VAISALA

МЕТЕОРОЛОГИЧЕСКОЕ ОБОРУДОВАНИЕ

КАТАЛОГ ОБОРУДОВАНИЯ

# Vaisala Moisture, Hydrogen and Temperature Transmitter MHT410 for Online Transformer Condition Monitoring

The Vaisala MHT410 Moisture, Hydrogen and Temperature Transmitter provides reliable online monitoring of insulating oil in power transformers. With its unique probe design, the MHT410 delivers accurate measurement and trend data about the health of the transformer in real time.

- Information on transformer fault situations
- Enables timely, proactive maintenance decisions to minimize expensive service shutdowns and outages

Dimensions

Dimensions in mm

Cable Ø 8...11 mm
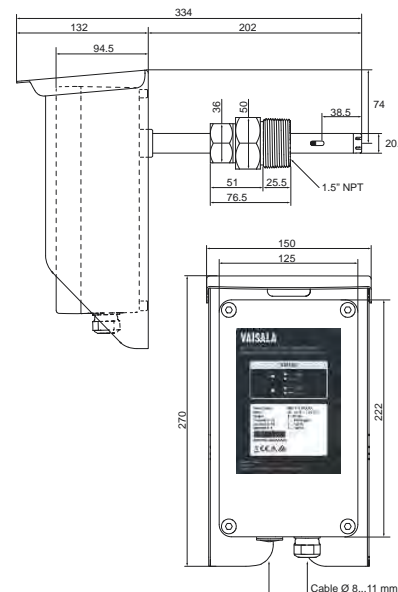
Features/Benefits

- Online monitoring of insulating oil transformer
- Measures directly from oil without a need of pumps, membranes etc.
- Moisture and hydrogen sensors are in direct contact with representative oil in the transformer
- Monitors health of the transformer in real time
- Information on transformer fault situations
- Unique probe design, robust and easy to install
- Compact size
- 5 year standard warranty
- Isolated inputs and outputs, EMC tolerant device with IP66 metal housing
- Adjustable probe installation depth fits in a variety of transformers

Technical Data

Measurement Performance

HYDROGEN MEASUREMENT

Measurement range (in oil)	0 ...5000 ppm
Accuracy (in oil temp. range -20 ...+60 °C) (-4 ...+140 °F)"	±20% of reading or ±25 ppm (whichever is greater)
Repeatability	±10 % of reading or ±15 ppm (whichever is greater)
Min. detection limit	20 ppm
Typical long-term stability	3 % of reading / year
Cross sensitivity to other gases	< 2 % (CO_2, C_2H_2, C_2H_4, CO)
Response time	63%: 2.5 hours (when sensor is not in reference cycle), 90%: 17 hours
Warm-up time	2 hours, 12 hours for full specification
Sensor	Catalytic palladium-nickel alloy film solid-state sensor

MOISTURE IN OIL MEASUREMENT

Measurement range (in oil)	0 ... 100 %RS / a_w 0 ... 1
Accuracy (in oil temp. range 0 ...+60 °C) (+32 ...+140 °F) (including non-linearity, hysteresis and repeatability)	
0 ...90 %RS (a_w 0 ...0.9)	±2 %RS (a_w ±0.02)
90 ...100 %RS (a_w 0.9 ...1.0)	±3 %RS (a_w ±0.03)
Sensor response time (90%, at +20 °C (+68 °F) in still oil)	10 min
Sensor	HUMICAP® 180L2

TEMPERATURE MEASUREMENT

Measurement range	-40 ...+120 °C (-40 ...+248 °F)
Accuracy at +20 °C (+68 °F)	± 0.2 °C (0.36 °F)
Sensor	Pt1000 RTD Class F0.1 IEC 60751

Technical Data

Operating Environment

Oil type	Mineral oil
Operating humidity range	0 ... 100 %RH, condensing
Operating temperature range (electronics)	-40 ...+60 °C (-40 ... 140 °F)
Storage temperature range	-40 ...+60 °C (-40 ... 140 °F)
Pressure tolerance (probe, short-term)	Vacuum ... 10 bara
Pressure tolerance (probe, continuous)	Max. 4 bara
Integrated protection for short power outages	> 3 seconds

Electromagnetic compatibility:

Complies with EMC standard EN61326-1, Industrial environment

Complies with CISPR22 class B emission limits when DC powered

Fulfills the requirements of IEC 61000-6-5 in the following tests:

IEC 61000-4-2	IEC 61000-4-8
IEC 61000-4-3	IEC 61000-4-11
IEC 61000-4-4	IEC 61000-4-12
IEC 61000-4-5	IEC 61000-4-16
IEC 61000-4-6	IEC 61000-4-17

Connections and Outputs

Operating voltage*	15 ... 30 VDC, 24 VAC (±15%) (power supply input is galvanically isolated)
Power consumption	4 W, typical 12 W max.
Analog output (current)*	Three isolated 4 ... 20 mA, loop powering required
External load	Max. 500 Ohm
Error status indication in case of device error	3.5 mA default, user configurable for each channel
Accuracy of analog outputs at +20 °C	± 0.125 % full scale
Temperature dependence of the analog outputs	± 0.006 %/ °C full scale
Digital outputs*	Isolated RS-485 half-duplex, RS-485 (Service Port, non-isolated)
Protocols	MODBUS RTU, serial ASCII commands
Screw terminals	Wire size AWG 22-14
Single wire (solid)	1.5 mm^2
Stranded wire (flex.)	1.0 mm^2
Recommended wire torque	0.4 Nm

*Max. isolation voltage 1.5 kV DC

Mechanics

Mechanical connection on transmitter	1.5" NPT (male)
Cable bushing (optional)	M20x1.5 for cable diameter 8 ... 11mm/0.31 ... 0.43"
Conduit fitting (optional)	1/2" NPT
Interface cable (optional, pre-assembled)	5 meters, 9.2 mm outer diameter
Housing material	AlSi 10 Mg
Housing classification	IP66
Transmitter weight without cables	4.1 kg

Other

Self-diagnostics indication	Status LEDs, analog output, MODBUS
Integrated data logging capabilities	Non-volatile memory up to 44 years storage with default logging
Individual functional test reports	Calibration test reports for moisture, hydrogen and temperature Probe leak test report (20 bara)
Factory warranty	5 years

Display with Relays (External Option 242003)

Pre-configured range for hydrogen	0...5000 ppm
Pre-configured alarm relays (user re-configurable)	Relay 1 trigger limit 200 ppm (hi) Relay 2 trigger limit 1500 ppm (hihi)
Input	4...20 mA, loop-powered
Accuracy	0.05 % of span (-10...+60 °C)
Relays	2 x solid state (SSR) max. 250 VAC, 150 mA
Display	4-digit red LED, 14.5 mm
Dimensions	100 x 100 x 57 mm (WHD)
Case Protection	IP65
Case material and color	ABS-plastic, grey
Cable glands	2 x M16x1.5

Spare Parts and Accessories

USB cable for PC connection	219690
External din rail power 100 ... 240 Vac to 24 Vdc	242422
5 meter shielded PUR cable	CBL210392-5MSP
10 meter shielded PUR cable	CBL210392-10MSP
Cable gland	214728SP
Detachable screw terminal block	236620SP
Loop-powered external display, Nokeval 302 (with alarm relays)	242003
MI70 connection cable	219980
Conduit fitting	214780SP
1.5" NPT ball valve with welding fitting	BALLVALVE-3SET

The Vaisala Optimus™ OPT100 DGA Monitor for Transformers

The Vaisala Optimus OPT100 DGA Monitor delivers out-of-the-box performance, completely eliminates false alarms, and gives you the best long-term stable measurements of any device on the market – without maintenance.

Dependable Data

- Sensor optics are protected from contamination
- Vacuum gas extraction is independent of oil temperature, pressure, and type
- Unique autocalibration eliminates long-term drift
- IR sensor technology designed and optimized in Vaisala cleanrooms
- Spectral scanning for better gas selectivity
- Excellent signal/noise ratio means no averaging

Robust Construction

- Hermetically sealed structure tolerates vacuum and pressure variation
- No consumables to replace or service
- IP66-rated and temperature-controlled housing withstands harsh conditions
- Stainless steel and aluminum components and piping
- Magnetic gear pump and magnetic valves

Smart Design

- Self-contained plug-and-play monitor that can be installed in less than two hours
- Browser-based user interface means no additional software needed
- Continuous real-time monitoring allows for trending, analysis, and correlation to, for example, load patterns
- Self diagnostics provide self recovery after disturbances

Vaisala Indigo 200 Series Transmittersfor

Features

- Plug-and-play probe connection for Vaisala CO_2 probes GMP251 and GMP252 and vaporized hydrogen peroxide probe HPP272

- Wireless interface for configuration and temporary use

- Operating temperature: -40 ... +60 °C, with display -20 ...+60 °C

- LCD color display (optional non-display version for analog model)

- IP65 enclosure

- 24 V power supply input

- Indigo 201: 3 analog outputs (mA or V)

- Indigo 202: RS485 with Modbus RTU

- 2 configurable relays

Indigo 200 series is a host device for Vaisala's CO_2 probes GMP251 and GMP252, and the H_2O_2 probe HPP272.

