

HUMIDITY / DEW POINT /
MOISTURE IN OIL / CARBON DIOXIDE /
OXYGEN / BAROMETRIC PRESSURE / WIND



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OVERVIEW

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Get the latest news about leading edge technology. Find out more about our existing application solutions, instrumentation and measurement practices.

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HVAC Measurement Spotlight

Learn about environmental measurement in HVAC systems. These articles deal with topics such as demand control ventilation, indoor air quality and good measurement practices. eNewsletters are available in English, German, French, and Chinese.

Life Science Spotlight

Get information about instrumentation and measurement in controlled environments such as cleanrooms & dryrooms, laboratories, incubators, environmental test chambers, warehouses and other critical environments. Topics include humidity monitoring in cleanrooms or test chambers, CO₂ monitoring in incubators and more. eNewsletters are available in English, German, French, Chinese, and Japanese.

Industrial Measurement Spotlight

Industrial processes such as air drying, lubricating oil management, and power production require rigorous measurements in extreme conditions. These articles deal with topics such as measuring moisture in oil, compressed air quality, and more. eNewsletters are available in English, German, French, Chinese, and Japanese.

What's New Spotlight

Be one of the first to know about new instruments, new application solutions and new company developments at Vaisala. eNewsletters are available in English, German, French, Chinese, and Japanese.

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We at Vaisala have always valued the opportunity to push ourselves and our products to a higher level for the benefit of our customers. Our new strategy nurtures this opportunity, allowing us to focus on customers who operate in tightly controlled and demanding areas in the chosen industrial applications introduced in this catalog. We are confident that concentrating Vaisala's product and business development efforts on these areas will result in the overall success of our customers.

The very core of Vaisala still is our unique devotion to products: the stability, reliability and performance that we have always been known and recognized for. With over 70 years of experience, close to 30 offices worldwide and thousands of customers in over 120 countries, Vaisala is an esteemed leader in innovating, manufacturing and servicing high-quality instruments and systems. Our products have been designed to meet the customers' measurement needs in the most demanding industrial processes and controlled environments. This catalog introduces Vaisala's measurement instrument offering for industrial customers. Our professional sales force all over the world is at your service, ready to help you choose just the right solution for your specific measurement needs.

I wish you every success with your business – we are at your service.

A handwritten signature in blue ink, appearing to read 'K Forss'. The signature is stylized and somewhat abstract, with overlapping lines.

*Kenneth Forss
Executive Vice President
Controlled Environment
Vaisala*

Go to www.vaisala.com for the latest updates and other product news.



Vaisala – at your service

Solutions to HVAC&R measurement needs

Vaisala serves building automation customers in a variety of HVAC&R measurement needs, providing the best solutions for energy optimization, Indoor Air Quality (IAQ) and Demand Controlled Ventilation (DCV) in diverse and demanding environments. Whether you are an OEM, integrator, contractor, or responsible for facility HVAC management, we have an answer to your specific business needs. [See Building Automation offering, page 6.](#)

Efficiency and productivity in controlled environments

Our cleanrooms and chambers group can help you increase the efficiency and productivity of your operations in controlled environments. Whatever the industry – life science, food, microelectronics, automotive, you name it – cleanrooms & dryrooms, laboratories, incubators, environmental test chambers, warehouses and various other critical environments all benefit from Vaisala's solutions that minimize downtime and maximize yield. [See Cleanrooms and Chambers offering, pages 7-8.](#)

Improved industrial processes

Many industries, such as power, pharmaceutical, marine and plastics industries, benefit from the wide range of Vaisala's measurement instruments. Accurate, stable and reliable measurements can improve your industrial processes, energy efficiency and end-product quality. Applications in which Vaisala measurement instruments and our excellent services help our customers include e.g. monitoring the quality of compressed air, lubricating and transformer oils, as well as controlling various drying processes. [See Targeted Industrial Applications offering, pages 8-9.](#)

A job well done

In any industrial environment, installing the best quality solutions – on time and on budget – can pose a real challenge. By drawing on our application knowledge and product expertise you can always rely on getting just the right solution for your needs.

Vaisala's offering ranges from lightweight, hand-held instruments and OEM models to configurable fixed transmitters designed to meet the most stringent of demands. The standard delivery time for a configured product is three business days. For re-calibration, our regional Service Centers offer express services. [See Service offering, pages 146-147.](#)

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HMT330 Series Humidity and Temperature Transmitters for demanding humidity measurement



The HMT330 transmitter family has the solution for demanding industrial humidity measurements.

Features/Benefits

- Six models for demanding industrial applications
- Full 0 ... 100 %RH measurement, temperature range up to +180 °C (+356 °F) (depending on model)
- Pressure tolerance up to 100 bar (depending on model)
- Next generation Vaisala HUMICAP® Sensor for excellent accuracy and stability
- Graphical display of measurement trends and over four-year history
- Multilingual user interface
- Excellent performance in harsh chemical concentrations
- Corrosion resistant IP65 housing
- NIST traceable (certificate included)
- Analog outputs, WLAN/LAN

The Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT330 is designed for demanding industrial applications where stable measurement and wide customization is important.


Vaisala HUMICAP® performance

The HMT330 series incorporates Vaisala's 30 years of experience in industrial humidity measurement. An updated, even more stable and chemical resistant HUMICAP® sensor is available, next to the proven reliable and accurate sensor.

Chemical purge minimizes effects of contaminants

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

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



Graphical display of history and measurement trends

The HMT330 can be ordered with a large numerical and graphical display, which allows the user to clearly monitor operational data, measurement trends and 1-year measurement history. The optional data logger with real-time clock makes it possible to generate over four years of measured history, and zoom in on any desired time or time frame. The battery backup of the clock guarantees a reliable logging of measured data.

The display alarm allows tracking of any measured parameter, with a freely configurable low and high limit.

Data collection and (wireless) transfer to PC

The recorded measurement data can be viewed on the display or transferred to a PC with Microsoft Windows® software. The transmitter can also be connected to a network with an optional (W)LAN interface, which enables a (wireless) Ethernet connection. A USB-RJ45 cable makes it easy to connect the service port of the HMT330 to a PC.

Many ways to install and versatile outputs

Mains and DC power options, and several mounting accessories make the instrument easy to install.

The HMT330 can have up to three

analog outputs. Isolated galvanic power supply and analog outputs are also available. For serial interface the USB connection, RS232 and RS485 can be used.

Flexible calibration

The HMT330 instruments are calibrated at six humidity points at the factory. A quick, one-point field calibration can be performed with the hand-held HM70 meter. A two-point calibration can be performed with the HMK15 salt bath calibrator in a controlled environment. The transmitter can be sent to Vaisala for recalibration. Accredited calibrations and maintenance contracts are also available.

Technical data

Performance

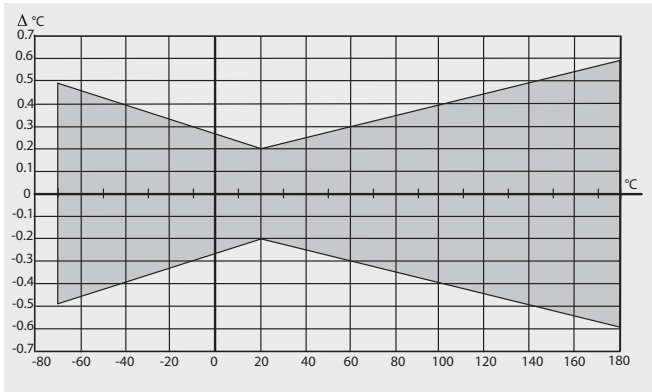
RELATIVE HUMIDITY

Measurement range	0 ... 100 %RH
Accuracy (including non-linearity, hysteresis, and repeatability)	
with Vaisala HUMICAP® 180 or 180R	for typical applications
with Vaisala HUMICAP® 180C or 180RC	for applications with chemical purge/warmed probe
at +15 ... +25 °C (59 ... +77 °F)	±1 %RH (0 ... 90 %)
	±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
Factory calibration uncertainty (+20 °C)	± 0.6 %RH (0 ... 40 %RH)
	± 1.0 %RH (40 ... 97 %RH)
(Defined as ±2 standard deviation limits. Small variations possible, see also calibration certificate.)	
Response time (90 %) at +20 °C (+68 °F)	8 s / 17 s* with grid filter
in still air	20 s / 50 s* with grid + steel netting filter
	40 s / 60 s* with sintered filter

* with HUMICAP® 180R or 180RC sensor

TEMPERATURE

Accuracy at +20 °C (+68 °F)	± 0.2 °C (± 0.36 °F)
Accuracy over temperature range (measurement range depends on model)	



Temperature sensor PT 100 RTD 1/3 Class B IEC 751

Other variables available (depends on model)

dewpoint temperature, mixing ratio, absolute humidity, wet bulb temperature, enthalpy, water vapor pressure

Inputs and outputs

Operating voltage	10 ... 35 VDC, 24 VAC
with optional power supply module	100 ... 240 VAC, 50/60 HZ
Power consumption at +20 °C (U _{in} 24 VDC)	
RS-232	max. 25 mA
U _{out} 2 x 0 ... 1 V/0 ... 5 V/0 ... 10 V	max. 25 mA
I _{out} 2 x 0 ... 20 mA	max. 60 mA
display and backlight	+ 20 mA
during chemical purge	max. 110 mA
during probe heating (HMT337)	+ 120 mA
Analog outputs (2 standard, 3rd optional)	
current output	0 ... 20 mA, 4 ... 20 mA
voltage output	0... 1 V, 0... 5 V, 0... 10 V
Accuracy of analog outputs at +20 °C	±0.05% full scale
Temperature dependence of the analog outputs	±0.005%/°C full scale
External loads	
current outputs	R _L < 500 ohm
0 ... 1 V output	R _L > 2 kohm
0 ... 5 V and 0 ... 10 V outputs	R _L > 10 kohm
Max. wire size	0.5 mm ² (AWG 20)
	stranded wires recommended
Digital outputs	RS-232, RS-485 (optional)
Service connection	RS-232, USB
Relay outputs (optional)	0.5 A, 250 VAC
Ethernet interface (optional)	
Supported standards	10/100Base-T
Connector	RJ45
Protocols	Telnet
Software support	Vaisala MI70 link
WLAN interface (optional)	
Supported standards	802.11b
Antenna connector type	RP-SMA
Protocols	Telnet
Security	WEP 64/128, WPA
Software support	Vaisala MI70 link
Authentication / Encryption (WLAN)	
Open / no encryption	
Open / WEP	
WPA Pre shared key / TKIP	
WPA Pre shared key / CCMP (a.k.a. WPA2)	
Optional data logger with real-time clock	
Logged parameters	max. three with trend/min/max values
Logging interval	10 sec (fixed)
Max. logging period	4 years 5 months
Logged points	13.7 million points per parameter
Battery lifetime	min. 5 years
Display	LCD with backlight, graphic trend display of any parameter
Menu languages	English, Chinese, Japanese, Spanish, German, French, Swedish, Russian, Finnish

Mechanics

Cable bushing	M20 x 1.5 for cable diameter
Measurement range	8 ... 11 mm/0.31 ... 0.43"
Conduit fitting	1/2" NPT
User cable connector (optional)	M12 series 8-pin (male)
option 1	female plug with 5 m (16.4 ft) black cable
option 2	female plug with screw terminals
Probe cable diameter	
HMT333 (+80 °C)	6.0 mm
other probes	5.5 mm
Housing material	G-ALSi 10 Mg (DIN1725)
Housing classification	IP 65 (NEMA4)

Operating environment

Operating temperature	
for probe	same as measurement range
for transmitter body	-40 ... +60 °C (-40 ... 140 °F)
with display	0 ... +60 °C (32 ... 140 °F)
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Industrial Environment

Mounting options



Mounting with Wall Mounting Kit



Mounting with DIN Rail Installation Kit



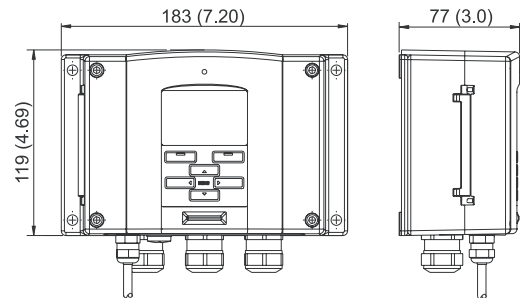
Pole Installation with Installation Kit for Pole or Pipeline



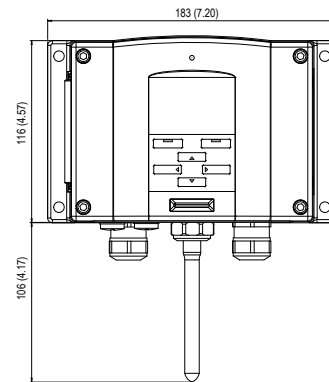
Mounting Rain Shield with Installation Kit

Dimensions

Dimensions in mm (inches)



Transmitter with WLAN antenna



TYPE APPROVED PRODUCT
CERTIFICATE NO.: A-11440

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HMT331 Humidity and Temperature Transmitter for Demanding Wall-Mounted Applications



HMT331 Humidity and Temperature Transmitter for demanding wall-mounted applications

The HMT331 is the state-of-the-art wall-mount humidity instrument.

Features/Benefits

- For temperatures -40 ... +60 °C (-40 ... +140 °F)
- Application examples: cleanrooms, pharmaceutical processes, greenhouses, swimming halls, museums and archives

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT331 is the top-of-the-line wall-mounted transmitter for demanding HVAC and condition monitoring applications.

Compared to regular wall-mounted transmitters, the HMT331 offers, higher measurement performance, better chemical tolerance, advanced graphical display features, more powering options, more output options and a wider variety of output humidity parameters.

Graphical display of history and measurement trends

The HMT330 series features a large numerical and graphical display, allowing users to easily monitor operational data, measurement trends and one-year measurement history.

The optional data logger with real-time clock makes it possible to generate over four years of measured history, and zoom in on any desired time or time frame.

Outputs and power supply options for every need

The output options include three analog outputs, RS-232, RS-485, and alarm relays.

The voltage supply range is from 10 to 35 VDC. With an additional module, the transmitter can be connected to all universal mains AC supplies.

The input/output cable can be fed through the back of the transmitter, which is a useful feature, especially for installations in cleanrooms.

Technical Data

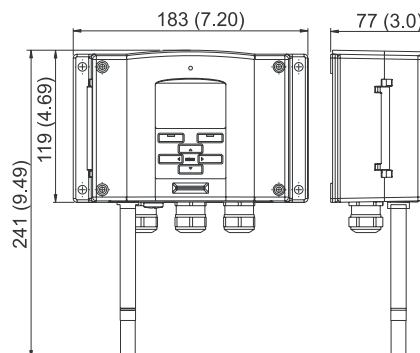
Temperature measurement range
-40 ... +60 °C (-40 ... +140 °F)

Accessories

PC software + cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
DIN rail installation set	215094

Dimensions

Dimensions in mm (inches)



HMT333 Humidity and Temperature Transmitter for Ducts and Tight Spaces



The HMT333 transmitter has a small probe for remote applications.



210697 duct installation kit for HMT333 and HMT337.

For outdoor environments, the DTR502B solar radiation shield provides protection for the probe. The shield can be installed on a pole, a beam or a flat surface.

For moderate humidities and temperatures

The HMT333 is typically used in demanding HVAC applications such as cleanrooms, pharmaceutical processes, and greenhouses, or in processes of moderate temperature.

For environments with continuously high humidity, the HMT337 with a warmed, vapor-tight and stainless steel probe is recommended.

Features/Benefits

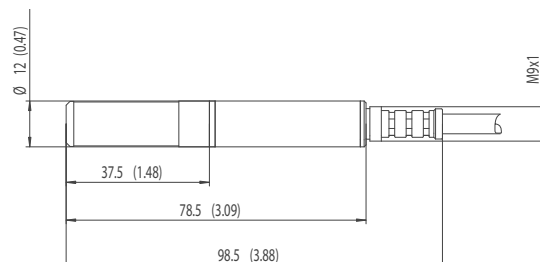
- For remote probe installations in demanding HVAC applications
- For temperatures -40 ... +80 °C (-40 ... +176 °F) or -40 ... +120 °C (-40 ... +248 °F)
- Small thermal mass - fast response to temperature changes
- Application examples: cleanrooms, pharmaceutical processes, greenhouses, environmental chambers

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT333 is a versatile instrument for applications where a small remote probe is needed.

Flexible installation

To install the probe in ducts, channels and through walls, an installation kit is available with an aluminum flange, lead-through piece, and steel support bar.

HMT333 has two probe cable options available, a flexible one that withstands heat up to +80° C, and a durable cable that withstands heat up to +120° C. Both cable options are available in lengths of 2, 5, and 10 meters.



Technical Data

Temperature measurement range
-40 ... +80 °C (-40 ... +176 °F) or
-40 ... +120 °C (-40 ... +248 °F)

Accessories

Duct installation kit	210697
Cable gland	HMP247CG
PC software + cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
Solar radiation shield	DTR502B
DIN rail installation set	215094

Dimensions

Dimensions in mm (inches)

HMT334 Humidity and Temperature Transmitter for High Pressure and Vacuum Applications



The display shows measurement trends and over four-year real time measurement history.

The HMT334 is ideal for permanent installations into pressurized or vacuum processes.

Features/Benefits

- For pressures up to 100 bar and vacuum applications
- For temperatures -70 ... +180 °C (-94 ... +356 °F)
- ISO and NPT threads available
- Application example: test chambers

Technical Data

Temperature measurement range	-70 ... +180 °C (-94 ... +356 °F)
Operating pressure	0 ... 10 MPa (0 ... 100 bar)

Accessories

Fitting body ISO M22 x 1.5	210697
Fitting body NPT 1/2"	17225
PC software + cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
DIN rail installation set	215094

Dimensions

Dimensions in mm (inches)

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT334 is designed to measure humidity in pressurized spaces or vacuum chambers. Each probe is tested to ensure a gas and vacuum tight installation.

Vaisala HUMICAP® performance

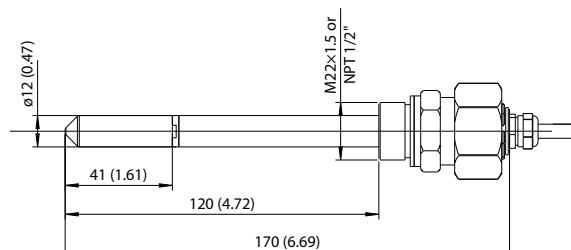
The HMT334 incorporates Vaisala's more than 30 years of experience in industrial humidity measurement. The sensor provides accurate and reliable measurement and is immune to particulate contamination and most chemicals.

Graphical display of measurement trends and real time history

The HMT330 series features a numerical and graphical display. The user can easily monitor operational data, measurement trends and up to one-year history.

The optional data logger with real-time clock makes it possible to generate more than four years of measured history, and zoom in on any desired time or time frame.

Using a serial line, the measurement data can be transferred to a PC where it can be further processed and copied to other programs.



HMT335 Humidity and Temperature Transmitter for High Temperatures



The installation flange allows an adjustable installation depth for the probe.

The HMT335 has a robust stainless steel probe ideal for high flow rates in hot processes.

Features/Benefits

- For temperatures -70 ... +180 °C (-94 ... +356 °F)
- Long metal probe head
- Stainless steel installation flange available
- Adjustable installation depth
- Application example: hot drying processes

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT335 has a long stainless steel probe designed for high temperatures.

Robust probe ideal for high flow rates

The HMT335 is ideal for duct measurements as the probe tolerates mechanical stress and withstands high flow rates. The HMT335 can be used, for example, in a hot drying process.

Graphical display of history and measurement trends

The HMT335 features a numerical and graphical display. The user can easily

monitor measurement operational data, measurement trends and one-year measurement history.

The optional data logger with real-time clock makes it possible to generate more than four years of measured history, and zoom in on any desired time or time frame.

Vaisala HUMICAP® performance

The sensor provides accurate and reliable measurement and is immune to particulate contamination and most chemicals.

Technical Data

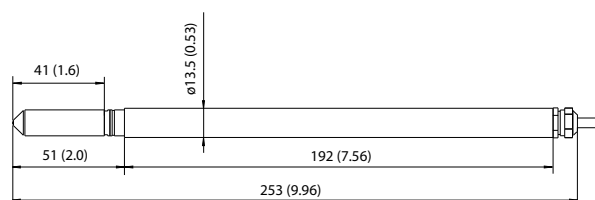
Temperature measurement range
-70 ... +180 °C (-94 ... +356 °F)

Accessories

Mounting flange	210696
PC software + cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
DIN rail installation set	215094

Dimensions

Dimensions in mm (inches)



HMT337 Humidity and Temperature Transmitter for High Humidity Applications



The HMT337 is the ideal transmitter for the most demanding process and meteorological measurements.



Duct installation kit

Features/Benefits

- For high-humidity applications in industry and meteorology
- Warmed probe for superior performance in condensing environments
- Small, stainless steel, vapor-tight remote probe
- For temperatures -70 ... +180 °C (-94 ... +356 °F)

Technical Data

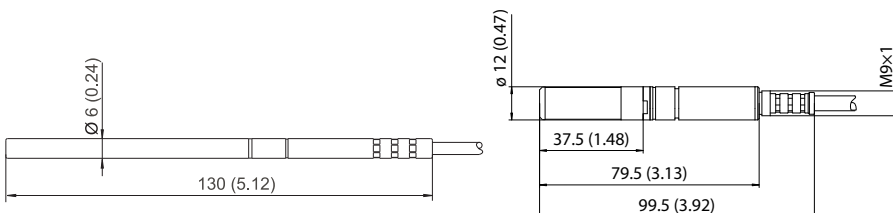
Temperature measurement range
-70 ... +180 °C (-94 ... +356 °F)

Accessories

Cable gland and AGRO	HMP247CG
Duct installation kit (RH probe)	210697
Duct installation kit (T probe)	215003
Swagelok fittings (NPT and ISO) for both RH and T probes	
Solar radiation shield	DTR502B
Meteorological inst. kit	HMT330MIK
PC software + cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
DIN rail installation set	215094

Dimensions

Dimensions in mm (inches)



The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT337 is delivered in one of three configurations:

- Basic: non-warmed probe for moderate humidities
- With a warmed probe: for near-condensing conditions and dew point measurement
- With a warmed probe and an additional temperature sensor: for near-condensing conditions and relative humidity measurement

True humidity readings in conditions of condensation

The Vaisala unique warmed probe provides fast and reliable

measurement in environments where humidity is near saturation. The warming prevents condensation from forming on the sensor.

As the probe is warmed, the humidity level inside it stays below the ambient level. With accurate temperature measurement, the ambient dewpoint can be calculated precisely.

If the relative humidity value is needed, an additional temperature sensor is used. The measured ambient temperature provides the compensation for calculating relative humidity and other humidity parameters.

Many ways to install

A tight installation through a process wall can be achieved with Swagelok® fittings. Meteorological installation kits for outdoor installations and duct installation kits are also available.

HMT338 Humidity and Temperature Transmitter for Pressurized Pipelines



The HMT338 is ideal for installations in pressurized processes where the probe needs to be removed while the process is running.

Features/Benefits

- Installed through ball valve
 - can be inserted and removed while the process is running
- Adjustable probe depth
- Pressure tolerance 40 bar
- For temperatures -70 ... +180 °C (-94 ... +356 °F)
- Two probe lengths available

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT338 is designed for pressurized processes.

Insert or remove probe while the process is running

With “hot tapping”, the probe is inserted directly into the process while it is running, without the need for venting or lowering the process pressure.

The probe is screwed into a ball valve assembly that has been fixed to the process pipe or wall. The adjustable hex nut is hand-tightened to temporarily hold the probe to the process. Then the probe is pushed

down to the appropriate depth. The hex nut is tightened with a wrench to lock the probe in its place. Hot tapping is possible in pressures up to 10 bar.

Graphical display of history and measurement trends

From the display, the user can easily monitor operational data, measurement trends and one-year measurement history.

The optional data logger with real-time clock makes it possible to generate more than four years of measured history, and zoom in on any desired time or time frame. The battery backup of the real-time clock guarantees a reliable logging of measured data.

Vaisala HUMICAP®

The HMT338 incorporates Vaisala's more than 30 years of experience in industrial humidity measurement. The sensor provides accurate and reliable measurement and is immune to particulate contamination and most chemicals.

Technical Data

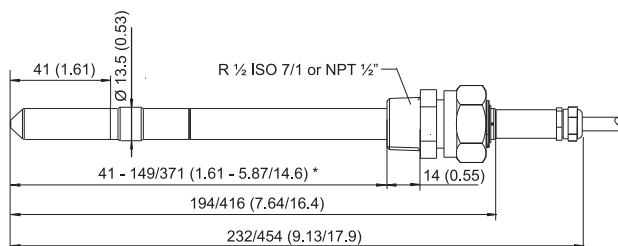
Temperature measurement range	-70 ... +180 °C (-94 ... +356 °F)
Operating pressure	0 ... 4MPa (0 ... 40 bar)

Accessories

Ball valve set	BALLVALVE-1
Pressure fitting ISO 1/2 to NPT 1/2	210662
PC software + cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
DIN rail installation set	215094

Dimensions

Dimensions in mm (inches)



Lengths for standard / optional probes
* freely user-adjustable length

HMT360 Series Intrinsically Safe Humidity and Temperature Transmitters



The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT361 wall mount transmitter, shown with six probe options, is designed specifically for hazardous and explosive environments.

Features/Benefits

- Measures humidity and temperature, outputs also dewpoint, mixing ratio, absolute humidity and wet bulb temperature
- Safe operation with the entire transmitter in hazardous areas: Division 1 and 2 (USA, Canada), Categories 1G / Zone 0 and 1D / Zone 20 with protection cover (EU)
- Intrinsically safe
- Designed for harsh conditions
- Vaisala HUMICAP® Sensor features high accuracy, excellent long-term stability, and negligible hysteresis
- Six probe options
- Temperature range between -40 ... +180°C (-40 ... +356°F) depending on the probe option
- NIST traceable (certificate included)

The Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT360 are the ideal solution for measuring humidity in hazardous areas. They operate safely and reliably even in the most hazardous classifications. The HMT360 transmitters' proven performance and technology conform with rigorous international standards.

Intrinsically safe

The entire HMT360 transmitter can be installed directly in explosive areas. It can withstand continuous exposure to potentially explosive environments that contain flammable gases or dust.

Customized configuration

Due to the microprocessor based electronics, options and accessories, the HMT360 series is truly flexible.

Customers may specify the transmitter configuration when ordering the instrument, however changes in configuration can also easily be made in the field.

Interchangeable probes

The HMT360 offers six probe options for various applications:

HMP361	- wall mount
HMP363	- confined spaces
HMP364	- pressurized spaces
HMP365	- high temperature
HMP367	- high humidity
HMP368	- pressurized pipelines

The interchangeable probes enable fast and easy removal or re-installation when required. Calibration, for example, is easy to perform due to the modular structure. All calibration coefficients are included in the probe unit itself, which means that probes can be switched between transmitter bodies without losing the accuracy.

Optimized sensors

In addition to the standard Vaisala HUMICAP® Sensor, an application specific, very chemically durable sensor is also available.

Long-term solution

The HMT360 transmitters are an investment; their rugged design, combined with trouble-free operation, ensure a long-term solution for monitoring humidity and dewpoint in explosive environments.

Customized calibration and maintenance contracts for the HMT360 series are available on request.



Interchangeable Probes for HMT360 Intrinsically Safe Humidity and Temperature Transmitter



The HMP361 probe in this picture has a stainless steel netting filter.

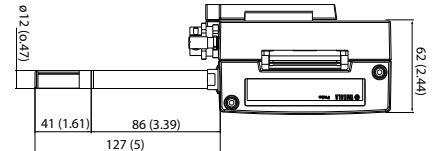
Technical Data

HMP361 for wall mounting

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

Dimensions

Dimensions in mm (inches)



The HMP363 probe is small and fits into tight spaces. This one is connected with a teflon cable.

Technical Data

HMP363 for confined spaces

Temperature range with teflon cable	-40 ... +120 °C (-40 ... +248 °F)
rubber cable	-40 ... +80 °C (-40 ... +176 °F)

Probe cable length 2,5 or 10 meters

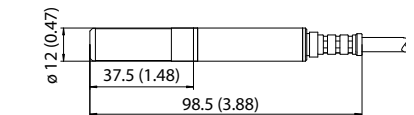
Probe diameter 12 mm

Installation

Duct installation kit	210697
Cable Gland M20x1.5 with splitting seal	HMP247CG
Swagelok for 12mm probe, 1/2" NPT thread	SWG12NPT12

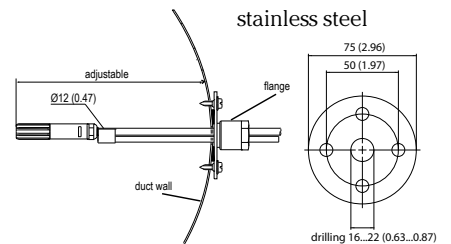
Dimensions

Dimensions in mm (inches)



Installation kit for duct mounting

Installation flange: aluminum or stainless steel



The HMP364 probe is designed for measurement in pressurized spaces or vacuum chambers.

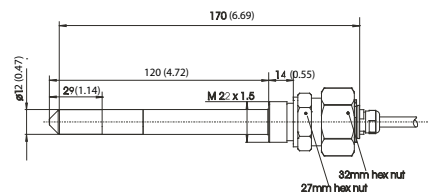
Technical Data

HMP364 for high pressure

Temperature range	-40 ... +180 °C (-40 ... +356 °F)
Pressure range	0 ... 10 MPa
Probe cable length	2,5 or 10 meters
Probe diameter	12 mm
Fitting body M22x1.5	17223
Fitting body NPT1/2	17225

Dimensions

Dimensions in mm (inches)





The HMP365 probe is designed for high temperature environments.

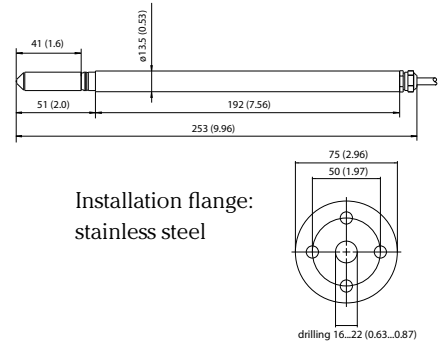
Technical Data

HMP365 for high temperature

Temperature range	-40 ...+180 °C (-40 ...+356 °F)
Probe cable length	2,5 or 10 meters
Probe diameter	13.5 mm
Installation	
Mounting flange	210696
Cable Gland M20x1.5 with splitting seal	HMP247CG

Dimensions

Dimensions in mm (inches)



Installation flange:
stainless steel



The HMP367 probe is constructed to be installed in environments with high humidities.

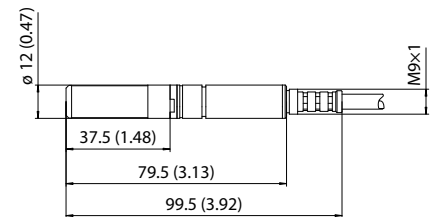
Technical Data

HMP367 for high humidities

Temperature range	-40 ...+180 °C (-40 ...+356 °F)
Probe cable length	2,5 or 10 meters
Probe diameter	12 mm
Installation	
Duct installation kit	210697
Cable Gland M20x1.5 with splitting seal	HMP247CG
Swagelok for 12mm probe, 3/8" ISO thread	SWG12ISO38
Swagelok for 12mm probe, 1/2" NPT thread	SWG12NPT12

Dimensions

Dimensions in mm (inches)



The HMP368 probe enables flexible installation in pressurized pipelines.

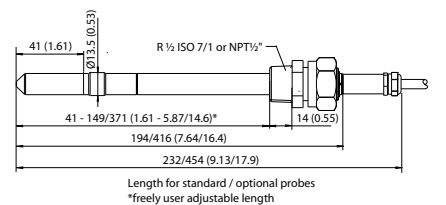
Technical Data

HMP368 for pressurized pipelines

Temperature range	-40 ...+180 °C (-40 ...+356 °F)
Pressure range	0 ... 4 MPa
Probe cable length	2,5 or 10 meters
Probe diameter	13.5 mm/12 mm
Two probe lengths available.	
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

Dimensions

Dimensions in mm (inches)



Technical data

Performance

RELATIVE HUMIDITY

Measurement range 0 ... 100 %RH

Accuracy (including non-linearity, hysteresis, and repeatability)

with Vaisala HUMICAP® 180 or 180R for typical applications

at +15 ... +25 °C (59 ... +77 °F) ± 1.0 %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

with Vaisala HUMICAP® 180_{L2} for application with demanding chemical environment

at -10 ... +40 °C (14 ... +104 °F) ± (1.0 + 0.01 x reading) %RH

at -40 ... +180 °C (-40 ... +356 °F) ± (1.5 + 0.02 x reading) %RH

Factory calibration uncertainty (+20 °C) ± 0.6 %RH (0 ... 40 %RH)

± 1.0 %RH (40 ... 97 %RH)

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

Response time (90 %) at +20 °C (+68 °F) in still air

with grid filter 8 s / 17 s*

with grid + steel netting filter 20 s / 50 s*

with sintered filter 40 s / 60 s*

* with HUMICAP® 180R sensor

TEMPERATURE

Measurement range -40 ... +180 °C (-40 ... +356 °F)

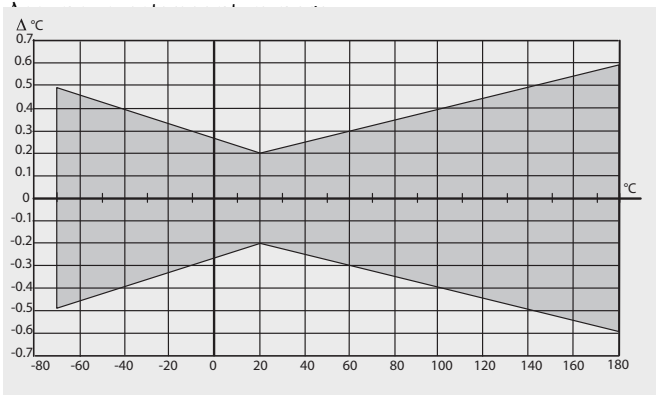
(depends on selected probe)

Typical accuracy of electronics at +20 °C (+68 °F) ± 0.2 °C (0.36 °F)

Typical temperature dependence of electronics

0.005 °C/°C (0.005 °F/°F)

Sensor Pt 1000 RTD 1/3 Class B IEC 751



OTHER VARIABLES

Optionally available dewpoint temperature, mixing ratio, absolute humidity, wet bulb temperature.

Operating environment

Temperature range

operating temp. range for

electronics -40 ... +60 °C (-40 ... +140 °F)

with display -20 ... +60 °C (-4 ... +140 °F)

storage -40 ... +70 °C (-40 ... +158 °F)

Pressure range see probe specifications

Complies with EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial Environment.

NOTE! IEC 1000-4-5 complies only when using external EXi approved surge arrester in the safe area.

Inputs and outputs

Operating voltage 12 ... 28 V

with serial port (service mode) 15 ... 28 V

Analog outputs two-wire 4 ... 20 mA, one standard, one optional

Typical accuracy of analog outputs at +20 °C ± 0.05% full scale

Typical temperature dependence

of analog outputs 0.005% / °C (0.005% / °F) full scale

Analog outputs connection via safety barriers

RS232C serial output for service use connector type RJ45

Display two-line LCD

Mechanics

Connections screw terminals, 0.33...2.0 mm
2 wires (AWG 14-22)

Cable bushings For 7.5...12mm or 10...15mm cable
diameters (M20)

Conduit fitting NPT 1/2" (M20)

Housing material G-AIS₁10Mg (DIN 1725)

Housing classification IP66 (NEMA 4X)

Housing weight 950 g

Options and accessories

Duct installation kit (for HMP363/367) 210697

Mounting flange (for HMP365) 210696

Ball valve ISO 1/2 with welding joint BALLVALVE-1
(for HMP368)

pressure range at +20 °C (+68 °F): 0 ... 20 bar (0 ... 290 psia)
(during installation max. 10 bar (145 psia))

Calibration adapter for HMK15 211302

Serial interface cable for PC
connectors RJ45 - D9 female 25905ZZ

Galvanic isolator 212483

Zener barrier (USA & Canada) 210664

Protection cover (for use in the presence of combustible dust, ATEX) 214101

II 1 D IP65 T = 70 °C

Classification with current outputs

EUROPE / VTT

EU (94/9/EC, ATEX100a) II 1 G Ex ia IIC T4 Ga
VTT 09 ATEX 028 X issue No: 1

Safety factors $U_i = 28\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 700\text{ mW}$
 $C_i = 1\text{ nF}$, L_i negligibly low

Environmental specifications

T_{amb} -40 ... +60 °C (-40 ... +140 °F)
 P_{amb} 0.8 ... 1.1 bar

Dust classification (with protection cover) II 1 D (IP65 T=70 °C)
VTT 04 ATEX 023X

USA (FM) Classes I, II, III, Division 1, Groups A-G and
Division 2, Groups A-D, F and G
FM Project ID: 3010615

Safety factors: $V_{max} = 28\text{ VDC}$, $I_{max} = 100\text{ mA}$,
 $C_i = 1\text{ nF}$, $L_i = 0$, $P_i = 0.7\text{ W}$, $T_{amb} = 60\text{ °C}$ (140 °F), T5

JAPAN (TIIS) Ex ia IIC T4
Code number: TC17897

Safety factors: $U_i = 28\text{ VDC}$, $I_i = 100\text{ mA}$, $C_i = 1\text{ nF}$,
 $P_i = 0.7\text{ W}$, $L_i = 0$, $T_{amb} = 60\text{ °C}$ (140 °F)

CANADA (CSA)

Class I Division 1 and Division 2, Groups A, B, C, D;
Class II Division 1 and Division 2, Groups G and
Coal Dust;

Class III CSA File No: 213862 0 000, CSA Report: 1300863
Safety factors: $T_{amb} = 60\text{ °C}$, T4,

Intrinsically safe when connected as per
Installation Drawing DRW213478.

CHINA (PCEC) Ex ia II CT4

Certificate No. CE092145
Standard GB3836.1-2000 and GB3836.4-2000

IECEX (VTT) Ex ia IIC T4 Ga

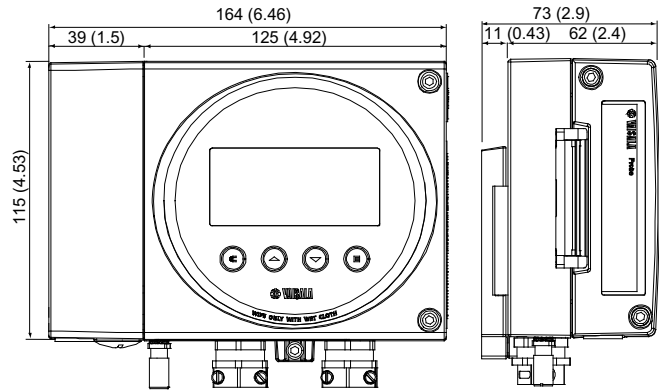
IECEX VTT 09.0002x issue No: 1
Safety factors $U_i = 28\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 700\text{ mW}$
 $C_i = 1\text{ nF}$, L_i negligibly low

Environmental specification

T_{amb} -40 ... +60 °C (-40 ... +140 °F)
 P_{amb} 0.8 ... 1.1 bar

Dimensions

Dimensions in mm (inches)



Accessories

		HMT361	HMT363	HMT364	HMT365	HMT367	HMT368
Accessory	part number						
Ball valve ISO 1/2 with welding joint	BALLVALVE-1						√
Cable Gland M20 x 1.5 with splitting seal	HMP247CG		√		√	√	
Duct installation kit	210697		√			√	
Fitting body ISO1/2 solid structure	DRW212076SP						√
Fitting body M22 x 1.5	17223			√			
Fitting body NPT1/2	17225			√			
Fitting body NPT1/2 solid structure	NPTFITBODASP						√
Mounting flange	210696				√		
Swagelok for 12mm probe, 1/2" NPT thread	SWG12NPT12		√			√	
Swagelok for 12mm probe, 3/8" ISO thread	SWG12ISO38		√			√	

VAISALA

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HMT310 Humidity and Temperature Transmitter



The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT310 models (from left to right): HMT313, HMT317, HMT314, HMT318, HMT315 and HMT311.

Features/Benefits

- Next-generation Vaisala HUMICAP® Sensor for excellent accuracy and stability
- Full 0 ... 100 %RH measurement, temperature range up to +180 °C (depending on model)
- Small size, easy to integrate
- Insensitive to dust and most chemicals
- NIST traceable

Reliable Vaisala HUMICAP® technology

The HMT310 incorporates the latest-generation Vaisala HUMICAP® Sensor. The Vaisala HUMICAP® Sensor is a capacitive thin-film polymer sensor. It features high accuracy, excellent long-term stability and negligible hysteresis. It is insensitive to dust, particulate dirt and most chemicals.

Several outputs, one connector

The HMT310 is powered up with 12 ... 35 VDC. It has two analog outputs and an RS-232 serial output. 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 and it involves heating the sensor to remove harmful chemicals. The function can be initiated manually or programmed to occur at set intervals.

Optional functions

The following optional functions are available: several probes for various applications, calculated humidity quantities, different mounting kits, sensor protection options and probe cable lengths, warmed probe and sensor heating for high humidity conditions (HMT317), and chemical purge for applications risking an interference with chemicals in the measuring environment.

Technical data

Measured values

RELATIVE HUMIDITY

Measurement range 0 ... 100 %RH

Sensor

Vaisala HUMICAP®180R typical applications
 Vaisala HUMICAP®180RC applications with chemical
 purge and/or warmed probe

Accuracy (incl. non-linearity, hysteresis and repeatability)

at a temperature range of

+15 ... +25 °C ±1 %RH (0 ... 90 %RH)
 ±1.7 %RH (90 ... 100 %RH)
 -20 ... +40 °C ±(1.0 + 0.008 x reading) %RH
 -40 ... +180 °C ±(1.5 + 0.015 x reading) %RH

Factory calibration uncertainty ±0.6 %RH (0 ... 40 %RH)*
 (+20 °C) ±1.0 %RH (40 ... 97 %RH)*

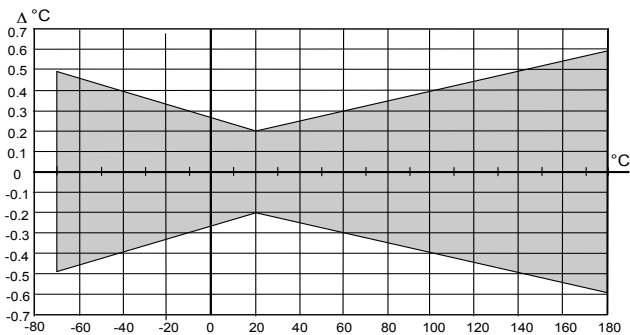
* Defined as ±2 standard deviation limits. Small variations possible, see also calibration certificate.

