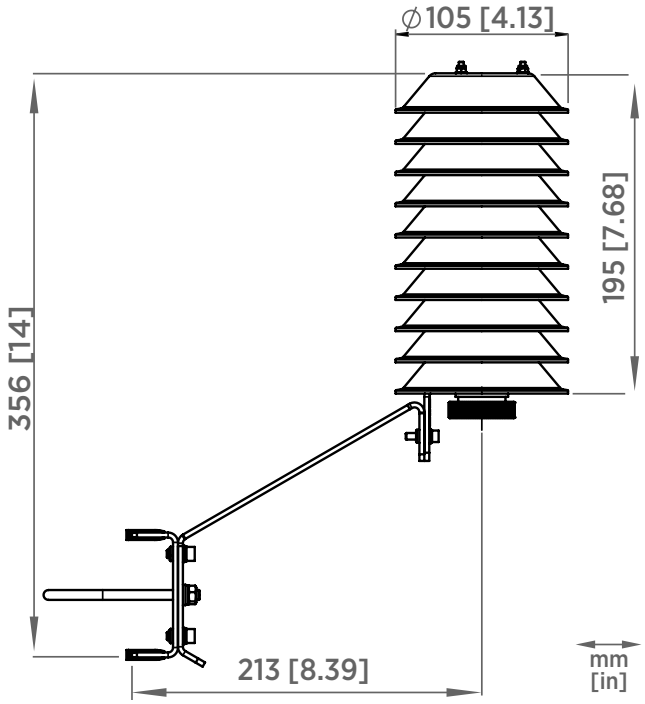
Vaisala HUMICAP® Humidity and Temperature Probe HMP110

Vaisala INTERCAP® Humidity and Temperature Probe HMP60

Technical data

DTR502B for HMT333, HMT337, HMT373, HMT377, HMP3, HMP7, PTU303, and PTU307

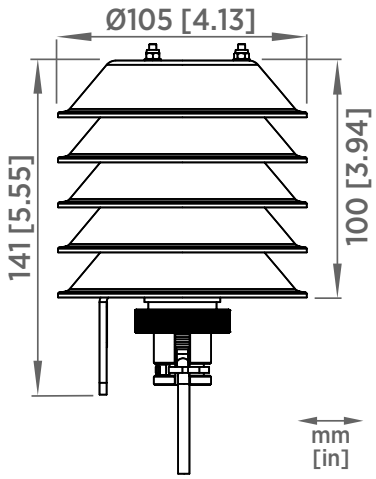
Dimensions (H × W)	195 × 105 mm (7.68 × 4.13 in)
Accessories	Product specific adapter



DTR502B dimensions

DTR504 for HMT120/130 remote probes, HMP110, and HMP60

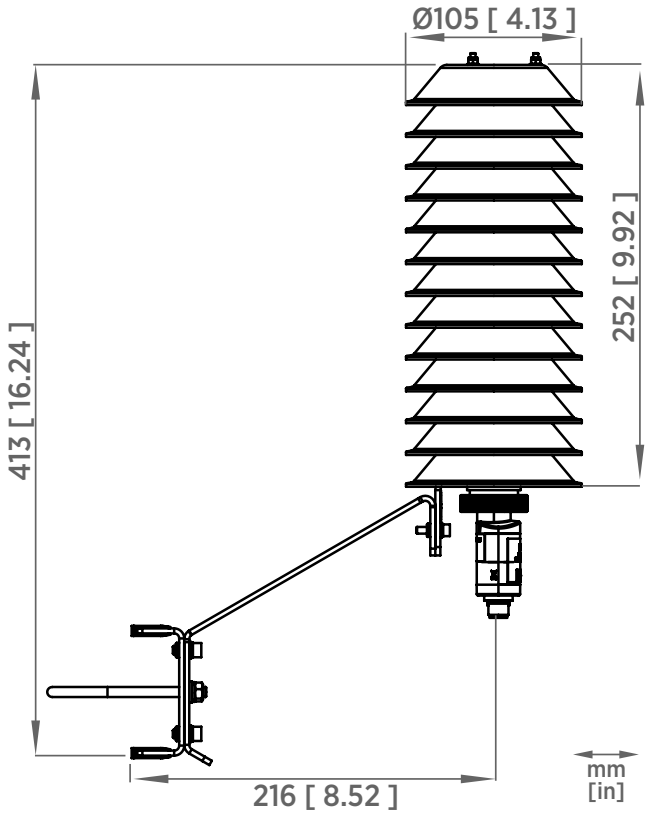
Dimensions (H × W)	141 × 105 mm (5.55 × 4.13 in)
Accessories	Horizontal beam assembly
	Pole mast installation kit



DTR504 dimensions

DTR503A for HMP155

Dimensions (H × W)	252 × 105 mm (9.92 × 4.13 in)
Accessories	Horizontal beam assembly
	Pole mast installation kit



DTR503A dimensions