Vaisala Indigo 200 Series Transmitters are host devices where the measurement result of Vaisala Indigo compatible probes is shown on the display and/or converted into other formats, for example, analog output signals and to a level where the relays are activated. These probe hosts are plug-and-play devices for current and future Vaisala Indigo compatible probes. The host device has a color LCD display; Indigo 201 is also available as a non-display version with a LED indicator for notifications.

Vaisala Indigo compatible probes are connected either directly to the host with a probe locking wheel, or by using a cable between Indigo 200 and the probe.

The Indigo 200 has a browser-based wireless (WLAN) configuration interface for a mobile device or

computer that supports a wireless connection. The host device and the probes connected to it can be configured using the wireless user interface. It also allows for temporary viewing of the measurement data.

The surface of the Indigo 200 enclosure is smooth, which makes it easy to clean. It is also resistant to dust and most chemicals, such as, H_2O_2, and alcohol-based cleaning agents.

An example of a wireless configuration window.

Technical Data

General

Supports Indigo compatible probes: CO_2 probes GMP251 and GMP252, vaporized hydrogen peroxide probe HPP272
LCD color display version (Indigo 201: optional non-display)
Wireless (WLAN) configuration interface:
connect to the Indigo 200 and use the browser-based user interface for device configuration and measurement data viewing.

Technical Data

Operating voltage	15 ... 30 VDC, (20 ... 22 VAC)
Operating temperature	-40 ... +60 °C, with display -20 ... +60 °C
Relay contacts x 2	max. switching power 30 W
	max. switching current 1 A
	max. switching voltage 40 VDC / 28 VAC
Material	
Housing	PC/ABS plastic
Display window	PMMA plastic
Housing classification	IP65
Screw terminals	wire size 0.2 mm^2 ... 1.5 mm^2
Weight	0.4 kg
Chemical tolerance (temporary exposure during cleaning)	
	H_2O_2 (6000 ppm) non-condensing;
	alcohol-based cleaning agents (e.g. ethanol and IPA)
Electromagnetic compatibility	EN61326-1,
	Generic Environment
Contains	FCC ID QOQ-WGM110, IC 5123A-WGM110,
	MIC 209-J00197, MSIP-CRM-BGT-WGM110
Safety	IEC/UL/EN 61010-1

INDIGO 201 MODEL
Three analog outputs (voltage or current)

Voltage	0 ... 1 V, 0 ... 5 V, 0 ... 10 V, 1 ... 5 V, scalable,
	min. load 1 kΩ
Current	4 ... 20 mA, 0 ... 20 mA, scalable, max. load 500 Ω
Accuracy of analog outputs at 20 °C	±0.1% full scale
	for 0 … 10 V and 0 … 20mA

INDIGO 202 MODEL

Digital communications	RS485, Modbus RTU

Accessories
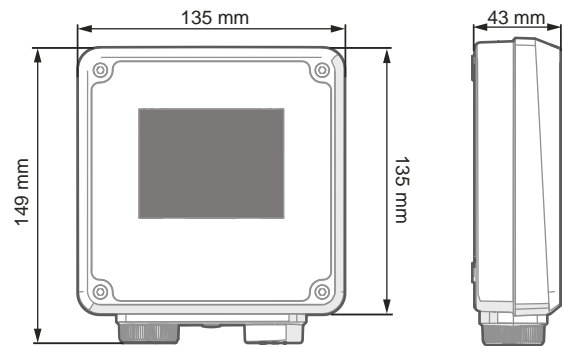
Remote probe cable 1 m	INDIGOCABLE1M
Remote probe cable 3 m	INDIGOCABLE3M
Remote probe cable 5 m	INDIGOCABLE5M
Remote probe cable 10 m	INDIGOCABLE10M

Wireless (WLAN) Configuration Interface

Module with internal chip antenna	
Networking standards	IEEE 802.11 b/g/n compliant

Dimensions

in mm
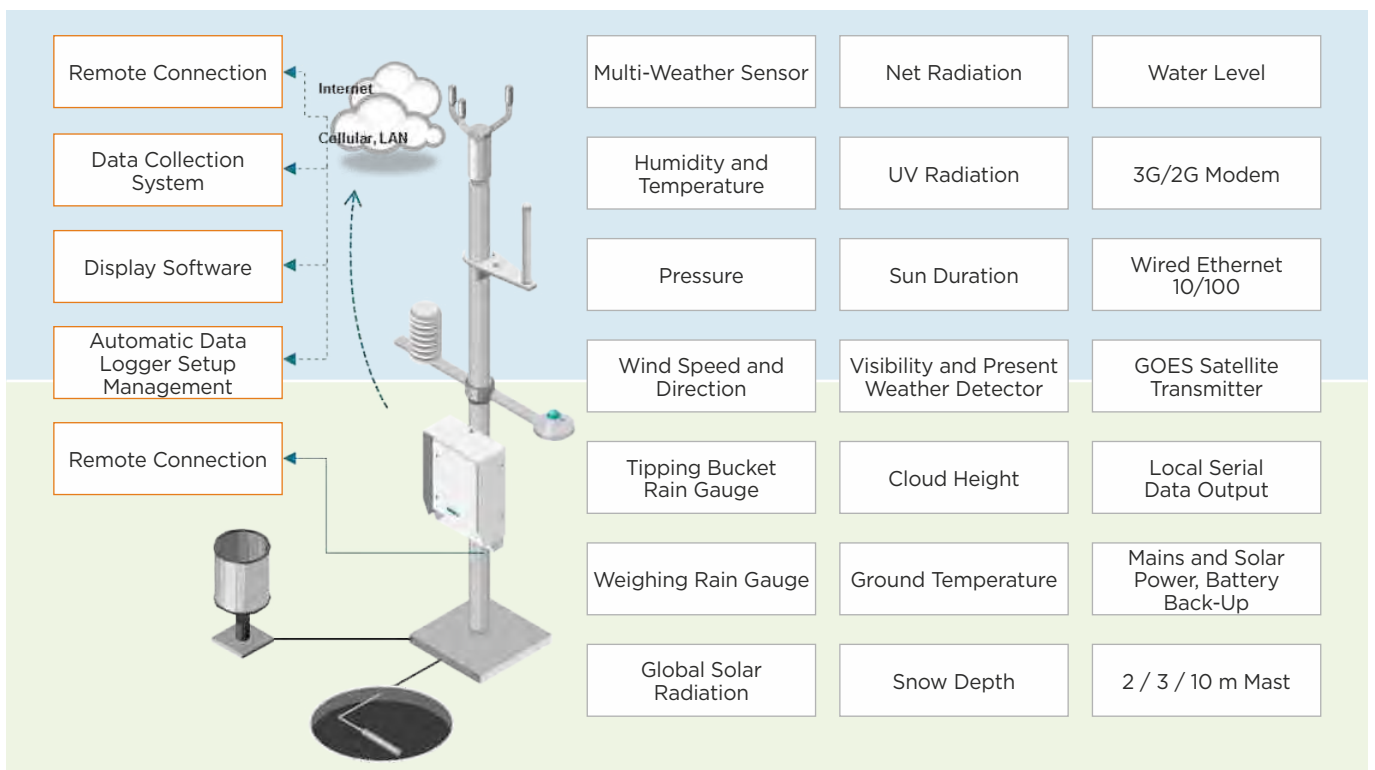135 (w) x 149 (h) x 43 (d)

AWS 310

Even without the NM10 software, you don't have to be on site to adjust settings or fix problems – the Vaisala AWSClient software supports setup, diagnostics, and data retrieval and is included in each AWS310 delivery. The AWS310 StationView GUI allows the user to view basic station information, sensor status, and readings, set site-specific parameters, and perform many of the AWSClient functions using a graphical user interface. The AWS310 can also automatically download a new configuration file from a network server, making maintenance even easier.