Response time (90 %) at +20 °C 17 s with grid filter
 in 0.1 m/s air flow 50 s with grid and steel, netting filter
 60 s with sintered filter

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)

Accuracy over temperature range (see graph below)



Typical temperature dependence of electronics ±0.05 °C/°C (±0.005 °F/°F)
 Temperature sensor Pt100 IEC751/3 class B

Electrical connections

Two analog outputs, 0 ... 20 mA or 4 ... 20 mA
 selectable and scalable
 Typical accuracy of analog output at +20 °C ±0.05 % full scale
 Typical temperature dependence 0.005 %/°C (0.003 %/°F)
 of analog output of full scale
 Serial output RS-232C
 Connections M12 8-pole connector with RS-232C,
 current outputs (two channels) and U_{in}
 Operating voltage 12 ... 35VDC, the maximum
 operating voltage for a device with
 sensor heating is 24VDC
 Power consumption 30 mA with RS-232
 External load R_i < 500 Ohm
 Startup time after powerup 3 s

General

Operating temperature range for electronics -40 ... +60 °C (-40 ... +140 °F)
 Storage temperature range -55 ... +80 °C (-67 ... +176 °C)
 Operating pressure
 HMT314 0 ... 100 bar
 HMT318 0 ... 40 bar
 HMT315, HMT317 vapor tight
 Transmitter housing material G-AlSi10Mg
 Transmitter base material ABS/PC
 Housing classification IP65
 Cable feed through 8-pole connector with 5 m cable,
 alternatives Female 8-pin connector screw joint for
 cable diameter 4 ... 8 mm
 Sensor protection PPS grid with stainless steel net,
 PPS grid, Sintered filter
 Membrane stainless steel filter
 Complies with EMC standard EN61326-1, Industrial environment

Note: When using the current output, the RF field susceptibility level according to standard EN61000-4-3 with a frequency band of 110 ... 165 MHz, is only 3V/m (generic environment) with the specified accuracy.

HUMICAP® is a registered trademark of Vaisala.

VAISALA

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HMT100 Series Humidity and Temperature Transmitter for Demanding HVAC Applications



HMT100 remote probe and wall mount models.

Features/Benefits

- Full 0 ... 100 %RH measurement
- Two-wire loop-powered or three-wire voltage output configurations
- Fixed and remote probe models
- Display available
- Relative humidity, dewpoint, temperature outputs
- Vaisala HUMICAP® sensor
- Interchangeable probe module for minimal maintenance downtime
- Different output scalings
- Compatible with hand-helds HM70 and HMI41 for calibration
- IP65 (NEMA 4) housing
- NIST traceable (certificate included)

The Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT100 are designed for humidity and temperature monitoring in demanding environments.

Typical applications include stability rooms, HVAC, livestock farms, greenhouses, indoor swimming pools, and outdoor applications.

Performance

HMT100 incorporates Vaisala HUMICAP® technology that measures relative humidity accurately and reliably. Vaisala HUMICAP® is also resistant to dust and most chemicals.

Available options

The HMT100 is available as a wall mount or remote probe model with an optional display. For high temperature applications or where space is limited, the remote probe is ideal.

HMT100 can show relative humidity only, dewpoint only, or relative humidity and temperature, or dewpoint and temperature readings. The probes are interchangeable without having to calibrate or adjust the transmitter.

HMT100 can also be installed outdoors using an installation kit, or directly into an air conditioning channel using a duct installation kit.

Annual calibration

Calibration is recommended typically at an interval of one year using either the Vaisala HUMICAP® Hand-held Humidity and Temperature Meter HM70 or the Vaisala HUMICAP® Humidity Indicator HMI41.

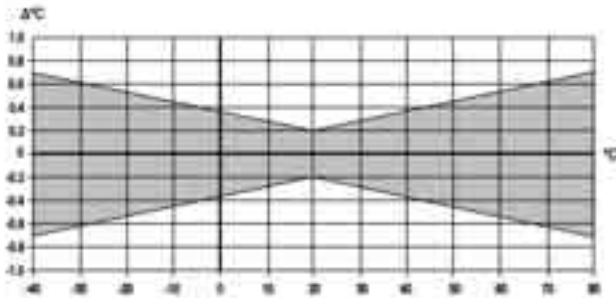
The accuracy of the instrument can also be checked using the Vaisala Humidity Calibrator HMK15, which is based on saturated salt solutions.

Technical data

Performance

RELATIVE HUMIDITY	
Measurement range	0 ... 100 %RH
Accuracy against factory standards including non-linearity, hysteresis, and repeatability	
at +15 ... +25 °C (+59 ... +77 °F)	±1.7 %RH (0 ... 90 %RH) ±2.5 %RH (90 ... 100 %RH)
at ±0 °C ... +40 °C (+32 ... +104 °F)	±(1.7 + 0.015 x reading) %RH
at -40 ... ±0 °C, +40 ... +80 °C (-40 ... +32 °F, +104 ... +176 °F)	±(2.0 + 0.025 x reading) %RH
Factory calibration uncertainty	
at +20 °C (+68 °F)	±1.0 %RH (0 ... 15 %RH) ±1.5 %RH (>15 ... 78 %RH)
Response time (90 %) at 20 °C in still air	
	8 s with plastic grid 20 s with membrane filter 40 s with sintered filter
Humidity sensor	
	Vaisala HUMICAP® 180
TEMPERATURE	
Measurement range	-40 ... +80 °C (-40 ... 176 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)

ACCURACY OVER TEMPERATURE RANGE



Temperature sensor	Pt1000 IEC 751 1/3 class B
DEWPOINT TEMPERATURE (CALCULATED)	
Measuring range	-20 ... +80 °C (-4 ... +176 °F)

Operating Environment

Operating temperature range	
transmitter body, no display	-40 ... +60 °C (-40 ... +140 °F)
transmitter body, with display	-30 ... +60 °C (-22 ... +140 °F)
probe (remote probe only)	-40 ... +80 °C (-40 ... +176 °F)
Storage temperature range	
	-40 ... +60 °C (-40 ... +140 °F)
Electromagnetic compatibility	
	EN61326-1, Industrial Environment

Inputs and outputs

Two-wire output signal	4 ... 20 mA
External loop load	10 ... 35 VDC ($R_L = 0$ ohms) 20 ... 35 VDC ($R_L = 500$ ohms)
Voltage output signals	0 ... 1 V, 0 ... 5 V, 0 ... 10 V (0 ... X V see order form)
Supply voltage	10 ... 35 VDC/24 VAC
Current consumption, 35 VDC/24 VAC	max. 12 mA
External load	R_L min. 10 k Ω

Mechanics

Material	
Housing	ABS/PC plastic
Probe	chrome coated aluminum
Mounting plate GM45160	ABS plastic
Housing classification	
	IP65 (NEMA 4)
Sensor protection	
Plastic grid	DRW010522
Plastic grid with membrane filter	DRW010525
Sintered stainless steel filter	HM46670SP
Connections	screw terminals 0.5 ... 1.5 mm ²
Probe cable lengths	3 m, 5 m, 10 m
Calibration	with HM70, HMI41, or with internal 11 %RH & 75 %RH buttons
Display option	
	One line fixed variable or changing variables when two variables are ordered

Options and accessories

Spare probe	HMP100
Spare extension cable (10 m)	DRW220095
Radiation shield	DTR502B
Rain shield with installation kit	215109
Installation plate	DRW010699
Duct installation kit	215619
Connection cable for HMI41	2591722
Connection cable for HM70	211339

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DMW19 Wall Mount Dewpoint Transmitters for Indoor Applications



Vaisala HUMICAP® Dewpoint Transmitter DMW19 is a compact wall mount dewpoint transmitter.



The Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70 is an easy and fast way to confirm the performance of DMW19 on site.

Features/Benefits

- Designed for demanding building automation applications and other wall mount indoor applications where dewpoint measurement is needed
- Dewpoint measurement range -20 ... +55 °C (-4...+131 °F)
- Accuracy ± 2 °C (± 3.6 °F)
- Vaisala HUMICAP® Sensor for excellent accuracy and long-term stability, negligible hysteresis and resistance to dust and most chemicals.
- Electronic, on site, one-point field check with Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70

The wall mount Vaisala HUMICAP® Dewpoint Transmitter DMW19 is designed for use in air conditioning and other indoor wall mount applications where accurate and stable dewpoint measurement is required. DMW19 is an ideal choice for demanding building automation applications where dewpoint is the preferred parameter for humidity measurement.

Proven Vaisala HUMICAP® Sensor Technology

The operation of DMW19 is based on the proven Vaisala HUMICAP® Sensor. The dewpoint is calculated from relative humidity and temperature. The patented Vaisala HUMICAP® Sensor is insensitive to dust, particulate dirt and most chemicals. This results in high accuracy, excellent long-term stability and negligible hysteresis.

Easy to install

DMW19 is compact and lightweight. In addition, DMW19 is easy to install and it is suitable for different junction boxes.

Fast, on-site field check

The accuracy of the transmitter is simple to check on-site using the Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70.

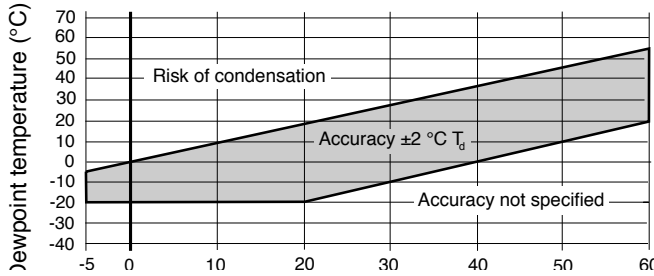


DMW19 is suitable for demanding building automation and other wall mount indoor dewpoint measurements.

Technical data

Dewpoint temperature

Measurement range	-20 ... +55 °C (-4 ... +131 °F)
Accuracy	±2 °C (±3.6 °F) (see graph below)



Dewpoint accuracy vs. measurement conditions

Response time	15 s
Humidity sensor	Vaisala HUMICAP® 180
Temperature sensor	Pt 100 IEC 751 1/3 class B

Operating environment

Operating temperature	-5 ... +60 °C (+23 ... +140 °F)
Storage temperature	-40 ... +80 °C (-40 ... 176 °F)
Relative humidity	0 ... 95 %RH operating and storage

Outputs

Analog outputs (scalable)	4 ... 20 mA 0 ... 1 V 0 ... 5 V
Resolution for current output	0.002 mA
Resolution for voltage output	0.3 mV
Typical temperature dependence	0.005 % of span/ °C

General

Operating voltage with voltage output	12 ... 35 VDC 11 ... 28 VAC
Operating voltage with current output	20 ... 35 VDC / 19 ... 28 VAC with RL500 ohm 17 ... 35 VDC / 16 ... 28 VAC with RL50 ohm
Supply current	10 mA + load current
Load for voltage output	min. 10 kohm
Load for current output	max. 500 ohm
Connections	screw terminals 0.5 ... 1.5 mm ²
Housing	ABS plastics
Housing colour	NCS-2502-R
Housing classification	IP33
Weight	110 g

Operating environment

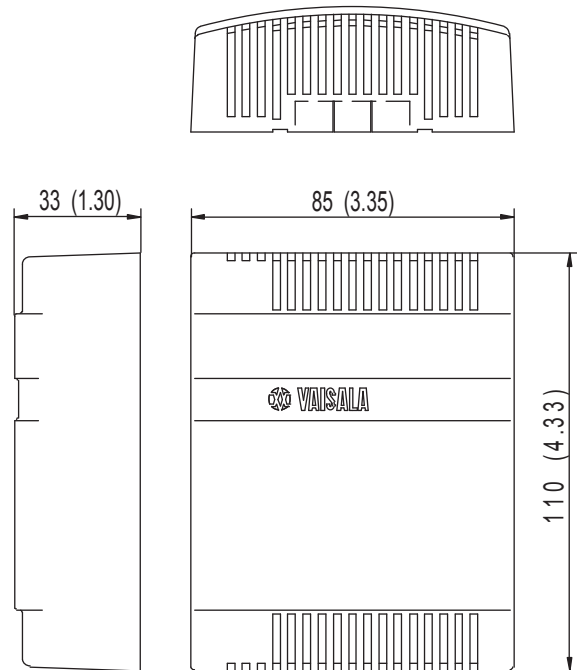
Operating temperature	-5 ... +60 °C (+23 ... +140 °F)
Storage temperature	-40 ... +80 °C (-40 ... 176 °F)
Relative humidity	0 ... 95 %RH operating and storage

Electromagnetic compatibility

Complies with EMC standard EN61326-1, Generic Environment

Dimensions

Dimensions in mm



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HMD60/70 Humidity and Temperature Transmitters for ducts in HVAC applications



Vaisala HUMICAP® Humidity and Temperature Transmitters HMD60 and HMD70 are designed for use in air conditioning applications where accurate and stable control of relative humidity and temperature are required.

The duct mounted Vaisala HUMICAP® Humidity and Temperature Transmitters HMD60 and HMD70 are designed for monitoring relative humidity and temperature in building energy management systems. The combination of high accuracy, stability and reliable operation, make these products the ideal choice for demanding applications.

Resistant to chemicals and dust

The duct mount HMD60 and HMD70 transmitters can also be used in many industrial humidity monitoring applications, where their stability and resistance to chemicals and dust are of great value. A useful feature of these duct mount transmitters is the ability to remove the electronics without removing the unit from the duct.

Measures both humidity and temperature

The HMD60 and HMD70 transmitters are available in three models: U for humidity measurement-only, Y for humidity and temperature measurement, and T for temperature only.

Fast, on-site calibration

The accuracy of the transmitters is simple to check using either the Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70 or the Vaisala HUMICAP® Humidity Indicator HMI41. The calibration can be done in seconds with a single potentiometer without disturbing the operation, resulting in great savings both in maintenance time and costs.

Features/Benefits

- Full 0 ... 100 %RH measurement
- Accuracy up to ± 2 %RH
- True two-wire transmitters with 4 ... 20 mA loop powered output (HMD60)
- Selectable signal output of 0 ... 1 V, 0 ... 5 V or 0 ... 10 V (HMD70) with optional current module also 0 ... 20 mA (HMD70)
- Vaisala HUMICAP® Sensor for excellent accuracy and long-term stability, negligible hysteresis and resistance to dust and most chemicals.
- Temperature compensated
- IP65 (NEMA 4) housing
- Also available as temperature-only transmitters HMD 60T/70T
- NIST traceable (certificate included)

Technical data

60 series: 2-wire, 4 to 20 mA output

Duct mount	RH only	HMD60U
	RH & T	HMD60Y
	T only	HMD60T

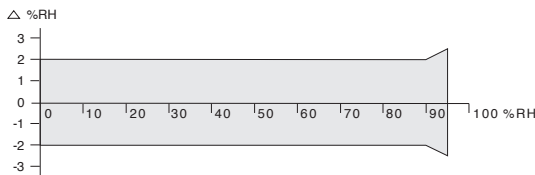
70 series: 3-wire, variable voltage output

Duct mount	RH only	HMD70U
	RH & T	HMD70Y
	T only	HMD70T

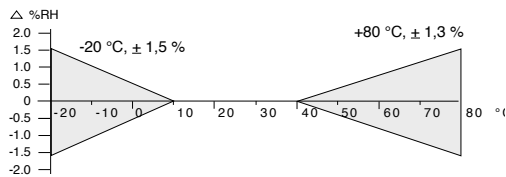
Relative humidity

Measurement range
duct mount 0 ... 100 %RH*

Accuracy at +20 °C



Temperature dependence



Response time at +20 °C (+68 °F),
90% response 15 s (with membrane filter)

Stability ± 2 %RH / 2 years

Sensor HUMICAP® 180

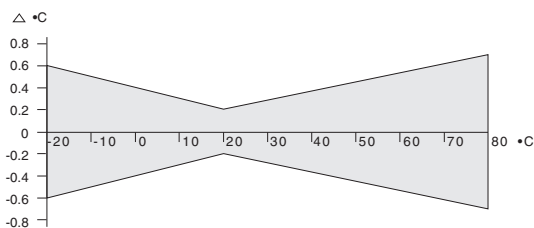
Temperature (Y and T models)

Linearity better than 0.1 °C

Sensor Pt 1000 IEC 751 class B

Measurement range -20 ... +80 °C (-4 ... 176 °F) **

Accuracy



** Optional temperature scales are available on request.

General - 60 series

Supply voltage	10 ... 35 VDC (RL = 0 ohm)
	20 ... 35 VDC (RL = 500 ohm)
Output signal	4 ... 20 mA

General - 70 series

Supply voltage range depends on the selected output signal		
	DC	AC
0 ... 1V	10 ... 35 V	9 ... 24 V
0 ... 5V	14 ... 35 V	12 ... 24 V
0 ... 10V	19 ... 35 V	16 ... 24 V
WITH OPTIONAL CURRENT MODULE		
0 ... 20 mA (RL = 0 ohm)	10 ... 35 V	11 ... 24 V
**0 ... 20 mA (RL = 500 ohm)	20 ... 35 V	17 ... 24 V
Power consumption @ 24 VAC		
HMD70U		10 mA typical
HMD70Y		12 mA typical

General

Operating temperature range	
electronics	-5 ... +55 °C (+23 ... +131 °F)
probe	-20 ... +80 °C (-4 ... +176 °F)
Storage temperature range -40 ... +80 °C (-40 ... +176 °F)	
Maximum flow speed	50 m/s
Current module	part no. 18945 HM
Housing	
probe	stainless steel
electronics	cast aluminum
Connections	screw terminals 0.5 ... 1.5 mm ²
Sensor protection	
standard	membrane filter (part no. DRW010525)
optional	stainless steel sintered filter (part no. HM46670SP)
Cable thread-through	
bushing for 7 ... 10 mm (PG9)	
cable housing IP65 (NEMA 4)	part no. 18941HM
armoured cable glands	part no. 10528HM
(must be ordered separately)	

Complies with EMC standard EN61326 and EN55022

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HMW60/70 Humidity and Temperature Transmitters for wall mounting in HVAC applications



Vaisala HUMICAP® Humidity and Temperature Transmitters HMW60 and HMW70 are designed for use in air conditioning applications where accurate and stable control of relative humidity and temperature are required.

Features/Benefits

- Accuracy up to ± 2 %RH
- True two-wire transmitters with 4 ... 20 mA loop powered output (HMW60)
- Selectable signal output of 0 ... 1 V, 0 ... 5 V or 0 ... 10 V (HMW70)
- Vaisala HUMICAP® Sensor for excellent accuracy and long-term stability, negligible hysteresis and resistance to dust and most chemicals.
- Temperature compensated
- Also available as temperature-only transmitters HMW 60T/70T
- NIST traceable (certificate included)

The wall mounted Vaisala HUMICAP® Humidity and Temperature Transmitters HMW60 and HMW70 are designed for monitoring relative humidity and temperature in building energy management systems. The combination of high accuracy, stability and reliable operation, make these products the ideal choice for demanding applications.

Measures both humidity and temperature

The HMW60 and HMW70 transmitters are available in three models: U for humidity measurement-only,

Y for humidity and temperature measurement, and T for temperature only.

Fast, on-site calibration

The accuracy of the transmitters is simple to check using either the Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70 or the Vaisala HUMICAP® Humidity Indicator HMI41. The calibration can be done in seconds with a single potentiometer without disturbing the operation, resulting in great savings both in maintenance time and costs.

Technical data

60 series: 2-wire, 4 to 20 mA output

Wall mount	RH only	HMW60U
	RH & T	HMW60Y
	T only	HMW60T

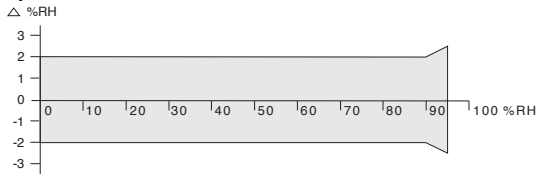
70 series: 3-wire, variable voltage output

Wall mount	RH only	HMW70U
	RH & T	HMW70Y
	T only	HMW70T

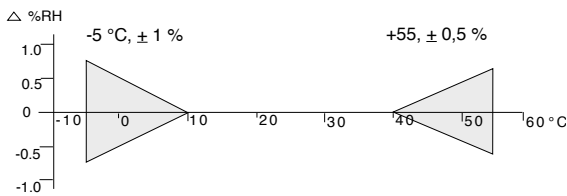
Relative humidity

Measurement range 0 ... 95 %RH*

Accuracy at +20 °C



Temperature dependence



Response time at +20 °C (+68 °F), 90 % response 15 s

Stability ±2 %RH / 2 years

Sensor HUMICAP® 180

* Output signal corresponds to 0 ... 100 %RH

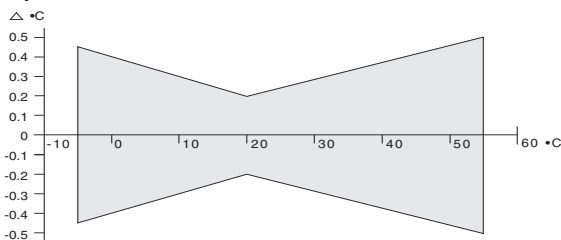
Temperature (Y and T models)

Linearity better than 0.1 °C

Sensor Pt 1000 IEC 751 class B

Measurement range -5 ... +55 °C (+23 ... 131 °F) **

Accuracy¹



** Optional temperature scales are available on request.

General - 60 series

Supply voltage	10 ... 35 VDC (RL = 0 ohm)
	20 ... 35 VDC (RL = 500 ohm)
Output signal	4 ... 20 mA

General - 70 series

Supply voltage range depends on the selected output signal		
	DC	AC
0 ... 1V	10 ... 35 V	9 ... 24 V
0 ... 5V	14 ... 35 V	12 ... 24 V
0 ... 10V	19 ... 35 V	16 ... 24 V
Power consumption @ 24 VAC		
	HMW70U	10 mA typical
	HMW70Y	12 mA typical

General

Operating temperature range	
electronics	-5 ... +55 °C (+23 ... +131 °F)
Storage temperature range	-40 ... +80 °C (-40 ... +176 °F)
Long-term humidity range for electronics	
	0 ... 85 %RH
Housing material	
	ABS plastic
IP Class 30	
Fire resistance	UL94-HB
Colour	NCS-2502-R
Connections	screw terminals 0.5 ... 1.5 mm ²

Complies with EMC standard EN61326 and EN55022



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HMW40/50 and HMD40/50 Wall and Duct Mount Transmitters for HVAC Applications



In energy management systems, the accurate measurement of relative humidity and temperature is essential for optimum control of the environment.

Vaisala INTERCAP® Humidity and Temperature Transmitters HMD/W40/50 are competitively priced and require no routine maintenance – a smart choice for your HVAC/EMC applications.

Features/Benefits

- Specially designed for building energy management systems
- 10 ... 90 %RH measurement
- -10 ... +60 °C (+14 ... +140 °F) operating range for duct units
- -5 ... +55 °C (+23 ... +131 °F) operating range for wall units
- 4 ... 20 mA 2-wire output (HMD/W40)
- Selectable voltage 3-wire output (HMD/W50)
- Combines excellent stability with easy installation and reliable operation
- No recalibration
- Fully interchangeable Vaisala INTERCAP® Sensor is easy to replace
- Low cost

The two and three-wire Vaisala INTERCAP® Humidity and Temperature Transmitters HMD/W40 and HMD/W50 are designed for use in energy management systems in buildings. They combine excellent stability with easy installation and reliable operation. The HMD40/50 are for duct installations and the HMW40/50 for wall installations.

Low maintenance costs

The HMD40/50 humidity transmitters use Vaisala INTERCAP® Sensor - the world's first interchangeable capacitive humidity sensor. The transmitters require no recalibration if the sensor is changed. This means great savings in overall maintenance costs. The sensor is also insensitive to dust as well as most chemicals.

Measures both humidity and temperature

The 40/50 series is available as humidity and temperature (Y), or humidity only (U) transmitters. The transmitters measure humidity with a ± 3 %RH accuracy and a ± 1 %RH stability per year.

Selectable functions (HMD/W50)

The HMD/W50 transmitters feature selectable output signals of 0 to 1 V and 0 to 10 V. They can be powered by either AC or DC voltage.

Technical data

Relative humidity

Measurement range (for which accuracy is specified)	10 ... 90 %RH
Operating range	
HMD40/50	0 ... 100 %RH
HMW40/50	0 ... 90 %RH
Accuracy at +20 °C (+68 °F)	better than ±3 %RH
Stability	±2 %RH over 2 years
Temperature dependence	<±1.5 %RH from -10 ... +60 °C (+14 ... 140 °F)
Sensor	INTERCAP® Sensor, part no. 15778HM

Temperature (40Y and 50Y)

Measurement range	
HMD40/50	-10 ... +60 °C (+14 ... +140 °F)
HMW40/50	-5 ... +55 °C (+23 ... +131 °F)
Total accuracy at +25 °C	±0.3 °C (±0.54 °F)
Temperature dependence	0.01 °C/°C (0.01 °F/°F)
Sensor	Pt 1000 IEC 751 class B

General

Output signal for relative humidity (equals 0...100 %RH)	
HMD/W40	4 ... 20 mA
HMD/W50	0 ... 1 V & 0 ... 10 V
Output signal for temperature	
HMD/W40	4 ... 20 mA
HMW50	0 ... 1 V & 0 ... 10 V
HMD50	0 ... 10 V
HMD40Y, HMD50Y	equals -40 ... +60 °C (-40 ... 140 °F)
HMW40Y, HMW50Y	equals -5 ... +55 °C (+23 ... 131 °F)

Power supply

HMD/W40	10 ... 28 VDC
HMD/W50	for 0 ... 1 V output: 12 ... 35 VDC/12 ... 24 VAC for 0 ... 10 V output: 15 ... 35 VDC/15 ... 24 VAC

Electromagnetic compatibility: Complies with EN61326-1, Generic Environment

Current consumption

HMD/W50	6 mA typical
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Operating temperature range

HMD40/50	-10 ... +60 °C (+14 ... +140 °F)
HMW40/50	-5 ... +55 °C (+23 ... +131 °F)

Storage temperature range

	-40 ... +60 °C (-40 ... +140 °F)
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Operating humidity range

HMD40/50	0 ... 100 %RH
HMW40/50	0 ... 90 %RH

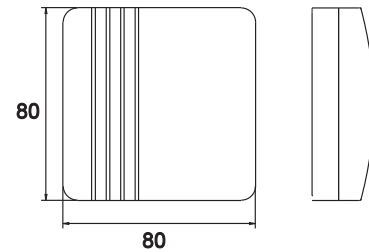
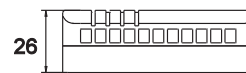
Housing

Material	ABS plastic
Classification (HMD40/50)	IP65 (NEMA 4)
Colour (HMW40/50)	NCS0502-G50Y

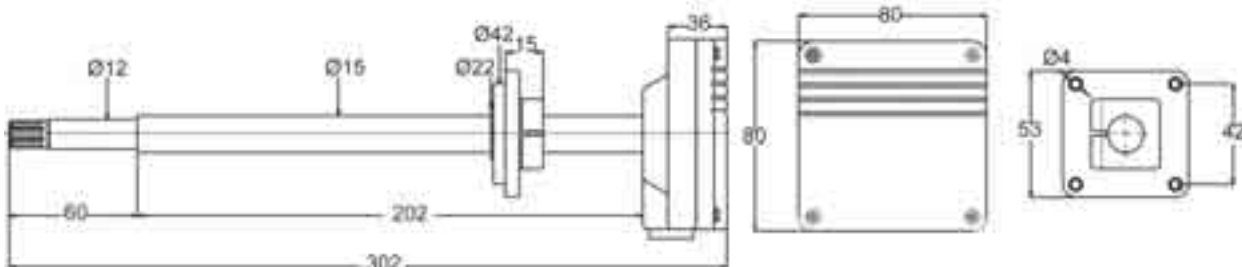
Dimensions

Dimensions in mm.

HMW40/50



HMD40/50



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HMM210 Series Humidity Modules for Environmental Chambers



Vaisala HUMICAP® Humidity and Temperature Module Series HMM210 provide fast real-time measurement in a wide temperature range. The modules are especially suitable for demanding OEM applications, e.g. environmental chambers and incubators.

Features/Benefits

- Three probe configurations:
- Relative humidity (RH) plus temperature (T) probe.
- Dewpoint probe with probe heating. By heating the whole probe a few degrees above ambient condensation is avoided.
- Dewpoint probe described above, together with a temperature probe for obtaining relative humidity and temperature outputs.
- Three module configurations
- Different probe and cable lengths
- Chemical purge option maintains high measurement performance in demanding chemical conditions.
- Calibration certificate included

The Vaisala HUMICAP® Humidity and Temperature Module Series HMM210 are designed for OEM type applications needing humidity or dewpoint measurement in demanding environments, e.g. in environmental chambers growth chambers and incubators.

Demanding applications

The HMM210 modules are optimized for harsh environments with both high humidities and a wide temperature range. The humidity measurement is fully temperature compensated. In addition, the modules remain accurate and reliable under extreme conditions where a combination of high humidity and rapidly changing temperature can result in condensation on the sensor head.

The modules are highly versatile and flexible. They provide either

relative humidity and temperature or dewpoint measurement with various configurations. All modules have microprocessor based electronics and are equipped with analog or digital outputs.

Unique warmed probe

The warmed probe and composite sensor, available on the dewpoint probe configuration, is warmed to always remain a few degrees higher than ambient. Advantages of this patented technique include:

- No condensation problems on the probe, as the temperature of the probe always remains higher than the ambient.
- Fast response time, especially in rapidly changing temperatures.
- Improved stability and accuracy in high humidities.

Vaisala HUMICAP® Sensor and chemical purge option

The HMM210 modules use Vaisala HUMICAP®180R sensors for best possible stability. The sensor is insensitive to dust and to most chemicals. In conditions of extraordinary high levels of chemicals and cleaning agents, chemical purge is available as an option. With chemical purge, contaminants are evaporated from the sensor and performance is returned to normal.

Technical data

Relative Humidity

Measurement range	0 ... 100 %RH
Accuracy (including non-linearity, hysteresis and repeatability)	± 2 %RH (0 ... 90 %RH) ± 3 %RH (90 ... 100 %RH)
Response time (90 % at +20 °C/+68 °F) in still air (with sintered filter)	60 s
Typical temperature dependence of electronics	0.02 %RH/°C (0.02 %RH/°F)
Humidity sensor	HUMICAP®180R

Temperature

Measurement range	-70 ... +180 °C (-94 ... +356 °F)
Typical accuracy of electronics at +20 °C	± 0.1 °C (± 0.18 °F)
Typical temperature dependence of electronics	0.0025 °C/°C (0.0025 °F/°F)
Temperature sensor in RH+T probe:	
HMM211 and HMM213	Pt 100 RTD IEC 751 1/3 Class B
HMM212	Pt 1000 RTD IEC 751 1/3 Class B
Additional temperature probe	Pt 100 RTD IEC 751 1/4 Class B

Outputs

Two analog outputs selectable	
HMM211	0 ... 1 V, 0 ... 5 V, 0 ... 10 V 0 ... 20 mA
HMM212	4 ... 20 mA (loop powered)
Digital output	
HMM213	RS232

General

Operating temperature range	
Probe	-70 ... +180 °C (-94 ... +356 °F)
Electronics	-5 ... +55 °C (+23 ... +131 °F)
Storage temperature range (Electronics)	-40 ... +70 °C (-40 ... +158 °F)
Sensor protection (standard)	stainless steel sintered filter
Connections	screw terminals for 0.5 ... 1.5 mm ² wires

Power Supply

Operating voltage	10 ... 35 VDC
In modules with analog outputs the supply range depends to a certain extent on the selected output range.	
Current consumption without sensor head warming or re-gaining option	
HMM211 & HMM213	12 mA at 35 VDC

Configuration Options

	Compatible with modules:		
PROBES	HMM211	HMM212	HMM213
RH+T	yes	yes	yes
Dewpoint (heated composite sensor)	yes		yes
Temperature	yes		yes
CABLE LENGTHS			
RH+T and Dewpoint probes			65, 150 and 300 cm
Temperature probe			150 and 300 cm
CHEMICAL PURGE	Automatically takes place at power-up		

HUMICAP® is a registered trademark of Vaisala.

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HMM100 Humidity Module for Environmental Chambers



The Vaisala HUMICAP® Humidity Module HMM100.

Features/Benefits

- Full temperature compensation over the operating temperature range of -70 °C ... +180 °C
- High temperature tolerance, also suitable for heat-sterilization
- Excellent measurement accuracy with Vaisala HUMICAP® 180R sensor
- Durable
- Easy field calibration by trimmers
- Maintenance-free
- Easy to install
- Applications: test chambers, incubators

The HMM100

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

Two probes are available, one made of plastics, the other of stainless steel. Several cable lengths up to 3 meters are available. Both the probes have the Vaisala HUMICAP® 180R sensor which ensures excellent measurement accuracy.

Robust and reliable

The HMM100 probe works in freezing conditions (-70 °C) and also in temperatures up to +180 °C. The

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.

Maintenance-free

Compared to psychrometers, the HMM100 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.

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

Performance

RELATIVE HUMIDITY	
Measurement range	0 ... 100 %RH
Accuracy (incl. non-linearity, hysteresis and repeatability)	
temperature range	-20 ... +40 °C
0 ... 90 %RH	±2 %RH
90 ... 100 %RH	±3 %RH
temperature range	-40 ... -20 °C, +40 ... +180 °C
0 ... 90 %RH	±2.5 %RH
90 ... 100 %RH	±3.5 %RH
Factory calibration uncertainty (+20 °C)	±1.5 %RH
Humidity sensor	Vaisala HUMICAP® 180R
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

Operating temperature range	
component board	-5 ... +55 °C (+23 ... +131 °F)
stainless steel and plastic probe	-70 ... +180 °C (-94 ... +356 °F)
porous PTFE filter stainless steel, sintered filter	-70 ... +180 °C (-94 ... +356 °F)
plastic grid, membrane filter	-20 ... +80 °C (-4 ... +176 °F)
Electromagnetic compatibility	Complies with EMC standard EN61326-1, for use in light industrial environments

Input and outputs

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

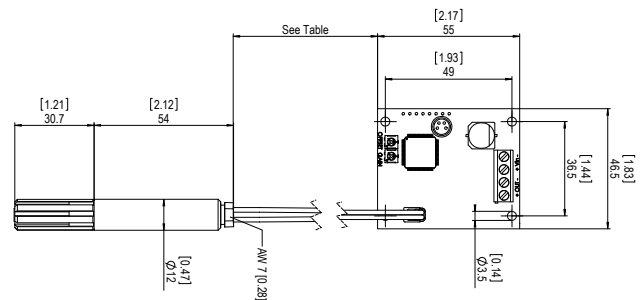
Mechanics

Service cable connector	M8 series 4-pin (male)
Probe diameter	12 mm
Probe cable lengths	0.6/1.55/2.9 m
Probe material	
plastics	PPS
stainless steel	AISI316/PPS
Probe mounting clamp	AISI316
Mounting bracket material	
lid	ABS/PC
bottom plate	Al
Module housing material	ABS/PC (cover)

Options and accessories

Humidity sensor	HUMICAP180R
Membrane filter	10159HM
Plastic grid filter	6221
Porous PTFE filter	219452SP
Stainless steel sintered filter	HM47280SP
Mounting bracket with lid	225979
Module housing (IP65)	226060
Probe mounting flange	226061
Probe mounting clamp set (10 pcs)	226067
USB cable	226068

Dimensions



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Vaisala INTERCAP® Humidity and Temperature Probe HMP60



The HMP60 for extreme conditions.

Features/Benefits

- Miniature-size humidity probe
- Low power consumption
- Measurement range:
0 ... 100 %RH; -40 ... +60°C
- Cable detachable with
standard M8 connector
- Rugged metal housing
- Interchangeable Vaisala
INTERCAP® Sensor
- Optional RS485 digital output
Optional dew point output
- Applications: volume
applications, integration
into other manufacturers'
equipment, glove boxes,
greenhouses, fermentation
chambers, data loggers

HMP60

The 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

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

Several outputs

There are two configurable voltage outputs with relative humidity, temperature or dew point scaling. Four voltage output ranges are available.

Rugged design

The HMP60 is designed for extreme conditions. The aluminum body of the 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

Performance

RELATIVE HUMIDITY

Measurement range	0 ... 100 %RH
Typical accuracy	
temperature range	0 ... +40 °C
0 ... 90 %RH	±3 %RH
90 ... 100 %RH	±5 %RH
temperature range	-40 ... 0 °C, +40 ... +60 °C
0 ... 90 %RH	±5 %RH
90 ... 100 %RH	±7 %RH
Humidity sensor	Vaisala INTERCAP®

TEMPERATURE

Measurement range	-40 ... +60 °C
Accuracy over temperature range -40 ... +60 °C	±0.6 °C

DEW POINT

Measurement range	-40 ... +60 °C
Typical accuracy	
temperature range	0 ... +40 °C
when dew point depression < 15 °C	±2 °C
temperature range	-40 ... 0 °C, +40 ... +60 °C
when dew point depression < 10 °C	±3 °C
dew point depression = ambient temperature - dew point	

Operating environment

Operating temperature	-40 ... +60 °C
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Basic immunity test requirements

Inputs and outputs

Operating voltage	5 ... 28 VDC / 8 ... 28 VDC with 5V output
(Use lowest available operating voltage to minimize heating.)	8 ... 28VDC with loop power converter
Current consumption	1 mA average, max. peak 5 mA
Start-up time at operating voltage	<14 V: 1 s; >14 V: 4 s
Outputs	
2 channels	0 ... 1 VDC / 0 ... 2.5 VDC / 0 ... 5 VDC / 1 ... 5 VDC
1-channel loop-power converter (separate module, compatible with humidity accuracy only)	4 ... 20 mA
digital output (optional)	RS485 2-wire half duplex

External loads

0 ... 1 V	R _L min 10 kΩ
0 ... 2.5 V / 0 ... 5 V	R _L min 50 kΩ

Mechanics

Materials

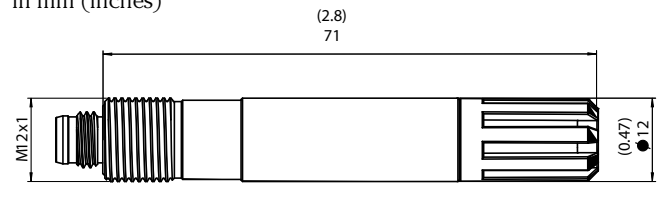
body	chrome coated aluminum
grid filter	chrome coated ABS plastic
cable	polyurethane or FEP
Housing classification	IP65
Body thread	M12x1 / 10 mm
Cable connector	4-pin M8 (IEC 60947-5-2)
Weight with 0.3 m cable	23 g

Options and accessories

Vaisala INTERCAP® Sensor, 1 piece	15778HM
Vaisala INTERCAP® Sensor, 10 pcs	INTERCAPSET-10PCS
Sensor protection	
plastic grid	DRW010522
membrane filter	DRW010525
stainless steel sintered filter	HM46670SP
4 ... 20mA loop power converter	UI-CONVERTER-1
Mounting bracket with lid	225979
Plastic M12 installation nuts, pair	18350SP
USB cable for PC connection	219690
Probe mounting clamp set, 10 pcs	226067
Probe mounting flange	226061
Connection cables	
0.3 m PU	HMP50Z032
3 m PU	HMP50Z30A
180°C 3 m FEP	226902

Dimensions

in mm (inches)



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Vaisala HUMICAP® Humidity and Temperature Probe HMP110



The HMP110 with excellent stability and high chemical tolerance.

Features/Benefits

- Miniature-size humidity transmitter
- Low power consumption and fast startup for battery powered applications
- Measurement range: 0 ... 100 %RH; -40 ... +80°C
- Cable detachable with standard M8 quick connector
- Reliable: Latest generation HUMICAP® 180R sensor for best stability and high chemical tolerance. IP65 metal housing.
- Optional RS485 digital output
- Traceable: Comes with calibration certificate. $\pm 1.7\%$ RH measurement accuracy (0 ... 90%RH)
- HMP110R replacement probe service available for easy maintenance
- Optional dew point calculation

HMP110

The 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. The HMP110 is also suitable for glove boxes, greenhouses, fermentation and stability chambers, data loggers, and incubators.

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

The temperature measurement is a standard feature, dew point measurement is optional. Three standard voltage outputs are available.

Robust design

The aluminum body of the HMP110 is classified as IP65. Thus, it survives rough conditions. The HMP110 has high chemical tolerance because of the HUMICAP® 180R sensor.

Easy maintenance

Maintaining measurement traceability is easy using the HMP110R replacement probe. We send you a replacement probe, you detach the old probe and send it back to us. In this way the measurement is available at all times without interruptions.

Technical data

Performance

RELATIVE HUMIDITY	
Measurement range	0 ... 100 %RH
Accuracy (incl. non-linearity, hysteresis and repeatability)	
temperature range	0 ... +40 °C
0 ... 90 %RH	±1.7 %RH
90 ... 100 %RH	±2.5 %RH
temperature range	-40 ... 0 °C, +40 ... +80 °C
0 ... 90 %RH	±3.0 %RH
90 ... 100 %RH	±4.0 %RH
Factory calibration uncertainty (+20 °C)	± 1.5 %RH
Humidity sensor	Vaisala 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 1/3, Class B IEC 751
DEW POINT	
Measurement range	-40 ... +80 °C
Accuracy (incl. non-linearity, hysteresis and repeatability)	
temperature range	0 ... +40 °C
when dew point depression < 15 °C	±1 °C
when dew point depression 15 ... 25 °C	±2 °C
temperature range	-40 ... 0 °C, +40 ... +80 °C
when dew point depression < 15 °C - dew point depression = ambient temperature - dew point	±2 °C

Operating environment

Measurement range	-40 ... +80 °C
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Basic immunity test requirements

Inputs and outputs

Operating voltage	5 ... 28 VDC / 8 ... 28 VDC with 5 V output
(Use lowest available operating voltage to minimize heating)	8 ... 28 VDC with loop power converter
Current consumption	1 mA average, max. peak 5 mA

Start-up time at operating voltage	<14 V: 1 s >14 V: 4 s
Outputs	
2 channels	0 ... 1 VDC / 0 ... 2.5 VDC / 0 ... 5 VDC / 1 ... 5 VDC
1-channel loop-power converter (separate module, compatible with humidity accuracy only)	4 ... 20 mA
digital output (optional)	RS485 2-wire half duplex
External loads	
0 ... 1 V	R _L min 10 kΩ
0 ... 2.5 V / 0 ... 5 V	R _L min 50 kΩ

Mechanics

Materials	
body	chrome coated aluminum
grid filter	chrome coated ABS plastic
cable	polyurethane or FEP
Housing classification	IP65
Body thread	M12x1 / 10 mm
Cable connector	4-pin M8 (IEC 60947-5-2)
Weight with 0.3 m cable	23 g

Options and accessories

Sensor protection	
plastic grid	DRW010522
membrane filter	DRW010525
stainless steel sintered filter	HM46670SP
4 ... 20 mA loop power converter	UI-CONVERTER-1
Mounting bracket with lid	225979
Plastic M12 installation nuts, pair	18350SP
USB cable for PC connection	219690
Probe mounting clamp set, 10 pcs	226067
Probe mounting flange	226061
Connection cables	
standard 0.3 m	HMP50Z032
standard 3 m	HMP50Z30A
80 °C 1.5 m	225777SP
80 °C 3 m	225229SP
180 °C 3 m FEP	226902

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HM70 Hand-Held Humidity and Temperature Meter for Spot-Checking Applications



The Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70 is a high-performance, portable humidity reference that is exciting to use.

Features/Benefits

- Multilingual user interface
- Shows measurement trends graphically
- Proven Vaisala HUMICAP® Sensor technology
- 3 probe alternatives, temperature measurement ranges between -70 and +180 °C
- Multiprobe operation; dewpoint and CO₂ probes can also be connected
- 2 probes can be connected simultaneously
- Displays various humidity parameters
- Sensor preheat and chemical purge options for demanding conditions
- NIST traceable (certificate included)

The Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM70 is designed for demanding humidity measurements in spot-checking applications. It is also ideal for field checking and calibration of Vaisala's fixed humidity instruments.

The HM70 incorporates the latest generation of the Vaisala HUMICAP® Sensor. It is reliable and has better than ever long-term stability. Additionally, it has a sensor that copes well with chemical interference and provides accuracy that lasts in demanding conditions.

The chemical purge option maintains measurement accuracy in environments with high concentrations of chemicals. The sensor preheat option reduces measurement delays as it keeps the sensor dry when the probe is inserted into hot and humid processes.