Vaisala Weather Station Training

Reliable data cannot be achieved without skilled technical staff to operate and maintain your weather station. Training courses provide an excellent overall understanding of the AWS310 system, and also cover how to install, operate, and troubleshoot the system and conduct any necessary field repairs.

Remote Connection	Multi-Weather Sensor	Net Radiation	Water Level
Data Collection System	Humidity and Temperature	UV Radiation	3G/2G Modem
Display Software	Pressure	Sun Duration	Wired Ethernet 10/100
Automatic Data Logger Setup Management	Wind Speed and Direction	Visibility and Present Weather Detector	GOES Satellite Transmitter
Remote Connection	Tipping Bucket Rain Gauge	Cloud Height	Local Serial Data Output
	Weighing Rain Gauge	Ground Temperature	Mains and Solar Power, Battery Back-Up
	Global Solar Radiation	Snow Depth	2 / 3 / 10 m Mast

Technical Data

General

Data Collection Platform	Vaisala Data Logger QML201
Operating temperature	-40 ... +60 °C
Storage temperature	-60 ... +70 °C
Humidity	0 ... 100 %RH
Methods of Testing and Required Test Results, as follows:	
	APPLIED STANDARD OR TEST PROCEDURE
Environmental tests: Operating	
Dry heat	IEC 60068-2-2
Cold	IEC 60068-2-1
Damp heat	IEC 60068-2-30
Environmental tests: Storage	
Dry heat	IEC 60068-2-2
Cold	IEC 60068-2-1
Damp heat	IEC 60068-2-30
Environmental tests: Transport	
Vibration (random)	ETSI EN 300 019-2-2v2.3.1
Rough handling (free fall etc.)	ETSI EN 300 019-2-2v2.3.1
EMC tests	IEC 61326-1- Industrial Standard
Electrostatic discharge	EN 61000-4-2
Fast transient burst	EN 61000-4-4
RF field immunity (80MHz ... 18GHz)	EN 61000-4-3
Transient surge	EN 61000-4-5
Conducted RF immunity	EN 61000-4-6
RF field emission	EN 55022
Emission to DC/I/O ports	EN 55022
Harmonic current emissions	IEC 61000-3-2
Magnetic field immunity	IEC 61000-4-8
Immunity to Voltage Dips and Short	IEC 61000-4-11
Safety tests	
Electrical safety	IEC 60950-1
Enclosure protection & IP-class	IP66 acc. IEC 60529. Sand & dust test acc. MIL-STD 810 G Method 506.5 Procedure 1
Enclosure materials	Stainless steel AISI316L, painted white
Enclosure radiation shield materials	Aluminum, painted white
Enclosure size	600 (H) x 500 (W) x 200 (D) mm
Mast [2]	Tiltable 2/3/10 m pole mast
Weight	Enclosure approx. 30 kg
10 m mast with sensors	75 ... 125 kg (composite mast) 150 ... 200 kg (aluminum & steel mast)
Maximum wind speed	75 m/s with 10 m mast and two guy wire sets
Powering	90 ... 264 VAC, 45 ... 65 Hz 12 ... 24 VDC recommended (30 VDC max.)
Solar panel	30W / 2 x 30W
Internal battery	Up to 52 Ah / 12 V with simultaneous AC (mains) and solar power supplies
Battery regulator	Charge/recharge control Temperature compensation Deep discharge protection Simultaneous inputs from solar and AC (mains) power allowed

Data Validation, Calculations and Reports[1]

Data quality control	Upper / lower climatological limits Step change validation Sensor status indication
Statistical calculations	Averages over set periods Minimum / maximum values Standard deviation Cumulative values
Other calculations	Dew point Heat index Wind chill Wet bulb temperature QFE/QFF/QNH pressure Sunshine duration Evapotranspiration
Default reporting formats	Table format diagnostics message CSV (comma-separated values) log message Vaisala SMSAWS message
All calculations and reporting in SI units by default[1]	

Preconfigured Sensor Options[2]

Weather transmitter	WA15, WMT703 (dual sensors available)
Wind speed & direction	WXT531, WXT532, WXT535, WXT536
Atmospheric pressure	BARO-1QML (Class A accuracy) PTB330 (Class A accuracy, with three transducers)
Air temperature, relative humidity & dew point	HMP110, HMP155
Rain / precipitation	QMR102, RG13, Pluvio2L (installation pedestal included)
Global solar radiation	SMP3, SMP6, SMP10, SMP21, SMP22, SP Lite2
Net radiation	QMN101
UV radiation	SUV5
Visibility & present weather	PWD22
Cloud height & sky condition	CL31
Ground temperature	QMT110
Snow depth	SR50A
Water level	Vegapuls 61, PAA-36 X W

Preconfigured Communication and Data Collection Software Options[2]

Wireless communication	Five-band UMTS 3G modem (with quad-band GSM GPRS support)
Landline communication	RS-232, RS-485 bus, LAN
Data collection software	Vaisala Observation Network Manager NM10
Satellite communication	Vaisala High Data Rate GOES Transmitter (V2.0)
Maintenance terminal software	Vaisala AWS Client with StationView GUI

[2] for other data validation, calculation, report, mast, powering, sensor, communication data collection software options, and measurement unit conversions, please contact Vaisala

Accessories Provided

USB maintenance cable
Removable 2GB CF memory card

AWS430 Automatic Weather Station

AWS430 is an automatic weather station specially designed for maritime environments such as ports, ships, and offshore platforms.

The AWS430 contains either a water proof outdoor enclosure with various mounting options or 19" equipment rack unit. Outdoor enclosure is designed to withstand the salty and wet conditions that prevail aboard ships and platforms as well as the freeze/thaw conditions experienced in extreme-weather environments. It is also able to endure vibration and shock.

Wide Range of High Quality Measurements

The basic weather parameters measured are wind speed and direction (relative wind, true wind, upwind), atmospheric pressure, air temperature, and humidity. Additional sensors can be installed for measuring other parameters, including water temperature, duration of rain and sunshine, global and long wave radiation,

amount of precipitation, cloud heigh, visibility, wave height, water level, water current and ship motion. AWS430 has built in calculation for many meteorological and statistical parameters such as dew point temperature.

Flexible Integration

To obtain the most accurate true wind calculation, the vessel's own gyrocompass and navigation system can be used to provide the required heading and ship speed, direction, and location information. However, an optional GPS compass can also be integrated into the system. The system fully supports all the requirements for data communication as specified in NMEA 0183 and IEC 1162-1. When system is equipped with several wind sensors the most accurate wind data is selected by built in selection algorithm. The Vaisala AWS430 supports LAN connection with XML and Modbus TCP-IP protocols and remote maintenace functionality. Satellite communication options are also available.

Self Diagnostics and Constant Data Availability

Built-in algorithms test each measurement to ensure data quality. For every parameter, tests are carried out on the minimum and maximum readings as well as step limits. Various parameters are also cross-checked. The built-in testing system continuously monitors the sensors, providing an immediate alert in case of a fault.

Designed for Demanding Maritime Applications

All the materials of the AWS430 have been selected for their ability to withstand the harsh, corrosive conditions experienced in maritime environments. The AWS430 has successfully passed a wide variety, of environmental, electrical, vibration and shock tests. All test specifications comply with both the Lloyd'sLloyds' Register approval system and the IEC 60945 international maritime standard.

Technical Data

General

Temperature	
Operating, Outdoor Enclosure	-50 ... +60 °C (-58 ... 140 °F)
Operating, 19" Rack Enclosure	-25 ... +60 °C (-13 ... 140 °F)
Storage	-50 ... +70 °C (-58 ... 158 °F)
Humidity	0 ... 100 %RH

In compliance with Lloyd's Register (LR) Type Approval System, Test Specification Number 1; 2002, Performance and Environmental Test Specification for the Environmentally Tested Products used in Marine and Offshore Applications, and IEC 60945 International Standard, 4th edition, 2002-08, Maritime Navigation and Radio communication Equipment and Systems - General Requirements Methods of Testing and Required Test Results, as follows:

Vibration	IEC 60068-2-6/IEC 60945
Shock	MIL-STD-202G, Method 213B, cond. J
Dry heat	IEC 60068-2-2/IEC 60068-2-48
Damp Heat	Cyclic IEC 60068-2-30
Extreme conditions*	IEC 60068-2-3, Test Ca
Low temperature*	IEC 60068-2-1 Test Ab/Ad
Rain & spray*	IEC 60529/IEC 60945
Corrosion & Salt mist*	IEC60068-2-52, test Kb/VDA 621-415
Conducted LF immunity	IEC 61000-4-16
Conducted RF immunity	IEC 61000-4-6
EFT immunity	IEC 61000-4-4
Surge immunity	IEC 61000-4-5
ESD immunity	IEC 61000-4-2
Dielectric tests	IEC 60947-2
Conducted emissions	CISPR 22 **
Radiated emissions	CISPR 22 **
RF field immunity	IEC 61000-4-3
Insulation resistance	IEC 60092-504
Power supply short term variation immunity	IEC 61000-4-11
Power supply failure immunity	IEC 61000-4-11/IEC 60092-504
Materials	Acid-proof stainless steel
	Anodized sea aluminum
	UV resistant plastic
Size, Outdoor Enclosure	600 (H) x 500 (W) x 200 (D) mm
Size, 19" Rack Enclosure	177 (H) x 433 (W) x 555 (D) mm
Weight, Outdoor Enclosure	max 40kg
Weight,19" Rack Enclosure	max 15 kg
Powering	90 ... 264 VAC, 45 ... 65 Hz
	24 VDC (30 VDC max.)*
Internal battery	2.6 Ah/12 V
Battery regulator Charge/recharge control	
Temperature compensation	
Deep discharge protection	

* Only with Outdoor Enclosure.   ** Limits according to IEC 60945

Basic Sensor Options

Wind speed & direction WMT52, WMT700
Atmospheric pressure BARO-1, PTB330
Air temperature, relative humidity & dew point HMP155
Rain/precipitation Model 50202, DRD11A
Water temperature DTS12W
Vaisala weather transmitter WXT520
GPS Satellite Compass Vector G2
Visibility sensors PWD10/20/50
Present weather sensors PWD12/22/52
Ceilometer CL31
Wave and tide sensor WGS167
Water Current sensor 4830 Z-pulse DCS
Water salinity sensor 3919
Water level sensor PAA-36XW
Ship motion sensor DMS-525
Solar radiation/sun duration

Additional Sensor Options

RS485/RS232 sensors
SDI-12 sensors
Ethernet devices
Analog sensors, with differential measurement up to
10 sensors total
Digital sensors, two counter/frequency inputs
Software controlled power outputs

Data Validation, Calculations and Reports

DATA QUALITY CONTROL
Upper/lower climatological limits Step change validation
Statistical calculations Averaging over user set periods
True & relative wind, wind selection (upwind)
Message inputs/outputs
NMEA 0183 MVW/XDR/MTW message output
NMEA 0183 HDT/RMC/VTG/GLL message input
Vaisala SMSAWS message output
XML format message output
Modbus TCP-IP message output

Communication Options

Satellite communication Iridium, Inmarsat-C
Wireless communication UHF, VHF, GSM, GPRS
Landline communication RS232, RS485 bus, LAN
Data displays, Vaisala Panel displays
Pocket/Laptop/Tabletop PC

Note! Environmental and electrical specifications are valid only for the AWS430 weather station main unit. Sensor specifications are as stated in sensor specifications.

Vaisala MAWS201M

Компактная и легкая базисная система

Vaisala TacMet® MAWS201M представляет собой переносную метеостанцию, обладающую превосходными рабочими характеристиками при весьма компактном исполнении. Станция MAWS201M осуществляет измерение, обработку и выдачу отчетов с данными о скорости и направлении ветра, температуре воздуха, относительной влажности (точке росы), давлении и осадкам. Система питается от электрической сети (пер.тока) или от встроенной солнечной панели. Имеются также резервные батареи, обеспечивающие минимум 7 дней работы без перезарядки.

Расширение системы для обеспечения полной авиационной поддержки

MAWS201M легко расширяется необходимыми дополнительными средствами для нужд авиации. , Комплект расширения 1 включает средства измерения высоты облаков и покрытия, видимости, текущей погоды и молниевой активности. Комплект расширения 2 содержит средства обнаружения переохлажденного дождя, дополнительного измерения ветра, а также дополнительные цифровые дисплеи. MAWS201M включает в себя также портативный дисплей карманного ПК для просмотра измеренных и рассчитанных параметров и системных сигналов, а также для установки параметров конкретной станции.

Портативность и простота использования

Механические части системы имеют легковесную, но прочную конструкцию, все кабели оборудованы быстроразъемными соединениями с цветовой кодировкой. Переносные футляры имеют малый вес, но обеспечивают при этом прекрасную защиту от ударов при перевозке.

Разносторонние метеосводки

Станция MAWS201M поставляется с передовым программным обеспечением, автоматически отображающим цифровые и графические данные и коды. Она также выдает авиационные метеосводки METAR и отчеты на базе заданных пользователем метеорологических явлений, а также метеосводки SPECI. В сводки можно без труда включать замечания. Программное обеспечение также производит архивирование и передачу данных для дальнейшей обработки.

Надежность и исключительно высокая точность

MAWS201M обрабатывает статистические расчеты, производит контроль качества данных и форматирует данные для выхода. Встроенное программное обеспечение контроля качества проверяет правильность данных датчиков в части их соответствия заданным пользователем пределам и шаговым изменениям между последовательными измерениями. В случае весьма маловероятного сбоя в работе, станция MAWS201M автоматически обнаруживает неисправность, и соответствующий датчик может быть быстро заменен на месте.

Характеристики

- Экономичная, быстро разворачиваемая, переносная автоматическая метеостанция
- Для выполнения армейских операций при наличии малых взлетно-посадочных полос, зон сбрасывания, испытательных полигонов, беспилотных авиационных систем и некатегорированных аэропортов
- Самая компактная и легковесная система с полной авиационной поддержкой
- Надежность и точность, достигаемые за счет встроенной системы диагностики и высококачественной технологии чувствительных элементов
- Прочная конструкция для наиболее суровых условий окружающей среды
- Дополнительные средства обнаружения переохлажденного дождя.
- Второй пост точного измерения ветра в помощь приближению к аэродрому
- Сконфигурированные цифровые дисплеи для предоставления информации командному пункту управления

Технические данные

Общие сведения

Платформа сбора данных	Vaisala Data Logger QML201
Температура	
Рабочая *)	-50 ... +60 °C (-58 ... 140 °F)
Хранения	-50... +70 °C (-58 ... 158 °F)
Отн. влажность	0 ... 100 %
Класс защиты IP	IP66
Среднее время безотказной работы	>12,500 ч (MIL-HNDB217F)
Трехногая мачта, регулируемая от 1.8 до 3.6 м (от 6 до12 футов)	
Опционная телескопическая мачта 10 м (30 футов)	
Максимальная скорость ветра	35 м/с (70 узлов)
Вес	
Базисная система	в двух футлярах, общий вес 42 кг
Система с комплектом расширения 1	в двух футлярах, всего 71 кг
Система с комплектом расширения 2	в двух футлярах, всего 61 кг
ВРЕМЯ УСТАНОВКИ	
Базисная система	менее 15 мин.
Система с комплектом расширения 1	30 мин.
Система с комплектом расширения 2	30 мин.**
ЭЛЕКТРИЧЕСКОЕ ПИТАНИЕ	
Сеть пер.тока	85 - 264 В, 47 - 63 Гц, макс. 200 ВА
Солнечная панель	11 Вт
Встроенная батарея	
Базисная система непрерывная работа без питания от сети)	7 Ач / 12 В
Система с комплектом расширения 1 (работа без питания от сети мин. 24 ч)	48 Ач / 12 В
с комплектом расширения 2 (работа без питания от сети мин. 24 ч)	24Ач / 12В
Регулятор батареи для систем с расширением	Регулирование зарядкой / перезарядкой
	Температурная компенсация
	Защита от глубокой разрядки
Допускается одновременное питание от солнечной панели и сети переменного тока	
Электромагнтная совместимость	IEC/EN 61326-1

Проверка корректности данных, расчеты и сводки

Контроль качества данных	Верхний / нижний климатологические пределы
	Проверка ступенчатого изменения
	Индикация состояния датчика
Статистические расчеты	Усреднение по периодам, устанавливаемым пользователем
	Минимальные/максимальныевеличины
	Стандартное отклонение
	Кумулятивные величины
Прочие расчеты	Точка росы
	Параметры QNH, QFE, QFF, PA, DA, барическая тенденция, тренд давления
	Порыв ветра, пик, шквал
	Приведенный коэффициент дискомфорта
Метеорологические сводки (с ПО MIDASIV)	METAR
	SPECI

Варианты датчиков по типам систем

	Базисная	К-т расширения 1	К-т расширения 2
Скорость ветра (WMS302M)	√	√	√
Атмосферное давление (BARO-1)	√	√	√
ТЕМПЕРАТУРА, ОТНОСИТЕЛЬНАЯ ВЛАЖНОСТЬ (HMP155)	√	√	√
Дождь / осадки (QMR101M)	√	√	√
Высота облаков и покрытие (CL31M)		√	√
Видимость и текущая погода (PWD22M)		√	√
Молниевая активность (SA20M)		√	√
Переохлажденный дождь (LID330IP)			√
Дополнительныйдатчикветра(WMT700)			√

Стандартные варианты связи **)

Беспроводная связь	УВЧ, ОВЧ
Проводная связь	RS232

MM70 Handheld Moisture and TemperatureMeter 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.