Three probes to choose from

The HMP75 is a general purpose probe whereas the HMP76 is a long, stainless steel probe especially suitable for spot-checking in ducts. The HMP77 is a small probe at the end of a 5-meter cable. The probe is ideal for difficult-to-reach areas and for on-site calibration of Vaisala's process transmitters.

In addition, the HM70 supports the use of Vaisala's dewpoint, carbon dioxide and moisture in oil probes, allowing measurements in several multiparameter applications.

MI70 Link

The optional MI70 Link Windows® software and the USB connection cable form a practical tool for transferring logged data and real time measurement data from the HM70 to a PC.

Technical data

HMP75, HMP76 and HMP77 probes

Measured variables

RELATIVE HUMIDITY

Measurement range 0 ... 100 %RH

Accuracy (including nonlinearity, 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) $\pm (1.0 + 0.008 \times \text{reading})$ %RH

at -40 ... +180 °C (-40 ... +356 °F) $\pm (1.5 + 0.015 \times \text{reading})$ %RH

Factory calibration ± 0.6 %RH (0 ... 40 %RH)

uncertainty (+20 °C / +68 °F) ± 1.0 %RH (40 ... 97 %RH)

(Defined as ± 2 standard deviation limits.)

Response time (90%) at +20 °C (+68 °F) in still air

HMP75 (with standard plastic grid) 17 s

HMP76 (with standard sintered bronze filter) 60 s

HMP77 (with standard plastic grid and stainless steel netting) 50 s

Sensor HUMICAP® 180R

HUMICAP® 180RC (chemical purge, sensor preheat)

Typical long-term stability better than 1 %RH / year

TEMPERATURE

Measurement range

HMP75 -20 ... +60 °C (-4 ... +140 °F)

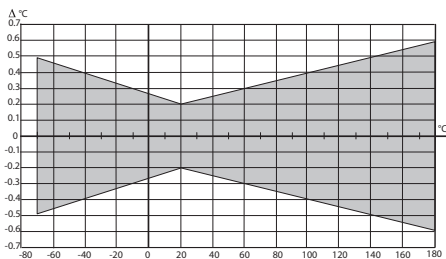
HMP76 -50 ... +120 °C (-58 ... +248 °F)

short time -50 ... +180 °C (-58 ... +356 °F)

HMP77 -70 ... +180 °C (-94 ... +356 °F)

Accuracy at +20 °C (+68 °F) ± 0.2 °C (± 0.36 °F)

Accuracy over temperature range (see graph)



Temperature sensor Pt100 IEC751 1/3 class B

Probe general

Operating temperature range for electronics -40 ... +60 °C

(-40 ... +140 °F)

Housing classification IP65 (NEMA 4)

Housing material ABS/PC blend

Probe material Stainless steel (AISI316L)

Cable length between probe and indicator 1.9 m

MI70 measurement indicator

Indicator general

Menu languages English, Chinese, French, Spanish, German, Russian, Japanese, Swedish, Finnish

Display LCD with backlight, graphic trend display of any parameter, character height up to 16 mm

Max. no. of probes 2

Power supply Rechargeable NiMH battery pack with AC-adaptor or 4xAA-size alkalines, type IEC LR6 0

Analog output 0...1 VDC

Output resolution 0.6 mV

PC interface MI70 Link software with USB or serial port cable

Data logging capacity 2700 points

Alarm audible alarm function

Operating temperature range -10 ... +40 °C (+14 ... +104 °F)

Operating humidity range non-condensing

Housing classification IP54

Battery operation time

Continuous use 48 h typical at +20 °C (+68 °F)

Data logging use up to a month, depending on logging interval

Electromagnetic compatibility Complies with EMC standard EN61326-1, Portable Equipment

MI70 indicator + probe = HM70

ACCESSORIES

Carrying cases

for MI70 and HMP75/77 probe MI70CASE

for MI70 and HMP75/76 probe MI70CASE2

Transmitter connection cables for

HMT330 & HMT100 Series 211339

HM60/70/140 Series HMA6070

MI70 Link software with USB cable 219687

MI70 Link software with serial port cable MI70LINK

Analog output cable 27168ZZ

Sensor protection HMP75

Plastic PC grid (HMP75 standard) 6221

Membrane filter 10159HM

Sintered bronze filter DRW212987SP

HMP76/77

Plastic PPS grid DRW010276SP

Sintered stainless steel filter HM47280SP

Sintered bronze filter (HMP76 standard) DRW212987SP

PPS grid with SS netting (HMP77 standard) DRW010281SP

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HMI41 Indicator and HMP46 High Temperature Probe



The Vaisala HUMICAP® Humidity Indicator HMI41 equipped with the Vaisala HUMICAP® Humidity and Temperature Probe HMP46 is an ideal combination for spot checking and field calibration.

The Vaisala HUMICAP® Humidity Indicator HMI41 fitted with the Vaisala HUMICAP® Humidity and Temperature Probe HMP46 can be used for spot checking humidity and temperature in ducts or chambers. Typical applications are plant maintenance, installation and inspection of air conditioning systems, production and storage areas and production processes. In addition, it is suitable for field checking Vaisala's humidity transmitters.

Withstands high temperatures

The HMP46 operates in full humidity range of 0 ... 100 %RH. The temperature range is from -40 to +100 °C (-40 ... +212 °F). For short periods of time, the probe can withstand temperatures up to +180 °C (+356 °F).

The HMP46 probe is solid and rugged. Its stainless steel probe is made to withstand rough handling in mechanically demanding applications. The probe's long shaft can also reach otherwise unreachable places.

Versatile and easy to use

In addition to displaying the humidity and temperature readings, the HMI41 indicator calculates dewpoint and wet bulb temperature, absolute humidity and mixing ratio.

The indicator has an easy-to-read two line liquid crystal display. The display units (metric or non-metric) are easily selected.

Features/Benefits

- RH measurement range 0 ... 100 %RH
- Temperature measurement range -40 ... +100 °C (-40 ... +212 °F), for short periods up to +180 °C (+356 °F)
- Calculates dewpoint, wet bulb temperature, absolute humidity and mixing ratio
- Versatile and easy-to-use
- Incorporates Vaisala HUMICAP® Sensor
- Excellent stability
- Data collection with serial line
- NIST traceable (certificate included)
- Optional carrying case and calibration cable
- Available as a complete calibration kit HMK41

These features, plus fast response time, high measurement accuracy and excellent stability, as well as the wide temperature range of the probe, make the HMI41/HMP46 combination an ideal choice for the most demanding applications.

High performance sensor

The HMP46 probe incorporates Vaisala HUMICAP® Sensor. This sensor has high accuracy, excellent long-term stability and negligible hysteresis. In addition, the sensor is insensitive to dust, particulate dirt and most chemicals.

Technical data

HMI41 indicator

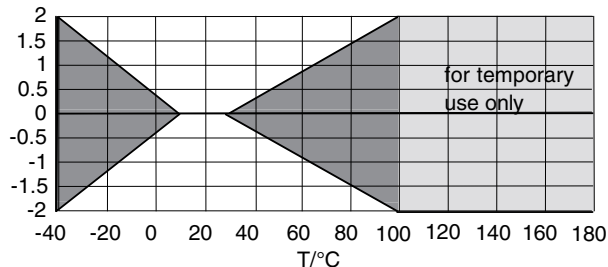
Calculated variables	dewpoint temperature, absolute humidity, wet bulb temperature, mixing ratio
Resolution	0.1 %RH; 0.1 °C/°F
Power supply	4 batteries, type AA (LR 6)
Battery operation time (alkaline batteries)	72 h continuous use
Auto-off function	
Operating temperature	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Display	two line LCD
Housing material	ABS plastic
Housing classification	IP53 (with connectors blocked)
Weight (incl. batteries)	300 g
Maximum measurement error of indicator at +20 °C	
humidity	±0.1 %RH
temperature	±0.1 °C (±0.18 °F)

HMP46 probe

HUMIDITY	
Measurement range	0 ... 100 %RH, non-condensing
Accuracy (incl. nonlinearity, hysteresis and repeatability) at +20 °C	
Maximum achievable accuracy when calibrated against high quality, certified humidity standards:	
0 ... 90 %RH	±1 %RH
90 ... 100 %RH	±2 %RH
When calibrated against salt solutions (ASTM E104-85)	
0 ... 90 %RH	±2 %RH
90 ... 100 %RH	±3 %RH

Temperature Dependence

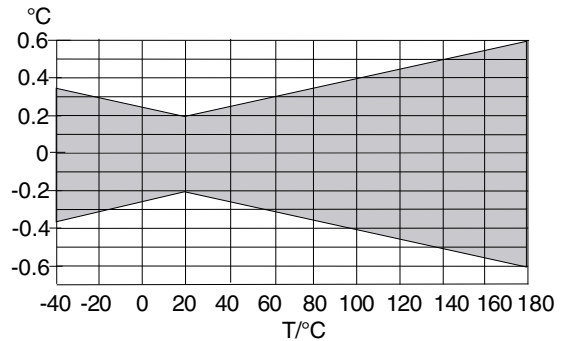
error %RH



Typical long-term stability	better than 1 %RH per year
Response time (90%) at +20 °C in still air w/sintered filter	15 s
Humidity sensor	HUMICAP® 180

TEMPERATURE

Continuous measurement	-40 ... +100 °C (-40 ... +212 °F)
Short-term measurement	-40 ... +180 °C (-40 ... +356 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Accuracy over the measurement range	



Temperature sensor

Pt 100 IEC 751 1/3 class B

General

Typical ranges of calculated variables

dewpoint temperature	-20 ... +100 °C (-4 ... +100 °F)
absolute humidity	0 ... 600 g/m ³
wet bulb temperature	0 ... 100 °C (32 ... 212 °F)
mixing ratio	0 ... 600 g/kg d.a.

The accuracies of these calculated variables are limited by the accuracies of the measured variables on which they are based, namely RH and T. The RH and T accuracies are stated under HMP46 probe.

Cable length 1500 mm; extended spiral cable

Operating temperature range

for electronics -20 ... +60 °C (-4 ... +140 °F)

Housing material

Electronics housing ABS plastic

Probe stainless steel

Housing classification

electronics IP65 (NEMA 4)

Sensor protection

sintered filter, part no. 0195

option membrane filter, part no. 10159HM (max +80 °C / +176 °F)

plastic grid, part no. 6221 (max +80 °C / +176 °F)

Weight

450 g

Electromagnetic compatibility

Complies with EMC standard

EN61326-1, Portable Equipment

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HMP41, HMP42 and HMP45 Probes for HMI41 Indicator



The HMI41 indicator with the HMP41 probe.



HMI41 with the HMP42 probe.



HMI41 with the HMP45 probe.

Vaisala HUMICAP® Humidity Indicator HMI41 can be used with any one of the four probes to quickly and easily measure humidity and temperature, and to make other measurement calculations such as dewpoint, wet bulb temperature, absolute humidity and mixing ratio.

The HMI41 has an easy-to-read LCD display. Temperature readout is available in either degrees Centigrade or Fahrenheit. Calculated variables are available in metric and non-metric format.

Ideal for spot checking applications

The HMI41 indicator with probes is ideal for use in a variety of spot checking applications such as plant maintenance, air-conditioning system installation and inspection, freezers and storage and production areas.

Vaisala HUMICAP® Humidity and Temperature Probe HMP41:

This probe is fix-mounted directly on the HMI41 indicator. It can be upgraded to an HMP45 by purchasing the HMH45 handle and cable option.

Vaisala HUMICAP® Humidity and Temperature Probe HMP42:

The HMP42 probe can be used for spot checking humidity and temperature in applications which require an extremely thin probe, such as:

- for monitoring the drying of structures during construction or after water damage

Features/Benefits

- Humidity measurement range 0 ... 100 %RH
- Temperature measurement range HMP41, HMP45: -20 ... +60 °C (-4 ... +140 °F) HMP42: -40 ... +100 °C (-40 ... +212 °F)
- For spot checking measurements
- Versatile and easy-to-use
- The HMI41 Indicator can be used with any of the four available probes
- Extremely thin 4 mm probe head (HMP42)
- Incorporates Vaisala HUMICAP® Sensor, which provides high accuracy, excellent long-term stability, negligible hysteresis, and insensitivity to dust and most chemicals
- NIST traceable (certificate included)

- in tight places
- in ducts or chambers
- under a linoleum floor

The probe diameter is only 4 mm, allowing access into very small, tight, and hard-to-reach spaces.

Vaisala HUMICAP® Humidity and Temperature Probe HMP45:

This probe for general purposes features an extended spiral cable.

Vaisala HUMICAP® Humidity and Temperature Probe HMP46:

See preceding data sheet.

Technical data

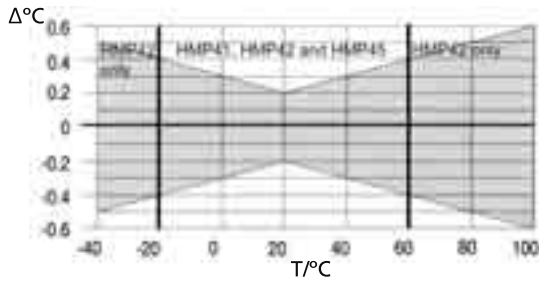
HMP41, HMP42, and HMP45 probes

HUMIDITY

Measurement range	0 ... 100 %RH
Accuracy at +20 °C (+68 °F)	
when calibrated against salt solutions (ASTM E014-85)	±2 %RH (0 ... 90 %RH) ±3 %RH (90 ... 100 %RH)
Temperature dependence of electronics	±0.05 %RH/°C
Typical long-term stability	better than 1 %RH per year
Response time (90%) at +20 °C in still air	(HMP41, HMP45) 15 s (HMP42) 30 s
Sensor HMP41 & 45	HUMICAP® 180
Sensor HMP42	HUMICAP® MINI

TEMPERATURE

Measurement range probe	
HMP41, HMP45	-20 ... +60 °C (-4 ... +140 °F)
HMP42	-40 ... +100 °C (-40 ... +212 °F)
Temperature accuracy over measurement range	
Sensor (HMP41 & 45)	PT 1000 IEC 751 1/3 class B
(HMP 42)	PT 100 IEC 751 class B



General

Typical ranges of calculated variables	
dewpoint temperature	-20 ... +60 °C (-4 ... +140 °F)
absolute humidity	0 ... 160 g/m ³
wet bulb temperature	0 ... +60 °C (32 ... +140 °F)
mixing ratio	0 ... 160 g/Kg d.a.

The accuracies of these calculated variables are limited by the accuracies of the measured variables on which they are based, namely RH and T. The RH and T accuracies are stated above in the probe section.

Cable length (HMP42 & 45)	1500 mm; extended spiral cable
Operating temperature range	
HMP41	-20 ... +60 °C (-4 ... +140 °F)
HMP42	-40 ... +100 °C (-40 ... +212 °F)
HMP45	-40 ... +60 °C (-40 ... +140 °F)

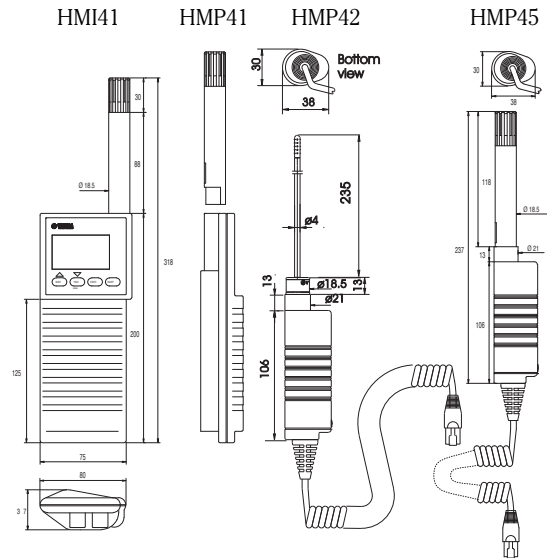
Battery operation time (alkaline batteries)	72 h continuous use
Housing material	ABS plastic
Housing classification, electronics	IP65 (NEMA 4)
Sensor protection	
HMP41 & 45	plastic grid HM46717
option	membrane filter 2787HM
HMP42	steel grid 19867HM
membrane	tube set (5pcs) 19858HM
Weight	
HMP41	30 g
HMP42	200 g
HMP45	160 g
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Portable Equipment.

Accessories

Serial interface cable	19446ZZ
Carrying case for HMI41 and HMP41/45	HM36736
Aluminum case for HMP41/42/45/46	MI70CASE2
Rigid plastic case for HMP41/42/45/46	210614
HMP42	
Calibration adapter	HM37067
Rubber sleeve set	19809HM

Dimensions

Dimensions in mm.



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HM34 Pocket Size Relative Humidity Meter

The Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM34 provides a fast and convenient way to accurately spot-check relative humidity and temperature.

Fast and easy-to-use

In measurement mode, the extendable probe just slides out. Normally, measurement takes only a few seconds. The HM34 meter includes a HOLD button which allows the user to retain an RH or T measurement until it has been noted or recorded.

If no buttons are pressed for three minutes, the unit automatically switches itself off. This automatic POWER-OFF function prevents the possibility of accidental discharge of the HM34's battery.

After the measurement is completed, the probe is slid back into the meter casing. Between spot checks, the meter is normally stored in its carrying case.



The Vaisala HUMICAP® Hand-Held Humidity and Temperature Meter HM34 provides accurate spot checks of humidity and temperature.

Features/Benefits

- Ideal for spot checking humidity levels
- Measurement range 0 ... 100 %RH
- Fast response with $\pm 2\%$ accuracy
- Temperature measurement range -20 ... +60 °C (-4 ... +140 °F)
- Lightweight, pocket-sized
- Extendable probe
- Automatic POWER-OFF
- Incorporates Vaisala HUMICAP® Sensor that provides high accuracy, excellent long-term stability, negligible hysteresis, and insensitivity to dust and most chemicals
- Available in either °F or °C
- NIST traceable (certificate included)
- Each unit comes with a 9V battery, attached probe, 0.2 μ m protective membrane filter and a carrying case

Technical data

Relative humidity

Measurement range	0 ... 100 %RH
Accuracy	±2% (0 ... 90 %RH) ±3% (90 ... 100 %RH)
Resolution	0.1 %RH
Temperature dependence	±0.04 %RH/°C
Sensor type	HUMICAP®H thin film capacitive sensor
Response time (90%)	15 s with membrane filter 5 s with plastic grid

Temperature

Range	-20 ... +60 °C (-4 ... +140 °F)
Accuracy	±0.3 °C (±0.54 °F)
Resolution	0.1 °C (0.1 °F)
Temperature dependence	±0.02 °C/°C (±0.02 °F/°F)
Sensor	Pt 100 IEC 751 1/3 Class B

General

Display	3 1/2 digit LCD
Hold function	Push-button hold of displayed value
Power supply	9 V battery
Battery operation time	50 h
Automatic POWER OFF	after 3 minutes, unless HOLD is activated
Operating temperature range	-20 ... +60 °C (-4 ... +140 °F)
Housing	ABC plastic
Sensor protection	standard plastic grid, part no. 6221 optional sintered filter 133 mm, part no. 0195
Weight	180 g with battery
Ordering Information	HM34C with °C temperature reading HM34F with °F temperature reading
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Portable Equipment

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HMK15 Humidity Calibrator



accepted and reliable method to calibrate humidity instruments. Usually two or three different salt solutions are used. Salts are chosen according to the application.

Certified salts

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

Calibrated thermometer

The HMK15 can be ordered with a thermometer, which is used for measuring the temperature during the calibration. It can also be used for checking the temperature measurement accuracy of the transmitter. The thermometer can contain either mercury (accuracy $\pm 0.3\text{ }^{\circ}\text{C}$ ($\pm 0.54\text{ }^{\circ}\text{F}$)) or red capillary fluid (accuracy $\pm 1.0\text{ }^{\circ}\text{C}$ ($\pm 1.8\text{ }^{\circ}\text{F}$)).

FINAS approved 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).



In addition to laboratory use, Vaisala Humidity Calibrator HMK15 is suitable for on-site checks of humidity probes and transmitters.

Features/Benefits

- 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 the Vaisala Humidity Calibrator HMK15 to make calibration and spot checking of humidity probes and transmitters easy and reliable.

Method used by leading laboratories

The operating principle of the 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 leading laboratories use this generally

Technical data

General

The standard HMK15 consists of the following parts:

Two salt chambers, chamber covers and transit covers

Base plate

Choice of thermometers

mercury thermometer, Vaisala calibrated,
order code 19728HM

thermometer with red capillary liquid, calibrated by
manufacturer, order code 25130HM

Measurement cup and mixing spoon

Options

Certified and ready dosed salts:		Order code:	Total uncertainty*:
LiCl salt	11 %RH	19729HM	(±1.3%RH)
MgCl ₂ salt	33 %RH	19730HM	(±1.2%RH)
NaCl salt	75 %RH	19731HM	(±1.5%RH)
K ₂ SO ₄ salt	97 %RH	19732HM	(±2.0%RH)
*Uncertainties given at +20 °C			
on exchanged water		19767HM	
Extra salt chambers		19766HM	
Carrying bag		HM27032	

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HMP155 Humidity and Temperature Probe



HMP155 with a new, stable HUMICAP®180R sensor and an additional temperature probe.

Features/Benefits

- Vaisala HUMICAP®180R sensor - superior long-term stability
- Optional warmed humidity probe
- Plug-and-play
- Chemical purge
- USB connection for service use
- Installation kits for DTR13 and DTR502 radiation shields and also for a Stevenson screen
- Weather-proof housing IP66
- New, fast temperature probe
- Different output possibilities: voltage, RS-485, resistive Pt100
- Applications: meteorological applications, aviation and road weather, instrumentation

New probe for reliability

The new Vaisala HUMICAP® Humidity and Temperature Probe HMP155 provides reliable humidity and temperature measurement.

Long-term stability

The HMP155 has a new generation Vaisala HUMICAP®180R sensor that has excellent stability and withstands well harsh environments. The probe structure is solid and the sensor is protected with a sintered teflon filter, which gives maximum protection against liquid 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 a patented, warmed probe for reliable measuring. 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 temperature measurement

What's more, with its fast response time, the additional temperature probe for the HMP155 is ideal for measurement in environments with changing temperatures.

Long lifetime

Protecting the sensor from scattered and direct solar radiation, and precipitation will increase its lifetime. Thus, Vaisala recommends installing the HMP155 in one of the following radiation shields: DTR503, DTR13, or a Stevenson screen.

Easy maintenance

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



Technical data

Performance

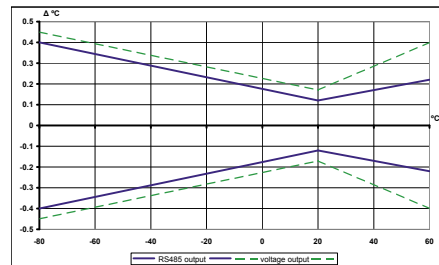
RELATIVE HUMIDITY	
Measurement range	0 ... 100 %RH
Accuracy (incl. non-linearity, hysteresis and repeatability) at	
+15 ... +25 °C (+59 ... +77 °F)	±1 %RH (0 ... 90 %RH) ±1.7 %RH (90 ... 100 %RH)
-20 ... +40 °C (-4 ... 104 °F)	±(1.0 + 0.008 x reading) %RH
-40 ... -20 °C (-40 ... -4 °F)	±(1.2 + 0.012 x reading) %RH
+40 ... +60 °C (+104 ... +140 °F)	±(1.2 + 0.012 x reading) %RH
-60 ... -40 °C (-76 ... -40 °F)	±(1.4 + 0.032 x reading) %RH
Factory calibration uncertainty (+20 °C / +68 °F)	±0.6 %RH (0 ... 40 %RH)* ±1.0 %RH (40 ... 97 %RH)*
* Defined as ±2 standard deviation limits. Small variations possible, see also calibration certificate.	
Recommended humidity sensor	HUMICAP®180R(C)
Response time at +20 °C in still air with a sintered PTFE filter	
63 %	20 s
90 %	60 s
TEMPERATURE	
Measurement range	-80 ... +60 °C (-112 ... +140 °F)
Accuracy with voltage output at	
-80 ... +20 °C	±(0.226 - 0.0028 x temperature) °C
+20 ... +60 °C	±(0.055 + 0.0057 x temperature) °C
passive (resistive) output according to IEC 751 1/3 Class B	±(0.1 + 0.00167 x temperature) °C
RS485 output	
-80 ... +20 °C	±(0.176 - 0.0028 x temperature) °C
+20 ... +60 °C	±(0.07 + 0.0025 x temperature) °C
Accuracy over temperature range (opposite)	
Temperature sensor	Pt100 RTD 1/3 Class B IEC 751
Response time with additional temperature probe in 3 m/s air flow	
63 %	<20 s
90 %	<35 s
OTHER VARIABLES	
dewpoint/frost point temperature, wet bulb temperature, mixing ratio	

General

Operating temperature range	-80 ... +60 °C (-112 ... +140 °F)
Storage temperature range	-80 ... +60 °C (-112 ... +140 °F)
Connection	8-pin male M12 connector
Connection cables	3.5, 10, and 30 m
Cable material	PUR
Wire size	AWG26
Service cables	USB connection cable MI70 connection cable
Additional T probe cable length	2 m
Housing material	PC
Housing classification	IP66
Sensor protection	sintered PTFE
Weight (probe)	86 g
Electromagnetic compatibility: Complies with the EMC standard EN61326-1, Electrical equipment for measurement control and laboratory use - EMC requirement for use in industrial locations	

Inputs and outputs

Operating voltage	7 ... 28VDC*
*Note: minimum operating voltage 12V with 0 ... 5V output and 16V with 0 ... 10V output, probe heating, chemical purge or XHEAT.	
Outputs	
voltage output	0 ... 1V, 0 ... 5V, 0 ... 10V
resistive Pt100 (4-wire connection)	
RS485	
Average current consumption (+15VDC, load 100 kOhm)	
0 ... 1V output	<3 mA
0 ... 10V output	+0.5 mA
RS485	<4 mA
during chemical purge with warmed probe	max. 110 mA max. 150 mA
Settling time at power-up	
voltage output	2 s
RS485	3 s



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DTR500 Solar Radiation and Precipitation Shields

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

Shield protects sensor

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; the black inside absorbs accumulated heat. The shields can be easily installed on either a vertical pole, horizontal beam, or a flat surface.

The DTR Shields can be used with the following Vaisala probes:

- Vaisala HUMICAP® Humidity and Temperature Probe HMP155
- Vaisala HUMICAP® Humidity and Temperature Transmitter HMT337
- Vaisala HUMICAP® Humidity and Temperature Transmitter HMT100

Choice of models and installation accessories

Two models are available:

- Nine-plate shield:
Vaisala Radiation Shield DTR502B for HMT337, HMT100, PTU300 and HMP155's additional T probe
- Twelve plate shield:
Vaisala Radiation Shield DTR503A for HMP155



The Vaisala Solar Radiation Shield Series DTR500 are available in either a 9 or 12-plate, model.

Features/Benefits

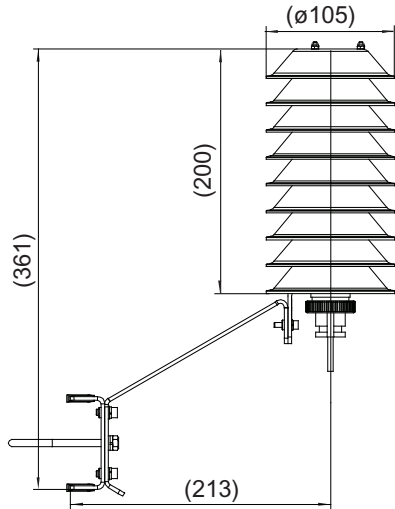
- Protects temperature and humidity probes from scattered, as well as, direct solar radiation and rain.
- Maintenance-free
- Naturally ventilated
- Installs easily on a vertical pole, horizontal beam or flat surface
- Suitable for a wide range of applications
- Choice of shields and mounting accessories

Technical data

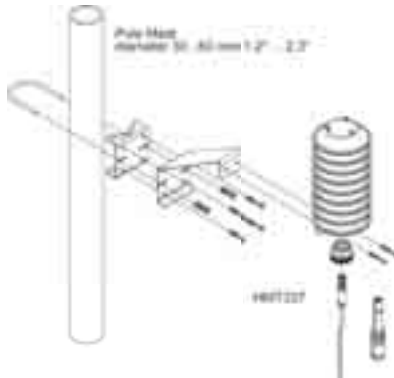
Dimensions

Dimensions in mm.

DTR502B
for HMT337, HMT100 and PTU300



DTR502B pole mast installation.



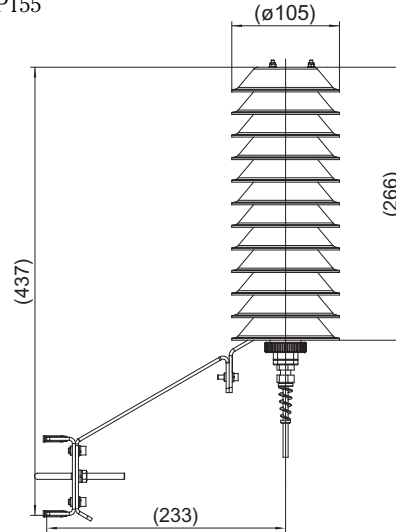
DTR502B horizontal beam installation.



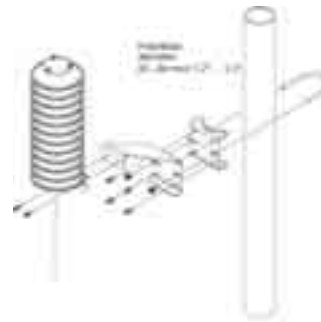
Dimensions

Dimensions in mm.

DTR503A
for HMP155



DTR503A pole mast installation.



DTR503A horizontal beam installation.



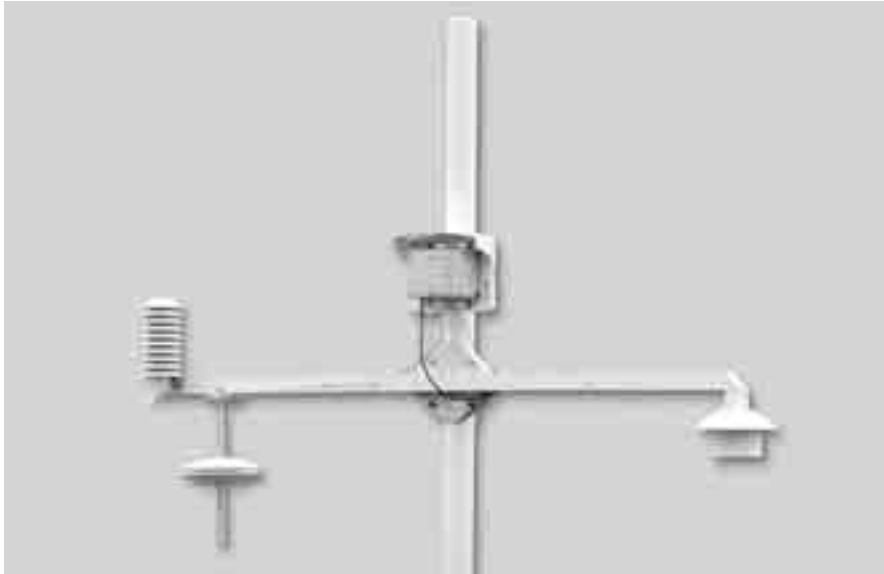
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HMT330MIK Meteorological Installation Kit



The HMT337 and PTU307 feature warmed probe technology. Installed with the HMT330MIK kit either one forms the right choice for reliable humidity measurement in humid weather conditions.

Features/Benefits

- For outdoor humidity and temperature measurements
- Can be ordered in a variety of configurations
- Used together with HMT337 transmitter or PTU307
- Vaisala SPH 10/20 Static Pressure Head eliminates effectively pressure variations in the barometer caused by wind

HMT337/PTU307 Features

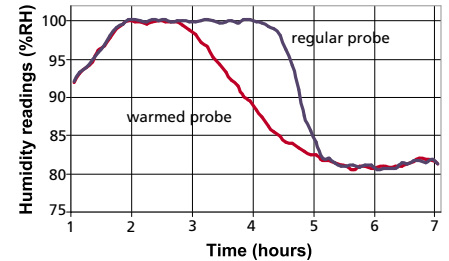
- Warmed probe provides true humidity readings in condensing conditions
- Humidity measurement expressed as relative humidity and/or dewpoint temperature
- Easy field calibration with the HM70 hand-held meter

The Vaisala Meteorological Installation Kit HMT330MIK enables the Vaisala HUMICAP® Humidity and Temperature Transmitter HMT337 to be installed outdoors to obtain reliable measurements for meteorological purposes.

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 this dew evaporates.

Both the PTU307 and HMT337 avoid this problem by warming the probe. When warmed, the relative humidity inside the probe stays below the ambient level. With an accurate temperature measurement, the ambient dewpoint can be calculated precisely. To obtain the ambient relative humidity, an additional probe measures the ambient temperature,



After a period of 100 % relative humidity, the warmed probe measures the true humidity, whereas the non-warmed probe takes time to recover from the condensation.

and the transmitter calculates the relative humidity from the dewpoint and temperature values.

Open shield prevents microclimates

The warmed probe of the HMT337/PTU307 is mounted in a shield which is open at the bottom to ensure steady air circulation to the sensor even in calm weather.

In traditional radiation shields sleet or snow can accumulate on the shield and prevent the proper air circulation through the shield, and create a humid microclimate until the snow melts.

Essential for critical weather measurements

Obtaining a true humidity reading is particularly important e.g. in traffic safety: at airports and at sea as well as on the roads. It is essential, for example, in fog and frost prediction.

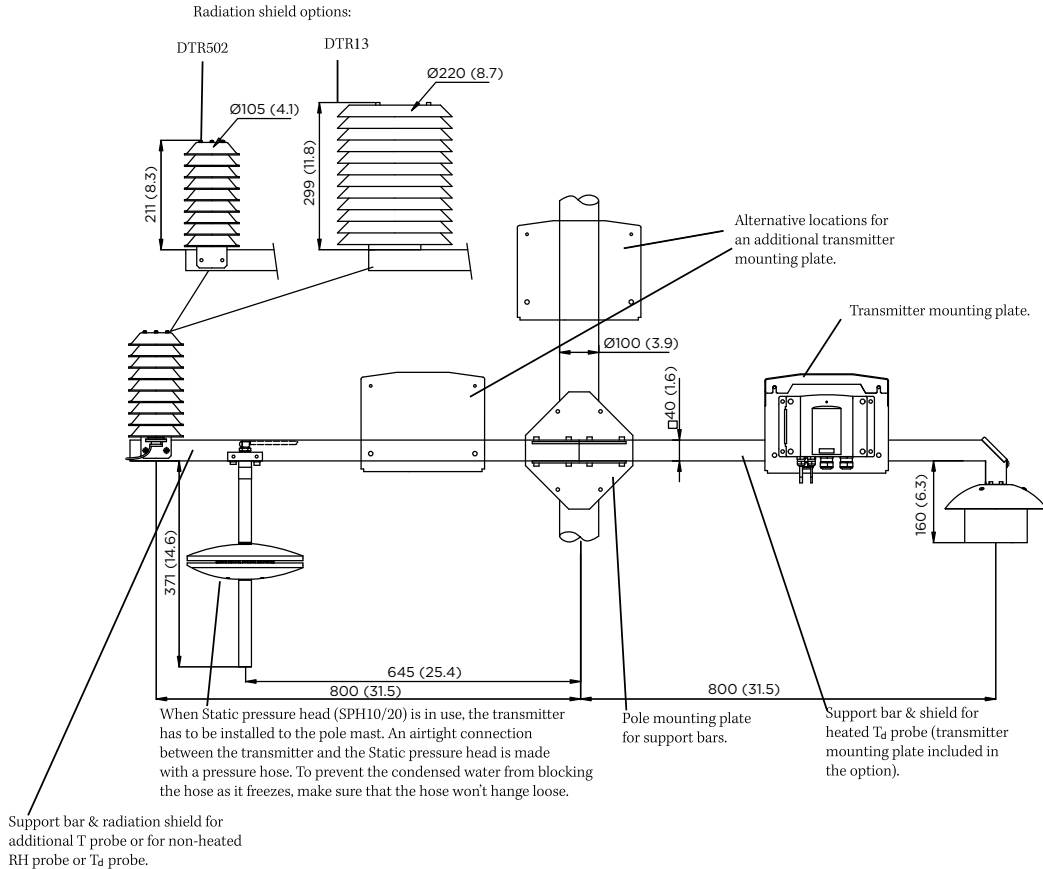


For calibration, a portable HMP77 reference probe is easy to attach beside the HMT337 or PTU307 probe.

Technical data

Dimensions

Dimensions in mm (inches)



Order form

Vaisala Meteorological Installation Kit		HMT330MIK			
Support bar & shield for warmed T _d probe	No support bar & shield for warmed T_d probe	0			
	<i>Support bar, transmitter mounting plate & shield for warmed T_d probe</i>	1			
Support bar and radiation shield for additional T probe or for non-warmed RH or T _d probe	No support bar or radiation shield		A		
	<i>Support bar with DTR502 shield for T probe</i>		B		
	<i>Support bar with DTR13 shield for T probe</i>		C		
	<i>Support bar with DTR502 shield for non-warmed RH or T_d probe</i>		D		
	<i>Support bar with DTR13 shield for non-warmed RH or T_d probe</i>		E		
Support bar mounting plate	No mounting plate	0			
	<i>Pole mounting plate for support bar/bars</i>	1			
Additional transmitter mounting plate	No additional transmitter mounting plate		A		
	<i>Transmitter mounting plate for support bar assembly</i>		B		
	<i>Transmitter mounting plate for pole assembly</i>		C		
Static Pressure Head	No Static Pressure Head	0			
	<i>Static Pressure Head SPH10</i>	1			

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HMT300TMK Turbine Mounting Kit for Power Turbine Intake Air Measurement



The Vaisala HUMICAP® Turbine Mounting Kit HMT300TMK is shown with the cover open.

The Vaisala HUMICAP® Turbine Mounting Kit HMT300TMK is developed to monitor the air intake of gas and liquid fueled power turbines. It is ideal for measuring in water vapor injection applications because

Features/Benefits

- Designed for high humidity applications
- Measurement range: -40 ... +100°C
- Patented, warmed probe
- Incorporates Vaisala HUMICAP® Sensor for excellent accuracy and long-term stability and resistance to dust and most chemicals
- Low maintenance need
- Outer cover provides protection from rain and direct sunlight
- NIST traceable (certificate included)

the sensor has been optimized for high humidity environments by utilizing a patented, warmed probe. Water vapor is added to the intake of the turbine to increase the mass flow which in turn increases compression and electrical power output.

Low maintenance

Power turbines also require exact water vapor injection in the chamber to reduce pollutant emissions. Vaisala's warmed probe technology is ideal because of its reliability in the field. In fact, the only suggested scheduled maintenance is annual calibration.

Patented, warmed probe prevents condensation

The HMT300TMK with the HMT337 installed, provides fast and reliable dewpoint measurement especially under high humidity conditions where dew would normally form on the humidity sensor and thereby

cause errors in measurement. The patented warmed probe prevents condensation from forming on the sensor.

Protective enclosure

The HMT300TMK includes a white, painted aluminum enclosure with an installation kit for the probe. The HMT337 Humidity and Temperature Transmitter is installed in the aluminum enclosure at the factory. The instrument can be equipped to be powered with either 24 VDC/VAC or with an internal 110/230 volt power supply unit.

The outer cover protects the transmitter from direct sun light and rain. The installation kit protects the probe from outer water splashes, keeps the sensor dry, and prevents any parts that could vibrate loose from entering the turbine.

The HMT300TMK can be ordered separately for installation with the customer's existing HMT337.

HUMICAP® performance

The HMT330 Series Transmitters are fitted with the latest generation of the HUMICAP®, the polymer sensor known for its accuracy, reliability and long-term stability. The sensor has a high tolerance for particulate abrasion and chemical contamination.

Vaisala HUMICAP® Humidity and Temperature Transmitter HMT337

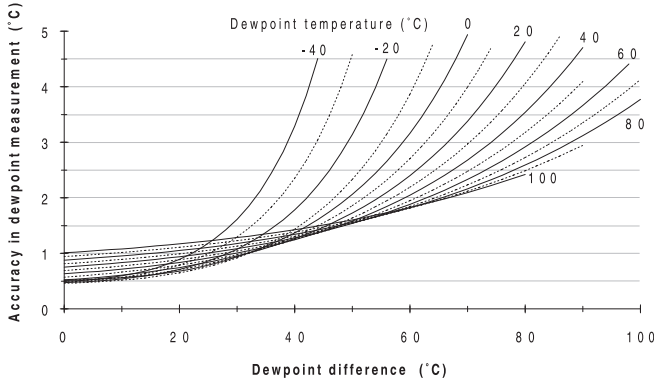
The HMT337 is intended for demanding industrial humidity measurement applications with a risk of condensation. The stainless steel probe is mechanically durable and preferred for most industrial applications.

Technical data

Dewpoint temperature

Measurement range -40 ... +100 °C (-40 ... +212 °F)

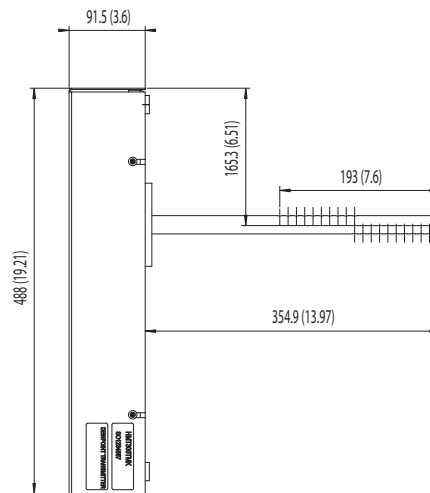
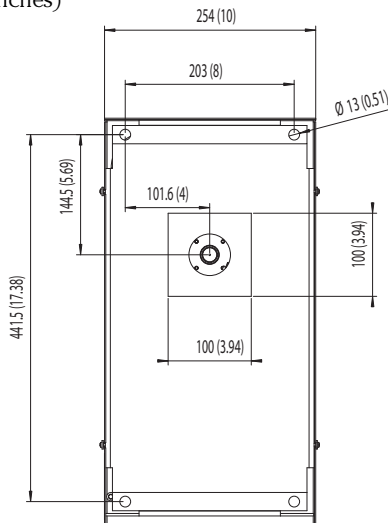
Accuracy: find the intersection of the dewpoint temperature curve and the dewpoint difference reading (process temperature - dewpoint temperature) on the x-axis and read the accuracy in dewpoint measurement at the y-axis



Response time (90 %) at +20 °C (68 °F) in still air (PPS grid with steel netting) 20 s
 Sensor HUMICAP® 180C

Dimensions

Dimensions in mm (inches)



HUMICAP® is a registered trademark of Vaisala.

General

Connections screw terminals for 0.5 mm² wires (AWG 20), stranded wires recommended
 Operating voltage 24 VDC/VAC (20...28 V) or 115/230 VAC (Must be specified at time of order)
 Recommended external load for current outputs < 500 ohm
 0...1 V output > 2 kohm (to ground)
 0...5 & 0...10 V outputs > 10 kohm (to ground)
 Operating temperature range for electronics -40...+60 °C (-40 ... +140 °F)
 Storage temperature -55...+80 °C (-67 ... +176 °F)
 Housing material G-AISI10 (DIN 1725)
 Housing classification IP65 (NEMA 4)
 Bushing 8...11 mm diameter cables (0.31 ... 0.43 inch)
 Humidity sensor protection (Ø 12 mm) PPS grid with steel netting
 Electromagnetic compatibility Complies with EMC standard EN61326-1, Industrial Environment

Outputs

Two standard outputs, third optional 0...20 mA, 4...20 mA, 0 ... 1 V, 0...5 V, 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 full scale
 Serial output available RS232C (optional RS485)

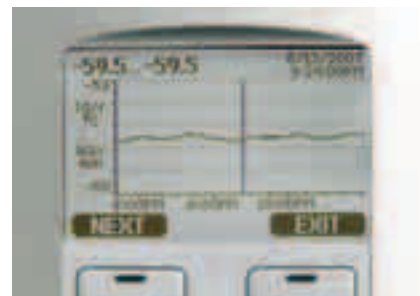


For more information, visit www.vaisala.com or contact us at sales@vaisala.com

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DMT340 Series Dewpoint and Temperature Transmitters for very dry conditions



The display shows measurement trends, real time data and history.