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.

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 dew point or relative humidity probes for other tasks. For example, a dew point probe is ideal for checking the moisture inside washed and dried oil tanks.

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.

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
- Proven Vaisala HUMICAP® Sensor, over 15 years in oil applications.
- Compatible with Vaisala's fixed oil moisture instruments
- No reference oil needed for recalibration
- NIST traceable calibration (certificate included)

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

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

The MM70 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.

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.

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® 180L2
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	Pt100 RTD Class F0.1 IEC 60751
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	max. 20 bar
during installation through ball valve	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.

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

Weatherproof Carrying Case	MI70CASE4
Ball valve set (incl. fitting body & blanking plug)	HMP228BVS
Probe cable extension, 10 m	213107SP
Transmitter connection cables for	
MMT162	219980
MMT310	DRW216050
MMT330	211339
MI70 Link software with USB cable	219687
MI70 Link software with serial port cable	MI70LINK
Analog output cable	27168ZZ
Sensor protection	HM47453SP
Dew point measurement probes	DMP74A/B
Relative humidity measurement probes	HMP75, HMP76, HMP77

Dimensions

Dimensions in mm (inches)
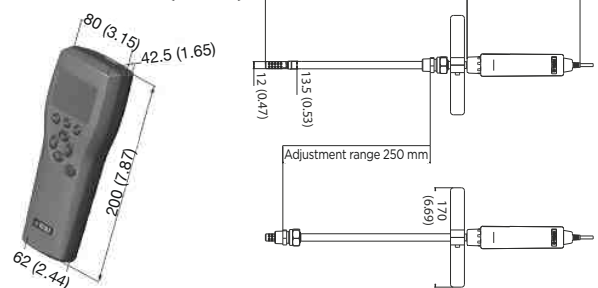
MMT162 Compact Moisture in Oil andTemperature Transmitter for OEM Applications

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

- Proven Vaisala HUMICAP® Sensor, 15 years in oil applications

- Measures water activity - ppm-calculation available for transformer oil

- Small size, easy to integrate

- Digital output RS-485 with MODBUS

- 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.
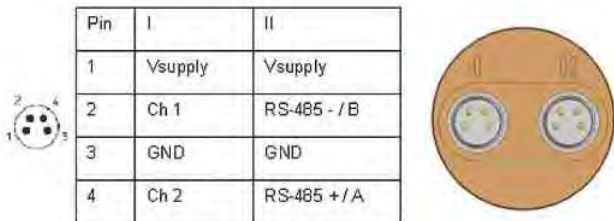
Technical Data

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, non-isolated, Vaisala protocol, MODBUS RTU protocol

Pin	I	II
1	Vsupply	Vsupply
2	Ch 1	RS-485 - / B
3	GND	GND
4	Ch 2	RS-485 +/ A

Dimensions

Dimensions in mm (inches)
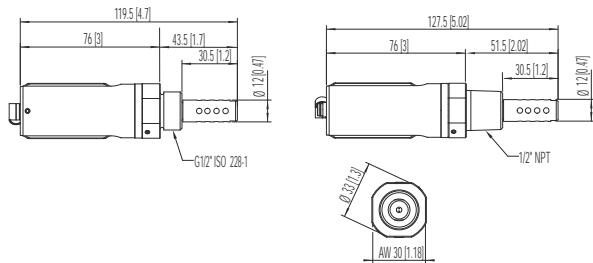
General

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	IP66 (IP65 with plastic housing)
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)	225356SP
Stainless steel filter for high flow (>1 m/s)	221494SP
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	HMP50Z300SP
5.0 m (16.4 ft), Shielded, M8 threaded	HMP50Z500SP
10 m (32.8 ft), Shielded, M8 threaded	HMP50Z1000SP
3 m, connector 90° angle	221739
5 m, connector 90° angle	221740
M8 threaded, Ch1 signal + Ch2 LED	MP300LEDCBL

MMT310 Series Moisture and Temperature Transmitters for Oil

Two probe options: MMT318 and MMT317. Optional rain shield is also available.

Features/Benefits

- Continuous measurement of moisture in oil
- Proven Vaisala HUMICAP® sensor, over 15 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 (certificate included)
- 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 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 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 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.

An optional rain shield is available for outdoor installations.

Several Outputs, One Connector

The MMT310 series has two analog outputs and an RS232 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® 180L2

TEMPERATURE

Measurement range	-40 ... +180 °C (-40 ... +356 °F)
Typical accuracy at +20 °C (68 °F)	±0.2 °C (±0.36 °F)
Sensor	Pt100 RTD Class F0.1 IEC 60751

Electrical Connections

Two analog outputs, selectable and scalable	0 ... 20 mA or 4 ... 20 mA
	0 … 5 V or 0 … 10 V
	1 … 5 V available through scaling
Typical accuracy of analog output at +20 °C	±0.05 % full scale
Typical temperature dependence of analog output	0.005 %/˚C (0.003 %/°F) full scale
Serial output	RS232C
Connections	8-pole connector with RS232C, current/ voltage outputs (two channels) and U_{in}
Operating voltage	10 ... 35 VDC
Minimum operating voltage	
RS232C output	10 VDC
Analog output	15 VDC
Pressures above 10 bara (145 psia)	24 VDC
Power consumption	
RS232C	12 mA
U_{out} 10 V (10 kOhm) channel 1 & channel 2	12 mA
I_{out} 20 mA (load 511 Ohm) channel 1 & channel 2	50 mA
External load	R_L < 500 Ohm
Startup time after power-up	3 s

Accessories

Rain shield	ASM211103
USB cable	238607
Stainless steel filter	HM47453SP
Stainless steel filter (high flow rate)	220752SP

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
Material	
transmitter housing	G-AlSi 10 Mg
transmitter base	PPS
Housing classification	IP66
Cable feed through alternatives	8-pole connector with 5 m cable, female 8-pin connector screw joint for cable diameter 4 ... 8 mm
Sensor protection	stainless steel grid standard filter stainless steel grid filter for high flow rates (>1 m/s)
Probe cable length	
MMT317	2 m, 5 m, or 10 m
MMT318	2 m, 5 m, or 10 m
Weight (depending on selected probe and cable)	
example: MMT317 with 2 m cable	476 g
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	

Dimensions

Dimensions in mm (inches)

Transmitter body

MMT317 probe

MMT318 probe
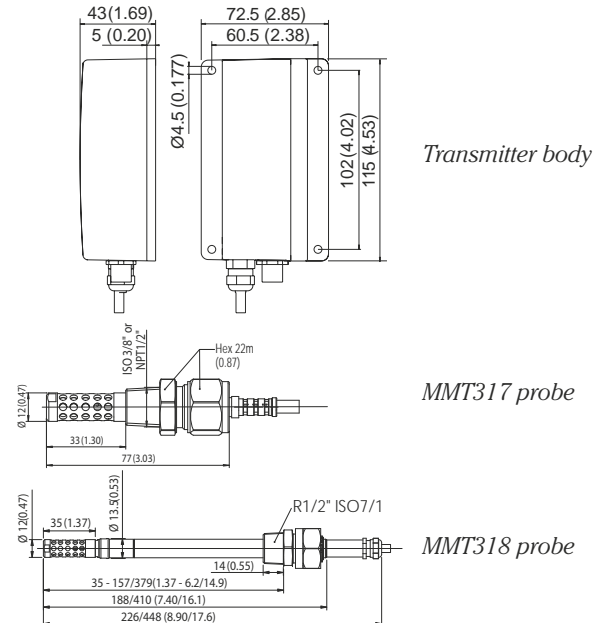
MMT330 Series Moisture and Temperature Transmitters for Oil
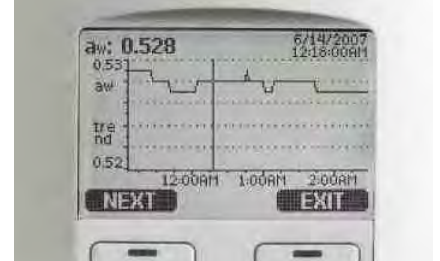
The MMT330 transmitter family offers reliable performance for the demanding measurement of moisture in oil.