Features/Benefits

- Measures dew points from -60 °C to +80 °C (-76 ... +176 °F) with the accuracy of ± 2 °C (± 3.6 °F)
- Vaisala DRYCAP® Sensor provides accurate, reliable measurement with excellent long-term stability and fast response
- Withstands condensation
- Unique auto-calibration feature
- Optional alarm relays, local display and mains power supply module
- Compatible with Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70
- NIST traceable (certificate included)
- 3 analog outputs and a serial interface, WLAN/LAN

The Vaisala DRYCAP® Dewpoint and Temperature Transmitter Series DMT340 is designed for industrial low humidity applications. Typical applications include compressed air drying and metal treatment. The device is very reliable, easy to use and economical to maintain.

Stability in low dew points

The Vaisala DRYCAP® Sensor is immune to particulate contamination, water condensation, oil vapor and most chemicals. Since the sensor withstands condensation, its performance is unmatched for low dew point applications that experience water spikes in the process. The sensor recovers rapidly from contact with free water.

Patented auto-calibration

The stability of the DMT340 is due to the unique auto-calibration function, patented by Vaisala.

The auto-calibration makes the transmitter perform a calibration and adjustment by itself while the measured process is running. If the measurement accuracy is not confirmed, corrections are made automatically. The procedure is so quick and corrections are so minor that it will go unnoticed. This ensures low maintenance and high performance. To continue performance at the highest level, the transmitter can be sent to Vaisala for a NIST traceable calibration. Calibration intervals depend on the application; in normal conditions, a NIST traceable calibration in every two years is recommended.

Graphical measurement trend and history display

The DMT340 can be ordered with a large numerical and graphical display with a multilingual menu. It allows

the user to monitor measurement trends and one-year history. The optional data logger with real-time clock makes it possible to generate more than four years of measured history and zoom in on any desired time or time frame. The display alarm allows tracking of any measured parameter, with a freely configurable low and high limit.

Versatile outputs and (wireless) data collection

The DMT340 can be connected to a network with an optional (W)LAN interface, which enables a (wireless) Ethernet connection.

For serial interface also the USB connection, RS232 and RS485 can be used. Additionally an alarm relay option is available.

The transmitter can have up to three analog outputs. Galvanic isolation of supply power and analog outputs are also offered.

The recorded measurement data can be viewed on the display or transferred to a PC with Microsoft Windows® software.

Easy installation

The DMT340 has a variety of features to choose from. Units are delivered installation-ready.



The Vaisala DRYCAP® HandHeld Dewpoint Meter DM70 is ideal for field checking DMT340 transmitters.tt



The DMT342 probe is installed using a flange or sampling cell. The small probe is ideal for integrating into larger equipment.

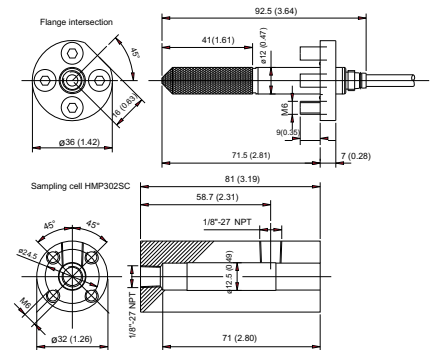
Probe specifications

DMT342 with Small Size Flanged Probe

Pressure range	0 ... 50 bar/0 ... 725 psia
Mechanical durability	up to 250 bar/ 3625 psia
Probe diameter	12 mm/0.5 inch
Installation	
Flange	36 mm/1.4 inch
Sampling cell	HMP302SC

Dimensions

Dimensions in mm (inches)



The DMT344 features a threaded connection for extended pressures with different fitting body options. It is ideal for permanent installations into pressurized or vacuum processes.

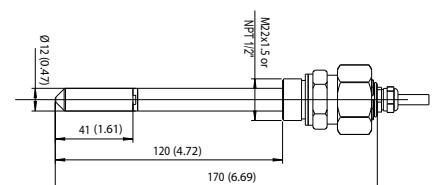
Probe specifications

DMT344 with Probe for High Pressures

Pressure range	0 ... 50 bar/0 ... 725 psia
Mechanical durability	up to 100 bar/ 1450 psia
Probe diameter	12 mm/0.5 inch
Installation	
Fitting Body	M22 x 1.5
Fitting Body	NPT 1/2"

Dimensions

Dimensions in mm (inches)





The DMT347 probe is ideal for tight spaces with thread connection. The small probe is installed using the Swagelok® connectors.

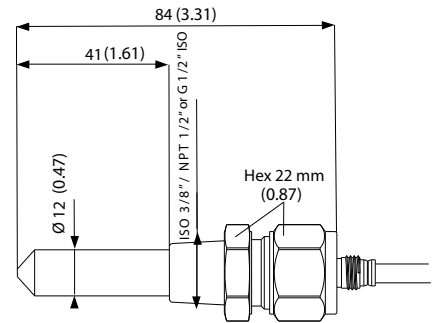
Probe specifications

DMT347 with Small Sized Probe

Pressure range	0 ... 10 bar/0 ... 145 psia
Mechanical durability	up to 100 bar/ 145 psia
Probe diameter	12 mm/0.5 inch
Installation	
Fitting Body	R 3/8" ISO
Fitting Body	G 1/2" ISO
Fitting Body	NPT 1/2"

Dimensions

Dimensions in mm (inches)



The DMT348 is ideal for installations in pressurized processes where the probe needs to be removed while the process is running. The probe depth is adjustable.

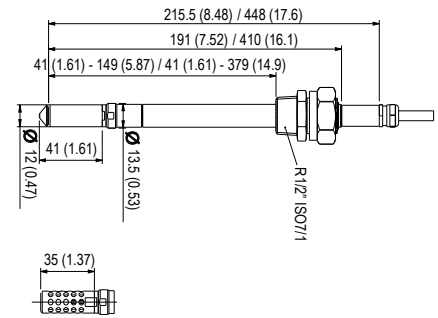
Probe specifications

DMT348 with Probe for Pipeline Installations

Pressure range	0 ... 40 bar/0 ... 580 psia
Adjustable length	41 ... 149/371 mm/ 1.61 ... 5.87/14.6 inch
Installation	
Fitting Body	R1/2" ISO
Fitting Body	NPT 1/2"
Ball Valve Set	BALLVALVE-1
Sampling Cell	DMT242SC or DMT242SC2

Dimensions

Dimensions in mm (inches)

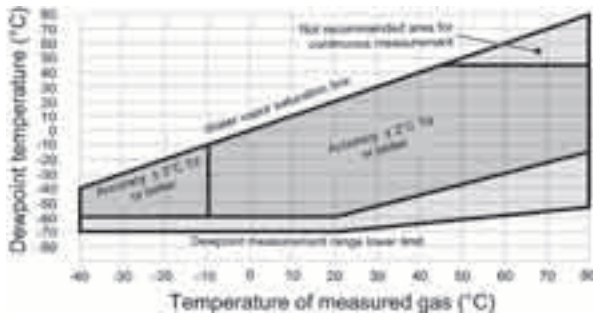


Optional filter for low pressures
(for all models)

Technical data

Measured parameters

DEW POINT	
Sensor	Vaisala DRYCAP®180M
Measurement range	-60 ...+80 °C (-76 ...+176 °F) Td
For continuous use	-60 ...+45 °C (-76 ...+113 °F) Td
Accuracy	±2 °C/±3.6 °F see the accuracy graph below
up to 20 bar/290 psia	additional inaccuracy +1 °C Td
20 ...50 bar/290 ...725 psia	



Dew point accuracy vs. measurement conditions	
Response time	63% [90%] at +20°C gas temperature
Flow rate	1 l/min and 1 bar pressure
-60 ...-20 °C Td (-76 ...-4 °F Td)	5s [10s]
-20 ...-60 °C Td (-4 ...-76 °F Td)	45s [10min]
TEMPERATURE	
Measurement range	0 ...+80 °C (+32 ...+176 °F)
Accuracy	±0.2 °C at room temperature
Temperature sensor	Pt 100 IEC 751 1/3 class B
RELATIVE HUMIDITY	
Measurement range	0 ... 70 %RH
Accuracy (RH <10 %RH, at +20 °C)	±0.004 %RH + 20 % of reading
PPM	
Measurement range (typical)	10 ...2500 ppm
Accuracy (at +20 °C, 1 bar)	1 ppm + 20 % of reading
Other measurement parameters available (depends on model) mixing ratio, absolute humidity, pressure dew point calculated to 1 bar, temperature difference (T _{Td}), water vapor pressure	

Operating environment

Operating temperature	
for probes	-40 ...+80 °C (-40 ...+176 °F)
Mechanical durability	Up to +180 °C (+356 °F)
for transmitter body	-40 ...+60 °C (-40 ...+140 °F)
with display	0 ...+60 °C (+32 ...+140 °F)
Storage temperature range	-55 ...+80 °C (-67 ...+176 °F)
Pressure range for probes	See probe specifications
Sample flow rate	No effect
Measured gases	non corrosive
Complies with EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial environment.	

Inputs and outputs

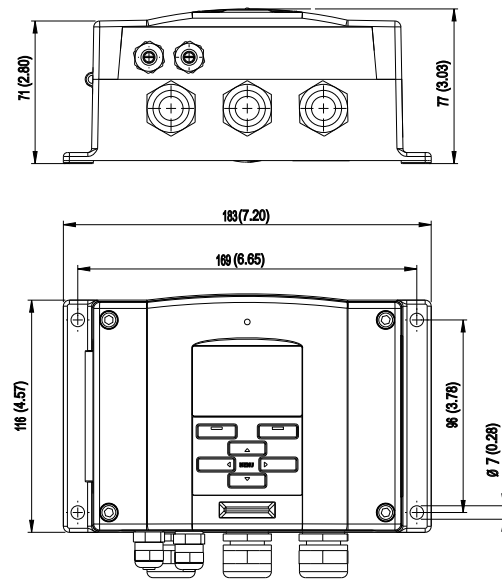
Operating voltage	10 ...35 VDC, 24 VAC
with optional power supply module	100 ...240 VAC 50/60 Hz
Power consumption @ 20 °C (U _{in} 24VDC)	
RS-232	max 25 mA
U _{out} 2 x 0...1V / 0...5V / 0...10V	max 25 mA
I _{out} 2 x 0...20 mA	max 60 mA
display and backlight	+ 20 mA
during sensor purge	+ 110 mA max
Analog outputs (2 standard, 3rd optional)	
current output	0 ...20 mA, 4 ...20 mA
voltage output	0 ... 1 V, 0 ... 5 V, 0 ... 10 V
Accuracy of analog outputs at 20 °C	0.05 % full scale
Temperature dependence of the analog outputs	± 0.005 %/°C full scale
External loads	
current outputs	R _L < 500 ohm
0 ... 1V output	R _L > 2 kohm
0 ... 5V and 0 ... 10V outputs	R _L > 10 kohm
Max wire size	0.5 mm ² (AWG 20) stranded wires recommended
Digital outputs	RS-232, RS-485 (optional)
Service connection	RS-232, USB
Relay outputs	0.5 A, 250 VAC, SPDT (optional)
Ethernet interface (optional)	
Supported standards	10/100Base-T
Connector	RJ45
Protocols	Telnet
WLAN interface (optional)	
Supported standards	802.11b
Antenna connector type	RP-SMA
Protocols	Telnet
Security	WEP 64/128, WPA
Authentication / Encryption	
Open / no encryption	
Open / WEP	
WPA Pre shared key / TKIP	
WPA Pre shared key / CCMP (a.k.a. WPA2)	
Optional data logger with real-time clock	
Logged parameters	max. three with trend/min/max values
Logging interval	10 sec (fixed)
Max. logging period	4 years 5 months
Logged points	13,7 million points per parameter
Battery lifetime	min. 5 years
Display	LCD with backlight, graphic trend display of any parameter
Display menu languages	English, Chinese, Spanish, German, French, Japanese, Russian, Swedish, Finnish

Mechanics

Cable bushing	M20x1.5 for cable diameter 8 ... 11mm/0.31 ... 0.43"
Conduit fitting	1/2"NPT
User cable connector (optional)	M12 series 8 pin (male)
option 1	with plug (female) with 5 m / 16.4 ft black cable
option 2	with plug (female) with screw terminals
USB-RJ45 Serial Connection Cable	order no.219685
Probe cable diameter	5.5 mm
Probe cable lengths	2 m, 5 m or 10 m
Housing material	G-AISI 10 Mg (DIN 1725)
Housing classification	IP 65 (NEMA 4X)

Dimensions

Dimensions in mm (inches)



DRYCAP® is a registered trademark of Vaisala.



TYPE APPROVED PRODUCT
CERTIFICATE NO.: A-11440

VAISALA

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Ensure dry compressed air with dewpoint measurement

Vaisala innovated DRYCAP® dewpoint instruments have been developed for the most demanding conditions.

- Fastest wet-to-dry response time on the market - just minutes
- High resistance to contamination - immune to compressor oil
- Complete recovery from saturated conditions
- Long 2-year calibration interval

Want to know more? Our experts welcome your most difficult questions.



DMT345 and DMT346 Dewpoint Transmitters for High Temperature Applications



The large and clear display allows the user to check data at a glance.

The Vaisala DRYCAP® Dewpoint Transmitters DMT345 and DMT346 are designed to measure and control humidity especially in dry environments with high temperatures.

Features/Benefits

- The DMT345 measures humidity in temperatures up to 180 °C (356 °F)
- The DMT346 measures humidity in temperatures up to 350 °C (+662 °F)
- Dewpoint accuracy ± 2 °C (± 3.6 °F)
- Vaisala DRYCAP® Sensor provides accurate, reliable measurement with excellent long-term stability and fast response
- Withstands condensation
- Unique auto-calibration feature
- Optional local display with keypad, mains power supply module and alarm relays
- NIST traceable calibration (certificate included)
- Analog outputs, WLAN/LAN

The Vaisala DRYCAP® Dewpoint Transmitters DMT345 and DMT346 are designed for humidity measurement in industrial drying applications with particularly high temperatures.

Both transmitters incorporate the Vaisala DRYCAP® sensor, which is accurate, reliable, and stable. The sensor withstands condensation and is immune to particulate contamination, oil vapor and most chemicals. The DRYCAP® sensor stands out for its swift response time and rapid recovery after getting wet.

Measure humidity directly in hot processes

The DMT345 and DMT346 are constructed for direct measurement in hot processes. Therefore, there is no need for sampling systems and trace heating. As a result, high accuracy and constancy are maintained.

The accuracy and stability of the DMT345 and the DMT346 are due to the unique auto-calibration function, patented by Vaisala. This auto-calibration makes the transmitter perform a calibration and adjustment by itself while the measured process is running. If the measurement accuracy is not confirmed, corrections are made automatically. The procedure is so quick and corrections are so minor that it will go unnoticed. This ensures low maintenance and high performance. In normal conditions, it is recommended to have a traceable calibration performed once a year.

DMT345, Accurate in hot and dry environments

The DMT345 is designed for accurate humidity measurement in hot and dry conditions. This model provides unmatched dry end measurement accuracy in temperatures up to 140 °C, however the DMT345 can operate safely in temperatures up to 180 °C.

The stainless steel probe is especially designed for high temperatures and has an optional installation flange that allows an adjustable installation depth and therefore a precise positioning.

DMT346, Reliable in very hot processes

When process temperatures range between 140 °C to 350 °C, the DMT346 provides the best measurement performance.

The DMT346 comes with a cooling set as a standard feature. The cooling effect may be regulated by adding the cooling fins, or removing them from the set for the best measurement performance.

The cooling system operates without moving parts, additional power or cooling utilities, thereby eliminating the risk of sensor damage due to a mechanical cooling failure.

Additionally, sensor warming minimizes the risk of condensing on the sensor. In low humidity the combination of auto-calibration and DRYCAP® ensures accurate measurement.

Graphical display

The DMT345 and DMT346 transmitters can be ordered with a large numerical and graphical display, which allows the user to clearly monitor operational data, measurement

trends and up to one-year measurement history.

The optional data logger with real-time clock makes it possible to generate more than four years of the measured history and zoom in on any desired time or time frame.

Versatile outputs and (wireless) data collection

The transmitter can be connected to a network with an optional (W)LAN interface, which enables a (wireless) Ethernet connection.

For serial interface also the USB connection, RS232 and RS485 can be used. Additionally an alarm relay option is available.

The transmitter can have up to three analog outputs. Galvanic isolation of supply power and analog outputs are also offered. The recorded measurement data can be viewed on the display or transferred to a PC with Microsoft Windows® software.

Units are delivered installation-ready and meet ROHS requirements.

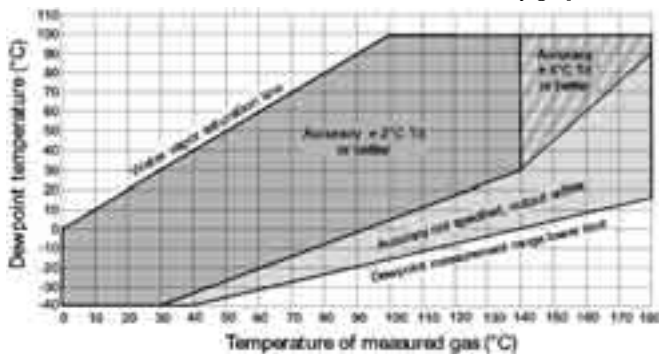
Technical data

Measured variables DMT345

DEWPOINT DMT345

Sensor	Vaisala DRYCAP®180S
Measurement range	-40 ...+100 °C (-40 ...+212 °F) Td
Accuracy	±2°C (±3.6 °F) Td

See the accuracy graph below



Dewpoint accuracy vs. measurement conditions

Response time 63 % [90 %]	flow rate 1 l/min and 1 bar pressure
from dry to wet	5s [10 s]
from wet to dry including auto-calibration	45s [5 min]

TEMPERATURE DMT345

Measurement range	0 ...+180 °C (+32 ...+356°F)
with sensor warming	upper range limited by humidity
	(at 80% RH warming is switched on and T reading not actual process Temperature)
Accuracy	±0.4 °C at 100 °C
Temperature sensor	Pt 100 IEC 751 1/3 class B

RELATIVE HUMIDITY DMT345

Measurement range	0 ... 100 % RH
with sensor warming	0 ... 80 % RH
Accuracy	
below 10 % RH	±10 % of reading
above 10 % RH	±1,5% RH + 1,5 % of reading

MIXING RATIO DMT345

Measurement range (typical)	0 ... 1000 g/kg (0 ... 7000 gr/lbs)
Accuracy (typical)	±12% of reading

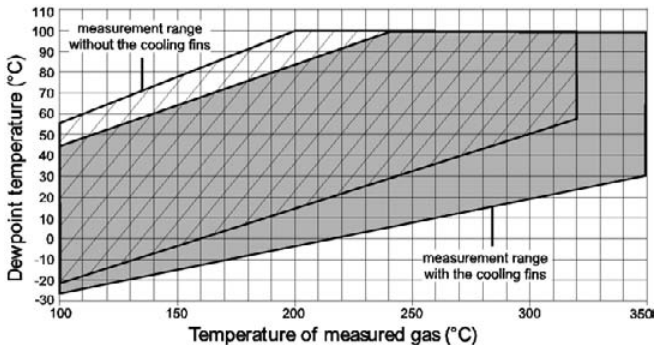
Technical data

Measured variables DMT346

DEWPOINT DMT346

Sensor	Vaisala DRYCAP®180S
Measurement range	-25 ... +100 °C (-13 ... +212 °F) Td
Accuracy	±2 °C (±3.6 °F) Td

See the accuracy graph below



Dewpoint accuracy vs. measurement conditions

Response time 63 % [90 %] flow rate 1 l/min and 1 bar pressure	
from dry to wet	5s [10 s]
from wet to dry including auto-calibration	45s [5 min]

MIXING RATIO DMT346

Measurement range (typical)	0 ... 1000 g/kg (0 ... 7000 gr/lbs)
Accuracy (typical)	±12% of reading

Operating Environment, both models

Mechanical durability of probes	Up to +180 °C (+356 °F) for DMT345 Up to +350 °C (+662 °F) for DMT346
for transmitter body	-40 ... +60 °C (-40 ... +140 °F)
with display	0 ... +60 °C (32 ... +140 °F)
Storage temperature range	-55 ... +80 °C (-67 ... +176 °F)
Pressure range for probes	slight pressure difference (~ 200 mbar)
Measured gases	non corrosive gases
Complies with EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial environment.	

Inputs and outputs, both models

Operating voltage	10 ... 35 VDC, 24 VAC
with optional power supply module	100 ... 240 VAC 50/60 Hz
Default start-up time	
initial reading after power-up	3 s
full operation after sensor Purge and Autocal	about 6 min
Power consumption @ 20 °C (U _{in} 24VDC)	
U _{out} 2x0 ... 1V/0 ... 5V/0 ... 10V	max 25 mA
I _{out} 2x0 ... 20mA	max 60 mA
RS-232	max 25 mA
display and backlight	+ 20 mA
during sensor purge	+ 110 mA max
Analog outputs	(2 standard, 3rd optional)
current output	0 ... 20 mA, 4 ... 20 mA
voltage output	0 ... 1 V, 0 ... 5 V, 0 ... 10 V

Accuracy of analog outputs at 20 °C	± 0.05 % full scale
Temperature dependence of the analog outputs	± 0.005 %/°C full scale
External loads	
current outputs	R _L < 500 ohm
0 ... 1V output	R _L > 2 kohm
0 ... 5V and 0 ... 10V outputs	R _L > 10 kohm
Max wire size	0.5 mm ² (AWG 20) stranded wires recommended
Digital outputs	RS-232, RS-485 (optional)
Service connection	RS-232, USB
Relay outputs 2+2 pcs (optional)	0.5 A, 250 VAC, SPDT
Ethernet interface (optional)	
Supported standards	10/100Base-T
Connector	RJ45
Protocols	Telnet
Software support	Vaisala MI70 link
WLAN interface (optional)	
Supported standards	802.11b
Antenna connector type	RP-SMA
Protocols	Telnet
Security	WEP 64/128, WPA
Software support	Vaisala MI70 link
Authentication / Encryption (WLAN)	
Open / no encryption	
Open / WEP	
WPA Pre shared key / TKIP	
WPA Pre shared key / CCMP (a.k.a. WPA2)	
Optional data logger with real-time clock	
Logged parameters	max. three with trend/min/max values
Logging interval	10 sec (fixed)
Max. logging period	4 years 5 months
Logged points	13,7 million points per parameter
Battery lifetime	min. 5 years
Display (optional)	LCD with backlight, graphic trend display
Display menu languages	English, French, Spanish, Chinese, German, Japanese, Russian, Swedish, Finnish

Mechanics, both models

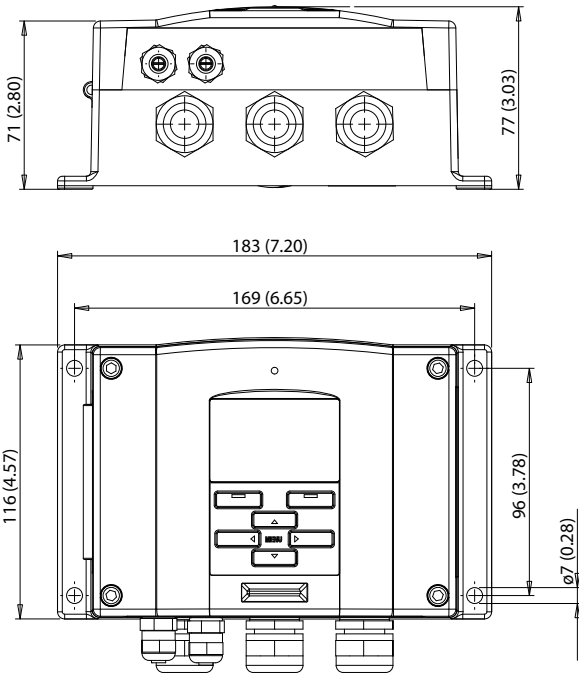
Cable bushing	M20x1.5 For cable diameter 8 ... 11mm/0.31 ... 0.43"
Conduit fitting (optional)	1/2" NPT
User cable connector (optional)	M12 series 8-pin (male)
option 1	with plug (female) with 5 m /16.4 ft black cable
option 2	with plug (female) with screw terminals
USB-RJ45 Serial Connection Cable	part. no 219685
Probe cable diameter	5.5 mm
Probe cable length	2 m, 5 m or 10 m
Housing material	G-AISI 10 Mg (DIN 1725)
Housing classification	IP 65 (NEMA 4X)
Housing weight	1.2 kg

Technical data

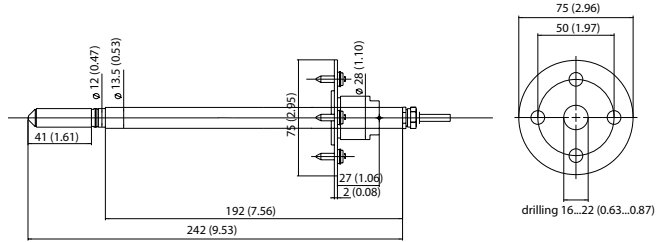
Dimensions

Dimensions in mm (inches)

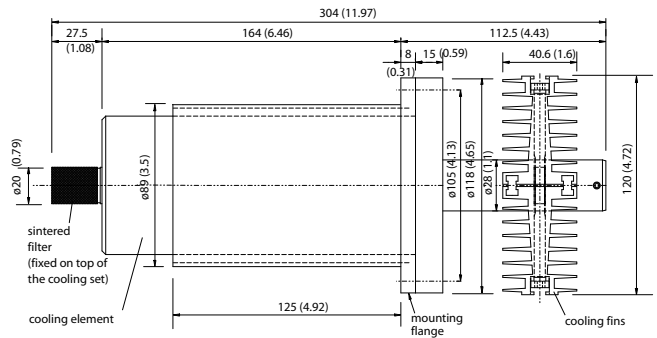
DMT345 and DMT346 Transmitter housing



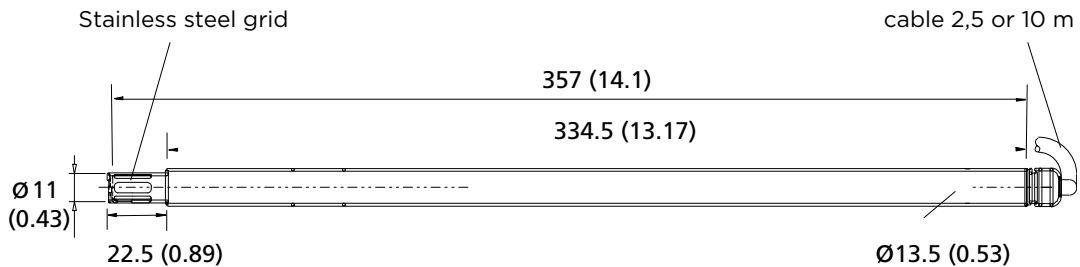
DMT345 probe and mounting flange



DMT346 Cooling set



DMT346 Probe



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DMT242 Dewpoint Transmitter for OEM Applications



Due to its wide measurement range and high long-term stability, the DMT242 is an ideal choice for low dewpoint industrial applications such as compressed air dryers, plastic dryers and other OEM applications.

The Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 is ideal for confirming the performance of the DMT242 in the field.

Features/Benefits

- Ideal choice for industrial dryer applications
- Incorporates advanced Vaisala DRYCAP® Sensor and enhanced auto-calibration software
- Long-term stability in low dewpoints
- Fast response time
- Two sensor options cover dewpoint measurement range from -60 ... +60 °C (-76 ... +140 °F) with an accuracy of ± 2 °C (± 3.6 °F)
- Withstands condensation
- NIST traceable (certificate included)
- Compatible with Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70

Vaisala DRYCAP®

The Vaisala DRYCAP® Dewpoint Transmitter DMT242 provides reliable and stable measurements for industrial dryer applications. It is designed for extreme conditions. DMT242 incorporates the Vaisala DRYCAP® thin film polymer sensor and auto-calibration software. The standard sensor choice for dry gases and desiccant dryers is DRYCAP® 180M and for more humid applications such as refrigeration dryers, a DRYCAP® 180S sensor. Both the sensors are immune to particulate contamination, water condensation, oil vapor and most chemicals. Because the sensor withstands condensation, its performance is unmatched for low dewpoint applications that experience process water spikes, such as pipeline condensation during a system failure or start-up.

The auto-calibration software works on-line while the process is running. If the measurement accuracy is not confirmed, corrections are made automatically. The DMT242 adjusts the measurement, corrects dry-end drifts and continues to function. Calibration occurs quickly, and with corrections so minor, it will go unnoticed.

Compact, rugged and intelligent

Due to its compact size, DMT242 is quickly and easily installed in tight spaces.

Users can perform a field-check by using the Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70. The transmitter can be sent to Vaisala Service for NIST traceable calibration. The recommended calibration interval is every two years.

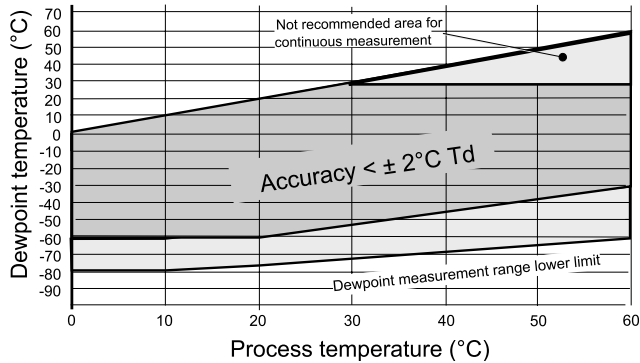
Technical data

Dewpoint temperature

Measurement range (typical)	-60 ...+60 °C (-76 ...+140 °F)
Analog output scalings	
Option A	-80 ...+20 °C (-112 ...+68 °F) T _d
Option B	-60 ...+60 °C (-76 ...+140 °F) T _d
Option X	free scaling

(when the dewpoint is below 0 °C (32 °F), the transmitter outputs frostpoint)

Accuracy with DRYCAP® 180M ± 2 °C (± 3.6 °F)
(see graph below)



DEWPOINT ACCURACY VS. MEASUREMENT CONDITIONS

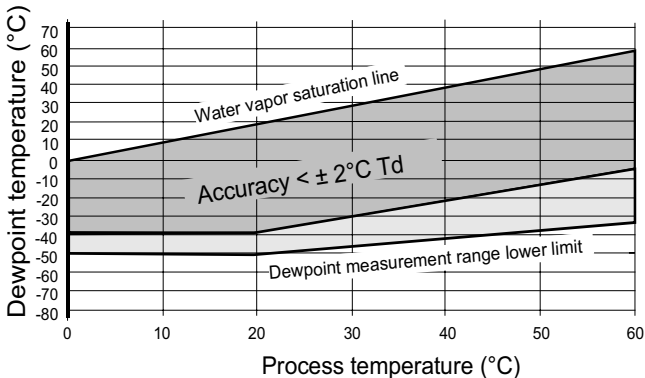
Response time 63 % [90 %] at +20 °C gas temperature

Flow rate >1 l/min and 1 bar pressure

-60 -> -20 °C Td (-76 -> -4 °F Td) 5 s [10 s]

-20 -> -60 °C Td (-4 -> -76 °F Td) 45 s [10 min]

Accuracy with DRYCAP® 180S ± 2 °C (± 3.6 °F)
(see graph below)



Operating environment

Temperature	0 ...+60 °C (32 ...+140 °F)
higher temperature peaks	Short-term OK
Relative humidity	0 ... 100 %RH
Pressure	0 ...20 bara (0 ...290 psia)
Sample flow rate	no effect

Output

Analog output	4 ...20 mA
Resolution for analog output	± 0.002 mA
Typical temperature dependence	0.0008 mA/ °C
Serial line for service use	RS232

General

Sensor	DRYCAP® 180M
Optimal sensor for refrigeration dryers	DRYCAP® 180S
Operating voltage	18 - 35 VDC, 20 - 28 VAC
Power consumption at 24 VDC	max. 220 mA
External load for analog output	max. 500 Ω
Optional connection cable with DMT242 connector	2 m or 10 m
Connector for supply voltage and signal output	
max. wire size	0.75 mm ²
max. cable diameter	6.5 mm /PG7
Service cable for serial interface RS232	product code DMT242RS

Probe material (wetted parts)	stainless steel (AISI 316L)
Sensor protection	stainless steel sintered filter (HM47280)
Mechanical connection	G $\frac{1}{2}$ " ISO228-1 thread with bonded seal ring (U-seal)
Electronics housing material	plastic (ABS/PC)
Housing classification	IP65 (NEMA4)
Storage temperature range	-40 ...+70 °C, (-40 ...+158 °F)
Complies with the EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial environment.	

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For more information, visit
www.vaisala.com or contact
us at sales@vaisala.com

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DMT152 Dewpoint Transmitter for Low Dewpoint Measurement in OEM Applications



The small and powerful DMT152 measures dewpoint down to -80 °C.

Features/Benefits

- Compact
- Accurate
- Vaisala DRYCAP® technology with a polymer sensor
- Measures dewpoint down to -80 °C (-112 °F)
- Reduced maintenance costs due to long calibration interval
- Fast response time
- Withstands condensation
- NIST traceable
- Applications: compressed air, plastics drying, dry chambers, pure gases, and high-voltage circuit breakers

DMT152

The Vaisala DRYCAP® Dewpoint Transmitter DMT152 is designed for measuring low dewpoint in OEM applications, even down to -80°C . The excellent long-term stability and reliability of its performance is based on the latest DRYCAP® polymer sensor technology.

Low maintenance

The DMT152 mechanics have been designed for harsh environments requiring protection against dust, dirt, and splashed water.

The DRYCAP® technology has a low maintenance need due to its excellent long-term stability and durability against condensation.

Applications

The DMT152 is an ideal choice for industrial applications where it is necessary to control very low humidity. Most typical areas of use are air and plastics dryers, dry chambers, pure gases, and high-voltage circuit breakers.

The DMT152 measures accurately and reliably also in the challenging combination of low humidity and hot air, which is typical in plastics drying.

Technical data

Measured variables

DEWPOINT TEMPERATURE

Measurement range	-80 ... -30 °C (-112 ... +14 °F) T _d
Accuracy	±2 °C (3.6 °F) T _d
Non-calibrated range	-100 ... +20 °C (-148 ... +68 °F) T _d
Analog output scalings	
option 1	-80 ... +20 °C (-112 ... +68 °F) T _d
option 2	-100 ... 0 °C (-148 ... +32 °F) T _d
option 3	user-specified output scaling

Response time 63 % [90 %] at a gas temperature of +20 °C (+68 °F) and pressure of 1 bar	
-80 ... -30 °C (-112 ... -22 °F) T _d	10 s [20 s]
-30 ... -80 °C (-22 ... -112 °F) T _d	2 min [30 min]

PPM VOLUME CONCENTRATION

Measurement range (typical)	0 ... 500 ppm
Accuracy at +20 °C (+68 °F), 1013 mbar	±(0.2 ppm + 20 % of reading)

Operating environment

Temperature	-40 ... +60 °C (-40 ... +158 °F)
Relative humidity	0 ... 100 % RH (up to +20 °C/68 °F)
Pressure	0 ... 50 bar (725 psia)
Measured gases	non-corrosive gases
Sample flow rate	no effect on measurement accuracy

Outputs

Two analog outputs (scalable)	4 ... 20 mA, 0 ... 20 mA (3 wire) 0 ... 5 V, 0 ... 10 V
Accuracy of analog outputs	± 0.01 V / ± 0.01 mA
Digital output	RS485 (2-wire)
Alarm-level indication by analog signal	user selectable
Purge or autocalibration information	5 V, 10 V, 20 mA or LED

General

Sensor	Vaisala DRYCAP® 180U Thin-film capacitive polymer sensor
Recommended calibration interval	2 years
Operating voltage with	
RS485 output	11* ... 28 VDC
voltage output	15* ... 28 VDC
current output	21 ... 28 VDC

*For extended temp. down to -40 °C (-40 °F) or pressure up to 50 bar (725 psia), the supply voltage is 21 ... 28 VDC.

Supply current

normal measurement	20 mA + load current
during self-diagnostics	max. 220 mA pulsed

External load for

voltage output	min. 10 kOhm
current output	max. 500 Ohm

Housing material (wetted parts)

AISI316L

Stainless steel mesh filter AISI303, filter grade 18 µm

Mechanical connections ISO G½, NPT ½, UNF 3/4"- 16"

Housing classification IP65 (NEMA 4)

Storage temperature range -40 ... +80 °C (-40 ... +176 °F)

Weight (ISO G½") 190 g (6.70 oz)

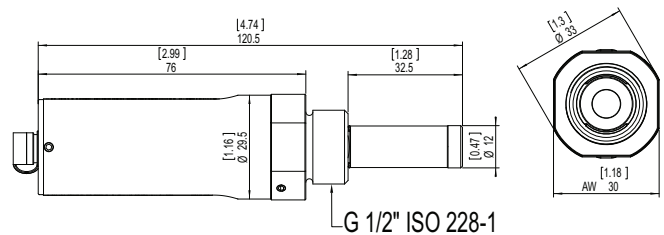
Complies with EMC standard EN61326-1, Electrical equipment for measurement control and laboratory use - EMC requirements;

Industrial environment

Accessories

Connection cable for MI70 hand-held indicator	219980
USB cable for pc connection	219690
Sampling cells (available for ISO G½")	
basic sampling cell	DMT242SC
with Swagelok 1/4" male connectors	DMT242SC2
with a quick connector and leak screw	DSC74
two-pressure sampling cell	DSC74B

Dimensions



For more information, visit www.vaisala.com or contact us at sales@vaisala.com

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DMT142 Miniature Dewpoint Transmitter for OEM Applications



The Vaisala DRYCAP® Dewpoint Transmitter DMT142 is an ideal choice for small compressed air dryers, plastic dryers and other OEM applications.



The Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 is ideal for confirming the performance of the DMT142 in the field.

Features/Benefits

- Miniature size dew point transmitter for e.g. small industrial dryer applications
- Vaisala DRYCAP® technology with auto-calibration
- Calibration interval of two years
- Dew point measurement range -60 ... +60 °C (-76 ... +140 °F) with an accuracy ± 3 °C (± 5.4 °F)
- Withstands condensation
- Fast response time
- Compatible with Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70
- NIST traceable (certificate included)

Vaisala DRYCAP®

The Vaisala DRYCAP® Dewpoint Transmitter DMT142 is a miniature dew point measurement instrument. The transmitter can be installed directly into pressurized systems at 50 bar (725 psia) maximum pressure. The long-term high performance is achieved with Vaisala DRYCAP® technology.

The sensor fully withstands getting wet, and therefore, the transmitter performs exceptionally well in applications that occasionally experience process water spikes, such as pipeline condensation during a system failure or start-up. The sensor is also immune to particulate contamination, oil vapor and most chemicals, and is insensitive to the flow rate.

Long calibration interval

The calibration interval of the DMT142 is two years. Additionally, the Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 can be used to confirm the performance of the DMT142 without disconnecting the transmitter. For any adjustment needs, the transmitter can be sent to Vaisala Service.

The auto-calibration software works on-line while the process is running. If the measurement accuracy is not confirmed, corrections are made automatically.

Easy installation

The DMT142 has a variety of features to choose from, including different output and installation options. Due to its small size and light weight, the DMT142 is quickly and easily installed in tight spaces or in small-size pipelines.

Technical data

Measured variables

DEW POINT TEMPERATURE

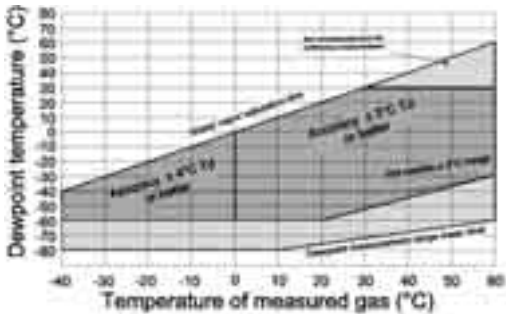
Measurement range(typical)

Standard version	-40 ...+60 °C (-40 ...+140 °F) T _d
Extended version	-60 ...+60 °C (-76 ...+140 °F) T _d
SF ₆ version	-50 ...+60 °C (-58 ...+140 °F) T _d

Analog output scalings

option 1	-80 ...+20 °C (-112 ...+68 °F) T _d
option 2	-60 ...+40 °C (-76 ...+104 °F) T _d
option 3	free scaling

Accuracy ±3 °C (±5.4 F) T_d (see graph below)
(when the dew point is below 0 °C (32 °F), the transmitter outputs frostpoint)



(Dewpoint accuracy range for the extended version. Standard version with dotted line.)

DEW POINT ACCURACY VS. MEASUREMENT CONDITIONS
Dew point accuracy range for the extended version. Standard version with dotted line.

Response time 63% [90%] at +20 °C gas temperature and 1 bar pressure

-60 → -20 °C T _d (-76 → -4 °F T _d)	5 s [10 s]
-20 → -60 °C T _d (-4 → -76 °F T _d)	45 s [10 min]

PPM VOLUME CONCENTRATION

Measurement range 70 ... 200 000 ppm
Accuracy at +20 °C (+68 °F), 1013 mbar 7.3 ppm + 9.2% of reading

Operating environment

Temperature *)	-40 ...+60 °C (-40 ...+140 °F)
Relative humidity	0 ... 100 %RH
Pressure *)	0 ... 50 bar _a (725 psia)
Sample flow rate	no effect for measurement accuracy

*) For extended temperature down to -40 °C (-40 °F) or pressure up to 50 bar_a (725 psia) the supply voltage must be 24 ... 28 VDC.

Outputs

Analog output (scalable)	4 ... 20 mA (3-wire), 0 ... 1 V/5 V
Resolution for current output	0.002 mA
Resolution for voltage output	0.3 mV
Typical temperature dependence	0.005% of span / °C
Connector	4-pin M8 (IEC 60947-5-2) connection cable with snap-on or thread locking available
RS232 serial line for service use	with DMT142RS cable

General

Sensor	Vaisala DRYCAP® 180D
Measured gases	non-corrosive gases (SF ₆ gas with special model)
Recommended calibration interval to confirm the specified accuracy	2 years
Operating voltage with voltage output	12 ... 28 VDC
Operating voltage with current output	18 ... 28 VDC
Supply current	normal measurement 10 mA + load current during self-diagnostics max. 220 mA pulsed
Load for current output	max. 500 ohm
Load for voltage output	min. 10 kohm
Housing material	stainless steel body (AISI316L) plastic cap (ABS/PC)
Sensor protection	stainless steel sintered filter
Mechanical connection	G1/2" ISO 228-1 thread with bonded seal ring (U-seal)
Housing classification	IP64 (NEMA 3S)
Storage temperature range	-40 ... +80 °C (-40 ... +176 °F)
Weight	118 g (4.16 oz)
Complies with EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial environment.	

Accessories

Output cable M8, snap-on connector, 2 meters	211598
Output cable M8, thread connector, 3 meters	HMP50Z300, several lengths available
Connection cable for DM70	211917ZZ
Service cable for serial line	DMT142RS
Sampling cells	
basic sampling cell	DMT242SC
with Swagelok 1/4" male connectors	DMT242SC2
with quick connector and leak screw	DSC74
two-pressure sampling cell	DSC74B
cooling/venting coil	DMCOIL
See DM70 / Portable Sampling Systems and Sampling Cells for further information about sampling cells available	

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DM70 Hand-Held Dewpoint Meter for Spot-Checking Applications



The Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 offers accurate and fast measurement for industrial dew point applications, such as compressed air, metal treatment and plastics drying.

response from ambient to dry conditions exceptionally fast.

The DM70 is fitted with the Vaisala DRYCAP® Sensor. The sensor provides reliable, stable and high-performance dew point measurement. Autocalibration detects on-line possible measurement inaccuracies and automatically corrects dry-end drift in the calibration curve.

The DM70 has a versatile and easy-to-use, menu-based user interface, a clear graphical LCD display, and data-logging capability. It can also be used as a tool for reading the output of fixed Vaisala dew point transmitters, like the DMT242, DMT142, DMT152 and DMT340.

The DM70 displays one to three parameters at a time, either numerically or graphically. Several humidity units can be selected. In addition, the DM70 includes conversion from gas pressure dew point to ambient pressure dew point. An analog output is also available.

The DM70 meter is suitable for direct process dew point measurement in a wide temperature and pressure range. For more demanding applications, the DM70 can be used with the Vaisala sampling cell adapters, or with the Vaisala DRYCAP® Sampling System DSS70A.

Features/Benefits

- Designed for industrial spot-checking and field calibration
- Three models: accurate measurement ranges from -60 to +60 °C (-76 ... +140 °F)
- Vaisala DRYCAP® Sensor with patented autocalibration function
- Low maintenance need due to superior long-term stability
- Sensor withstands condensation
- Fast response, enhanced by Sensor Purge option
- Easy-to-use user interface
- Data can be logged and transferred to a PC via MI70 Link software
- Compact, small and light
- NIST traceable (certificate included)

The Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 measures dew point temperature accurately over a wide measurement range. The probe may be inserted directly into pressurized processes, and it responds rapidly from ambient to process conditions. The sensor withstands condensation and fully recovers from getting wet.

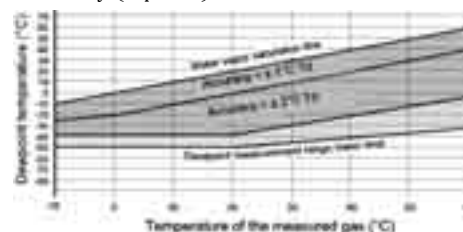
Three probe models, all with auto-calibration, are available. The A and B models are both general purpose probes. The C model is specifically developed for SF₆ gas. The B and C probe models have an additional Sensor Purge feature that heats and dries the sensor, making the

Technical data

Measured variables, DMP74A probe

DEW POINT

Measurement range (typical) -50 ... +60 °C (-58 ... +140 °F)
 Accuracy (A probe) -40...+60 °C ±2 °C (±3.6 °F)
 (see graph)



Dew point accuracy vs. measurement conditions

Response time

flow rate 0.2 m/s, 1 bar pressure, +20 °C (+68 °F) 63% [90%]
 0 → -40 °C Td (32 → -40 °F Td) 20 s [120 s]
 -40 → 0 °C Td (-40 → 32 °F Td) 10 s [20 s]

Dew point sensor

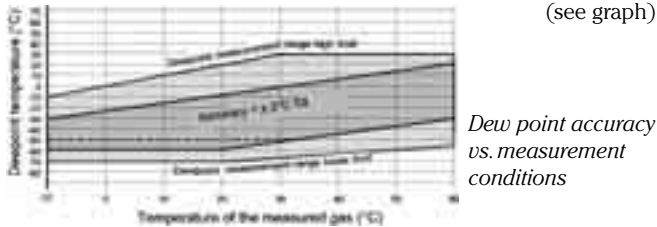
Vaisala DRYCAP® 180S

Technical data

TEMPERATURE	
Measurement range	-10 ... +60 °C (+14 ... +140 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Typical temperature dependence of electronics	±0.005 °C/°C (±0.005 °F/°F)
Temperature sensor	Pt100 IEC751 1/3 class B
OTHER VARIABLES AVAILABLE	
Dew point converted to atmospheric pressure, ppm volume and ppm weight concentration, absolute humidity, mixing ratio, relative humidity	

Measured variables, DMP74B and DMP74C (for SF6 gas) probes

DEW POINT	
Measurement range (typical)	-70 ... +30 °C (-94 ... +86 °F)
Accuracy (B and C probe)	±2 °C (±3.6 °F) (see graph)



Dotted line:
For DMP74C the ±2 °C accuracy range is limited to -50 °C T_d when used in SF6 gas.

Response time

flow rate 0.2 m/s, 1 bar pressure, +20 °C (+68 °F)	63% [90%]
0 → -60 °C T _d (32 → -76 °F T _d)	50 s [340 s]
-60 → 0 °C T _d (-76 → 32 °F T _d)	10 s [20 s]

Dew point sensor Vaisala DRYCAP® 180M

TEMPERATURE	
Measurement range	-10 ... +60 °C (+14 ... +140 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Typical temperature dependence of electronics	±0.005 °C/°C (±0.005 °F/°F)
Temperature sensor	Pt100 IEC751 1/3 class B
OTHER VARIABLES AVAILABLE	
Dew point converted to atmospheric pressure, ppm volume and ppm weight concentration	

All probe models

Operating temperature	-10 ... +60 °C (+14 ... +140 °F)
Operating pressure	
DMP74A, DMP74B	0 ... 20 bara (0 ... 290 psia)
DMP74C	0 ... 10 bara (0 ... 150 psia)

Sample flow rate	no effect for measurement accuracy
Measured gases	non-corrosive gases
Probe material (wetted parts)	Stainless steel (AISI 316L)
Sensor protection	Sintered filter (AISI 316L) partno: HM47280
Mechanical connection	G1/2" ISO228-1 thread with bonded seal ring (U-seal)
Housing classification	IP65 (NEMA 4)
Weight	350 g

MI70 indicator, general

Menu languages	English, Chinese, Spanish, Russian, French, Japanese, German, Swedish, Finnish,
Display	LCD with backlight Graphic trend display of any parameter Character height up to 16 mm
Max. no of probes	2
Power supply	Rechargeable NiMH battery pack with AC-adaptor or 4xAA size alkalines, type IEC LR6
Analog output	0...1 VDC
Output resolution	0.6 mV
PC interface	MI70 Link software with USB or serial port cable
Datalogging capacity	2700 points
Alarm	Audible alarm function
Operating temperature range	-10...+40 °C (+14...+104 °F)
Storage temperature range	-40 ... +70 °C (-40 ... +158 °F)
Operating humidity range	0 ... 100 % RH, non-condensing
Housing classification	IP54
Housing materials	ABS/PC blend
Weight	400 g
Battery operation time with DMP74 probe	
continuous use	48 h typical at +20 °C (+68 °F)
data logging use	up to a month, depending on logging interval
Electromagnetic compatibility	EN 61326-1, Generic Environment

Accessories

Connection cables for fixed Vaisala dew point transmitters	
for DMT242 transmitter	27160ZZ
for DMT340 series	211339
for DMT152 transmitter	219980
for DMT142 transmitter	211917ZZ
MI70 Link software with USB cable	219687
MI70 Link software with serial port cable	MI70LINK
Analog output cable	27168ZZ
10 m (32.81 ft) extension cable for probe	213107SP

DSS70A Portable Sampling System and Sampling Cells for DM70



The DSS70A provides a compact solution for field checking dew point where direct measurement is difficult. Typical applications for the sampling system are metal treatment and plastics drying processes.

DSS70A portable sampling system

The DSS70A is designed to provide dewpoint sampling flexibility: for the DM70 hand-held dew point meter. For processes at atmospheric pressure, a battery powered pump is used to extract a gas sample. For pressurized processes up to 20 bar, the sample is measured at process pressure and then reduced to atmospheric pressure for venting or re-direction, bypassing the pump. In all cases, the sample gas passes through a filter to remove particulate contamination before measurement. Flow through the system is controlled and monitored with a needle valve and flow meter.

The DSS70A is easily connected to an appropriate sample point with tubing (typically 1/4" or 6 mm). The measured dewpoint must be below ambient temperature to avoid condensation in the system. Gas

temperatures higher than +40 °C (+104 °F) should be cooled with a short PTFE (included in the DSS70A system) or stainless steel tube prior to entering the DSS70A.

Sampling cells for pressurized processes

The DM70 can easily be connected to pressurized processes. In addition to direct pipeline installation, a variety of sampling cell options are available for gas sampling.

The DSC74 sampling cell is the recommended choice. It has a variety of connection adapters that allow several different ways of installation. The quick connector with a leak screw allows a very fast connection for compressed air lines. Additionally, two thread adapters are available for the inlet port.

The DSC74B is a two-pressure sampling cell, which enables measurements in both process and

ambient pressure. This sampling cell is especially suitable for dewpoint measurements in SF₆ gas with the DMP74C probe.

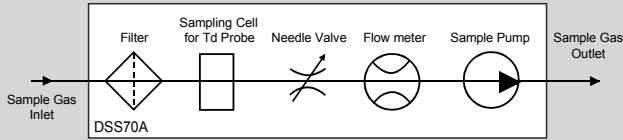
The DMT242SC is a basic sampling cell. The DMT242SC2 is a sampling cell supplied with welded Swagelok connectors for sampling in a 1/4" pipeline.



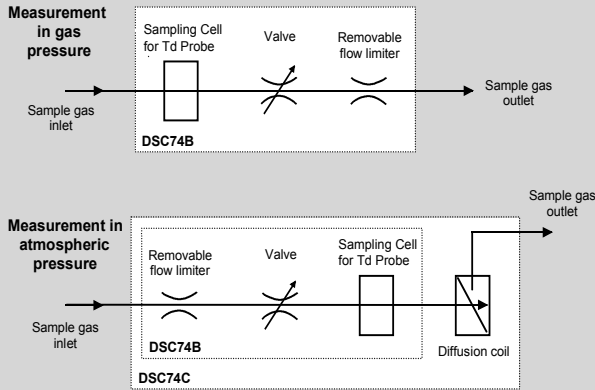
The sampling cells (from the left) DMT242SC2, DMT242SC and DSC74 can be used to connect the DM70 to sample gas flow. The DSC74B (right) is a two-pressure sampling cell that can be used for measurements in either pressurized or ambient pressure. The cooling/venting coil is included in the DSC74C sample cell, but is an option for all sampling cells.

Technical data

DSS70A Sampling System and DSC74B/C Sampling Cells



The DSS70A sampling system includes a filter to clean the dirty sample gas and a needle valve to control the sample flow rate with the flow meter. A sample pump is used to generate a sample flow from processes at ambient pressure.



The DSC74B sampling cell enables the measurement of the sampled gas either in gas pressure up to 10 bar or in atmospheric pressure depending on the gas inlet and outlet. The DSC74C is like the DSC74B but with an additional coil to avoid back diffusion, the effect of surrounding moisture, in dewpoint measurements in atmospheric pressure.

Sampling cells technical data

DSC74	sampling cell for pressurized gases
pressure limit	1 MPa (10 barg, 145 psig)
DSC74B	two pressure sampling cell
pressure limit	1 MPa (10 barg, 145 psig)
DSC74C	DSC74B with DMCOIL cooling/venting coil

DMCOIL	cooling/venting coil
DMT242SC	sampling cell
pressure limit	10 MPa (100 barg, 1450 psig)
DMT242SC2	sampling cell with Swagelok connectors
pressure limit	4 MPa (40 barg, 580 psig)
Material for all sampling cells	stainless steel AISI316

DSS70A sampling system Operating conditions

Operating gases	air, N ₂ and other non-toxic, inert gases
Dewpoint range	-70 °C ... Tamb (-76 °F ... Tamb)
Inlet/outlet connection	1/4" Swagelok
Operating temperature	
ambient temperature	0 ... +40 °C (32 ... +104 °F)
process gas temperature	
with PTFE tube at +20 °C (+68 °F)	max. +200 °C (+392 °F)
with stainless steel tube	specification according to stainless steel tube specification
(included in the DSS70A)	
maximum gas temperature at inlet	+40 °C (+104 °F)
Operating pressure	
with pump	0.6 ... 1.2 bara (8.7 ... 17.4 psia)
pump disconnected	0 ... 20 bara (0 ... 290 psia)

General

Battery operation time for pump	8 h continuous use
	battery can be recharged using DM70 charger
Filter	7 mm inline filter cartridge 1/4" Swagelok SS-4F-7 (spare part order no. 210801)
Materials	
wetted parts	Stainless steel
carrying case	ABS plastic
Case size (W x D x H)	430 x 330 x 100 mm
Weight	5.5 kg (12 lbs)

Electromagnetic compatibility

EN61326-1, Generic Environment.

MMT330 Moisture and Temperature Transmitter Series for Oil



The display shows measurement trends, real time data and history.

The MMT330 transmitter family offers a range of solutions for demanding moisture in oil measurements.

Features/Benefits

- Continuous on-line measurement of moisture in oil
- Ball valve installation - no need to shut down the process
- Incorporates Vaisala HUMICAP® Sensor - more than 30 years of field performance
- Ten years of experience in measuring moisture in oil
- Excellent long-term stability
- Easy to calibrate and maintain in the field - Compatible with Vaisala HUMICAP® Hand-Held Moisture for Oil Meter MM70
- NIST traceable calibration (certificate included)
- Analog outputs, WLAN/LAN

The Vaisala HUMICAP® Moisture and Temperature Transmitter Series for Oil MMT330 enables fast and reliable detection of moisture in oil. The MMT330 can be used in on-line moisture monitoring and as a control device, allowing separators and oil driers to be started only when needed.

Proper monitoring saves both oil and the environment. With the MMT330 it is easy and economical to monitor the changes of moisture in oil.

Reliable Vaisala HUMICAP® technology

The MMT330 incorporates the latest generation of the Vaisala HUMICAP® Sensor, which is the result of ten years of field experience. It was developed for demanding moisture measurement in liquid hydrocarbons.

The sensor's excellent chemical tolerance provides accurate and reliable measurement over a wide measurement range.

For diverse applications and demanding conditions

Because of the variety of probes, the transmitter can be used in lubrication systems, hydraulic systems, and transformers.

Indicates the margin to water saturation

The MMT330 measures moisture in oil in terms of the water activity (a_w) and temperature (T). Water activity indicates directly whether there is a risk of free water formation. The measurement is also independent of oil type and age.

Water content as ppm conversion

In addition to water activity, the MMT330 can output ppm, the average mass concentration of water in oil. Vaisala has this conversion readily available for mineral transformer oil.

For other oils, the oil specific conversion coefficients can be programmed to the transmitter if the water solubility of the oil is known.

Graphical measurement trend and historical display

The MMT330 can be ordered with a large numerical and graphical display with a multilingual menu. It allows the user to monitor operational data, measurement trends and up to 1-year measurement history. The optional data logger with real-time clock makes it possible to generate over four years of measured history, and

zoom in on any desired time or time frame.

The display alarm allows tracking of any measured parameter, with a freely configurable low and high limit.

Data collection and (wireless) transfer to PC

The recorded measurement data can be viewed on the display or transferred to a PC with Microsoft Windows® software. The transmitter can also be connected to a network with an optional (W)LAN interface, which enables a (wireless) Ethernet connection.

Versatile outputs and easy installation

The MMT330 provides up to three analog outputs. Galvanic isolation of supply power and analog outputs is also available. For serial interface the USB connection, RS232 and RS485



The Vaisala HUMICAP® Hand-Held Moisture for Oil Meter MM70 is designed for field checking MMT330 transmitters.

can be used. In addition, alarm relay option is available.

The MMT330 has several options for transmitter mounting. Transmitters are delivered pre-configured with all settings installation ready.



The MMT332 probe is installed using a flange. It is for high pressure applications.

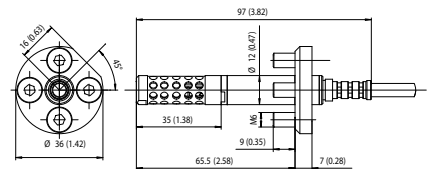
Installation options

MMT332 For High Pressure Installations

Pressure range	0 ... 250 bar / 0 ... 3625 psia
Probe diameter	12 mm / 0.5 inch
Installation	
Flange	36 mm / 1.4 inch
Temperature	
Measurement range	-40 ... +180 °C (-40 ... 356 °F)

Dimensions

Dimensions in mm (inches)



The MMT337 probe, with optional Swagelok connector, is ideal for tight spaces with a thread connection. The small probe is designed for integrating into confined spaces with small diameter lines.

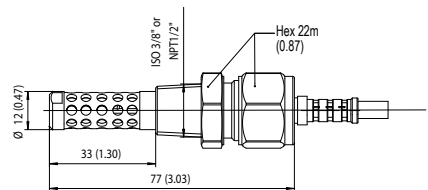
Installation options

MMT337 with Small Sized Probe

Pressure range	0 ... 10 bar / 0 ... 145 psia
Probe diameter	12 mm / 0.5 inch
Installation	
Fitting Body	R 3/8" ISO
Fitting Body	1/2" ISO
Fitting Body	NPT 1/2"
Temperature	
Measurement range	-40 ... +180 °C (-40 ... 356 °F)

Dimensions

Dimensions in mm (inches)



The MMT338 is ideal for installations in pressurized processes where the probe needs to be removed while the process is running. The probe depth is adjustable.

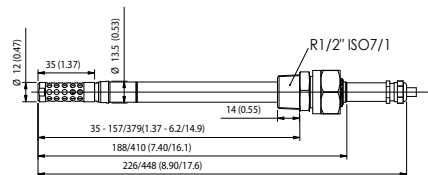
Installation options

MMT338 with Probe for Pipeline Installations

Pressure range with ball valve	0 ... 40 bar / 0 ... 580 psia up to 120 °C (248 °F) and 40 bar
Adjustable length	35 ... 157/379 mm / 1.37 ... 6.2 / 14.9 inch
Installation	
Fitting Body	R1/2" ISO
Fitting Body	NPT 1/2"
Ball Valve Set	BALLVALVE-1
Sampling Cell	DMT242SC2
Temperature	
Measurement range	-40 ... +180 °C (-40 ... 356 °F)

Dimensions

Dimensions in mm (inches)



Technical data

Measured values

WATER ACTIVITY	
Measurement range a_w	0 ... 1
Accuracy (including nonlinearity, hysteresis and repeatability)	
0 ... 0.9	±0.02
0.9 ... 1.0	±0.03
Response time (90 %) at +20 °C in still oil (with stainless steel filter)	10 min.
Sensor	HUMICAP®

Performance

TEMPERATURE	
Measurement range	
MMT332	-40 ... +180 °C (-40 ... +356 °F)
MMT337	-40 ... +180 °C (-40 ... +356 °F)
MMT338	-40 ... +180 °C (-40 ... +356 °F)
Accuracy at +20 °C (+68 °F)	± 0.2 °C (0.36 °F)

Operating environment

Operating temperature	
for probes	same as measurement ranges
for transmitter body	-40 ... +60 °C (-40 ... +140 °F)
with display	0 ... +60 °C (+32 ... +140 °F)
Pressure range for probes	See probe specifications

Complies with EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial environment.

Inputs and outputs

Operating voltage	10 ... 35 VDC, 24 VAC
with optional power supply module	100 ... 240 VAC 50/60 Hz
Power consumption @ 20 °C (U_{in} 24VDC)	
RS-232	max 25 mA
U_{out} 2 x 0...1V / 0...5V / 0...10V	max 25 mA
I_{out} 2 x 0...20 mA	max 60 mA
display and backlight	+ 20 mA
Analog outputs (2 standard, 3rd optional)	
current output	0 ... 20 mA, 4 ... 20 mA
voltage output	0 ... 1 V, 0 ... 5 V, 0 ... 10 V
Accuracy of analog outputs at 20 °C	± 0.05 % full scale
Temperature dependence of the analog outputs	± 0.005 %/°C full scale
External loads	
current outputs	$R_L < 500 \text{ ohm}$
0 ... 1V output	$R_L > 2 \text{ kohm}$
0 ... 5V and 0 ... 10V outputs	$R_L > 10 \text{ kohm}$

Max wire size	0.5 mm ² (AWG 20) stranded wires recommended
Digital outputs	RS-232, RS-485 (optional)
Service connection	RS-232, USB
Relay outputs	0.5 A, 250 VAC, SPDT, Potential Free (optional)
Ethernet interface (optional)	
Supported standards	10/100Base-T
Connector	RJ45
Protocols	Telnet
WLAN interface (optional)	
Supported standards	802.11b
Antenna connector type	RP-SMA
Protocols	Telnet
Security	WEP 64/128, WPA
Authentication / Encryption	
Open / no encryption	
Open / WEP	
WPA Pre shared key / TKIP	
WPA Pre shared key / CCMP (a.k.a. WPA2)	
Optional data logger with real-time clock	
Logged parameters	max. three with trend/min/max values
Logging interval	10 sec (fixed)
Max. logging period	4 years 5 months
Logged points	13,7 million points per parameter
Battery lifetime	min. 5 years
Display	LCD with backlight, graphic trend display of any parameter
Display menu languages	English, Chinese, Spanish, German, French, Japanese, Russian, Swedish, Finnish

Mechanics

Cable bushing	M20x1.5 for cable diameter 8 ... 11mm/0.31 ... 0.43"
Conduit fitting	1/2" NPT
Interface cable connector (optional)	M12 series 8 pin (male)
option 1	with plug (female) with 5 m / 16.4 ft black cable
option 2	with plug (female) with screw terminals
USB-RJ45 Serial Connection Cable (incl. Mi70 Link software)	219685
Probe cable diameter	5.5 mm
Probe cable lengths	2 m, 5 m or 10 m
Housing material	G-AlSi 10 Mg (DIN 1725)
Housing classification	IP 65 (NEMA 4X)

Mounting options



Mounting with Wall Mounting Kit



Mounting with DIN Rail Installation Kit



Pole Installation with Installation Kit for Pole or Pipeline

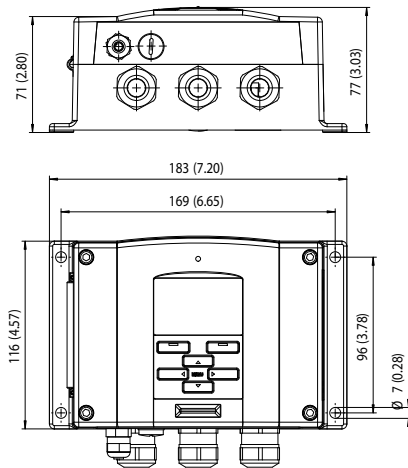


Mounting Rain Shield with Installation Kit

HUMICAP® is a registered trademark of Vaisala.

Dimensions

Dimensions in mm (inches)



TYPE APPROVED PRODUCT
CERTIFICATE NO.: A-11440

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Don't measure the damage. Prevent it.

New intelligence for measuring moisture in oil.

- On-line, real time measurement without sampling
- Installation through ball valve - no need to shut down the process
- High stability in extreme conditions

Know your oil better -
Vaisala HUMICAP® instruments!

Download the 'Top 8 FAQs - Measuring moisture in oil' at www.vaisala.com/mioFAQ



Instruments display water activity trends.

MMT310 Series Moisture and Temperature Transmitter for Oil



Two probe options: MMT317 and MMT318

Features/Benefits

- Continuous measurement of moisture in oil
- Proven Vaisala HUMICAP® sensor, 10 years in oil applications
- Measurements in lubrication, hydraulic and transformer oils
- Excellent pressure and temperature tolerance
- Measuring water activity - ppm calculation for transformer oil
- Small size, easy to integrate
- NIST traceable calibration
- Applications: e.g. monitoring of transformer oil and of lubrication systems in marine and paper industry

The Vaisala HUMICAP® Moisture and Temperature Transmitter Series for Oil MMT310 is a fast and reliable on-line detector for moisture in oil.

Reliable Vaisala HUMICAP® technology

The MMT310 series incorporates the latest generation of the Vaisala HUMICAP® Sensor, developed for demanding moisture measurement in liquid hydrocarbons. The sensor's excellent chemical tolerance provides accurate and reliable measurement over the wide measurement range.

Measuring water activity

The MMT310 series measures moisture in oil in terms of the water activity (aw) and temperature (T).

Water activity directly indicates if there is a risk of free water formation. The measurement is independent of oil type, age, and temperature.

Water content as ppm calculation for transformer oils

PPM units are traditionally used in transformer applications. They indicate the average mass concentration of water in oil. The ppm calculation for mineral oil based transformer oil is optional in the MMT310 series.

Diverse applications and demanding conditions

The MMT310 series can be used in lubrication and hydraulic systems as well as in transformers. It can be used for on-line moisture monitoring and as a control function, allowing separators and oil purifiers to be started only when necessary.

Installation options

The MMT318 has two adjustable probe lengths. The transmitter can be ordered with a ball valve set that enables the insertion and removal of the moisture probe for calibration, without the need to empty the oil system.

The MMT317 has a small pressure-tight probe with optional Swagelok fittings.

Several outputs, one connector

The MMT310 series has two analog outputs and an RS-232 serial output. The output signals and the supply power travel in the same cable, the only cable connected to the unit.

Technical data

Measured values

WATER ACTIVITY	
Measurement range a_w	0 ... 1
Accuracy (including non-linearity, hysteresis and repeatability)	
0 ... 0.9	±0.02
0.9 ... 1.0	±0.03
Response time (90 %) at +20 °C in still oil (with stainless steel filter)	10 min
Sensor	Vaisala HUMICAP®
TEMPERATURE	
Measurement range	-40 ... +180 °C (-40 ... +356 °F)
Typical accuracy at +20 °C	±0.1 °C (±0.18 °F)
Typical temperature dependence of electronics	±0.05 °C/ °C (±0.005 °F/°F)
Sensor	Pt100 IEC751/3 class B

Electrical connections

Two analog outputs, selectable and scalable	0 ... 20 mA or 4 ... 20 mA
Typical accuracy of analog output at +20 °C	±0.05 % full scale
Typical temperature dependence of analog output	0.005 %/°C (0.003 %/°F) full scale
Serial output	RS-232C
Connections	8-pole connector with RS-232C, current outputs (two channels) and U_{in}
Operating voltage U_{in}	24 VDC (10 ... 35 VDC)
Minimum operating voltage U_{in} with RS-232C	10 VDC
I_{out} 0 ... 20 mA, 4 ... 20 mA	11 VDC + ($R_{load}/60$) VDC
Power consumption at +20 °C, U_{in} = 24 VDC with RS-232C	20 mA
I_{out} 2 x 0 ... 20 mA	60 mA

General

Operating temperature range for electronics	-40 ... +60 °C (-40 ... +140 °F)
Storage temperature	-55 ... +80 °C (-67 ... +176 °F)
Pressure range for MMT318 with ball valve up to 120 °C	0 ... 40 bar
Pressure range for MMT317	0 ... 10 bar
External load	$R_L < 500$ Ohm
Material	
transmitter housing	G-AISI 10 Mg
transmitter base	ABS/PC
Housing classification	IP65
Cable feed through alternatives	to be protected from direct rain 8-pole connector with 5 m cable, female 8-pin connector screw joint for cable diameter 4 ... 8 mm
Sensor protection	stainless steel grid
Probe cable length	
MMT317	0.5, 2, 5 or 10 meters
MMT318	2, 5 or 10 meters
Probe installation MMT317	
Swagelok®	NPT 1/2", ISO 3/8" or ISO 1/2"
Probe installation MMT318	
Fitting bodies	ISO 1/2", NPT 1/2"
Ball Valve Set	BALLVALVE-1
Complies with EMC standard EN61326-1, Industrial environment	

Note: When using the current output, the RF field susceptibility level according to standard EN61000-4-3 with a frequency band of 110 ... 165 MHz, is only 3V/m (generic environment) with the specified accuracy.

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MMT162 Compact Moisture in Oil and Temperature Transmitter for OEM Applications



The MMT162 enables on-line moisture monitoring in oils even in the most demanding applications.

Features/Benefits

- Continuous measurement of moisture in oil
- Measures in lubrication, hydraulic and transformer oils
- Excellent pressure and temperature tolerance
- Vaisala HUMICAP® Sensor - proven in the field since 1973
- Measures water activity - ppm-calculation available for transformer oil
- Small size, easy to integrate
- NIST traceable calibration (certificate included)

The Vaisala HUMICAP® Moisture and Temperature Transmitter for Oil MMT162 is an excellent economical solution for reliable on-line detection of moisture in oil.

Reliable Vaisala HUMICAP® technology

The MMT162 incorporates the latest generation of the Vaisala HUMICAP® Sensor. The sensor is developed for demanding moisture measurement in liquid hydrocarbons and has been successfully used in oil applications for over a decade. The sensor's excellent chemical tolerance provides accurate and reliable measurement over the measurement range.

Water activity measurement

The MMT162 measures moisture in oil in terms of the water activity (aw) and temperature (T). Water activity directly indicates whether there is a risk of free water formation. The measurement is independent of oil type, age and temperature. The ppm calculation for mineral oil based transformer oil is optional in the MMT162.

Several outputs - one connector

The MMT162 has two analog outputs that can be scaled and the measurement ranges changed. Additionally, the transmitter has an RS-485 serial output. The signals and the unit power travel in the same cable.

An optional LED-cable enables a visual alarm.

Compact, rugged and intelligent

Due to its compact size, the MMT162 is quickly and easily installed in tight spaces. Units are delivered fully assembled, however, you can re-configure them to suit your needs.

MM70

In combination with an MM70 indicator, the MMT162 provides an ideal tool for on site calibration. The MI70 indicator can be used as a display, communication, and data-logging device for the MMT162.

Technical data

Measured Values

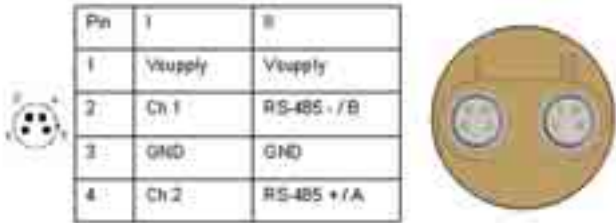
WATER ACTIVITY	
Measurement range	0 ... 1 aw
Accuracy (including non-linearity, hysteresis and repeatability)	
0 ... 0.9	± 0.02
0.9 ... 1.0	± 0.03
Response time	
in oil flow (typical)	<1 min (dry-wet)
MOISTURE	
Calculated moisture content in ppm for mineral transformer oil	
TEMPERATURE	
Accuracy at +20 °C (+68 °F)	± 0.2 °C (0.36 °F)

Operating Environment

Operating temperature	-40 ... +60 °C (-40 ... +140 °F)
Oil temperature	-40 ... +80 °C (-40 ... +176 °F)
Pressure range	
metal version	up to 200 bar
plastic version	up to 40 bar
Oil flow	some flow recommended

Outputs

Analog outputs (two channels)	
current output	0 ... 20 mA, 4 ... 20 mA
voltage output	0 ... 5 V, 0 ... 10 V
Alarm level indication by analog signal	user selectable
Digital outputs	RS-485



General

Sensor	HUMICAP®
Cable connections (2 ports)	M8, 4 pin
Minimum operating voltage with	
RS-485 output	14 ... 28 VDC
voltage output	16 ... 28 VDC
current output	22 ... 28 VDC
Supply current	
normal measurement	20 mA + load current
External load for	
voltage output	min. 10 kOhm
current output	max. 500 Ohm
Housing material	
metal	AISI 316L
plastic	PPS + 40% GF
Mechanical connections with bonded seal ring (washer)	
metal version	G 1/2" ISO or NPT 1/2"
plastic version	G 1/2" ISO
Housing classification	IP65 (NEMA 4)
Storage temperature range	-40 ... +80 °C (-40 ... +176 °F)
Weight	
with plastic housing	65 g (2.3 oz)
with metal housing	200 g (7 oz)
Complies with EMC standard EN61326-1, Electrical equipment for measurement control and laboratory use - EMC requirements; Industrial environment	

Options and accessories

Stainless steel filter (standard)	221494SP
Stainless steel filter for high flow (>1 m/s)	221493SP
Connection cable for MM70 hand-held meter	219980
USB serial interface cable	219690
Sealing ring set (U-seal) ISO G1/2, 3 pcs	221525SP
Sealing ring set (copper) ISO G1/2, 3 pcs	221524SP
ISO 1/2" plug	218773
NPT 1/2" plug	222507
Sampling cell	DMT242SC
Sampling cell w. Swagelok connectors	DMT242SC2
Connection cable	
2 m (6.5 ft), M8 snap-on	211598
0.32 m (1 ft) Shielded, M8 threaded	HMP50Z032
3.0 m (9.8 ft), Shielded, M8 threaded	HMP50Z300
5.0 m (16.4 ft), Shielded, M8 threaded	HMP50Z500
10 m (32.8 ft), Shielded, M8 threaded	HMP50Z1000
3 m, Shielded, connector 90° angle	221739
5 m, Shielded, connector 90° angle	221740
M8 threaded, Ch1 signal + Ch2 LED	MP300LEDCBL

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MM70 Hand-Held Moisture and Temperature Meter for Spot-Checking in Oil



The MM70 is an ideal tool for the preventive maintenance of oil-filled systems. The water activity measurement indicates the margin to free water formation, which causes severe problems in lubrication systems.

Features/Benefits

- Measurement independent of oil type, age and temperature
- In-line process checking through ball valve, no need to drain the oil
- Rugged and reliable construction
- Excellent pressure and temperature tolerance
- Data can be logged and transferred to a PC
- Vaisala HUMICAP® Sensor - proven field performance since 1973
- Compatible with Vaisala's fixed oil moisture instruments
- No reference oil needed for recalibration
- NIST traceable (certificate included)

The Vaisala HUMICAP® Hand-held Moisture Meter for Oil MM70 enables reliable detection of moisture in oil.

In-line process checking through ball valve

The probe can be inserted directly into the process pipe through a ball valve without draining the oil in the system.

Water activity measurement

The MM70 measures moisture in oil in terms of the water activity (a_w) and temperature (T). Water activity directly indicates whether there is a risk of free water formation. The measurement is independent of oil type, age and temperature.

ppm calculation included

The MM70 has an embedded model for expressing moisture as ppm in mineral transformer oil. The customer can enter up to three other oil models into the meter's memory.

Numerical and graphical display

The MM70 features a multilingual, menu-based user interface and a backlit LCD display. The measurement parameters can be numerically and graphically displayed and logged into the meter's memory at the same time. An analog output option is also available.

Connection to PC

The optional MI70 Link Windows® software in combination with a USB connection cable is used to transfer logged data and real time measurement data from the MM70 to a PC.

Proven Vaisala HUMICAP® technology

The MM70 incorporates the latest generation of the Vaisala HUMICAP® Sensor, developed for demanding moisture measurements in liquid hydrocarbons. The sensor's excellent chemical tolerance provides accurate and reliable measurement over the measurement range.

Speedy service - once a year

The meter can be recalibrated by sending the probe to Vaisala Service, or customers can calibrate the instrument themselves using a standard relative humidity calibration.

Multi-probe operation

One or two probes can be connected simultaneously. Maintenance teams can use additional Vaisala dewpoint or relative humidity probes for other tasks. For example, a dewpoint probe is ideal for checking the moisture inside washed and dried oil tanks.

Technical data

Performance

WATER ACTIVITY

Measurement range a_w	0 ... 1
Accuracy (including nonlinearity, hysteresis and repeatability)	
When calibrated against salt solutions (ASTM E104-85):	
0 ... 0.9	±0.02
0.9 ... 1.0	±0.03
Maximum achievable accuracy when calibrated against high-quality, certified humidity standards:	
0 ... 0.9	±0.01
0.9 ... 1.0	±0.02
Response time (90%) at +20 °C (+68 °F) in still oil (with stainless steel filter)	10 min.
Sensor	Vaisala HUMICAP®
Recommended recalibration interval	1 year

TEMPERATURE

Measurement range	-40 ... +100 °C (-40 ... +212 °F)
Typical accuracy at +20 °C	±0.2 °C (±0.36 °F)
Typical temperature dependence of electronics	±0.005 °C/°C (±0.005 °F/°F)
Sensor	Pt 100 IEC 751 1/3 class B
Typical long-term stability	better than 0.01 aw / year

Operating environment

PROBE

Operating temperature range for electronics	-40 ... +60 °C (-40 ... +140 °F)
Operating pressure range during installation through ball valve	max. 20 bar max. 10 bar
Oil flow range	max. 1 m/s

INDICATOR

Operating temperature range	-10 ... +40 °C (+14 ... +104 °F)
Operating humidity range	non-condensing

ELECTROMAGNETIC COMPATIBILITY

Complies with EMC standard EN61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements; Portable equipment.

Inputs and outputs

Power supply	Rechargeable NiMH battery pack with AC-adaptor or 4xAA-size alkalines, type IEC LR6
Battery operation time	
continuous use	48 h typical at +20 °C (+68 °F)
data logging use	up to a month, depending on logging interval
Menu languages	English, Chinese, Spanish, French, German, Japanese, Russian, Swedish, Finnish

Display	LCD with backlight, graphic trend display of any parameter, character height up to 16 mm
Analog output	0 ... 1 VDC
Output resolution	0.6 mV
PC interface	MI70 Link software with USB or serial port cable
Data logging capacity	2700 points
Alarm	Audible alarm function

Mechanics

PROBE

Housing classification	IP65 (NEMA 4)
Housing material	ABS/PC blend
Probe material	Stainless steel (AISI316L)
Cable length between probe and indicator	1.9 m, 10 m extension available
Weight	506 g

INDICATOR

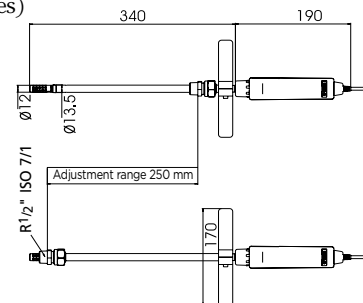
Housing classification	IP54
Weight	400 g
Probe inputs	1 or 2

Options and accessories

Carrying case	MI70CASE2
Ball valve set (incl. fitting body & blanking plug)	HMP228BVS
Probe cable extension, 10 m	213107SP
Transmitter connection cables for	
HMP228	27159ZZ
MMT318	DRW216050
MMT/HMT330/DMT340	211339
MI70 Link software with USB cable	219687
MI70 Link software with serial port cable	MI70LINK
Analog output cable	27168ZZ
Sensor protection	HM47453SP
Dewpoint measurement probes	DMP74A/B
Relative humidity measurement probes	HMP75, HMP76, HMP77

Dimensions

Dimensions in mm (inches)



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GMP343 Carbon Dioxide Probe for Demanding Measurements



Features/Benefits

- Excellent accuracy and stability
- Vaisala CARBOCAP® Sensor, a silicon-based non-dispersive infrared (NDIR) sensor
- A single-beam, dual-wavelength CO₂ measurement with no moving parts
- Compensation options for temperature, pressure, humidity and oxygen
- Low power consumption and heat emission
- Designed for outdoor use
- Compact and lightweight

The GMP343 is available as an open-path diffusion-aspirated model (left) and as a flow-through model (right).

The Vaisala CARBOCAP® Carbon Dioxide Probe GMP343 is an accurate and rugged probe-type instrument for ecological measurements. Typical applications include CO₂ soil respiration, ambient CO₂ monitoring, plant growth chambers, and OEM applications.

The GMP343 can output both numerically filtered and raw measurement data and it can also compensate the measurement with an internal temperature measurement and user-set relative humidity, pressure and oxygen values.

In combination with an MI70 indicator, the GMP343 provides a tool for accurate in-situ measurement. The MI70 can be used as a display, communication and data logging device.

Each GMP343 is calibrated using ±0.5 % accurate gases at 0 ppm, 200 ppm, 370 ppm, 600 ppm, 1000 ppm, 4000 ppm and 2 %. Calibration is also done at temperature points of -30 °C, 0 °C, 25 °C and 50 °C. If needed, the customer can recalibrate the instrument using the multipoint calibration (MPC) feature allowing up to 8 user-defined calibration points.

Technical data

Performance

Measurement range options	0 ... 1000 ppm, 0 ... 2000 ppm, 0 ... 3000 ppm, 0 ... 4000 ppm, 0 ... 5000 ppm, 0 ... 2 %
---------------------------	---

Accuracy (excluding noise) at 25 °C (77 °F) and 1013 hPa after factory calibration with 0.5 % accurate gases with different range options	
0 ... 1000 ppm	±(3 ppm + 1 % of reading)
0 ... 2000 ppm - 0 ... 2 %*	±(5 ppm + 2 % of reading)

*Accuracy below 200 ppm CO₂ not specified for 2 % range option

Noise (repeatability) at 370 ppm CO ₂	
with no output averaging	±3 ppm CO ₂
with 30 s output averaging	±1 ppm CO ₂

TEMPERATURE

Effect on accuracy **with** temperature compensation:

CO ₂ range options	0 ... 1000 ppm	0 ... 2 000 - 5000 ppm	0 ... 2 %
Temperature °C (°F)	Accuracy (% of reading)		
+10 ... +40 (+50 ... +104)	±1	±1	±2
+40 ... +60 (+104 ... +140)	±2	±3	±4
-40 ... +10 (-40 ... +50)	±3	±3	±5

For readings below 200 ppm CO₂ ±5 ppm CO₂
Temperature compensation is performed by an integrated Pt1000 element

Technical data

PRESSURE

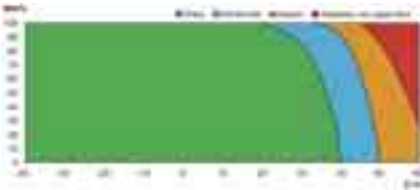
Effect on accuracy **with** pressure compensation:

CO ₂ range options	0 ... 1000 ppm	0 ... 2000 - 2 %
Pressure (hPa)	Accuracy (% of reading)	
900 ... 1050	±0.5	±1
700 ... 1300	±1	±2

Integrated pressure sensor is **not** included in GMP343

Long term stability	see graph below
easy	<±2 % of reading / year
moderate	<±2 % of reading / 6 months
harsh	<±2 % of reading / 3 months

GMP343 OPERATING CONDITIONS



Response time (90 %)

DIFFUSION MODEL		
Filter attached	Averaging (s)	Response (s)
Yes	0	75
Yes	30	82
No	0	<2
No	30	30

FLOW-THROUGH MODEL		
Gas flow (l/min)	Averaging (s)	Response (s)
0.3	0	26
0.3	30	44
1.2	0	8
1.2	30	23

Warm-up time	
full accuracy ±0.5 %	10 min
full accuracy	30 min

Operating Environment

Temperature	
operating	-40 ... +60 °C (-40 ... +140 °F)
storage	-40 ... +70 °C (-40 ... 158 °F)
Humidity	see graph 'GMP343 Operating Conditions'
Pressure	
compensated range	700 ... 1300 hPa
operating	<5 bar
Gas flow for flow-through model	0 ... 10 liters/min
Electromagnetic compatibility	EN61326, Generic Environment

Inputs and outputs

Operating voltage	11 ... 36 VDC
Power consumption	
without optics heating	<1 W
with optics heating	<3.5 W
ANALOG OUTPUTS	
Current output	
range	4 ... 20 mA
resolution	14 bits
max. load	800 Ohm @ 24 VDC, 150 Ohm @ 10 VDC
Voltage output	
range	0 ... 2.5 V, 0 ... 5 V
resolution	14 bits (13 bits with 0 ... 2.5 V)
min. load	5 kOhm
DIGITAL OUTPUTS	RS485, RS232

Materials

Housing	anodized aluminium
Filter cover	PC
IP classification	<1 W
Housing (cable attached)	IP67
Diffusion filter (weather protection)	IP65
Diffusion filter (sintered PTFE)	IP66
Cable connector type	8-pin M12
Weight (probe only)	360 g

Options and accessories

Wall mount bracket	GMP343BRACKET
Mounting flange	GMP343FLANGE
Standard diffusion filter (weather protection, IP65) + filter cover	GMP343FILTER
Diffusion filter (sintered PTFE filter, IP66) + filter cover	215521
Calibration adapter (for the diffusion model)	GMP343ADAPTER
Junction box	JUNCTIONBOX-8
Probe cables	
2m	GMP343Z200SP
6m	GMP343Z600SP
10m	GMP343Z1000SP
PC connection cable, 2m	213379
MI70 connection cable, 2m	DRW216050SP
USB adapter (USB-D9 Serial connection cable)	219686
Soil adapter kit for horizontal positioning	215519
Soil adapter kit for vertical positioning	215520

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GMT220 Series Carbon Dioxide Transmitters for Industrial Applications



The GMT220 transmitters withstand harsh and humid environments.