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

Features/Benefits

- Continuous online measurement of moisture in oil
- Ball-valve installation – no need to shut down the process or drain the oil
- Proven Vaisala HUMICAP® sensor, used for over 15 years in oil applications
- Easy field calibration and maintenance – compatible with Vaisala HUMICAP® Hand-Held Moisture Meter for Oil MM70
- NIST traceable calibration (certificate included)
- Analog outputs, RS232/485, WLAN/LAN
- MODBUS protocol support (RTU/TCP)
- Approved for installation in MAN Diesel & Turbo Two-Stroke Diesel Engines lubrication systems

The Vaisala HUMICAP® Moisture and Temperature Transmitter Series for Oil MMT330 enables the fast and reliable detection of moisture in oil. MMT330 series transmitters can be used in online moisture monitoring and as control devices, allowing separators and oil driers to be started only when needed.

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

Reliable Vaisala HUMICAP® Technology

The MMT330 series incorporates the latest-generation Vaisala HUMICAP® sensor, which is the result of over 15 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

With a wide 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 (aw) and temperature (T). Water activity indicates directly whether there is a risk of free-water formation. The measurement is 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 into the transmitter if the water solubility of the oil is known.

Graphical Display of Measurement Data and Trends for Convenient Operation

The MMT330 features a large numerical and graphical display with a multilingual menu and keypad. It allows users to easily monitor operational data, measurement trends, and access measurement history for the past 12 months.

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

The display alarm allows any measured parameter to be tracked, with freely configurable low and high limits.

Versatile Outputs and Data Collection

The MMT330 can support up to three analog outputs; an isolated galvanic power supply and relay outputs are also available.

For serial interface the USB connection, RS232, and RS485 can be used.

MMT330 is also capable of applying the MODBUS communication protocol and, together with an appropriate connection option, provides either MODBUS RTU (RS485) or MODBUS TCP/IP (Ethernet) communication.

The data logger, with real-time clock and battery backup, guarantees reliable logging of measurement data for over four years. The recorded data can be viewed on the local display or transferred to a PC with Microsoft Windows® software. The transmitter can also be connected to a network with an optional (W)LAN

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

interface, which enables a (wireless) Ethernet connection. A USB service cable makes it easy to connect the MMT330 to a PC via the service port.

Easy Installation

MMT330 transmitters have several options for transmitter mounting. They are delivered installation-ready, pre-configured with all settings.

Mounting Options
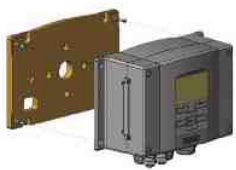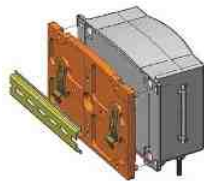
Mounting with Wall Mounting Kit
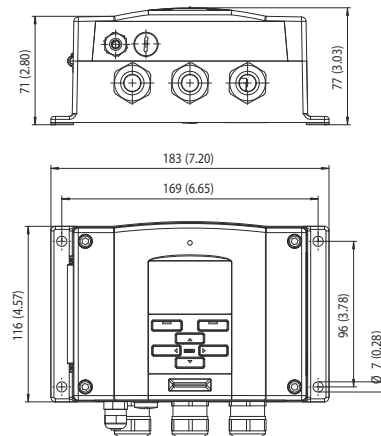
Mounting with DIN Rail Installation Kit

Pole Installation with Installation Kit for Pole or Pipeline

Mounting Rain Shield with Installation Kit

Dimensions

Dimensions in mm (inches)

71 (2.80) 77 (3.03)

183 (7.20)
169 (6.65)

116 (4.57) 96 (3.78) Ø 7 (0.28)

The MMT332 probe is installed using a flange. It is designed 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"
Installation	
Flange	36 mm / 1.4"
Temperature	
Measurement range	-40 ... +180 °C (-40 ... 356 °F)

Dimensions
Dimensions in mm (inches)

16 (0.63)   45°   97 (3.82)   Ø 12 (0.47)
35 (1.38)   M6
Ø 36 (1.42)   9 (0.35)
65.5 (2.58)   7 (0.28)
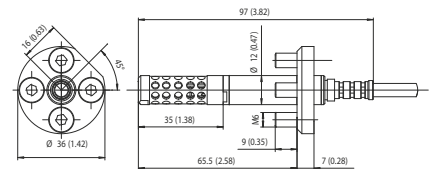
The MMT337 probe, with optional Swagelok® connector, is ideal for tight spaces with a thread connection. The small probe is designed for integration into small diameter lines.

Installation Options

MMT337 with Small-Sized Probe

Pressure range	0 ... 10 bar / 0 ... 145 psia
Probe diameter	12 mm / 0.5"
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)

ISO 3/8" or NPT1/2"   Hex 22m (0.87)
Ø 12 (0.47)
33 (1.30)
77 (3.03)
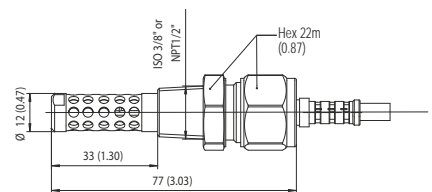
The MMT338 is ideal for installation into pressurized processes where the probe needs to be able to be removed while the process is running. The probe depth is adjustable.

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"
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)

Ø 12 (0.47)   Ø 13.5 (0.53)   R1/2" ISO7/1
35 (1.37)
14 (0.55)
35 - 157/379(1.37 - 6.2/14.9)
188/410 (7.40/16.1)
226/448 (8.90/17.6)

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	HUMICAP® 180$_L$2

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

Electromagnetic compatibility   Complies with EMC standard
EN61326-1, Industrial environment
Note: Transmitter with display test impedance of
40 ohm is used in IEC61000-4-5 (Surge immunity)

Inputs and Outputs

Operating voltage	10 ... 35 VDC, 24 VAC ± 20%
with optional power supply module	100 ... 240 VAC 50/60 Hz
Power consumption @ 20 °C (U_{in} 24VDC)	
RS232	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 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	RS232, RS485 (optional)

Protocols	ASCII commands, MODBUS RTU
Service connection	RS232, USB
Relay outputs	0.5 A, 250 VAC, SPDT, potential-free (optional)
Ethernet interface (optional)	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP
WLAN interface (optional)	
Supported standards	802.11b
Antenna connector type	RP-SMA
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP
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. four 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, graphical trend display of any parameter
Menu languages	English, Chinese, Finnish, French, German, Japanese, Russian, Spanish, Swedish

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	female plug with 5 m (16.4 ft.) black cable
option 2	female plug with screw terminals
USB-RJ45 Serial Connection Cable	219685
(incl. Mi70 Link software)	
Probe cable diameter	5.5 mm
Standard probe cable lengths	2 m, 5 m or 10 m
	(Additional cable lengths available, please see order forms for details)
Housing material	G-AlSi 10 Mg (DIN 1725)
Housing classification	IP 66
	IP65 (NEMA4X) with local display
Weight	
depending on selected probe, cable and modules	1.0 - 3.0 kgs
Sensor protection	Stainless steel grid standard filter/ Stainless steel grid filter for high flow rates (>1 m/s)

HMT300 Turbine Mounting Kit for Power Turbine Intake Air Measurement
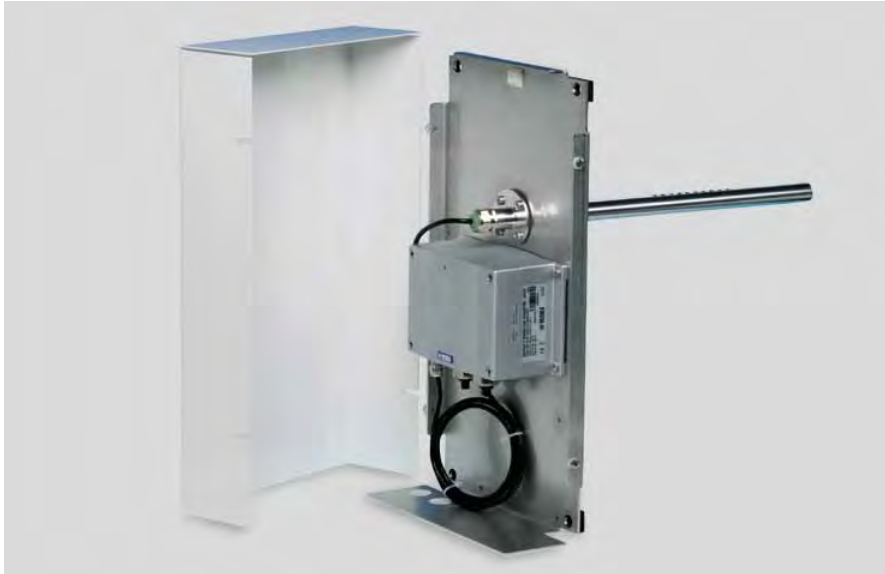
The Vaisala HUMICAP® Turbine Mounting Kit HMT300TMK is shown with the cover open and HMT337 Humidity and Temperature Transmitter installed. (Not included in the HMT300TMK.)