Features/Benefits

- Incorporates Vaisala CARBOCAP® - the silicon-based NDIR sensor
- IP65 protected against dust and spray water
- Several measurement ranges
- Easy installation
- Standard analog outputs and two configurable relays available

Applications include:

- Horticulture and fruit storage
- Greenhouses and mushroom farming
- Safety alarming and leakage monitoring
- Demand controlled ventilation in harsh environments

The Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220 is designed to measure carbon dioxide in harsh and humid environments. The housing is dust- and waterproof to IP65 standards.

The GMT220 series transmitters incorporate the advanced Vaisala CARBOCAP® Sensor. The patented sensor has unique reference measurement capabilities. Its critical parts are made of silicon; this gives the sensor outstanding stability over both time and temperature. By lengthening the calibration intervals, the user saves both time and money.

Interchangeable probes

The user has a choice of measurement ranges up to 20% of CO₂. The GMT221 is for higher concentrations of CO₂ and the

GMT222 for lower concentrations of CO₂. The GMT220 probes are interchangeable. They can be removed and reattached or replaced at any time – without the need for calibration and adjustment. The probes can be attached directly to the transmitter body or, when used with a cable, installed remotely into hard-to-reach places or areas with dangerously high levels of CO₂.

The interchangeability of the GMT220 transmitter's probes truly facilitates field maintenance.

The end user can carry out field maintenance without any additional equipment or heavy and expensive calibration gas bottles by simply replacing a probe.

Probes that have been replaced can be sent to Vaisala for recalibration.

Technical data

Performance

Measurement Ranges	
GMT221	0 ... 2 %
for high concentrations	0 ... 3 %
	0 ... 5 %
	0 ... 10 %
	0 ... 20 %
GMT222	0 ... 2000 ppm
for low concentrations	0 ... 3000 ppm
	0 ... 5000 ppm
	0 ... 7000 ppm
	0 ... 10 000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty) at 25 °C and 1013 hPa	
GMT221	±(1.5 % of range + 2 % of reading)
(applies for concentrations above 2 % of full scale)	
GMT222	±(1.5 % of range + 2 % of reading)
Temperature dependence, typical	-0.3 % of reading / °C
Pressure dependence, typical	+0.15 % of reading/hPa
Long-term stability	<±5 %FS/2 years
Response time (63 %)	
GMT221	20 seconds
GMT222	30 seconds
Warm-up time	30 seconds, 15 minutes full specifications

Inputs and outputs

Outputs	0 ... 20 or 4 ... 20 mA and 0 ... 10 V
Resolution of analog outputs	12 bits
Recommended external load:	
current output	max. 400 Ohm
voltage output	min. 1 kOhm
Two pre-or user-defined relay outputs	
Relay contacts	max. 30VAC/60VDC, 0.5A
Connections	screw terminals, 0.5 ... 1.5 mm ²
Operating voltage	nominal 24 VAC/DC
Power consumption	<4 W

Operating environment

Operating temperature	-20 ... +60 °C (-4 ... +140 °F)
with display	0 ... +50 °C (+32 ... +122 °F)
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Humidity	0 ... 100 %RH, non-condensing
Electromagnetic compatibility	EN61326-1, Generic Environment

Mechanics

Housing material	
transmitter body	ABS plastic
probe	PC plastic
Housing classification	
	IP65
Weight:	
GMT221	max. 280 g
GMT222	max. 300 g
Probe cable length	2 m and 10 m (optional)

Accessories

Spare probe	GMP221, GMP222 (use the order form to define measurement range etc.)
Clips (2 pcs) for attaching the probe	25245GM
Mounting flange for the probe	GM45156
Probe cables	
2 m	25665GMSP
10 m	210848GMSP
Calibrator for interchangeable probes	GMK220
Wall Assembly Plate	GM45160
In-soil adapter for probe	211921GM
Serial COM adapter	19040GM
Calibration adapter for probe	26150GM

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GMM220 Carbon Dioxide Modules for Demanding OEM Applications



The Vaisala CARBOCAP® Carbon Dioxide Module Series GMM220 withstand harsh conditions. They provide high carbon dioxide measurement accuracy over wide temperature and relative humidity ranges.

Features/Benefits

- Incorporates Vaisala CARBOCAP® - the silicon based CO₂ sensor
- Choice of several measurement ranges
- IP65 protected probe against dust and spray water
- Interchangeable probes provide easy maintenance
- Modules optimized for integration into equipment for greenhouse control, incubators, fermentors, safety alarming and integrated systems.

For harsh environments

The Vaisala CARBOCAP® Carbon Dioxide Module Series GMM220 are designed for Original Equipment Manufacturers (OEM's) requiring carbon dioxide measurements in harsh and demanding applications.

Vaisala CARBOCAP®

The GMM220 series modules incorporate the industrial Vaisala CARBOCAP® Sensor. The patented sensor has unique reference measurement capabilities. Its critical parts are made of silicon; this gives the sensor outstanding stability over both time and temperature.

Since water vapor, dust, and most chemicals do not affect the measurement, the GMM220 series modules can be used in harsh and humid environments.

Interchangeable probes

The GMP220 probes are interchangeable. They can be removed, reattached or replaced at any time – without the need for calibration and adjustment. The interchangeable probes make calibration and field service easy. In addition, the measurement range can be changed simply by replacing one probe with another.

Different configurations

The user has a choice of measurement ranges up to 20 % CO₂: the Vaisala CARBOCAP® Carbon Dioxide Module GMM221 for higher and the Vaisala CARBOCAP® Carbon Dioxide Module GMM222 for lower concentrations of CO₂.

Different power supply voltages, output options, as well as cable lengths, connectors, and mounting gear are also available.

Technical data

Carbon dioxide

Measurement ranges	
GMM221 for high concentrations	0 ... 2 %, 0 ... 3 %, 0 ... 5 %, 0 ... 10 %, 0 ... 20 %
GMM222 for low concentrations	0 ... 2000 ppm, 0 ... 3000 ppm, 0 ... 5000 ppm, 0 ... 7000 ppm, 0 ... 10 000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty) at 25 °C and 1013 hPa	
GMM221	±(1.5% of range + 2% of reading)
(applies for concentrations above 2% of full scale)	
GMM222	±(1.5% of reading + 2% of reading)
Temperature dependence, typical	-0.3 % of reading / °C
Pressure dependence, typical	+0.15% of reading hPa
Long-term stability	<±5 %FS/2 years
Response time (63 %)	
GMM221	20 seconds
GMM222	30 seconds
Warm-up time	30 seconds, 15 minutes full specifications

Inputs and outputs

Outputs	0 ... 20 or 4 ... 20 mA, 0 ... 1 V, 0 ... 2V, 0 ... 2.5 V, or 0 ... 5 V
Resolution of analog outputs	12 bits
Recommended external load:	
current output	max. 200 Ohm
voltage output	min. 1 kOhm
Operating voltage	11 ... 20 VDC or 18 ... 30 VDC
Connections	screw terminals, wire size 0.5 ... 1.5 mm ²
Power consumption	<2.5 W

Operating environment

Operating temperature	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Operating pressure	700 ... 1300 hPa
probe	0 ... 100 %RH, non-condensing
mother board	0 ... 85 %RH, non-condensing
Electromagnetic compatibility	EN61326-1, Generic Environment

Mechanics

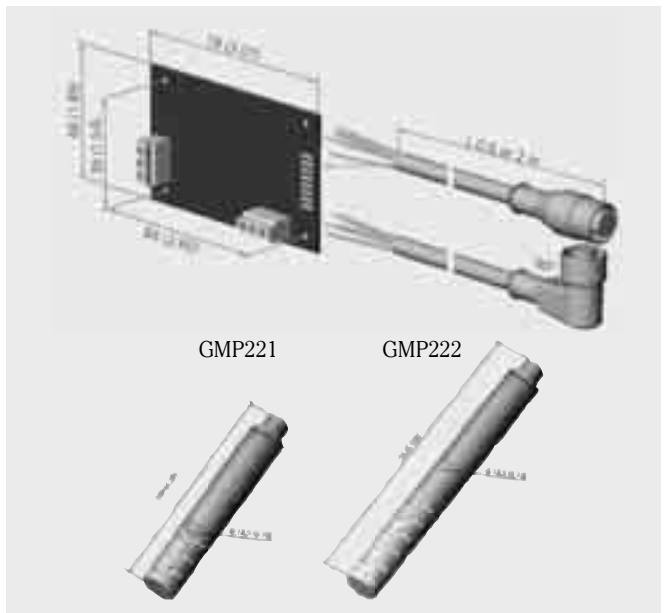
Probe housing material	PC plastic
Housing classification (probe only)	IP65
Weight: GMM221 (w/2m cable)	max. 180 g
Weight: GMM222 (w/2m cable)	max. 200 g
Probe cable length	0.6 m, 1 m (high temperature cable), 2 m, 6 m or 10 m (optional)

Accessories

Spare probe	GMP221, GMP222 (use the order form to define measurement range etc.)
Clips (2 pcs) for attaching the probe	25245GM
Mounting flange for the probe	GM45156
CO ₂ Calibration Unit	GMK220
Probe cables	
1 m high temperature probe cable (180 °C / 365 °F)	GMM220Z100SP
2 m probe cable	GMM220Z200SP
6 m probe cable	GMP343Z600SP
10.0 m probe cable	GMP343Z1000SP
Serial COM adapter	19040GM

Dimensions

Dimensions in mm (inches)



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GMM111 Carbon Dioxide Module



The Vaisala CARBOCAP® Carbon Dioxide Module GMM111 is a CO₂ measurement module with flow-through aspiration.

Features/Benefits

- Compact CO₂ module with flow-through aspiration
- Ideal for control of CO₂ concentrations in incubators
- Incorporates Vaisala CARBOCAP®, the silicon based NDIR sensor with unique internal referencing
- Advanced single-beam, dual wavelength measurement with no moving parts
- Measurement range options 0 ... 5 %, 0 ... 10 % and 0 ... 20 % CO₂
- Excellent long-term stability

GMM111

The Vaisala CARBOCAP® Carbon Dioxide Module GMM111 is designed especially for control of biological processes where high CO₂ concentrations are used. It has 3 optional measurement ranges 0 ... 5/10/20 % CO₂. The GMM111 is a flow-through model and has barbed connectors for attaching the in and out flow tubes. As the module is not mounted in the chamber, the chamber can be heatsterilized without removing the module.

The Vaisala CARBOCAP® CO₂ sensors have been proven to be accurate and durable. They have an excellent long-term stability, which decreases maintenance. The superior performance of Vaisala

CARBOCAP® sensors results largely from the stable reference provided by the electrically tunable Fabry-Perot Interferometer(FPI).

The tunable FPI filter measures CO₂ absorption, and simultaneously a reference wavelength. This internal reference measurement compensates effectively for any changes in the optical path, such as light source intensity changes and contamination. In the HVAC market, this type of reference measurement is a unique feature to Vaisala CARBOCAP® products.

The true internal reference measurement of Vaisala CARBOCAP® CO₂ transmitters provides years of stable CO₂ measurements.

Technical data

Performance

CO ₂ measurement range	0 ... 5 %, 0 ... 10 % or 0 ... 20 %
Accuracy (including repeatability, non-linearity and calibration uncertainty)	±(1.5% of range + 3 % of reading)
Long-term stability	±1 % CO ₂ /2 years
Response time T ₉₀	1 min at 0.5 l/min flow
Flow rate dependence	
< 1 l/min flow	no effect
1 ... 10 l/min flow	4 % of reading/ l/min
Temperature dependence, typical	-0.3 % of reading/°C
Pressure dependence, typical	+0.15 % of reading/hPa
Warm-up time	1 min, 10 min for full specifications
Product lifetime	> 10 years

Operating environment

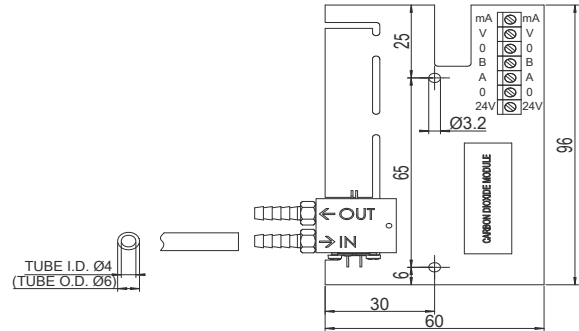
Temperature	+5 ... +55 °C (+41 ... +131 °F)
Humidity	0 ... 99 %RH non-condensing
Pressure	700 ... 1200 hPa
Gas flow	
operating range	< 10 l/min
recommended range	0.2 ... 0.8 l/min
Electromagnetic compatibility	
Complies with EMS Standard EN61326-1, Generic Environment	

Inputs and outputs

Outputs	4 ... 20 mA, 0 ... 10 V RS485, 2-wire, non-isolated
Operating voltage	24 V (±20 %) AC/DC
Power consumption	< 2 W

Dimensions

Dimensions in mm



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GM70 Hand-Held Carbon Dioxide Meter for Spot-Checking Applications



The Vaisala CARBOCAP® Hand-Held Carbon Dioxide Meter GM70 is the demanding professional's choice for hand-held carbon dioxide measurement. The meter consists of the indicator (center) and probe, used either with the handle (left) or pump (right).

Features/Benefits

- Proven Vaisala CARBOCAP® reliability
- Two optional sampling methods: diffusion or pump aspiration
- User-friendly meter with multilingual user interface
- Numerical and graphical display of measurements
- Data can be logged and transferred to PC via MI70 Link software
- Wide selection of measurement ranges
- Easy recalibration using the interchangeable probes
- Suitable for field checking of fixed CO₂ instruments
- Short warm-up time
- Compact and versatile

The Vaisala CARBOCAP® Hand-Held Carbon Dioxide Meter GM70 is a user-friendly meter for demanding spot measurements in laboratories, greenhouses and mushroom farms. The meter can also be used in HVAC and industrial applications, and as a tool for checking fixed CO₂ instruments. The GM70 has a short warm-up time and is ready for use almost immediately. It has a menu-based interface, a graphical LCD display and data logging capability. The optional MI70 Link Windows® software in combination with a USB connection cable provides an easy way to handle data in a PC environment.

Vaisala CARBOCAP® technology

The GM70 incorporates the advanced Vaisala CARBOCAP® sensor that has unique reference measurement capabilities. The measurement

accuracy is not affected by dust, water vapor or most chemicals. The GM70 has a two-year recommended calibration interval.

Two sampling methods

The handle is for hand-held diffusion sampling. The GM70 pump enables pump-aspirated sampling from locations difficult to access otherwise. It is also ideal for comparisons with fixed CO₂ transmitters.

Interchangeable probes

The GM70 uses the same probes as Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220 and Modules Series GMM220. By plugging different probes into the handle or pump, the user can easily change the measurement range of the GM70. The meter can also be used as a calibration check instrument for Vaisala's GM20 and series, GMT/M220 fixed CO₂ instruments. GMP220 probes can even be adjusted by using the GM70 meter.

The GM70 has two probe inputs. Vaisala's relative humidity and dewpoint probes can also be used simultaneously with CO₂ measurement.

Technical data

CO₂ volume concentration measurement

Measurement ranges	
High concentrations	0 ... 2 %
short probe (GMP221)	0 ... 3 %
	0 ... 5 %, 0 ... 10 %, 0 ... 20 %
Low concentrations	0 ... 2000 ppm
long probe (GMP222)	0 ... 3000 ppm, 0 ... 5000 ppm, 0 ... 7000 ppm, 0 ... 10,000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty) at 25 °C and 1013 hPa	
GMP221	±(1.5% of range + 2% of reading)
(applies for concentrations above 2% of full scale)	
GMP222	±(1.5% of range + 2% of reading)
Temperature dependence, typical	-0.3 % of reading / °C
Pressure dependence, typical	+0.15% of reading/hPa
Long-term stability	<±5 %FS/2 years
Response time (63 %)	
GMP221	20 seconds
GMP222	30 seconds
Warm-up time	30 seconds, 15 minute full specifications

Measurement environment

Temperature	-20 ... +60 °C (-4 ... +140 °F)
Relative humidity	0 ... 100 %RH non-condensing
Operation pressure	700 ... 1300 hPa
Flow range (diffusion sampling)	0 ... 10 m/s

Probe, handle & pump general

Sensor	Vaisala CARBOCAP®
Housing material	
GMP221/222 probe	PC plastic
GMH70 handle	ABS/PC blend
GM70 Pump	aluminium casing
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Storage humidity	0 ... 100 %RH non-condensing
Weight	
GMH70 with GMP221/222 probe	230 g
GM70 Pump with GMP221/222 probe	700 g

MI70 Indicator general

Menu languages	English, Chinese, French, Spanish, German, Japanese, Russian, Swedish, Finnish
Display	LCD with backlight, graphic trend display of any parameter, character height up to 16 mm
Max. no. of probes	2
Power supply	Rechargeable NiMH battery pack with AC-adaptor
Analog output	0 ... 1 VDC
Output resolution	0.6 mV
PC interface	MI70 Link software with USB or serial port cable
Data logging capacity	2700 points
Alarm	Audible alarm function
Operating temperature range	-10 ... +40 °C (+14 ... +104 °F)
Operating humidity range	non-condensing
Housing material	ABS/PC blend
Housing classification	IP54
Weight	400 g

Battery operation time

Continuous use	
with handle	better than 8h at +20 °C (+68 °F)
with pump	better than 5h at +20 °C (+68 °F) without load
Data logging use	up to a month, depending on logging interval

Electromagnetic compatibility

EN 61326-1, Portable Equipment.

Accessories

Connection cable for fixed CO ₂ instruments	
GMT220, GMM220, GMD20 and GMW20	GMA70
MI70 Link software with USB cable	219687
MI70 Link software with serial port cable	MI70LINK
Analog output cable for 0 ... 1 VDC	27168ZZ
Calibration adapter	26150GM
Carrying case	MI70CASE
Battery, NiMH 4.8V	26755
Spare probe	GMP221, GMP222
(use the order form to define measurement range etc.)	
Nafion Membrane Tubing	212807GM

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GMW115 Carbon Dioxide Transmitter for Demand-controlled Ventilation



The Vaisala CARBOCAP® Carbon Dioxide Transmitter GMW115 is a wall-mounted CO₂ transmitter for demand-controlled ventilation.

Features/Benefits

- Compact, wall-mounted transmitter for demand-controlled ventilation
- Incorporates Vaisala CARBOCAP®, the silicon based NDIR sensor with unique internal referencing
- Advanced, single-beam, dual wavelength measurement with no moving parts
- Excellent long-term stability
- Ideal for ventilation control in all types of occupied spaces

Most of us spend 90 % of our time indoors. Consequently, good indoor air quality is important to our wellbeing. All human beings produce carbon dioxide gas by respiration, thus the carbon dioxide level can be used as an indicator for indoor human presence. A high CO₂ level is a sign of poor ventilation and often an indication of other unpleasant odors in the air. In many buildings the ventilation need varies throughout the day. Demand controlled ventilation is an economical way to ensure good air quality.

The Vaisala CARBOCAP® CO₂ sensors have been proven to be accurate and durable. They have an excellent long-term stability, which decreases maintenance. The superior performance of Vaisala CARBOCAP® sensors results largely

from the stable reference provided by the electrically tunable Fabry-Perot Interferometer (FPI).

The tunable FPI filter measures CO₂ absorption, and simultaneously a reference wavelength. This internal reference measurement compensates effectively for any changes in the optical path, such as light source intensity changes and contamination. In the HVAC market, this type of reference measurement is a unique feature to Vaisala CARBOCAP® products, distinguishing them from competitors' comparative products that do not have a reference measurement at all, or have an indirect reference measurement, which is based on an assumed background CO₂ levels. In buildings with around-the-clock occupancy (e.g. hospitals, work-places, residential buildings, retirement homes), the assumed background CO₂ level reference is simply not applicable. The true internal reference measurement of Vaisala CARBOCAP® CO₂ transmitters provides years of stable CO₂ measurements.

The GMW115 Transmitter is designed especially for DCV (Demand Controlled Ventilation) applications with two optional CO₂ measurement ranges of 0...2000 ppm and 0...5000 ppm.

Technical data

Performance

CO ₂ -measurement range	0 ... 2000 ppm 0.....5000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty)	±(2 % of range + 2 % of reading)
Long-term stability	± 5 % of range/5 years
Response time T90	1 min
Temperature dependence, typical	-0,35 % of reading / °C
Pressure dependence, typical	+0,15 % of reading/hPa
Warm-up time	1 min, 10 min for full specification
Product lifetime	> 10 years

Operating environment

Temperature	-5 ... +45 °C (23 ... 113 °F)
Humidity	0 ... 85 %RH
Pressure	700 ... 1200 hPa
Electromagnetic compatibility	Complies with EMS standard EN61326-1, Generic Environment

Inputs and outputs

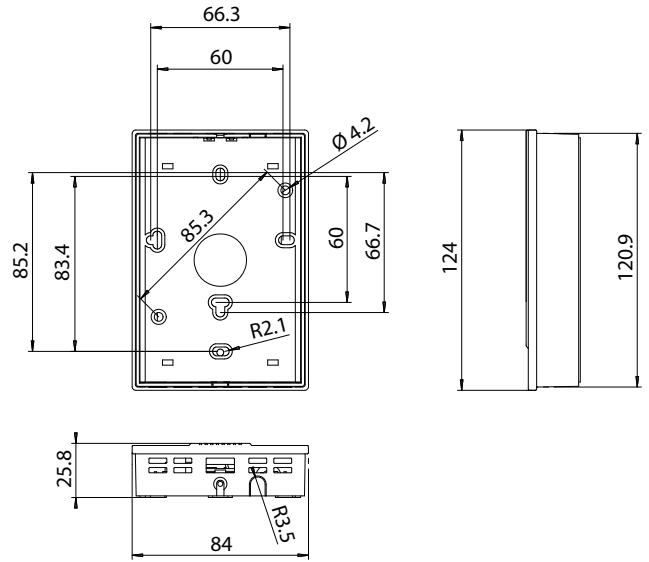
Operating voltage	24 V (±20 %) AC/DC
Power consumption	<2 W
Outputs	4 ... 20 mA, 0 ... 10 V, RS-485, 2-wire, non-isolated

Housing

Material:	ABS plastics
Colour:	Cyclac 233599/NCS 0502-G50Y
Fire resistance:	UL94 HB
Ingress protection:	IP30

Dimensions

Dimensions in mm



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GMD/W20 Series Carbon Dioxide Transmitters for Demand Controlled Ventilation Applications



affected by dust, water vapor and most chemicals.

Versatile transmitters

The GMD/W20 series transmitters can be used independently, or incorporated into building energy management systems. The series consists of duct mount units GMD20/D and wall mount units GMW21/D and GMW22/D. Version D has a display. The two sizes in the wall-mount series make them easy to install for most standard junction boxes.

The duct units' compact sensor head design requires only a small hole in a ventilation duct, thereby minimizing the risk of leaking gaskets and measurement errors.

In addition to the standard 0 ... 20 mA, 4 ... 20 mA and 0 ... 10 V outputs, there are three other options: two LonWorks® interfaces and a relay output. The relay output is standard with the display units.

Improve indoor air at minimal energy costs

The use of the GMD/W20 series transmitters ensures the best possible control of air quality and results in considerable savings in energy consumption, maintenance and recalibration costs.

Temperature option

The GMA20T temperature module, an option with the GMW21 wall mount unit, combines both CO₂ and temperature measurement into one transmitter. The GMA20T has an output of 0 ... 10 V corresponding to a temperature range of 0 ... +50 °C (+32 ... +122 °F).

The GMD/W20 series transmitters are designed for use in ventilation-related applications.

Features/Benefits

- Versatile transmitters
- Duct and wall mount models
- Incorporates Vaisala CARBOCAP® Sensor - the silicon-based NDIR sensor
- Excellent long-term stability
- Negligible temperature dependence
- Ease of installation

The duct mounted Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMD20 and wall mounted GMW20 are specially designed for Demand Controlled Ventilation (DCV). They are easy to install and require no maintenance. The recommended calibration interval is five years.

Vaisala CARBOCAP® technology

The GMD/W20 Series Transmitters use the silicon-based Vaisala CARBOCAP® Sensor. The simple structure and reference measurement capabilities make this Single-Beam, Dual-Wavelength NDIR sensor extremely stable and reliable.

The temperature and flow dependences of the sensor are negligible. In addition, the measurement accuracy is not

Technical data

Performance

CARBON DIOXIDE MEASUREMENT	
Measurement range	0 ... 2000 ppm (nominal; can be calibrated for other ranges: 0 ... 5000 ppm, 0 ... 10,000 ppm, 0 ... 20,000 ppm)
Accuracy (including repeatability, non-linearity and calibration uncertainty)	± (2 % of range + 2% of reading)
Long-term stability	<±5 % of range / 5 years
Response time (63%)	1 minute
Warm-up time	1 minute, 15 minutes full specifications
TEMPERATURE MEASUREMENT (OPTIONAL WITH GMW21)	
Output signal	0 ... 10V
Corresponding measurement range	0 ... +50 °C (+32 ... +122 °F)
Accuracy at +25 °C	±0.5 °C (0.9 °F)
Warm up time	30 min
Temperature sensor	Semiconductor IC

Inputs and outputs

Outputs	0 ... 20 or 4 ... 20 mA and 0 ... 10V
Optional outputs	relay LonWorks® interface
Resolution of analog outputs	8 bits
Recommended external load:	
current output	max. 500 ohm
voltage output	min. 1 kohm
Operating voltage	nominal 24 VAC/DC (18 ... 30 VDC)
Connections	screw terminals, wire size 0.5 ... 1.5 mm ²
Power consumption	<2.5 W

Operating environment

Temperature	-5 ... +45 °C (+23 ... +113 °F)
Humidity	0 ... 85 %RH, non-condensing
Flow velocity (GMD20)	0 ... 10 m/s
Electromagnetic compatibility	EN61326-1, Generic Environment

Mechanics

Housing material	ABS plastic
Housing classification (GMD20 electronics housing)	IP65
Housing colour GMW21/22	NCS 0502-G50Y
Weight:	
GMD20 (D)	140 g (170 g)
GMW21 (D)	100 g (130 g)
GMW22 (D)	90 g (120 g)

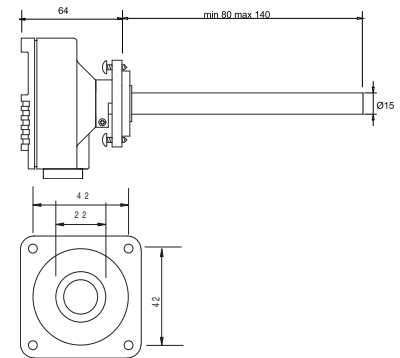
Accessories and options

Display and relay option for GMD/W21/22	GMI21
Relay output option	GMR20
LonWorks® module with CO ₂ signal (Not available when display option is added)	GML20
LonWorks® module with both CO ₂ signal and temperature signals (Not available when display option is added)	GML20T
Serial COM adapter	19040GM
Analog temperature module for GMW21 (not available when display option is added)	GMA20T
Hand-held meter for field verification	GM70

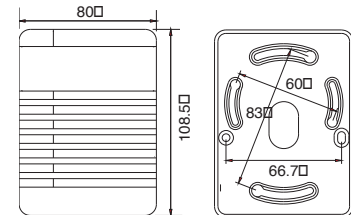
Dimensions

Dimensions in mm

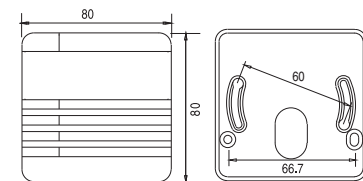
GMD20 and GMD20D



GMW21 and GMW21D



GMW22 and GMW22D



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GMM112 Carbon Dioxide Module for HVAC Applications



The Vaisala CARBOCAP® Carbon Dioxide Module GMM112 is a basic CO₂ measurement module.

Features/Benefits

- Compact, OEM module for demand-controlled ventilation and other CO₂ measurement applications
- Incorporates Vaisala CARBOCAP®, the silicon based NDIR sensor with unique internal referencing
- Advanced, single-beam, dual wavelength measurement with no moving parts
- Excellent long-term stability
- Ideal for ventilation control in all types of occupied spaces

Most of us spend 90% of our time indoors. Consequently, good indoor air quality is important to our wellbeing. All human beings produce carbon dioxide gas by respiration, thus the carbon dioxide level can be used as an indicator for indoor human presence. A high CO₂ level is a sign of poor ventilation and often an indication of other unpleasant odors in the air. In many buildings the ventilation need varies throughout the day. Demand controlled ventilation is an economical way to ensure good air quality.

The Vaisala CARBOCAP® CO₂ sensors have been proven to be accurate and durable. They have an excellent long-term stability, which decreases maintenance. The

superior performance of Vaisala CARBOCAP® sensors results largely from the stable reference provided by the electrically tunable Fabry-Perot Interferometer (FPI).

The tunable FPI filter measures CO₂ absorption, and simultaneously a reference wavelength. This internal reference measurement compensates effectively for any changes in the optical path, such as light source intensity changes and contamination. In the HVAC market, this type of reference measurement is a unique feature to Vaisala CARBOCAP® products, distinguishing them from competitors' comparative products that do not have a reference measurement at all, or have an indirect reference measurement,

which is based on an assumed background CO₂ levels. In buildings with around-the-clock occupancy (e.g. hospitals, work-places, residential buildings, retirement homes), the assumed background CO₂ level reference is simply not applicable. The true internal reference measurement of Vaisala CARBOCAP® CO₂ transmitters provides years of stable CO₂ measurements.

The GMM112 Carbon Dioxide Module is designed especially for DCV (Demand Controlled Ventilation) applications with three optional CO₂ measurement ranges of 0...2000 ppm, 0...5000 ppm and 0...10000 ppm.

Technical data

Performance

CO ₂ -measurement range	0 ... 2000 ppm 0 ... 5000 ppm 0 ... 10000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty)	± (2 % of range + 2 % of reading)
Long-term stability	± 5 % of range/5 years
Response time T90	1 min
Temperature dependence, typical	-0,35 % of reading / °C
Pressure dependence, typical	+0,15 % of reading/hPa
Warm-up time	1 min, 10 min for full specification
Product lifetime	> 10 years

Operating environment

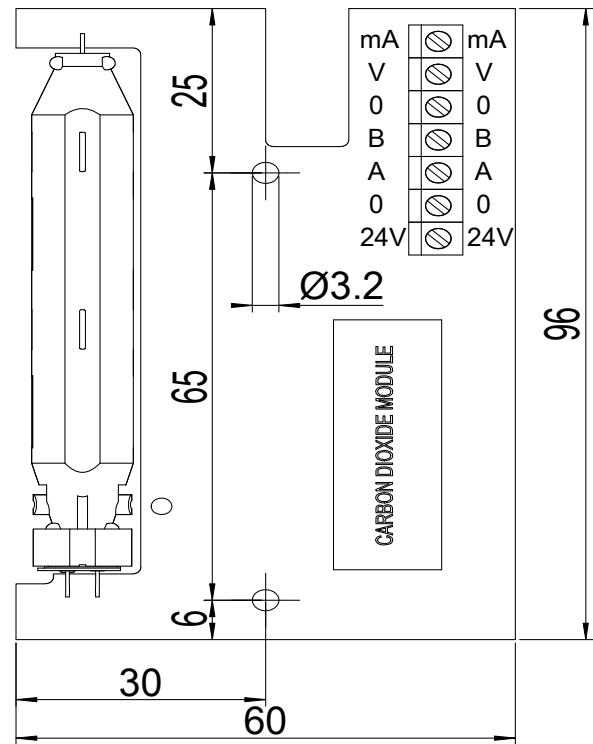
Temperature	-5 ... +45 °C (23 ... 113 °F)
Humidity	0 ... 85 %RH
Pressure	700 ... 1200 hPa
Electromagnetic compatibility	Complies with EMS standard EN61326-1:1997 + Am1:1998, Generic Environment

Inputs and outputs

Operating voltage	24 V (±20 %) AC/DC
Power consumption	<2 W
Outputs	4 ... 20 mA, 0 ... 10 V, RS-485, 2-wire, non-isolated

Dimensions

Dimensions in mm



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GMM20W Carbon Dioxide Module for OEM Applications



Features/Benefits

- Incorporates the silicon based Vaisala CARBOCAP® Sensor
- Stable in terms of time and temperature
- Dust, water vapor or most chemicals do not affect the measurement accuracy of the sensor
- Small size enables easy integration into various systems

The Vaisala CARBOCAP® Carbon Dioxide Module GMM20W is designed for OEM applications in benign environments.

Technical data

Performance

CARBON DIOXIDE MEASUREMENT

Measurement range	0 ... 2000 ppm (nominal; can be calibrated for other ranges: 0 ... 5000 ppm, 0 ... 10,000 ppm, 0 ... 20,000 ppm)
Accuracy (including repeatability, non-linearity and calibration uncertainty)	± (2 % of range + 2% of reading)
Long-term stability	≤ 5 % of range / 5 years
Response time (63%)	1 minute
Warm-up time	minute, 15 minutes full specifications
Weight	45 g

Inputs and outputs

Outputs	0 ... 20 or 4 ... 20 mA and 0 ... 10 V
Resolution of analog outputs	8 bits
current output	max. 500 ohm
voltage output	min. 1 kohm
Operating voltage	nominal 24 VAC/DC (18 ... 30 VDC)
Power consumption	< 2.5 W

Operating environment

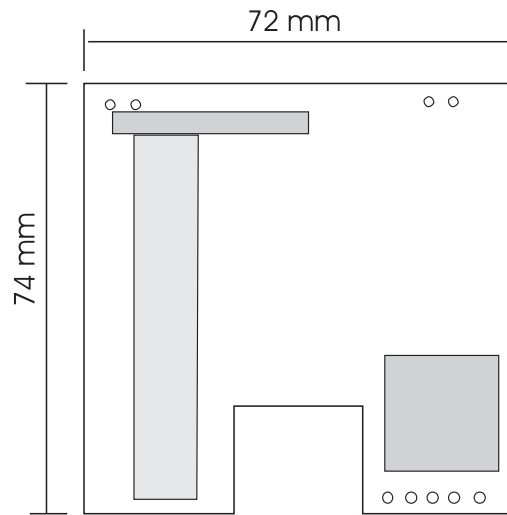
Temperature	-5 ... +45 °C (+23 ... +113 °F)
Humidity	0 ... 85 %RH, non-condensing
Electromagnetic compatibility	EN61326-1, Generic Environment

Accessories and options

Display and relay option	GMI21
Relay output option	GMR20
Calibration software kit (disk and serial COM adapter)	19222GM
Analog temperature module* (not available when display option is added)	GMA20T

Dimensions

Dimensions in mm



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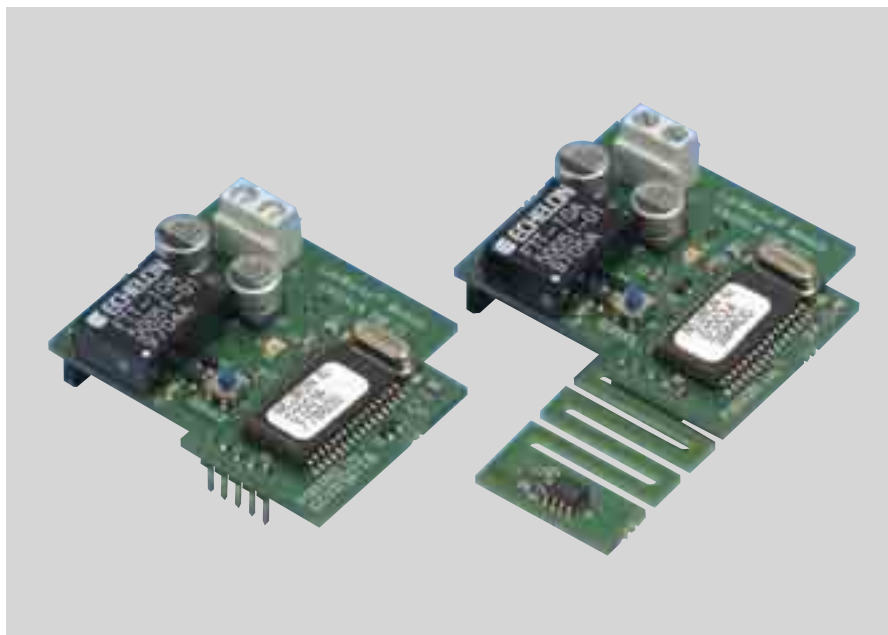
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GML20 and GML20T LonWorks® Options for GMD/W20 Series



GML20 (left) and GML20T modules enable digital communication between the Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GM20 and a LonWorks® network.

GML20T module connects a Vaisala CARBOCAP® Carbon Dioxide Transmitter GMW21 to a LonWorks® network.

Significant savings

Vaisala's GML20 and GML20T are interface modules for distributing signals from Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GM20 digitally to a LonWorks® network over a twisted pair.

Features/Benefits

- Enables digital communication between Vaisala CARBOCAP®
- Carbon Dioxide Transmitter Series GM20 and LonWorks®
- GML20 for CO₂ signal
- GML20T for CO₂ + T signal
- Savings in cabling, installation and maintenance costs

The GML20 Module distributes CO₂ signals; the GML20T Module distributes both CO₂ and temperature signals. The GML20T Module can be used only with the Vaisala CARBOCAP® Carbon Dioxide Transmitter GMW21.

The use of these modules and Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GM20 with a LonWorks® networked control system contributes to considerable savings in cabling, installation and maintenance costs.

Intelligent LonTalk® protocol

In a LonWorks® network, devices called nodes communicate with each other using the LonTalk® protocol. Every node consists of a Neuron®

chip and a transceiver. The Neuron® chip is a microprocessor which contains an application program and LonTalk® protocol. The transceiver adapts the Neuron® chip into the hardware environment used. The nodes communicate with each other, sending messages containing the value of the desired variables.

With Vaisala modules, these variables are CO₂ (GML20) or CO₂ and temperature (GML20T). Some network variables are so-called configuration variables, which are used to define the behavior of the node. With the GML20 and GML20T, they are used to designate how much the temperature and/or carbon dioxide level must change before a measured value is sent again.

Technical data

Features

- LonWorks® interoperable
- Twisted pair free topology, network type TP/FT-10 at 78kbps
- Additional two wires needed for powering the transmitter; can thus be connected to both powered and non-powered networks
- Service button and service LED for simple installation and configuration
- External interface (.xif) file available on request (GML20 part no. 19412GM, GML20T part no. 19748GM)
- Temperature (GML20T only): Measurement accuracy 0.5 °C (0.9 °F) Measurement range 0 ...+45 °C (+32 ... 113 °F) Warm-up time 30 min.

Network Variables for CO₂

(BOTH MODELS GML20 AND GML20T)

nviRequest: to request modes for objects within this node

nvoStatus: to report status of objects on this node

nvoCO₂ppm: this output variable reports the CO₂ level detected by the sensor

nciMaxSendtime: indicates the maximum period of time that expires before the sensor object automatically updates all its output variables (default value: 300 seconds)

nciMinSendtime: indicates the minimum period between output network variable transitions (default value: 5 seconds)

nciCO₂MinDelta: indicates the minimum CO₂ level change required to update the output network variables (default value: 10 ppm)

Networks Variables for Temperature

(GML20T MODEL ONLY)

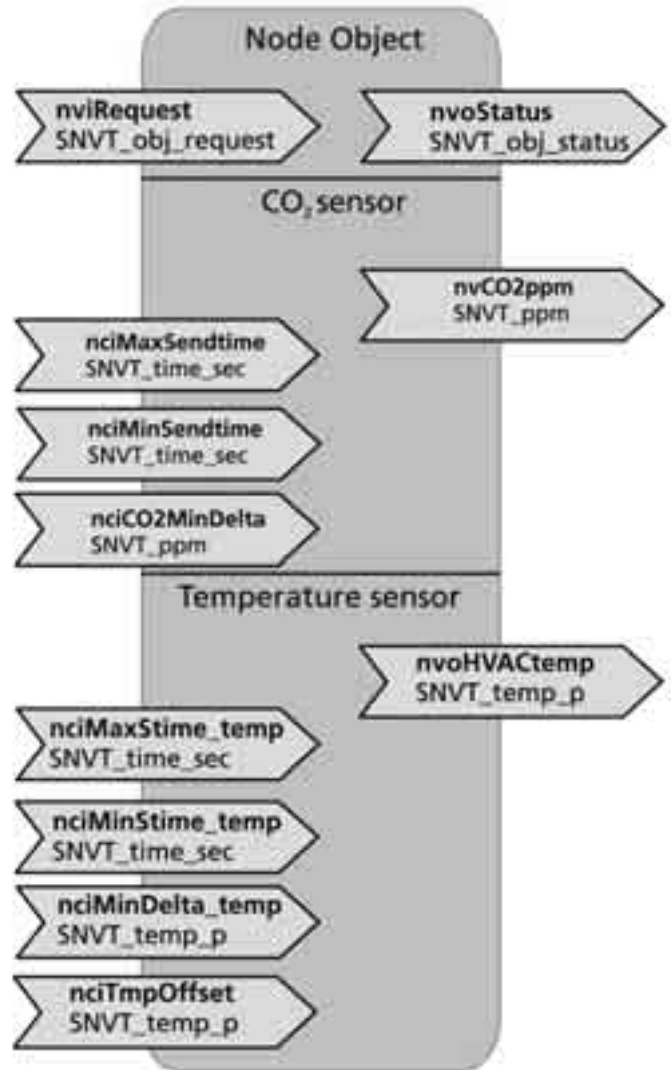
nvoHVACTemp: this output variable reports the temperature detected by the sensor

nciMaxStime_temp: indicates the maximum period of time that expires before the sensor object automatically updates all its output variables (default value: 300 seconds)

nciMinStime_temp: indicates the minimum period between output network variable transitions (default value: 5 seconds)

nciMinDelta_temp: indicates the minimum temperature change required to update the output network variables (default value: 0.3 °C)

nciTmpOffset: indicates the temperature offset level (default value: -0.8 °C)



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OMT355 Oxygen Transmitter for Industrial Process Measurements



OMT355 with the sampling cell.

The Vaisala SPECTRACAP® Oxygen Transmitter.

Features/Benefits

- Minimizes need for sample conditioning equipment
- In-situ probe or sampling cell options
- Tolerates aggressive chemicals
- Tolerates excessive amounts of moisture even in liquid form
- Low maintenance
- Diagnostic output for preventive maintenance
- Heated optical surfaces to prevent condensation
- Typical applications:
 - gas generation
 - gas blanketing
 - fermentation
 - composting process monitoring

The Vaisala SPECTRACAP® Oxygen Transmitter OMT355 is ideal for oxygen monitoring in moist and aggressive process gases. Typical applications include gas generation, inert gas blanketing, fermentation and composting process monitoring.

Laser based measurement

The Vaisala SPECTRACAP® Oxygen Transmitter OMT355 is ideal for oxygen monitoring in moist and aggressive process gases. The OMT355 incorporates a compact tunable diode laser (TDL) gas spectrometer built in the measurement probe. This optical measurement technology is well known for unmatched stability and robustness. The SPECTRACAP® sensor offers TDL technology in a compact probe suitable for field use.