The Vaisala HUMICAP® Turbine Mounting Kit HMT300TMK is developed to monitor the air intake of gas and liquid fueled power turbines. HMT300TMK is used together with HMT337 Temperature and Humidity Transmitter.

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)

It is ideal for measuring in water vapor injection applications because 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 stainless steel enclosure with an installation kit for the probe. The HMT337 Humidity and Temperature Transmitter is installed in the stainless steel enclosure at the factory, when ordered together with HMT300TMK. 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
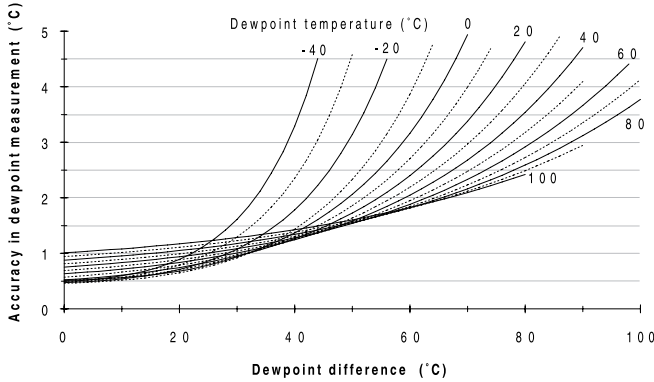
Response time (90 %) at +20 °C (68 °F)	
in still air (PPS grid with steel netting)	20 s
Sensor	HUMICAP® 180C

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-AlSi10 (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
Weight:	
HMT300TMK with HMT337	8,7 kg
HMT300TMK with HMT337, packed in a wooden shipping box	13,3 kg
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)

Dimensions

Dimensions in mm (inches)
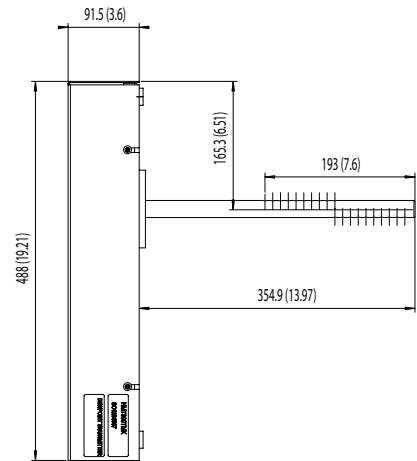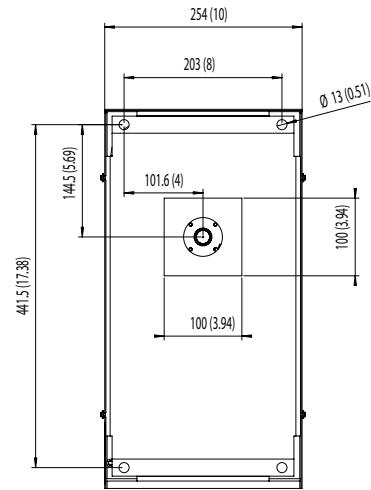
HMT310 Humidity and Temperature Transmitter

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

Features/Benefits

- Latest generation Vaisala HUMICAP® sensor for excellent accuracy and stability
- Full 0 … 100 %RH measurement, temperature range up to +180 °C (+356 °F), depending on model
- Small size, easy to integrate
- Insensitive to dust and most chemicals
- NIST traceable calibration (certificate included)

Reliable Vaisala HUMICAP® Technology

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

Several Outputs, One Connector

The HMT310 is powered up with 10 … 35 VDC. It has two analog outputs and an RS232 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. 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, variety of mounting kits, rain shield, 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/warmed probe
- Vaisala HUMICAP®180V — catalytic sensor for H_2O_2 environments
- Vaisala HUMICAP®180VC — catalytic sensor with chemical purge for H_2O_2 environments

Accuracy (including non-linearity, hysteresis, and repeatability) at a temperature range of

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

Accuracy over temperature range (see graph below)

Temperature sensor	Pt100 RTD Class F0.1 IEC 60751

Electrical Connections

Two analog outputs,	0 ... 20 mA or 4 ... 20 mA
selectable and scalable	0 … 5 V or 0 … 10 V
	1 … 5 V available through scaling
Typical accuracy of analog output at +20 °C	±0.05 % full scale
Typical temperature dependence of analog output	0.005 %/°C (0.003 %/°F) of full scale
Serial output	RS232C
Connections	M12 8-pole connector with RS232C, current/voltage outputs (two channels) and U_{in}
Operating voltage	10 ... 35 VDC

Minimum operating voltage
RS232C output	10 VDC
Analog output	15 VDC
Probe heating and chemical purge	15 VDC
Pressures above 10 bara (145 psia)	24 VDC

Power consumption
RS232	12 mA
U_{out} 10 V (10 kOhm) channel 1 & channel 2	12 mA
I_{out} 20 mA (load 511 Ohm) channel 1 & channel 2	50 mA
Chemical purge at 24 VDC	+ 220 mA
Warmed probe at 24 VDC	+ 240 mA
External load	$R_L < 500$ Ohm
Startup time after power-up	3 s

General

Operating temperature range for electronics	-40 ... +60 °C (-40 ... +140 °F)
Storage temperature range	-55 ... +80 °C (-67 ... +176 °F)

Operating pressure
HMT314	0 ... 100 bar
HMT318	0 ... 40 bar
HMT315, HMT317	vapor tight
Transmitter housing material	G-AlSi10Mg
Transmitter base material	PPS
Housing classification	IP66
Cable feed through alternatives	8-pole connector with 5 m cable, Female 8-pin connector screw joint for cable diameter 4 ... 8 mm
Probe cable length	2m, 5m, or 10m
Sensor protection	PPS grid with stainless steel net, PPS grid, Sintered filter, Membrane stainless steel filter, H_2O_2 filter

Complies with EMC standard EN61326-1, Industrial environment

Accessories

Rain shield	ASM211103
USB cable	238607
PPS Plastic Grid with Stainless Steel Netting	DRW010281SP
PPS Plastic Grid Filter	DRW010276SP
Sintered Filter AISI 316L	HM47280SP
Stainless Steel Filter	HM47453SP
Stainless Steel Filter with Membrane	214848SP
Catalytic H_2O_2 Filter	231865

HMT330 Series Humidity and Temperature Transmitters for Demanding Humidity Measurement

The HMT330 transmitter family offers reliable performance for a wide variety of 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
- 4th generation Vaisala HUMICAP® sensor for superior accuracy and stability
- Optional graphical display and keypad for convenient operation
- Multilingual user interface
- Excellent performance in harsh conditions; good chemical tolerance
- Corrosion-resistant IP65/IP66 housing
- 5-point calibration (certificate included)
- 10-year warranty when annually calibrated at the Vaisala Service Center
- RS232/485/422 WLAN/LAN
- MODBUS protocol support (RTU/TCP)
- Compatible with Vaisala viewLinc software

The Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT330 is designed for demanding industrial applications where stable measurements and extensive customization are essential. With multiple options to choose from, the instrument can be tailored to meet the specific needs of each individual application.

Proven Vaisala HUMICAP® Performance

The HMT330 series incorporates Vaisala's 40 years of experience in industrial humidity measurement. The updated fourth-generation HUMICAP sensor provides accurate and stable measurement even in environments with high humidity or chemical contaminants.