Direct installation

In many applications, the OMT355 can be flange-mounted directly into a process. No sampling or sample conditioning equipment is needed. This feature provides real time measurement data without sampling or sample switching delays.

Sampling cell installation

An optional sampling cell is available for processes with high temperatures, elevated pressures or extremely difficult mechanical conditions. Due to the robustness of the SPECTRACAP® sensor and its low sensitivity to gas flow and pressure variations, the sampling system can be very simple and it can be installed near the sampling point.

Low maintenance

A stainless steel mesh filter and an optional porous PTFE filter protect the OMT355 probe optics from dust and dirt. An intelligent measurement algorithm further minimizes contamination effects and provides a maintenance alert well before the measurement performance is affected.

Long calibration interval

Calibration or field checking of the instrument can be done either with ambient air or with zero/span

gases injected through an optional calibration gas connector. The calibration interval of the OMT355 is 12 months.

User friendly interfaces

For calibration and configuration, the OMT355 features both software and keypad user interfaces and an LCD display.

TDL Technology

The Tunable Diode Laser (TDL) technology used in the SPECTRACAP® sensor is one of the

most powerful technologies in gas measurement on the market today.

The technology is based on measuring the attenuation of a beam of laser light in the sample gas. For oxygen sensing the laser is tuned to a wavelength which is characteristic and unique for the oxygen molecule. Therefore, the measured attenuation is an extremely selective measure for the amount of oxygen on the path of the laser beam.

Technical data

Performance

Measurement range	0 ... 100 % O ₂
Accuracy (including noise, linearity, and repeatability)	±0.2 % O ₂
Temperature dependence over T range	±2 % of reading
Stability	±1 % of reading/yr
Zero drift	±0.1 % O ₂ /yr
Response time of measurement	3 s
Diffusion limited response in still air	T ₆₃ /T ₉₀
without filters	10 s / 20 s
with stainless steel mesh filter	10 s / 25 s
with stainless steel mesh and PTFE filters	30 s / 70 s
Pressure dependence without pressure compensation	
0.8 ... 1.2 bar	-2 % of reading
1.2 ... 1.4 bar	-5 % of reading
Accuracy of pressure compensation	±0.25 % of reading
Background gas effects for CO ₂ and H ₂ O, uncompensated	
<1 % of reading for <6 vol-% CO ₂	
<1 % of reading for gas dewpoint < 30 °C	
Accuracy of background gas compensation	
0 ... 50 vol-% CO ₂	±0.5 % of reading
0 ... 300 g/m ³ H ₂ O (T _d = 80 °C)	±1 % of reading

Operating Environment

Operating temperature range	
for probe (in-line installation)	-20 ... +80 °C
for electronics (housing)	-40 ... +60 °C
for transmitter (ambient gas measurement)	-20 ... +60 °C
Storage temperature range	-55 ... +80 °C
Operating pressure range	0.8 ... 1.4 bar
Maximum pressure range for probe	up to 10 bar
Compliance	
IEC(EN)-61326 Electrical equipment for measurement, control and laboratory use. EMC requirements	
EN50104 Electrical apparatus for the detection and measurement of oxygen. Performance requirements and test methods.	
EN50271 Electrical Apparatus for the Detection and Measurement of Combustible Gases, Toxic Gases or Oxygen	
Laser safety	Class 1 laser product

Inputs and Outputs

Power supply	
input range	11 ... 36 VDC
Power consumption	
maximum	6 W
typical	3 W
Analog output	0/4 ... 20 mA, sourcing
maximum load	500 Ω
Serial output (2-wire, non-isolated)	RS-485
Alarm/control relay	30 VAC/60 VDC

Technical data

Mechanics

Housing material	G-AISI10 Mg (DIN 1725)
Probe material	AISI 316
Housing classification	IP66
Dimensions	306 mm x 184 mm x 74 mm
Weight	2.2 kg
Mounting flange diameter	97 mm
Can be fitted to standard flanges. Minimum sizes: DIN (2527B) DN50 and ANSI (150) 2.5"	
Cable bushing	Cable gland M20 x 1.5
Stainless steel mesh filter	openings \varnothing 310 μ m
Wetted materials	AISI 316, EPDM or Kalrez [®] (optional), PTFE (optional), SiN, MgF ₂

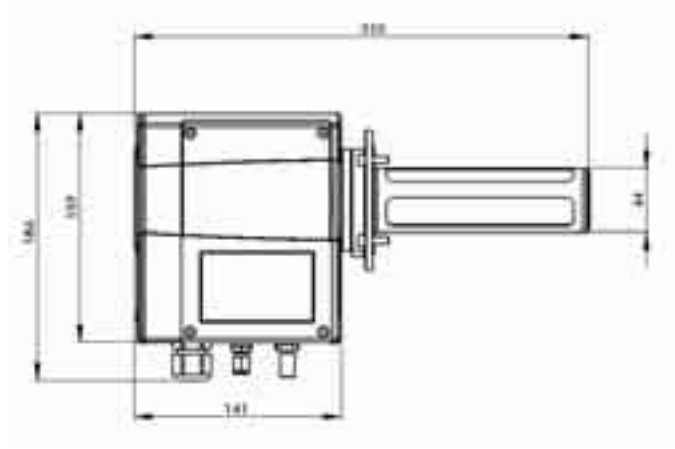
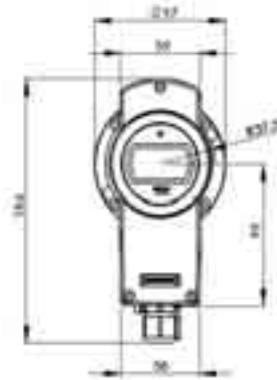
Options and accessories

Hydrophobic PTFE filter, pore size 8 μ m	
with EPDM O-rings	217055
with Kalrez [®] O-rings	217056
1/2" NPT conduit fitting	217197
M12 male 8-pin connector for user cable	214806SP
Serial interface cable for PC	19446ZZ
USB-RJ45 Serial interface cable	219685
Sample cell with wall mounting bracket	
with EPDM O-rings	217052
with Kalrez [®] O-rings	216619

For complete specifications, refer to the User's Guide.

Dimensions

Dimensions in mm 306 mm x 184 mm x 74 mm



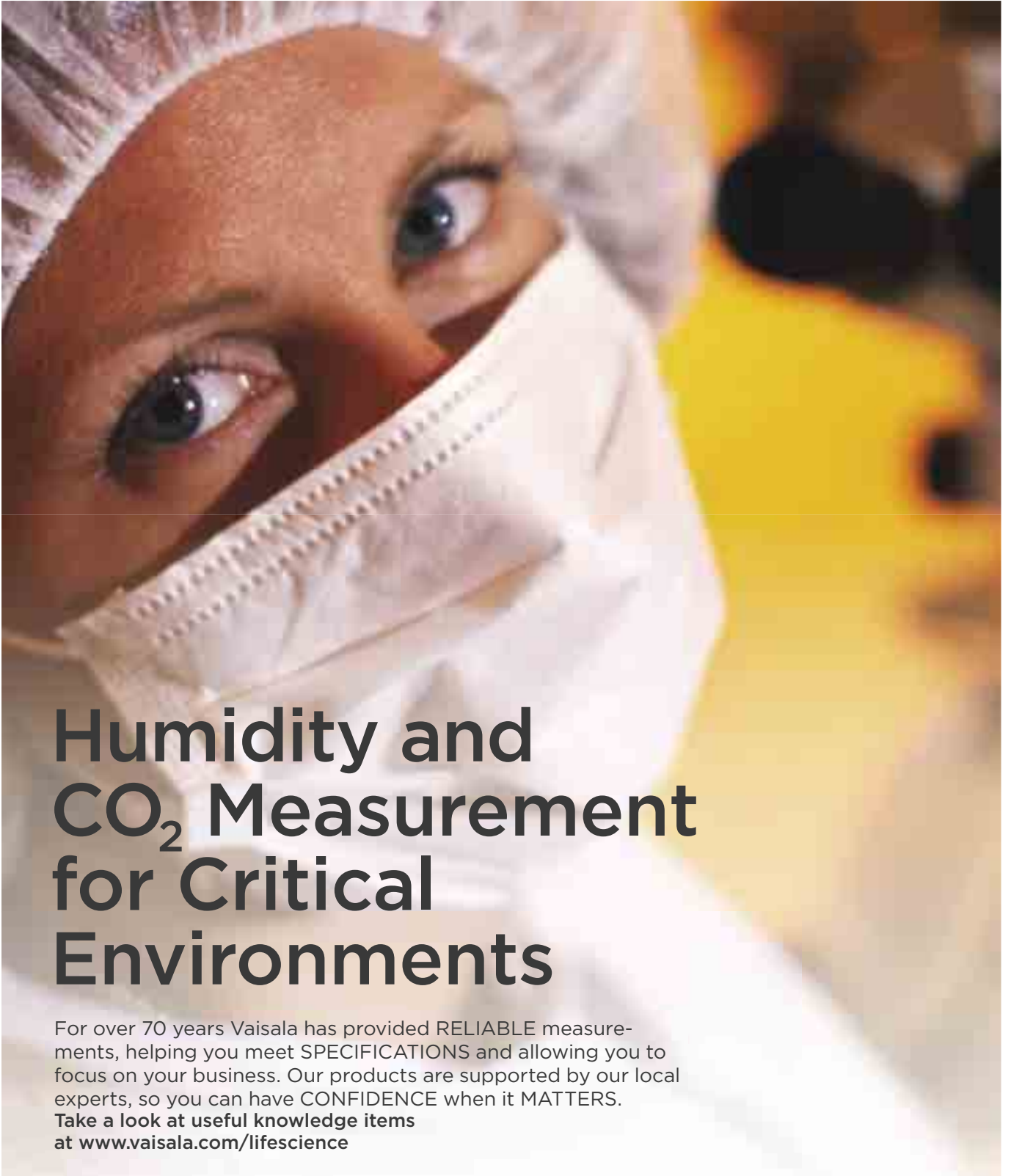
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OMT364 Oxygen Transmitter for Hazardous Areas



The Vaisala SPECTRACAP® Oxygen Transmitter OMT364 for hazardous areas.

Features/Benefits

- Minimizes need for sample conditioning equipment
- In-situ probe or sampling cell
- Tolerates aggressive chemicals
- Tolerates excessive amounts of moisture even in liquid form
- Low maintenance
- Calibration interval 12 months
- Software and keypad user interfaces and an LCD display
- Example applications: fermentation, composting process monitoring, inerting processes and flare gas recovery

The Vaisala SPECTRACAP® Oxygen Transmitter OMT364 is designed for oxygen monitoring in moist and aggressive process gases.

Laser based measurement

The OMT364 incorporates a compact tunable diode laser (TDL) gas spectrometer built in the measurement probe. This optical measurement technology is well known for unmatched stability and robustness. The patented SPECTRACAP® sensor offers uniquely TDL technology in a compact probe suitable for field use.

FM Approved OMT364 for Hazardous Areas

The non-incendive OMT364 transmitter is permitted for use in Class I, Division 2 of the NEC® 500 area classification according to FM Approvals SM . The probe of the

instrument can be installed in areas that are classified as Class I, Division 1 or 2.

Direct installation

In many applications, the OMT364 can be flange-mounted directly into a process. No sampling or sample conditioning equipment is needed. This feature provides real time measurement data without sampling or sample switching delays.

Sampling cell installation

An optional sampling cell is available for processes with high temperatures, elevated pressures or extremely difficult mechanical conditions. Due to the robustness of the SPECTRACAP® sensor and its low sensitivity to gas flow and pressure variations, the sampling system is simple and it can be installed near the sampling point.

Technical data

Performance

Measurement range	0 ... 100 % O ₂
Accuracy (including noise, linearity and repeatability)	±0.2 % O ₂
Temperature range over T range	±2 % of reading
Stability	±1 % of reading/yr
Zero drift	±0.1 % O ₂ /yr
Response time of measurement	3 s
Diffusion limited response in still air	T ₆₃ /T ₉₀
without filters	10 s / 20 s
with stainless steel mesh filter	10 s / 25 s
with stainless steel mesh filter and PTFE filters	30 s / 70 s
Pressure dependence without pressure compensation	
0.8 ... 1.2 bar	-2 % of reading
1.2 ... 1.4 bar	-5 % of reading
Accuracy of pressure compensation	±0.25 % of reading
Background gas effects for CO ₂ and H ₂ O uncompensated	
< 1% of reading for <6 vol-% CO ₂	
< 1% of reading for gas dew point < 30 °C	
Accuracy of background gas compensation	
0 ... 50 vol-% CO ₂	±0.5 % of reading
0 ... 300 g/m ³ H ₂ O (T _d =80 °C)	±1 % of reading

Operating environment

Operating temperature range for probe (in-line installation)	-20 ... +80 °C
electronics (housing) (Kalrez® seals)	-20 ... +60 °C
transmitter (ambient gas measurement)	-20 ... +60 °C
Storage temperature range	-55 ... +80 °C
Operating pressure range	0.8 ... 1.4 bar
Maximum pressure range for probe	up to 10 bar
Compliance	
IEC(EN)-61326 Electrical equipment for measurement, control and laboratory use. EMC requirements.	
Laser safety	Class 1 laser product

Classification

OMT364 CLASSIFICATIONS FOR THE TRANSMITTER	
USA and Canada	FM, Non-incendive for Class I, Division 2, Groups A, B, C, and D. T _a = -20 °C to +60 °C
OMT364 CLASSIFICATIONS FOR THE PROBE	
USA and Canada	FM, Suitable for Class I, Division 1, Groups A, B, C, and D. T _a = -20 °C to +80 °C

Inputs and outputs

Power supply	
input range	11 ... 36 VDC
Power consumption	
maximum	6W
typical	3W
Analog output	0/4 ... 20 mA sourcing
maximum load	500 Ω
Serial output (2-wire, non-isolated)	RS-485
Alarm/control relay	30 VAC/60 VDC

Mechanics

Housing material	G-AISI10 Mg (DIN 1725)
Probe material	AISI 316
Housing classification	IP66
Weight, transmitter and probe	2.2 kg
Weight, sample cell	2.6 kg
Mounting flange diameter	97 mm
Cable bushing	Cable gland M20 x 1.5
Stainless steel mesh filter	openings ø 310 µm
Wetted materials	
	AISI 316, Kalrez®, PTFE (optional), SiN, MgF ₂

Options and accessories

Hydrophobic PTFE filter, pore size 8 µm with Kalrez® O-rings	217056
1/2" NPT conduit fitting	217917
Sample cell with wall-mounting bracket	
gas fittings for O.D. 6 mm tube	
volume 260 m ³	
T63 response time with 1 l/min sample flow and mesh filter, 18 s	
with Kalrez® O-rings	216619

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PTU300 Combined Pressure, Humidity and Temperature Transmitter for demanding applications



The Vaisala PTU300 Combined Pressure, Humidity and Temperature Transmitter is a versatile, multi-purpose instrument.

Features/Benefits

- Barometric pressure, humidity and temperature measurement in one transmitter
- Available with two barometric pressure sensors – added reliability
- RS-232C serial interface with NMEA protocol for GPS use
- Optional display, RS-485, analog output, and relay
- Optional power supply module
- NIST traceable calibration
- HMT330MIK Installation kit for outdoor use
- Applications include environmental monitoring in calibration laboratories, GPS meteorology: estimating precipitable water vapor in the atmosphere; weather stations

One transmitter, three measurements

The Vaisala Combined Pressure, Humidity and Temperature Transmitter PTU300 measures barometric pressure in two accuracy classes, humidity, and temperature.

You can choose which probe best suits your needs: PTU301 for laboratories, PTU303 for outdoor use, the warmed PTU307 probe for demanding meteorology, and PTU30T for pressure and temperature only.

Vaisala proven sensor technology

The PTU300 transmitter uses sensors known for their high accuracy and excellent long-term stability: the Vaisala BAROCAP® is used for pressure measurement and the Vaisala HUMICAP® for humidity measurement. The temperature sensor is a platinum RTD sensor.

Graphical trend display

The PTU300 series features a large numerical and graphical display,

allowing users to easily monitor operational data, measurement trends and 1-year measurement history. The optional data logger with real-time clock makes it possible to generate over four years of measured history, and zoom in on any desired time or time frame. The battery backup of the real-time clock guarantees a reliable logging of measured data.

The display alarm allows tracking of any measured parameter, with a freely configurable low and high limit.

Data collection and (wireless) transfer to PC

The recorded measurement data can be viewed on the display or transferred to a PC with Microsoft Windows® software. The transmitter can also be connected to a network with an optional (W)LAN interface, which enables a (wireless) Ethernet connection.

A USB-RJ45 cable makes it easy to connect the service port of the PTU300 to a PC.

Flexible calibration

A quick, one-point field calibration for humidity can easily be done using the Vaisala Hand-Held Humidity Meter HM70.

Serial communication

The PTU300 comes with a standard RS-232 serial interface. The output format is compatible with major GPS receivers and NMEA coded messages. RS-485 is available as an option.

Outdoor installation kit

The optional HMT330MIK Installation Kit is available for outdoor installation. It provides reliable measurements for meteorological purposes.

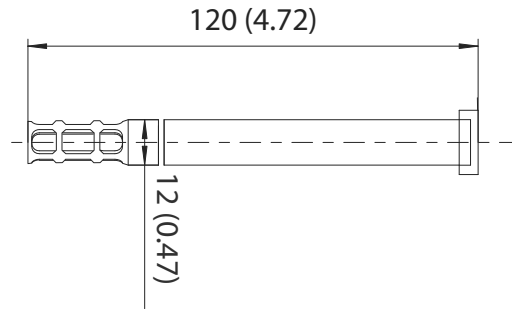
PTU300 Models



PTU301 for wall mounting

Dimensions

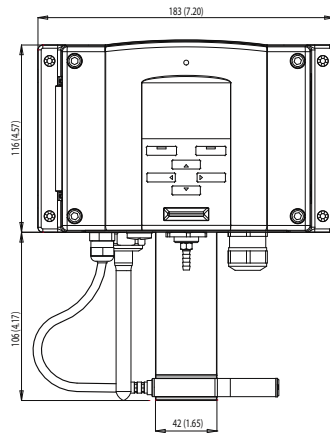
Dimensions in mm (inches)



PTU301 short cable probe

Dimensions

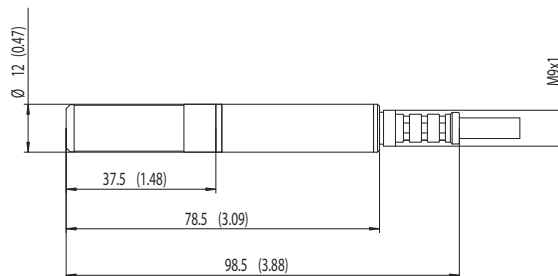
Dimensions in mm (inches)



PTU303 for outdoor use

Dimensions

Dimensions in mm (inches)



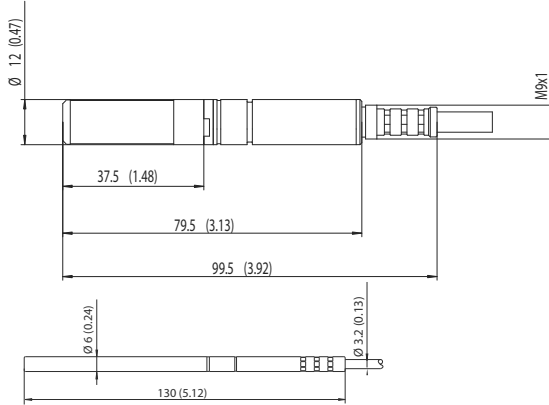
PTU300 Models



PTU307 warmed probe for demanding meteorological installations

Dimensions

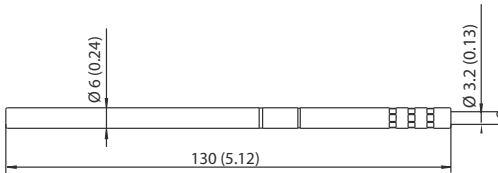
Dimensions in mm (inches)



PTU30T for pressure and temperature only measurement

Dimensions

Dimensions in mm (inches)



Technical data

Performance

BAROMETRIC PRESSURE

Pressure range	500 ... 1100 hPa, 50 ... 1100 hPa		
Accuracy	500 ... 1100 hPa	500 ... 1100 hPa	50 ... 1100 hPa
	CLASS A	CLASS B	
Linearity	±0.05 hPa	±0.10 hPa	±0.20 hPa
Hysteresis*	±0.03 hPa	±0.03 hPa	±0.08 hPa
Repeatability*	±0.03 hPa	±0.03 hPa	±0.08 hPa
Calibration uncertainty**	±0.07 hPa	±0.15 hPa	±0.20 hPa
Accuracy at +20 °C***	±0.10 hPa	±0.20 hPa	±0.30 hPa
Temperature dependence****	±0.1 hPa	±0.1 hPa	±0.3 hPa
Total accuracy (-40 ... +60 °C / -40 ... +140 °F)	±0.15 hPa	±0.25 hPa	±0.45 hPa
Long-term stability/year	±0.1 hPa	±0.1 hPa	±0.2 hPa
Response time (100 % response)			
one sensor	2 s	1 s	1 s
Pressure units	hPa, mbar, kPa, Pa, inHg, mmH2O, mmHg, torr, psia		

* Defined as ±2 standard deviation limits of endpoint non-linearity, hysteresis error or repeatability error and calibration.

** Defined as ±2 standard deviation limits of accuracy of the working standard including traceability to NIST.

*** Defined as the root sum of the squares (RSS) of endpoint non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

**** Defined as ±2 standard deviation limits of temperature dependence over the operating temperature range.

RELATIVE HUMIDITY

Measurement range	0 ... 100 %RH	
Accuracy (including non-linearity, hysteresis, and repeatability at +15 ... +25 °C)	±1 %RH (0 ... 90 %RH) ±1.7 %RH (90 ... 100 %RH)	
at -20 ... +40 °C	±(1.0 + 0.008 x reading) %RH	
at -40 ... +60 °C	±(1.5 + 0.015 x reading) %RH	
Factory calibration uncertainty (+20 °C) (Defined as ±2 standard deviation limits. Small variations possible, see also calibration certificate.)	± 0.6 %RH (0 ... 40 %RH) ± 1.0 %RH (40 ... 97 %RH)	

Sensor

for typical applications Vaisala HUMICAP® 180 or 180R*
for applications with chemical purge/warmed probe Vaisala HUMICAP® 180C or 180RC*

Response time (90 %) at +20 °C (+68 °F) in still air	
with grid filter	8 s / 17 s*
with grid + steel netting filter	20 s / 50 s*
with sintered filter	40 s / 60 s*

* with HUMICAP® 180R or 180RC sensor

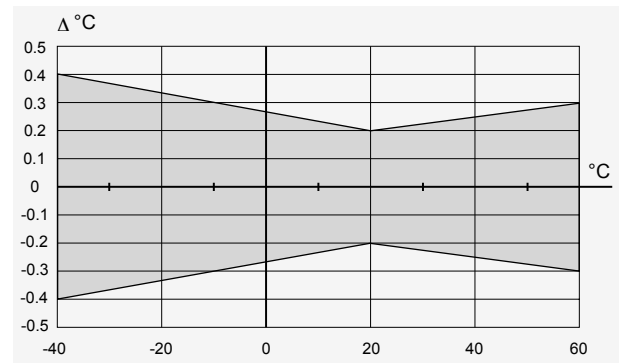
TEMPERATURE

Measurement range, all probes	-40 ... +60 °C (-40 ... +140 °F)
Accuracy at +20 °C (+68 °F)	± 0.2 °C (± 0.4 °F)
Temperature units	°C, °F



The display also shows the WMO pressure trend ΔP 3h and tendency of 0 ... 9.

ACCURACY OVER TEMPERATURE RANGE



Temperature sensor

PT100 RTD 1/3 Class B IEC 751

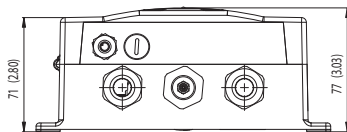
Operating Environment

Operating temperature	-40 ... +60 °C (-40 ... +140 °F)
with display	0 ... +60 °C (+32 ... +140 °F)
Humidity range	non-condensing
Electromagnetic compatibility	EN61326-1:1997 + Am1:1998 +Am2:2001; Industrial Environment

Inputs and outputs

Operating voltage	10 ... 35 VDC, 24 VAC
with optional power supply module	100 ... 240 VAC, 50/60 Hz
Power consumption at +20 °C (U_{in} 24 VDC)	
RS-232	max. 28 mA
U_{out} 3 x 0 ... 1 V / 0 ... 5 V / 0 ... 10 V	max. 33 mA
I_{out} 3 x 0 ... 20 mA	max. 63 mA
display and backlight	+20 mA
during chemical purge	max. +110 mA
during probe heating	+120 mA
Settling time at power-up (one sensor)	
class A	4 s
class B	3 s
External loads	
current outputs	$R_L < 500 \text{ ohm}$
0 ... 1 V output	$R_L > 2 \text{ kohm}$
0 ... 5 V and 0 ... 10 V outputs	$R_L > 10 \text{ kohm}$

Recommended wire size	0.5 mm ² (AWG 20) stranded wires	
Digital outputs	RS-232, RS-485 (optional)	
Service connection	RS-232, USB	
Relay outputs (optional)	0.5 A, 250 VAC	
Ethernet interface (optional)		
Supported standards	10/100Base-T	
Connector	RJ45	
Protocols	Telnet	
Software support	Vaisala MI70 link	
WLAN interface (optional)		
Supported standards	802.11b	
Antenna connector type	RP-SMA	
Protocols	Telnet	
Security	WEP 64/128, WPA	
Software support	Vaisala MI70 link	
Authentication / Encryption (WLAN)		
Open / no encryption		
Open / WEP		
WPA Pre shared key / TKIP		
WPA Pre shared key / CCMP (a.k.a. WPA2)		
Optional data logger with real-time clock		
Logged parameters	max. three with trend/min/max values	
Logging interval	10 sec (fixed)	
Max. logging period	4 years 5 months	
Logged points	13.7 million points per parameter	
Battery lifetime	min. 5 years	
Display	LCD with backlight, graphic trend display of any parameter	
Menu languages	English, Finnish, French, German, Japanese, Chinese, Spanish, Swedish, Russian	
Analog outputs (optional)		
current output	0 ... 20 mA, 4 ... 20 mA	
voltage output	0 ... 1 V, 0 ... 5 V, 0 ... 10 V	
Humidity and temperature		
accuracy at +20 °C	±0.05% full scale	
temperature dependence	±0.005%/°C full scale	
Pressure	500 ... 1100 hPa	50 ... 1100 hPa
accuracy at +20 °C	±0.30 hPa	±0.40 hPa
accuracy at -40 ... +60 °C	±0.60 hPa	±0.75 hPa



Mechanics

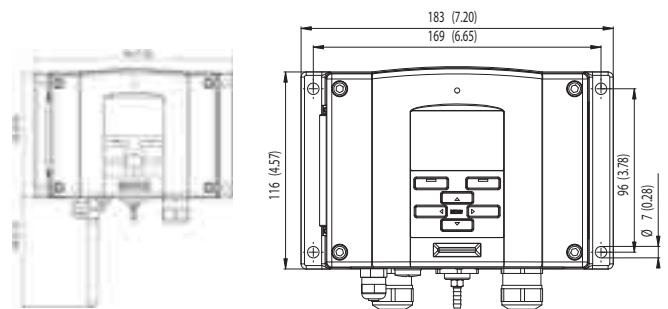
Cable bushing	M20 x 1.5 for cable diameter
	8 ... 11 mm/0.31 ... 0.43"
Conduit fitting	1/2" NPT
User cable connector (optional)	M12 series 8-pin (male)
option 1	female plug with 5 m (16.4 ft) black cable
option 2	female plug with screw terminals
Probe cable diameter	
PTU303	6.0 mm
other probes	5.5 mm
Housing material	G-AISI 10 Mg (DIN 1725)
Housing classification	IP 65 (NEMA 4)
Weight	
depending on selected probe	1.5 ... 2.0 Kg

Accessories

PC software and cable	215005
USB-RJ45 Serial Connection Cable	219685
Connection cable for HM70	211339
Wall mounting plate (plastic)	214829
Pole installation kit	215108
Rain shield	215109
DIN rail installation set	211477
Duct installation kit, PTU303/307	210697
Cable gland and AGRO, PTU303/307	HMP247CG
Solar radiation shield, PTU303/307/30T	DTR502B
Meteorological installation kit	HMT330MIK
Duct installation kit (T probe)	215003

Dimensions

Dimensions in mm (inches)



BAROCAP® and HUMICAP® are registered trademarks of Vaisala.



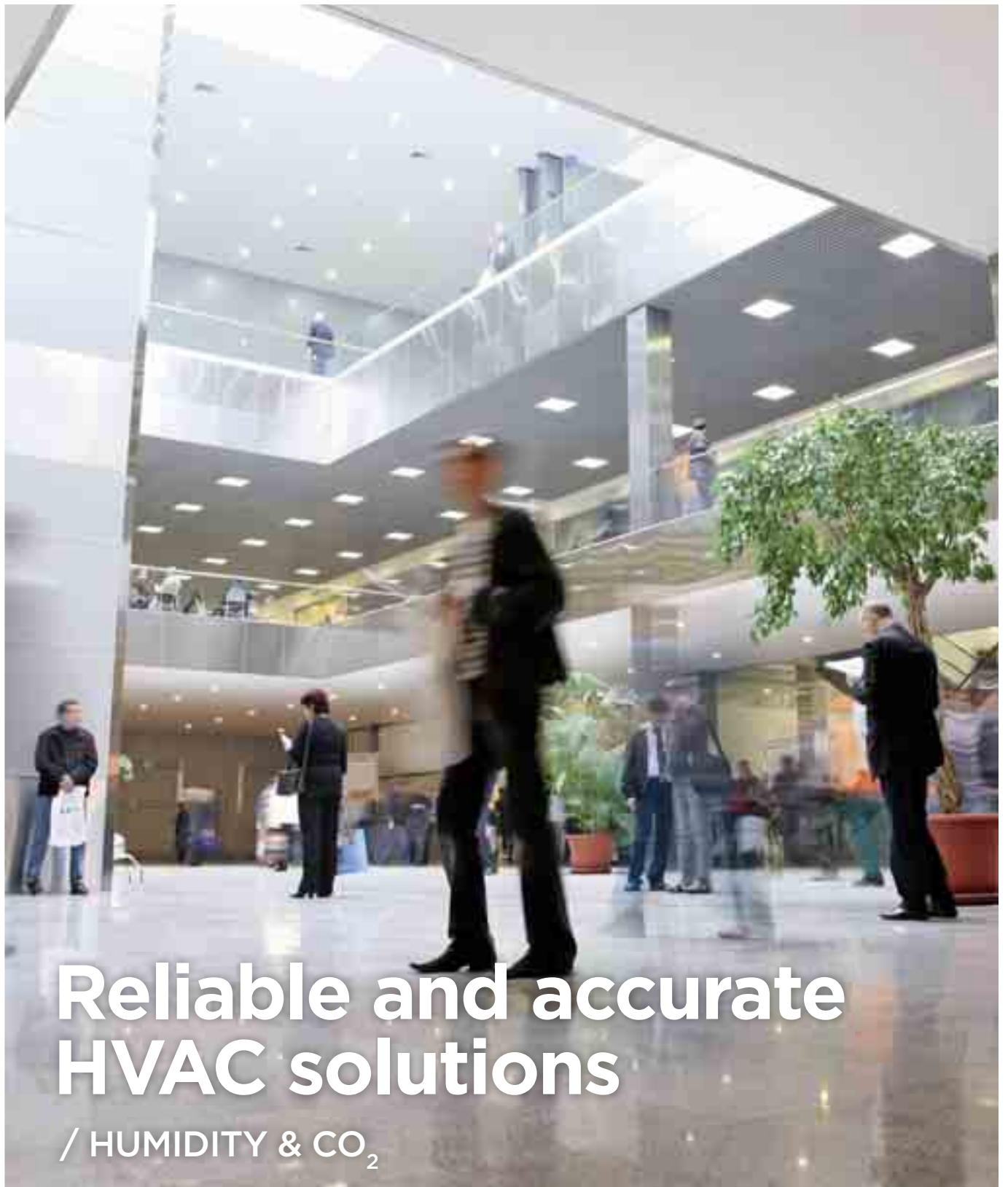
TYPE APPROVED PRODUCT
CERTIFICATE NO.: A-11440

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VAISALA

PTB330 Digital Barometer for Professional Meteorology, Aviation, and Industrial Users



Vaisala BAROCAP® Digital Barometer PTB330 with a new trend display.

Vaisala BAROCAP® Digital Barometer PTB330 is a new generation barometer, designed for a wide range of high-end atmospheric pressure measurement. The pressure measurement of the PTB330 is based on the Vaisala in-house, silicon

Features/Benefits

- Vaisala BAROCAP® sensor
- Accurate measurement
- Excellent long-term stability
- Added reliability through redundancy
- Graphical trend display with 1-year history data
- Height and altitude corrected pressure (QFE, QNH)
- For professional meteorology and aviation, laboratories, demanding industrial applications

capacitive, absolute pressure sensor - the Vaisala BAROCAP® Sensor. It provides high measurement accuracy and excellent long-term stability.

Highly accurate

The PTB330 series is highly accurate. The Class A barometers for the most demanding applications are fine-tuned and calibrated against a high-precision pressure calibrator. Class B barometers are adjusted and calibrated using electronic working standard. All the PTB330 barometers come with a NIST traceable, factory calibration certificate.

Reliability through redundancy

According to customers' choice, the PTB330 can incorporate one, two or three BAROCAP® sensors. When two or three sensors are used, the barometer continuously compares the readings of the pressure sensors

against one another and provides information on whether these are within the set internal difference criteria. This unique feature provides redundancy in pressure measurement.

Thus, users also get a stable and reliable pressure reading at all times as well as a pre-indication of when to service or recalibrate the barometer.

QNH and QFE

The PTB330 can be set to compensate for QNH and QFE pressure used especially in aviation. The QNH represents the pressure reduced to sea level, based on the altitude and temperature of the observation site. The QFE represents the height corrected pressure of small differences in altitude, for example, the air pressure at the airfield elevation.

Graphical display

The PTB330 features a multi-lingual, graphical display allowing users to monitor measurement trends. The graph is updated automatically while measuring and it provides a one-year measurement history. In addition to instant pressure, the PTB330 also provides the WMO pressure trend and tendency codes.

Applications

The PTB330 can be used successfully for aviation, professional meteorology, and for demanding industrial pressure measurement applications such as accurate laser interferometric measurement and exhaust gas analysis in engine test benches.

Technical data

Performance

BAROMETRIC PRESSURE RANGE 500 ... 1100 hPa		
	Class A	Class B
Linearity*	±0.05 hPa	±0.10 hPa
Hysteresis*	±0.03 hPa	±0.03 hPa
Repeatability*	±0.03 hPa	±0.03 hPa
Calibration uncertainty**	±0.07 hPa	±0.15 hPa
Accuracy at +20 °C (+68 °F) ***	±0.10 hPa	±0.20 hPa

BAROMETRIC PRESSURE RANGE 50 ... 1100 hPa		
	Class B	
Linearity*	±0.20 hPa	
Hysteresis*	±0.08 hPa	
Repeatability*	±0.08 hPa	
Calibration uncertainty**	±0.15 hPa	
Accuracy at +20 °C ***	±0.20 hPa	

TEMPERATURE DEPENDENCE****		
500 ... 1100 hPa	±0.1 hPa	
50 ... 1100 hPa	±0.3 hPa	

TOTAL ACCURACY -40 ... +60 °C (-40 ... +140 °F)		
	Class A	Class B
500 ... 1100 hPa	±0.15 hPa	±0.25 hPa
50 ... 1100 hPa	±0.45 hPa	

LONG-TERM STABILITY		
500 ... 1100 hPa	±0.1 hPa/year	
50 ... 1100 hPa	±0.1 hPa/year	

* Defined as ±2 standard deviation limits of endpoint non-linearity, hysteresis or repeatability error.

** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.

*** Defined as the root sum of the squares (RSS) of endpoint non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

**** Defined as ±2 standard deviation limits of temperature dependence over the operating temperature range.

Operating environment

Pressure range	500 ... 1100 hPa, 50 ... 1100 hPa
Temperature range	
operating	-40 ... +60 °C (-40 ... +140 °F)
with local display	0 ... +60 °C (+32 ... +140 °F)

Data transfer software

MI70 Link Interface Software	
Requirement:	Microsoft® Windows OS Microsoft® Excel

Inputs and outputs

Supply voltage	10 ... 35 VDC	
Supply voltage sensitivity	negligible	
Typical power consumption at +20 °C (U _{in} 24 VDC, one pressure sensor)		
RS-232	25 mA	
RS-485	40 mA	
U _{out}	25 mA	
I _{out}	40 mA	
display and backlight	+20 mA	
Serial I/O	RS232C, RS485/422	
Pressure units	hPa, mbar, kPa, Pa inHg, mmHg, torr, psia	
	Class A	Class B
Resolution	0.01 hPa	0.1 hPa
Settling time at power-up (one sensor)	4 s	3 s
Response time (one sensor)	2 s	1 s
Acceleration sensitivity	negligible	
Pressure connector	M5 (10-32) internal thread	
Pressure fitting	barbed fitting for 1/8" I.D. tubing or quick connector with shutoff valve for 1/8" hose	
Maximum pressure limit	5000 hPa abs.	
Compliance	EMC standard EN61326-1:1997 + Am1:1998 + Am2:2001: Industrial Environment	

Mechanics

Housing material	G AlSi10 Mg (DIN 1725)
Housing classification	IP66
Weight	1 - 1.5 kg

Analog output (optional)

Current output	0 ... 20 mA, 4 ... 20 mA	
Voltage output	0 ... 1 V, 0 ... 5 V, 0 ... 10 V	
Accuracy at pressure range	500 ... 1100 hPa	50 ... 1100 hPa
at +20 °C	±0.30 hPa	±0.40 hPa
at -40 ... +60 °C	±0.60 hPa	±0.75 hPa

Accessories

Serial interface cable	19446ZZ
USB-RJ45 serial connection cable	219685
Software interface kit	215005
Wall mounting kit	214829
Outdoor installation kit (weather shield)	215109
Installation kit for pole or pipeline	215108
Power supply module	POWER-1
Temperature compensated analog output module	AOUT-1T
Isolated RS-485 module	RS485-1

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Take the lab to the field

Vaisala Barometric Pressure Transfer Standard PTB330TS



Barometric Pressure Transfer Standard PTB330TS makes field inspection accurate and easy. It combines a PTB330 digital barometer with a hand-held MI70 indicator within a portable unit functioning as a transfer standard. The optional HMP155 probe is available for

Operational PTB330TS unit includes a PTB330 digital barometer, hand-held MI70 indicator, optional HMP155 humidity and temperature probe, optional MI70 Link PC software, a user's guide and a weatherproof transfer case equipped with a shoulder strap.



PTB330TS transport case

accurate humidity and temperature measurement.

The PTB330TS is suitable for various reference measurements in industrial and meteorological areas.

The PTB330TS comes in a durable and weatherproof transport case that can be easily carried and

shipped. The components are placed in a proofing foam interior, with accessories and user's guide placed in the lid organizer. The case includes a separate inner tabletop case in which the barometer is mounted. Shoulder strap is included for convenience. Battery duration is up to 11 hours of continuous use and up to 30 days in data logging use.

Features / Benefits

- Portable, battery operated transfer standard with data logging capability
- Barometric pressure with Vaisala BAROCAP® Digital Barometer PTB330
 - Excellent long term stability
 - Accurate measurements
 - Added reliability through redundancy
- Optional humidity and temperature measurements with HMP155
 - Vaisala HUMICAP®180R sensor - superior long-term stability
 - New, fast temperature probe
 - Chemical purge
- Multilingual user interface, nine languages
- Data can be logged, and transferred to a PC via MI70Link software
- SO/IEC 17025 Accredited calibration services available
- For professional meteorology, aviation, laboratories and demanding industrial applications



The PTB330 Digital Barometer

PTB330 Digital barometer

Vaisala BAROCAP® Digital Barometer PTB330 is a new generation barometer designed for a wide range of high-end atmospheric pressure measurement. The pressure measurement of the PTB330 is based on the Vaisala in-house, silicon capacitive, absolute pressure sensor – the Vaisala BAROCAP® Sensor. It provides high measurement accuracy and excellent long-term stability.

High accuracy

The PTB330 series features extremely high accuracy. Class A barometers for the most demanding applications are fine-adjusted and calibrated against a high-precision pressure calibrator. All the PTB330 barometers come with a NIST traceable, factory calibration certificate, also optional ISO/IEC 17025 accreditation calibration services are available.

Reliability through redundancy

According to customers' choice, the PTB330 can incorporate one, two or three BAROCAP® sensors. When two or three sensors are used, the barometer continuously compares the readings of the pressure sensors



The HMP155 probe

against one another and provides information on whether these are within the set internal difference criteria. This unique feature provides redundancy in pressure measurement. Thus, users get a stable and reliable pressure reading at all times as well as a pre-indication of when to service or re-calibrate the barometer.

Optional HMP155 Humidity and temperature probe

The new Vaisala HUMICAP® Humidity and Temperature Probe HMP155 provides reliable humidity and temperature measurement.

Long-term stability

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

Fast temperature measurement

What's more, with its fast response time, the additional temperature



The MI70 hand-held indicator displaying the prevailing pressure in hPa

probe for the HMP155 is ideal for measurement in environments with rapidly changing temperatures.

MI70 Hand-held indicator for spot-checking applications

The Vaisala Measurement Indicator MI70 is a user-friendly indicator for demanding spot-checking measurements. It is ideal for field checking and calibration of Vaisala's fixed instruments.

Easy-to-use user interface and three-variable display

The MI70 features a multilingual, menu-based user interface, and a clear graphical LCD display. Overall three measurement parameters can be displayed and logged into the meter's memory at the same time. One or two probes or transmitters can be connected simultaneously.

MI70 Link

The optional MI70 Link Windows® software and the USB connection cable form a practical tool for transferring logged data and real time measurement data from the MI70 to a PC.



For more information, visit www.vaisala.com or contact us at sales@vaisala.com

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Vaisala Barometric Pressure Transfer Standard PTB330TS

Technical data

These specifications apply when MI70, PTB330 and HMP155 are used together in the PTB330TS product. For individual specifications, please refer to the product documentation and brochures of the PTB330 and HMP155.

General

Operating temperature range	-10 ... +40 °C (+14 ... +104 °F)
Operating humidity range	non-condensing
Maximum pressure limit	5000 hPa abs.
Power supply	Rechargeable NiMH battery pack with AC-adaptor or 4xAA-size alkalines, type IEC LR6
Operation time (using rechargeable battery pack)	
Continuous use with PTB330	11 h typical at +20 °C (+68 °F)
Datalogging use	up to 30 days
Menu languages	English, Chinese, French, Spanish, German, Russian, Japanese, Swedish, Finnish
Display	LCD with backlight, graphic trend display of any parameter, character height up to 16 mm
Data logging capacity	2700 points
Alarm	audible alarm function

PTB330TS is in conformity with the following EU directives:
 - EMC Directive (2004/108/EC) Complies with the EMC product family standard EN61326-1, Electrical equipment for measurement control and laboratory use - Basic immunity test requirements.
 - Low Voltage Directive (2006/95/EC)
 - ROHS Directive (2002/95/EC)

Performance

Barometric pressure (PTB330)

Measurement range	500 ... 1100 hPa
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	±0.1 hPa/year
Settling time at power-up (one sensor)	4 s
Response time (one sensor)	2 s
Acceleration sensitivity	negligible

* Defined as ±2 standard deviation limits of endpoint nonlinearity, hysteresis or repeatability error.

** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.

*** Defined as the root sum of the squares (RSS) of endpoint non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

**** Defined as ±2 standard deviation limits of temperature dependence over the operating temperature range.



Relative humidity (HMP155)

Measurement range	0 ... 100 %RH
Accuracy (incl. non-linearity, hysteresis and repeatability) at +15 ... +25 °C (+59 ... +77 °F)	±1.7 %RH (0 ... 90 %RH) ±1.7 %RH (90 ... 100 %RH)
-10 ... +40 °C (-4 ... 104 °F)	±(1.0 + 0.008 x reading) %RH
Factory calibration uncertainty (+20 °C / +68 °F)	±0.6 %RH (0 ... 40 %RH)* ±1.0 %RH (40 ... 97 %RH)*
Humidity sensor	HUMICAP180R HUMICAP180RC

Response time at +20 °C in still air with a sintered PTFE filter	
63 %	20 s
90 %	60 s

* Defined as ±2 standard deviation limits. Small variations possible, see also calibration certificate.

Temperature (HMP155)

Measurement range	-10 ... +40 °C (+14 ... +104 °F)
Accuracy	
-10 ... +20 °C	±(0.176 - 0.0028 x temperature) °C
+20 ... +40 °C	±(0.07 + 0.0025 x temperature) °C

Accuracy over temperature range (see graph overleaf)

Temperature sensor Pt100 RTD 1/3 Class B IEC 751

Response time with additional temperature probe in 3 m/s air flow	
63 %	<20 s
90 %	<35 s

Technical data

Available Parameters

Pressure parameters	P, P3h, HCP, QFE, QNH
Humidity and temperature parameters	RH, T, Tdf, Td, x, Tw

Inputs and outputs

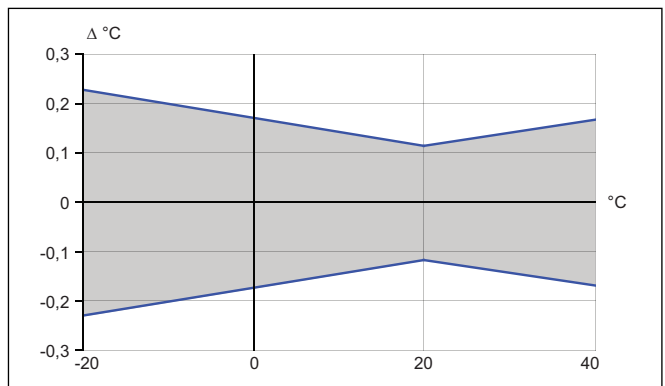
MI70 probe ports	2
MI70 data interface	RS-232 (accessible only with MI70 Link software)
PTB330 supply voltage	10 ... 35 VDC (if not powered by MI70)
PTB330 data interface	RS-232C
PTB330 serial I/O connectors	RJ45 (service port) Male 8-pin M12 (user port)
HMP155 data interface	RS-485
HMP155 serial I/O connector	Male 8-pin M12

Mechanics

PTB330	
Housing material	G-AISI 10 Mg (DIN 1725)
Housing classification	IP65
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8" I.D. tubing or quick connector with shutoff valve for 1/8" hose
HMP155	
Housing material	PC
Housing classification	IP66
Additional Tprobe cable length	2 m
Cable material	PUR
Sensor protection	Sintered PTFE
MI70 MEASUREMENT INDICATOR	
Housing classification	IP54
Housing material	ABS/PC blend
TRANSPORT CASE	
Housing classification (when closed)	IP67
Plastic parts	TTX01®, PP+SEBS, POM
Metal parts	stainless steel AISI303
Interior foam material	PE and polyether
Weight with all instruments and typical accessories	5.9 kg
Exterior dimensions (LxWxH)	405x330x165 mm (15.94x12.99x6.50) inch

Accessories

PTB330	
MI70 – PTB330 Spiral Cable	223235SP
USB-RJ45 serial connection cable	219685
Serial connection cable	19446ZZ
Barbed fitting 1/8"	19498SP
Quick Connector 1/8"	220186
Transport case with interior foams and tabletop casing for PTB330	224068SP
Tabletop casing for PTB330	224064SP
MI70	
USB cable for MI70, includes MI70 Link software	219687
MI70 Link software	MI70LINK
MI70 connection cable to HMT330, MMT330, DMT340, HMT100, PTB330	211339
MI70 battery pack	26755
variety of AC adapters available	
HMP155	
HMP155 – MI70 connection cable	221801
Protection set for HMP155 calibration buttons: protective cover, 2 O-rings and protective plug	221318
USB cable for HMP155	221040
Sintered teflon filter + O-ring	219452SP
Humidity sensor	HUMICAP180R
Humidity Calibrator	HMK15



Accuracy of HMP155 temperature measurement over temperature range

PTB210 Digital Barometer



The PTB210 paired with the SPH10 Static Pressure Head.

The Vaisala BAROCAP® Digital Barometer PTB210 is a reliable outdoor barometer that withstands harsh conditions.

For harsh environments

The Vaisala BAROCAP® Digital Barometer PTB210 is ideal for outdoor installations and harsh environments. The barometers are designed to operate in a wide temperature range, and the electronics housing provides IP65 (NEMA 4) standardized protection against sprayed water.

Features/Benefits

- 500 ... 1100 hPa or 50 ... 1100 hPa pressure ranges with serial output
- Different scalings between 500 ... 1100 hPa with analog output
- Electronics housing IP65 protected against sprayed water
- Accurate and stable measurement
- NIST traceable (certificate included)

The PTB210 barometers are ideal for use in applications such as weather stations, data buoys and ships, airports, and agrology. They are also an excellent solution for monitoring barometric pressure in industrial equipment such as laser interferometers and engine test benches.

Several pressure ranges

The PTB210 barometers are designed for various pressure ranges. They are available in two basic configurations: serial output for 500 ... 1100 hPa and 50 ... 1100 hPa and analog output with different scalings between 500 ... 1100 hPa.

Accurate and stable measurement

All the PTB210 barometers are digitally adjusted and calibrated by using electronic working standards. A higher accuracy barometer, that is fine-tuned and calibrated against a

High Precision Pressure Calibrator, is available for the 500 ... 1100 hPa pressure range.

In addition, the PTB210 integrates directly with Vaisala Static Pressure Head Series SPH10/20. This pairing offers accurate measurement in all wind conditions.

Vaisala BAROCAP® technology

The PTB210 barometers use the Vaisala BAROCAP® Sensor, a silicon capacitive absolute pressure sensor developed by Vaisala for barometric pressure applications. The Vaisala BAROCAP® Sensor provides excellent hysteresis and repeatability characteristics and outstanding temperature and long-term stability. All PTB210 barometers are delivered with a factory calibration certificate which is NIST traceable.

Technical data

Operating range (1hPa=1mbar)

Pressure range (order specified)	
serial output	500 ... 1100 hPa 50 ... 1100 hPa
analog output	500 ... 1100 hPa 600 ... 1060 hPa 800 ... 1060 hPa 900 ... 1100 hPa
Operating temperature range	-40 ... +60 °C (-40 ... +140 °F)
Humidity range	non-condensing

Accuracy

SERIAL OUTPUT (units in hPa)			
Pressure range	500 ... 1100		50 ... 1100
	Class A	Class B	
Non linearity*	± 0.10	± 0.15	± 0.20
Hysteresis*	± 0.05	± 0.05	± 0.10
Repeatability*	± 0.05	± 0.05	± 0.10
Calibration uncertainty**	± 0.07	± 0.15	± 0.20
Accuracy at +20 °C (+68 °F)***	± 0.15	± 0.20	± 0.35
Temperature dependence****	± 0.20	± 0.20	± 0.40
Total accuracy***	± 0.25	± 0.30	± 0.50
-40 ... +60 °C (-40 ... +140 °F)			
Long term stability (hPa/year)	± 0.10	± 0.10	± 0.20

ANALOG OUTPUT

Non linearity*	± 0.20 hPa
Hysteresis*	± 0.05 hPa
Repeatability*	± 0.05 hPa
Calibration uncertainty**	± 0.15 hPa
Accuracy at +20 °C (+68 °F)***	± 0.30 hPa
Temperature dependence****	± 0.50 hPa
Total accuracy*** -40 ... +60 °C (-40 ... +140 °F)	± 0.60 hPa
Long term stability	± 0.10 hPa/year

* Defined as the ±2 standard deviation limits of end point non-linearity, hysteresis error or repeatability error.

** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.

*** Defined as the root sum of the squares (RSS) of end point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

**** Defined as ±2 standard deviation limits of temperature dependence over the operating temperature range.

General

(• Factory setting)	
SERIAL OUTPUT	
Current consumption	
normal mode	< 15 mA•
power down mode	< 0.8 mA
shutdown mode	0.2 mA
Shutdown	ON/OFF
Settling time at power up	2 s
Serial I/O (factory setting•)	RS232C RS232C /TTL (optional) RS485, non isolated (optional)
parity	none, even, odd
data bits	7, 8
stop bits	1, 2
Baud rate	1200, 2400, 4800, 9600, 19200
Response time	1 s
Resolution	0.01 hPa (1 measurement/s) 0.03 hPa (10 measurements/s)
ANALOG OUTPUT	
Outputs	0 ... 5 VDC, 0 ... 2.5 VDC (order specified)
Current consumption	
normal mode	< 8 mA
shutdown mode	0.2 mA
Shutdown	ON/OFF
Response time	500 ms
Resolution	300 µV
Measurement rate	3 measurements/s
ALL MODELS	
Supply voltage (reverse polarity protected)	
with RS232/TTL output	5 ... 28 VDC
with RS485 or analog output	8 ... 18 VDC
Max. pressure	5 000 hPa abs.
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8" I.D. tubing
Housing	
electronics	IP65 (NEMA 4)
sensor	IP53
Housing material	PC plastic
Supply/output cable length	1, 2, 3, 5 or 10 m
Instrument	110 g
Cable	28 g/m
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Generic Environment

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PTB110 Barometer for Industrial Use



The Vaisala BAROCAP® Barometer PTB110 offers outstanding long-term stability.

Features/Benefits

- Vaisala BAROCAP® sensor
- Several pressure ranges
- Accuracy ± 0.3 hPa at $+20$ °C
- Long-term stability
- On/off control with external trigger
- Output voltage 0 ... 2.5 or 0 ... 5 VDC
- Current consumption less than 4 mA
- Mountable on a (35 mm wide) DIN rail
- NIST traceable (certificate included)

PTB110

The Vaisala BAROCAP® Barometer PTB110 is designed both for accurate barometric pressure measurements at a room temperature and for general environmental pressure monitoring over a wide temperature range.

Vaisala BAROCAP® technology

The PTB110 barometer uses the Vaisala BAROCAP® Sensor, a silicon capacitive absolute pressure sensor developed by Vaisala for barometric pressure measurement applications. The sensor combines the outstanding elasticity characteristics and mechanical stability of single-crystal silicon with the proven capacitive detection principle.

Accuracy and stability

The excellent long-term stability of the barometer minimizes or even removes the need for field adjustment in many applications.

Applications

The PTB110 is suitable for a variety of applications, such as environmental pressure monitoring, data buoys, laser interferometers, and in agriculture and hydrology.

The compact PTB110 is especially ideal for data logger applications as it has low power consumption. Also an external On/Off control is available. This is practical when the supply of electricity is limited.

Technical data

Operating range (1 hPa=1mbar)

Pressure ranges	500 ... 1100 hPa
	600 ... 1100 hPa
	800 ... 1100 hPa
	800 ... 1060 hPa
600 ... 1060 hPa	
Temperature range	-40 ... +60 °C (-40 ... +140 °F)
Humidity range	non-condensing

General

Supply voltage	10 ... 30VDC
Supply voltage control	with TTL level trigger
Supply voltage sensitivity	negligible
Current consumption	less than 4 mA
in shutdown mode	less than 1 µA
Output voltage	0 ... 2.5VDC
	0 ... 5VDC
Output frequency	500 ... 1100 Hz
Resolution	0.1 hPa
Load resistance	minimum 10 kohm
Load capacitance	maximum 47 nF
Settling time	1 s to reach full accuracy after power-up
Response time	500 ms to reach full accuracy after a pressure step

Acceleration sensitivity	negligible
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8"
Minimum pressure limit	0 hPa abs
Maximum pressure limit	2000 hPa abs
Electrical connector	removable connector for 5 wires (AWG 28 ... 16)
Terminals	Pin 1: external triggering
	Pin 2: signal ground
	Pin 3: supply ground
	Pin 4: supply voltage
	Pin 5: signal output

Housing material, plastic cover	ABS/PC blend
Housing classification	IP32
Metal mounting plate	Al
Weight	90 g
Electromagnetic compatibility	Complies with EMC standard EN 61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements - for use in industrial locations

Accuracy

Linearity*	±0.25 hPa
Hysteresis*	±0.03 hPa
Repeatability*	±0.03 hPa
Calibration uncertainty**	±0.15 hPa
Accuracy at +20 °C***	±0.3 hPa

* Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error or repeatability error.

** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.

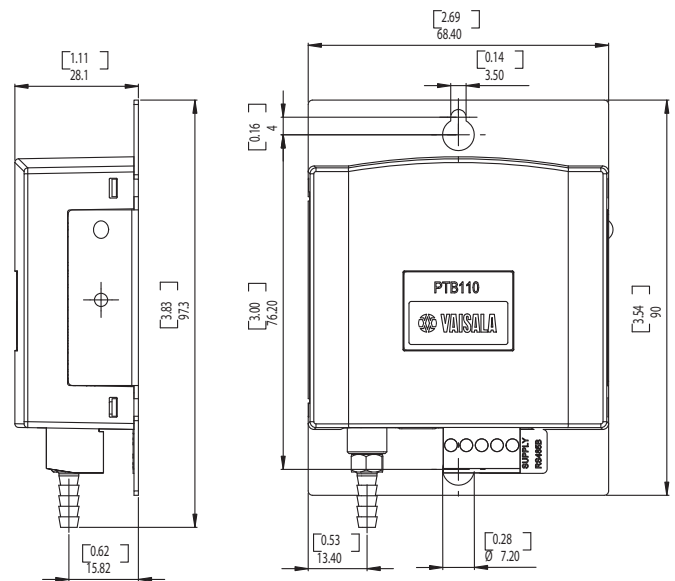
*** Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

TOTAL ACCURACY AT

+15 ... +25 °C (+59 ... +77 °F)	±0.3 hPa
0 ... +40 °C (+32 ... +104 °F)	±0.6 hPa
-20 ... +45 °C (-4 ... +113 °F)	±1.0 hPa
-40 ... +60 °C (-40 ... +140 °F)	±1.5 hPa
Long-term stability	±0.1 hPa/year

Dimensions

Dimensions in mm (inches)



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SPH10/20 Static Pressure Heads for Minimizing Wind Induced Error

Wind induced effects are one of the main sources of error when measuring barometric pressure. Variations due to strong and gusty wind can be overcome by using a static pressure head to 'filter out' the effect of dynamic pressure.

The Vaisala Static Pressure Head Series SPH10/20 are designed to minimize the errors caused by wind. The wind tunnel tested structure is both horizontally and vertically symmetrical. This design ensures reliable barometric pressure measurements in all weather.

Ideal for outdoor installations

Vaisala's static pressure heads are available in two models: the Vaisala Static Pressure Head SPH10 is a basic version, and the Vaisala Static Pressure Head SPH20 is a heated version for reliable operation in snowy and icy conditions. The warmed SPH20 contains a thermostat that switches on the warming power at temperatures, where the risk of icing may occur.

Composed of ultraviolet stabilized PC plastics and offshore aluminium, the

SPH10/20 static pressure heads are durable and weather resistant.

The SPH10/20 protects against rain and condensed water, thus preventing capillary condensation of a water column in the pressure channel which results in pressure error. The drain holes in the lower plate allow rain and water to flow out. The static pressure heads have internal netting which prevents insects and debris from blocking the pressure channel.

Carefree maintenance

The SPH10/20 static pressure heads are easy to install and disassemble, service and clean – even at the installation site. Vaisala BAROCAP® Digital Barometer PTB210 can be installed directly on top of the SPH10/20 static pressure heads. Other barometers can be connected to the heads with pressure tubing. SPH10 and SPH20 are a perfect pair for all Vaisala barometers. They ensure an accurate and reliable measurement in all weather conditions.



The SPH10/20 is easy to install and connect. In the picture, a SPH10 is connected to a PTB210 barometer.

Features/Benefits

- Minimizes wind induced error
- Reliable barometric pressure measurement in all weather
- Wind tunnel tested structure
- Easy-to-clean
- Easy-to-install

Technical data

General

Operating temperature	-60 ... +80 °C (-76 ... +176 °F)
Weight	
SPH10	800 g
SPH20	1360 g
Material	PC plastic, offshore aluminium
Mounting	with 2 bolts (M6 X 20 mm min)
Hose connection	barbed fitting for 4 mm I.D. hose or Rp1/4 thread (parallel)

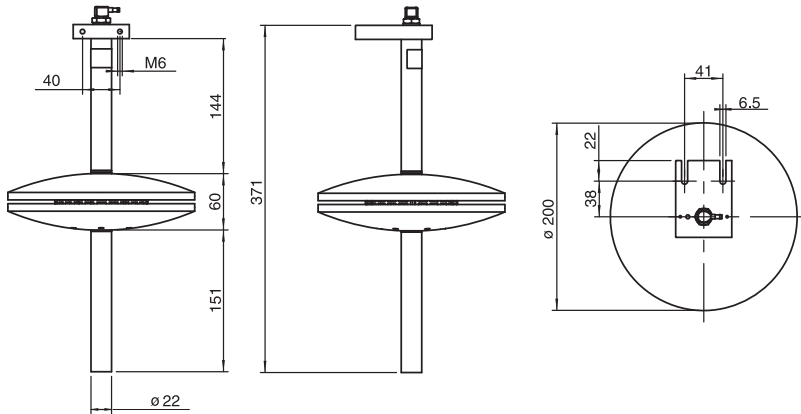
SPH20

Electrical connections	M12 connector
Power supply	factory setting 12 V changed connection 24 V
Thermostat switching temperature	
On	+4 °C (±3 °C) +39.2 °F (±4.4 °F)
Off	+13 °C (±3 °C) +55.4 °F (±4.4 °F)
Power consumption during heating	70 W

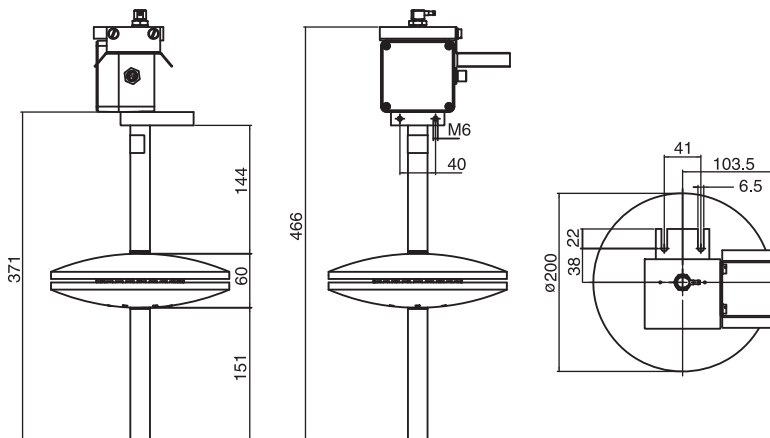
Dimensions

Dimensions in mm

SPH10



SPH20



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Vaisala Weather Transmitter WXT520

Access to Real Time Weather Data



The WXT520 has an automatic control circuit that switches the heating on at low temperatures.

Features/Benefits

- Measures 6 most essential weather parameters
- Accurate and stable
- Low power consumption – works also with solar panels
- Compact, light-weight
- Easy to install with one-bolt mounting method
- No moving parts
- Heating available
- Vaisala Configuration Tool for pc
- USB connection
- IP66 housing with mounting kit
- Applications: weather stations, dense networks, harbors, marinas

WXT520

The Vaisala Weather Transmitter WXT520 measures barometric pressure, humidity, precipitation, temperature, and wind speed and direction.

To measure wind speed and direction, the WXT520 has the Vaisala WINDCAP® sensor that uses ultrasound to determine horizontal wind speed and direction. The array of three equally spaced transducers on a horizontal plane is a Vaisala specific design. Barometric pressure, temperature, and humidity measurements are combined in the PTU module using capacitive measurement for each parameter. It is easy to change the module without any contact with the sensors.

The WXT520 is immune to flooding clogging, wetting, and evaporation losses in the rain measurement.

Measuring acoustic precipitation

The WXT520 precipitation measurement is based on the unique Vaisala RAINCAP® Sensor, which detects the impact of individual rain drops. The signals exerting from the impacts are proportional to the volume of the drops. Hence, the signal from each drop can be converted directly to the accumulated rainfall.

The WXT520 measures accumulated rainfall, rain intensity and duration of the rain — all in real time.

The Vaisala RAINCAP® Sensor is the only maintenance-free precipitation sensor on the market.

Technical data

Wind

SPEED	
range	0 ... 60 m/s
response time	250 ms
accuracy	0 ... 35 m/s ± 0.3 m/s or $\pm 3\%$, whichever is greater
	35 m/s ... 60 m/s $\pm 5\%$
output resolutions and units	0.1 m/s, 0.1 km/h, 0.1 mph, 0.1 knots
DIRECTION	
azimuth	0 ... 360°
response time	250 ms
accuracy	$\pm 3^\circ$
output resolution and unit	1°

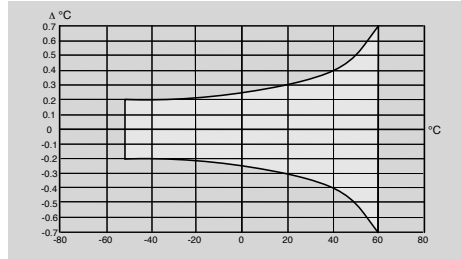
Liquid precipitation

RAINFALL	
	cumulative accumulation after the latest automatic or manual reset
output resolutions and units	0.01 mm, 0.001 inches
accuracy	5%*
RAINFALL DURATION	
	counting each ten-second increment whenever water droplet is detected
output resolution and unit	10 s
RAIN INTENSITY	
	one-minute running average in ten-second steps
range	0 ... 200 mm/h (broader range with reduced accuracy)
output resolutions and units	0.1 mm/h, 0.01 inches/h
HAIL	
	cumulative amount of hits against the collecting surface
output resolutions and units	0.1 hits/cm ² , 0.01 hits/in ² , 1 hits
HAIL DURATION	
	counting each ten-second increment whenever hailstone is detected
output resolution and unit	10 s
HAIL INTENSITY	
	one-minute running average in ten-second steps
output resolutions and units	0.1 hits/cm ² h, 1 hits/in ² h, 1 hits/h

* Due to the nature of the phenomenon, deviations caused by spatial variations may exist in precipitation readings, especially in a short time scale. The accuracy specification does not include possible wind induced errors.

Air temperature

Range	-52 ... +60 °C (-60 ... +140 °F)
Accuracy for sensor at +20 °C	± 0.3 °C (± 0.5 °F)
Accuracy over temperature range (see graph below)	



Output resolutions and units	0.1 °C, 0.1 °F
------------------------------	----------------

Barometric pressure

Range	600 ... 1100 hPa
Accuracy	± 0.5 hPa at 0 ... +30 °C (+32 ... +86 °F) ± 1 hPa at -52 ... +60 °C (-60 ... +140 °F)
Output resolutions and units	0.1 hPa, 10 Pa, 0.0001 bar, 0.1 mmHg, 0.01 inHg

Relative humidity

Range	0 ... 100 %RH
Accuracy	± 3 %RH within 0 ... 90 %RH ± 5 %RH within 90 ... 100 %RH
Output resolution and unit	0.1 %RH

General

Operating temperature	-52 ... +60 °C (-60 ... +140 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Operating voltage	5 ... 32 VDC
Typical power consumption	3 mA at 12 VDC (with defaults)
Heating voltage	5 ... 32 VDC / 5 ... 30 VAC _{RMS}
Serial data interface	SDI-12, RS-232, RS-485, RS-422, USB connection,
Weight	650 g (1.43 lb)
Housing	IP65
Housing with mounting kit	IP66

Electromagnetic compatibility

Complies with EMC standard	EN61326-1; Industrial
Environment IEC standards	IEC 60945/61000-4-2 ... 61000-4-6

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WMT52 Ultrasonic Wind Sensor for Accurate and Stable Measurement



The Vaisala WINDCAP® Ultrasonic Wind Sensor WMT52 - stable and inexpensive wind measurement for demanding applications.

Features/Benefits

- Measures horizontal wind speed and wind direction
- Triangular design ensures excellent data availability
- No moving parts
- Maintenance-free
- Optional heating available
- Compact, durable and robust
- Low power consumption
- IP66 housing with mounting kit
- Applications: marine, wind energy, environmental monitoring

Proven Vaisala performance

The Vaisala WINDCAP® Ultrasonic Wind Sensor WMT52 incorporates decades of Vaisala experience in wind measurement using ultrasound to determine horizontal wind speed and direction.

With no moving parts, the WMT52 has high sensitivity as the measurement time constant and starting threshold are virtually zero. This makes it superior to the conventional mechanical wind sensors.

The WMT52 is designed to operate without periodic field calibration and maintenance.

Applications

The WMT52 is ideal for use in marine applications as the housing with the mounting kit is water resistant. The WMT52 is also suitable for wind energy and environmental monitoring, for example, for measuring the distribution of air pollution and road tunnel ventilation.

Easy to install

The WMT52 is delivered fully assembled and configured from the factory. With the Vaisala Configuration Software Tool you can change the settings, such as averaging times, output mode, update intervals, measured variables and message contents.

The WMT52 can be mounted either on top of a pole mast or on a cross arm.

When using the optional mounting kit, the north alignment needs to be performed only once.

Heating

The optional heating available in the WMT52 assists measurements in the freezing weather conditions and during snowfall.

As the heating circuit is independent of the operational power, separate supplies can be used. Heating is switched on automatically at low temperatures, well before the freezing point.

Low power consumption

The WMT52 has very low power consumption; during the idle mode the device typically consumes about 2 ... 3 mW.

Technical data

Wind

WIND SPEED	
Range	0 ... 60 m/s
Response time	250 ms
Available variables	average, maximum, and minimum
Accuracy	
0 ... 35 m/s	±0.3 m/s or ±3 % whichever is greater
35 m/s ... 60 m/s	±5 %
Output resolution	0.1 m/s (km/h, mph, knots)
WIND DIRECTION	
Azimuth	0 ... 360°
Response time	250 ms
Available variables	average, maximum, and minimum
Accuracy	±3°
Output resolution	1°
MEASUREMENT FRAME	
Averaging time	1 ... 3600 s (=60 min), at one second steps on the basis of samples taken at 4 Hz rate (configurable)
Update interval	1 ... 3600 s (=60 min), at one-second steps

General

Self-diagnostics	separate supervision message, unit/status fields to validate measurement quality
Start-up	automatic, <10 s from power on to the first valid output
Serial data interface	SDI-12, RS-232, RS-485, RS-422, USB connection
Communication protocols	SDI-12 v1.3, ASCII automatic & polled, NMEA 0183 v.3.0 with query option
Baud rate	1200 ... 115 200
Operating temperature	-52 ... +60 °C (-60 ... +140 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Dimensions	
height	139 mm (5.7")
diameter	114 mm (4.49")
weight	510 g (1.12 lb)
Housing	IP65
Housing with mounting kit	IP66
Vibration	IEC 60945 paragraph 8

Power supply

Operating voltage	5 ... 32 VDC
Power consumption on average	
minimum	0.1 mA at 12 VDC
maximum	14 mA at 5 VDC
typical	3 mA at 12 VDC (default measuring intervals)
Heating voltage	5 ... 32 VDC / 5 ... 30 VAC _{RMS}

Accessories

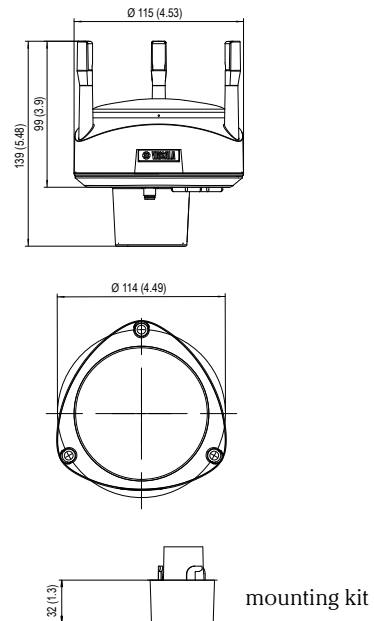
Mounting kit	212792
Bird spike kit	212793
Surge protector for sensor	WSP150

Electromagnetic compatibility

Complies with EMC standard: EN61326-1, Industrial Environment	
IEC standards	IEC 60945/61000-4-2 ... 61000-4-6

Dimensions

Dimensions in mm (inches)



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WA15 Wind Set for High Performance Wind Measurement



The WA15 is based on accurate sensors installed on a large crossarm. It is designed for demanding wind measurement applications.

With a proven track record of successful installations, the Vaisala Wind Set WA15 has earned its reputation as the industry standard in the wind sensor market.

The WA15 consists of a Vaisala Anemometer WAA151, a Vaisala Wind Vane WAV151, an optional crossarm, a power supply and cabling.

Anemometer with excellent linearity

The WAA151 is a fast response, low-threshold anemometer. Three lightweight, conical cups mounted on the cup wheel, provide excellent linearity over the entire operating range, up to 75 m/s.

A wind-rotated chopper disc attached to the shaft of the cup wheel cuts an infrared light beam 14 times

Features/Benefits

- High-performance wind measurement set
- Long and successful track record in meteorological applications
- Accurate wind speed and direction measurement
- Low measurement starting threshold
- Conical anemometer cups provide excellent linearity
- Heated shaft prevents bearings from freezing

per revolution. This generates a pulse output from the phototransistor.

The output pulse rate is directly proportional to wind speed (e.g. 246 Hz = 24.6 m/s). However, for the highest accuracy, the characteristic transfer function should be used to compensate for starting inertia. (See technical data.)

Sensitive wind vane

The WAV151 is a counter-balanced, low-threshold, optoelectronic wind vane. Infrared LEDs and phototransistors are mounted on six orbits on each side of a 6-bit GRAY-coded disc. Turned by the vane, the disc creates changes in the code received by the phototransistors. The output code resolution is $\pm 2.8^\circ$.

Heated bearings withstand cold weather

Heating elements in the shaft tunnels of both the anemometer and vane keep the bearings above freezing in cold climates.

Complete package available

The anemometer and vane are designed to be mounted on Vaisala crossarms.

The WHP151 power supply provides the operating and heating power needed for the WA15. The power supply, as well as the signal and power cables are available as options.

Technical data

Vaisala Wind Set WA15

Options and accessories

Crossarm and termination box	WAC151
16-lead signal cable	ZZ45048
6-lead power cable	ZZ45049
Crossarm and analog transmitter	WAT12
6-lead cable for signal and power	ZZ45049
Crossarm and serial RS485 transmitter	WAC155
Serial RS485 transmitter card	WAC155CB
Power supply	WHP151
Set of bearings and gasket	16644WA
Cup assembly	7150WA
Tail assembly	6389WA

Technical data

Vaisala Anemometer WAA151

Wind speed

Measurement range	0.4 ... 75 m/s
Starting threshold	< 0.5 m/s *
Distance constant	2.0 m
Characteristic transfer function	$U = 0.328 + 0.101 \times R$ (where U = wind speed [m/s], R = output pulse rate [Hz])
Accuracy (within range 0.4 ... 60 m/s)	
with characteristic transfer function	± 0.17 m/s **
with transfer function $U = 0.1 \times R$	± 0.5 m/s***

General

Operating power supply	$U_{in} = 9.5 \dots 15.5$ VDC, 20 mA typical
Heating power supply	AC or DC 20 V, 500 mA nominal
Output	0 ... 750 Hz square wave
Transducer output level	
with $I_{out} < +5$ mA	high state $> U_{in} - 1.5$ V
with $I_{out} > -5$ mA	low state < 2.0 V
Settling time after power turn-on	< 30 μ s
Plug 6-PIN	MIL-C-26482 type
Cabling	6-wire cable through crossarm
Recommended connector at cable end	SOURIAU MS3116F10-6P
Operating temperature with heating	$-50 \dots +55$ °C ($-58 \dots +131$ °F)
Storage temperature	$-60 \dots +70$ °C ($-76 \dots +158$ °F)
Material	
housing	AlMgSi, grey anodized
cups	PA, reinforced with carbon fibre
Dimensions	240 (h) \times 90 (\varnothing) mm
Swept radius of cup wheel	91 mm
Weight	570 g

Test compliance

Wind tunnel tests	ASTM standard method D5096-90
Exploratory vibration test	MIL-STD-167-1
Humidity test	MIL-STD-810E, Method 507.3
Salt fog test	MIL-STD-810E, Method 509.3

Complies with EMC standard EN61326-1:1997 + Am1:1998 + Am2:2001; Generic Environment

* Measured with cup wheel in position least favoured by flow direction. Optimum position gives approx. 0.35 m/s threshold.

** Standard Deviation

*** Typical error vs. speed with the "simple transfer function" used.

RANGE (m/s)	0-3	3-10	10-17	17-24	24-31	31-37	37-44	44-51	51-58	58-65
ERROR (m/s)	-0.4	-0.3	-0.2	-0.1	0.0	+0.1	+0.2	+0.3	+0.4	+0.5

Vaisala Wind Vane WAV151

Wind direction

Measurement range at wind speed 0.4 ... 75 m/s	0 ... 360°
Starting threshold	< 0.4 m/s
Resolution	± 2.8 °
Damping ratio	0.19
Overshoot ratio	0.55
Delay distance	0.4 m
Accuracy	better than ± 3 °

General

Operating power supply	$U_{in} = 9.5 \dots 15.5$ VDC, 20 mA typical
Heating power supply	AC or DC 20 V, 500 mA nominal
Output code	6-bit parallel GRAY
Output levels	
With $I_{out} < +5$ mA	high state $> U_{in} - 1.5$ V
With $I_{out} > -5$ mA	low state < 1.5 V
Settling time after power turn-on	< 100 μ s
Plug 10-PIN	MIL-C-26482 type
Cabling	10-wire cable through crossarm
Recommended connector at cable end	SOURIAU MS3116F12-10P
Operating temperature with heating	$-50 \dots +55$ °C ($-58 \dots +131$ °F)
Storage temperature	$-60 \dots +70$ °C ($-76 \dots +158$ °F)
Material	
housing	AlMgSi, grey anodized
wave	Alsi 12 anodized
Dimensions	300 (h) \times 90 (\varnothing) mm
Swept radius of vane	172 mm
Weight	660 g

Test compliance

Wind tunnel tests	ASTM standard method D5366-93 (for starting threshold, distance constant, transfer function)
Exploratory vibration test	MIL-STD-167-1
Humidity test	MIL-STD-810E, Method 507.3
Salt fog test	MIL-STD-810E, Method 509.3

Complies with EMC standard EN61326-1:1997 + Am1:1998; Am2:2001; Generic Environment

VAISALA

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Vaisala Service Offering

Vaisala offers you calibration and maintenance services. You can choose from different options to customize your service agreement to cover all your Vaisala instruments.

Easy and efficient calibration

Calibration is an essential part of measurement instrument maintenance. We offer Service agreements designed to fulfill your calibration and maintenance needs. Your instruments can be enrolled in the Calibration Reminder Program, which provides advance notification when regular calibration is due. For most Vaisala instruments, it also includes a calibration certificate with the 'before' and 'after' adjustment data. You can choose a standard (factory) calibration or accredited calibration for a certain period of time. The standard (factory) calibration is traceable and ISO 9001 compliant. The standard accreditation e.g. for Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT330 includes seven humidity and one temperature point at room temperature. Vaisala also offers accredited calibrations for many of its products.

Vaisala Service Centers are accredited and their working procedures are approved by third party

organizations. This is confirmed by the name and logo of the local accrediting body appearing on the report documentation. The documentation includes uncertainty calculations. Accredited calibrations are recommended especially for the measurement instruments that are used as transfer standards or in demanding measurement applications.

All accredited calibrations comply with ISO 17025 and are traceable to international standards.

You can also customize your calibration agreement, when needed.

Lifetime accuracy with Vaisala service agreement

Regular maintenance is a key factor in ensuring measurement accuracy.

A Vaisala Service Agreement is a convenient way to gain access to professional support over the life cycle of your instruments. Agreements can be customized to support highest uptime and accuracy of your instruments.

A Vaisala Service Agreement is designed to fulfill customer needs – we will proceed step by step to find out the most suitable solution for your application. Let us do the job and you can concentrate on the results!

Add benefits with options

The Vaisala Service Agreements are available with multiple optional services. You can select the options based on your needs.

- **SCHEDULED PART DELIVERY:** With this option Vaisala will keep an exchange unit (or units) in stock which will be shipped to you before the recommended calibration or maintenance time.
- **PRIORITY TECHNICAL SUPPORT:** Priority technical support increases uptime of your operations. Our response time to your technical inquiries can be agreed according to your need.
- **EXTENDED WARRANTY:** Secure your investment against accidental breakdowns for years to come – let Vaisala carry the risk of unpredictable repairs. You get all the benefits of Vaisala's standard warranty conditions, but for much longer.
- **CALIBRATION REMINDER PROGRAM:** By joining the Calibration Reminder Program, you'll receive a reminder for your upcoming calibration, along with detailed information on how to get the units calibrated at our service centers.
- **REPAIR AND CALIBRATION:** Vaisala Returns On the Web (ROW) is a system for easy shipping of Vaisala instruments for calibration or repair. The system processes your service order step-by-step and produces all required shipping documents and instructions needed.

Calibration is Our Core Operation

Standard (factory) Calibrations			
Service Center	European Service Center	Asian Service Center	North American Service Center
Location	Helsinki, Finland	Tokyo, Japan	Boston, MA, USA
Humidity	√	√	√
Temperature	√	√	√
Dewpoint Temperature	√	√	√
Barometric Pressure	√	√	√

Table 1. Standard (factory) calibration is available globally in all Vaisala Service Centers.

Traceability of Measurement Parameters				
	ISO9001 compliant		ISO17025 compliant	
	Standard Calibration	Traceability	Accredited Calibration	Traceability
Relative Humidity	Yes	NIST	Yes	JCSS/NIST, Salt Solutions
Temperature	Yes	NIST	Yes	NIST
Dewpoint Temperature	Yes	NIST, JCSS	Yes	JCSS
Barometric Pressure	Yes	NIST	Yes	NIST
Carbon Dioxide	Yes	NIST, NMI	Not available	-

Table 2. Traceability of different measurement parameters.




Accredited Body			
Service Center	European Service Center	Asian Service Center	North American Service Center
Location, Laboratory, Code	Helsinki, Finland, K008	Tokyo, Japan, 0123	Boston, MA, USA, 112765
			
Accredited Parameters			
Relative Humidity	√	√	√
Temperature	√		√
Dewpoint Temperature		√	√
Barometric Pressure	√		

Table 3. Accredited parameters in Vaisala Service Centers.

Vaisala Filters

Group A: 12 mm Diameter, Standard Length, Female Threads



0195

0195
Brass, sintered filter, 133 microns, \varnothing 12.0 mm
Use with: HMM20/30, HMP130, HMP36,
HMP46
Group: A



10159HM

10159HM
Membrane filter, 0.2 microns, \varnothing 12.0 mm
Use with: HMD20/30, HMM20/30, HMP133,
HMP75, HMM100
Group: A



6221

6221
Plastic grid, 2 mm protection, \varnothing 12.0 mm
Use with: HM34,
HMD20/30, HMM20/30, HMP133, HMP75,
HMM100
Group: A

Group B: 12 mm Diameter, Long Length, Female Threads (Could be used in place of "A" type filters)



DRW010276SP

DRW010276SP
PPS plastic grid filter, 6.5 mm, \varnothing 12 mm
Use with: DTS1, HMT330, HMP76/77, MMT310
Group: B



HM47280SP

HM47280SP
Stainless steel sintered filter, 38 μ m, \varnothing 12mm
Use with: HMT330, HMP76/77, DM70, DMT242,
DMP74, DMT142, HMM20/30, MMT310,
DMT340, HMM100
Group: B



DRW010281SP

DRW010281SP
PPS plastic grid with stainless steel netting,
15 μ m, \varnothing 12 mm
Use with: DTS1, HMT330, HMP76/77, MMT310
Group: B



HM47453SP

HM47453SP
Stainless steel filter guard for vacuum,
3.15 mm, \varnothing 12 mm
Use with: DM70, DMT242, HMP228, DMT340,
HMT310, MM70, MMT310, DMT142, MMT330
Group: B



DRW212987SP

DRW212987SP
Sintered filter, 40 μ m, \varnothing 12 mm
Use with: HMP76/77, HMP75
Group: B



219452SP

219452SP
Sintered PTFE filter, \varnothing 12 mm
Use with: HMP155, HMM100
Group: B

Vaisala Filters continued

Group C: 12 mm Diameter, Male Threads



17039HM

17039HM
Membrane filter 0.2 μm , \varnothing 12 mm
Use with: HMD60/70/40/50
HMP44, HMP141/143
Group: C



DRW010522

DRW010522
Plastic Grid, 2 mm, \varnothing 12 mm
Use with: HMP50, HMT100
Group: C



HMM46670SP

HMM46670SP
Sintered stainless steel filter, 38 μm ,
 \varnothing 12.0 mm
Use with: HMP50, HMM210, HMT100,
HMD60/70
Group: C



DRW010525

DRW010525
Membrane filter, 0.2 μm , \varnothing 12 mm
Use with: HMW61/71 Internal
HMD60/70, HMP50, HMT100
Group: C

Group D: 13.5 mm Diameter, Male Threads



16452SP

16452SP
Sintered filter, stainless steel, 37
microns, \varnothing 13.5 mm
Use with: DMP248, HMP230, HMP228,
HMT360
Group: D



17230HMSP

17230HMSP
PTFE membrane, 3.5 μm , \varnothing 13.5 mm.
Use with: HMP230, HMP228, HMT360
Group: D



16562SP

16562SP
PPS Grid, 2 mm, \varnothing 13.5 mm
Use with: HMP230, HMP37, HMP228, HMT360,
PTU200
Group: D



HM46999SP

HM46999SP
Sintered stainless steel filter, 2mm, \varnothing 13.5
Use with: DMP248, HMT360, HMP237
Group: D



16720HMSP

16720HMSP
PPS Grid and stainless steel net, 14 μm ,
 \varnothing 13.5 mm
Use with: HMP230, HMT360, HMP37E
Group: D

Vaisala Filters continued

Group E: 18.5 mm Diameter, Female Threads



6597

6597
Plastic grid, 2.5 mm, \varnothing 18.5 mm
Use with: HMM30N, HMP131, HMP35,
HMP45A/D
Group: E



2787HM

2787HM
Membrane filter, 0.2 microns, \varnothing 18.5 mm
Use with: HMM30, HMP35, HMP45, PTU200,
HMW21/31
Group: E



HM46717

HM46717
Plastic grid, 2.5 mm, \varnothing 18.5 mm
Use with: HMP41, HMP45
Group: E



16126HM

16126HM
Metallized membrane filter, 0.5 μ m, \varnothing 18.5 mm
Use with: HMP35
Group: E



HM47329

HM47329
Probe cap, \varnothing 18.5 mm (protective cap)
Use with: HMT100

Stand Alone - Not Interchangeable:



HM46780

HM46780
Stainless steel filter, 38 μ m, \varnothing 20 mm
Use with: DMP246CS - External

19858HM

19858HM
Membrane filter tube set (5 pcs)
HMP42 aprobe,
0.2 μ m, \varnothing 4mm

19867HM

19867HM
Steel grid for the HMP42 probe,
1 mm, \varnothing 4 mm

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