Chemical Purge Minimizes Effects of Contaminants

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

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

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

with Vaisala HUMICAP® 180VC   catalytic sensor with chemical purge for H_2O_2 environments

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

*HUMICAP 180R or 180RC recommended

** with HUMICAP 180R or 180RC or 180VC sensor

TEMPERATURE

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

Accuracy over temperature range (measurement range depends on model)
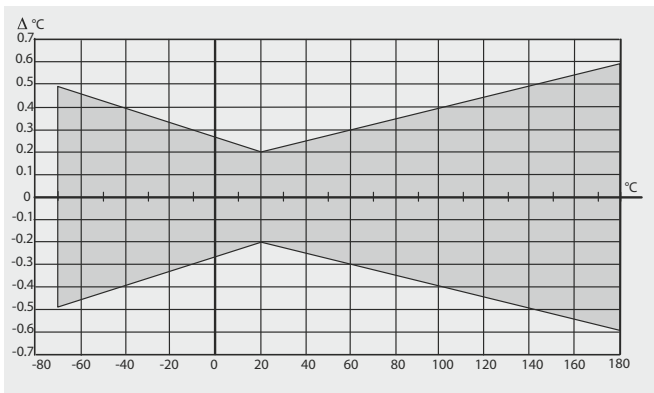
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751

Other available variables (model-dependent)

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

Inputs and Outputs

Operating voltage	10 ... 35 VDC, 24 VAC ±20%
with optional power supply module	100 ... 240 VAC, 50/60 HZ

Power consumption at +20 °C (U_{in} 24 VDC)

RS232	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 mm² (AWG 20)
	stranded wires recommended
Digital outputs	RS232, RS485 (optional)
Protocols	ASCII commands, MODBUS RTU
Service connection	RS232, USB
Relay outputs (optional)	0.5 A, 250 VAC

Ethernet interface (optional)

Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP

WLAN interface (optional)

Supported standards	802.11b
Antenna connector type	RP-SMA
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP
Security	WEP 64/128, WPA2/802.11i

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. four 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, graphical trend display of any parameter
Menu languages	English, Chinese, Finnish, French, German, Japanese, Russian, Spanish, Swedish

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	
HMT333 (+80 ℃)	6.0 mm
other probes	5.5 mm
Standard probe cable lengths	2 m, 5 m or 10 m (Additional lengths available, please see order forms for details)
Housing material	G-AlSi 10 Mg (DIN1725)
Housing classification	IP 66 IP65 (NEMA4X) with local display
Weight	
depending on selected probe, cable and modules	1.0 - 3.0 kgs

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

Note: Transmitter with display test impedance of 40 ohm is used in IEC61000-4-5 (Surge immunity)
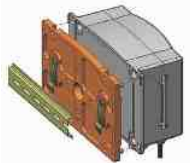
Dimensions

Dimensions in mm (inches)

Transmitter with WLAN antenna

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
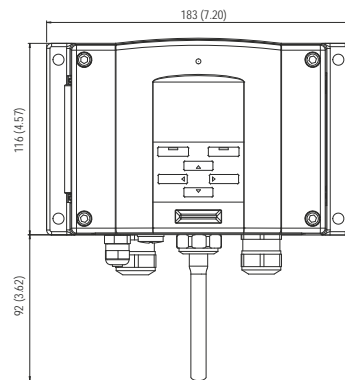
HMT331 Humidity and Temperature Transmitter for Demanding Wall-Mounted Applications

The HMT331 is a state-of-the-art wall-mounted humidity measurement instrument.

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT331 is a high-quality wall-mounted transmitter for demanding HVAC and condition-monitoring applications.

Typical Applications

- cleanrooms
- pharmaceutical processes
- swimming halls
- museums and archives

HMT331 Humidity and Temperature Transmitter with short flexible probe and optional WLAN.

Technical Data

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

Accessories

USB service port cable with PC software	219916
Connection cable for HM70	211339
Wall-mounting plate (plastic)	214829
Pole installation kit with rain shield	215109
DIN rail installation set	215094
PPS plastic grid filter with stainless steel net	DRW010281SP
Stainless steel sintered filter	HM47280SP

HMT333 Humidity and Temperature Transmitter for Ducts and Tight Spaces

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT333 is a versatile instrument for applications where a small remote probe is needed, for example in demanding HVAC applications. Its small thermal mass enables rapid response to temperature changes.

Flexible Installation

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

The HMT333 has two probe cable options – a flexible rubber cable that withstands temperatures of up to +80 °C, and a durable cable that withstands temperatures of up to +120 °C. Both cable options are available in lengths of 2, 5, and 10 meters. Additionally, flexible rubber cable (+80 °C) is available in 20-meter lengths.

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

The HMT333 transmitter's compact probe is designed for remote applications.

Typical Applications

- cleanrooms
- pharmaceutical processes
- environmental chambers
- processes with moderate temperature and humidity

Duct installation kit for HMT333 and HMT337.

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 with split seal	HMP247CG
USB service port cable with PC software	219916
Connection cable for HM70	211339
Wall-mounting plate (plastic)	214829
Pole installation kit with rain shield	215109
Solar radiation shield	DTR502B
DIN rail installation set	215094
PPS plastic grid filter with stainless steel net	DRW010281SP
PPS plastic grid filter	DRW010276SP
Stainless steel sintered filter	HM47280SP

HMT334 Humidity and Temperature Transmitter for High Pressure and Vacuum Applications

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

The Vaisala HUMICAP® Humidity and Temperature Transmitter HMT334 is designed for humidity measurement in pressurized spaces or vacuum chambers. Every probe is tested for gas and vacuum-tight installation.

Typical Applications

- test chambers
- high-pressure and vacuum processes

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	17223SP
Fitting body NPT 1/2"	17225SP
USB service port cable with PC software	219916
Connection cable for HM70	211339
Wall-mounting plate (plastic)	214829
Pole installation kit with rain shield	215109
DIN rail installation set	215094
PPS plastic grid filter with stainless steel net	DRW010281SP
PPS plastic grid filter	DRW010276SP
Stainless steel sintered filter	HM47280SP
Stainless steel grid filter	HM47453SP

HMT335 Humidity and Temperature Transmitter for High Temperatures

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

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

With high tolerance for mechanical stress and high flow rates, the HMT335 is ideal for duct measurements. The stainless steel installation flange allows easy adjustment of the probe's installation depth.

Typical Applications

- hot drying processes
- food processes, e.g. baking ovens

The installation flange allows easy adjustment of the probe installation depth.

Technical Data

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

Accessories

Mounting flange	210696
USB service port cable with PC software	219916
Connection cable for HM70	211339
Wall-mounting plate (plastic)	214829
Pole installation kit with rain shield	215109
DIN rail installation set	215094
PPS plastic grid filter with stainless steel net	DRW010281SP
PPS plastic grid filter	DRW010276SP
Stainless steel sintered filter	HM47280SP
Stainless steel grid filter	HM47453SP

HMT337 Humidity and Temperature Transmitter for High Humidity

The HMT337 is ideal for the most demanding process and meteorological measurements in high-humidity condensing environments.

Duct installation kit for HMT333 and HMT337.

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

- Basic, with a non-warmed probe for moderate humidity
- 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 Condensation Conditions

Vaisala's unique warmed probe provides fast and reliable measurement in environments where humidity is near saturation. The heating prevents condensation from forming on the sensor.

As the probe is heated, the humidity level inside it stays below the ambient level. With accurate temperature measurement, the ambient dew point 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.

Installation Options

Tight installation through a process wall can be achieved with Swagelok® fittings. The optional HMT330MIK Installation Kit is available for outdoor installations; duct installation kits are also available.

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 (up to 10 bar)	
Solar radiation shield	DTR502B
Meteorological installation kit	HMT330MIK
USB service port cable with PC software	219916
Connection cable for HM70	211339
Wall-mounting plate (plastic)	214829
Pole installation kit with rain shield	215109
DIN rail installation set	215094
Warmed probe accessory	HMT330WPA
PPS plastic grid filter with stainless steel net	DRW010281SP
PPS plastic grid filter	DRW010276SP
Stainless steel sintered filter	HM47280SP
Stainless steel grid filter	HM47453SP

*for more installation accessories, check the order form

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.

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

Insert or Remove the 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 tightened to a ball-valve assembly fixed to the process pipe or wall. The adjustable hex nut is hand-tightened to temporarily hold the probe in place. The probe is then pushed down to the appropriate depth. The hex nut is then tightened with a wrench to lock the probe in place. Hot tapping is possible in pressures up to 10 bar.

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
USB service port cable with PC software	219916
Connection cable for HM70	211339
Wall-mounting plate (plastic)	214829
Pole installation kit with rain shield	215109
DIN rail installation set	215094
PPS plastic grid filter with stainless steel net	DRW010281SP
PPS plastic grid filter	DRW010276SP
Stainless steel sintered filter	HM47280SP
Stainless steel grid filter	HM47453SP

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 dew point, 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 -70 ... +180°C (-94 ... +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 dew point in explosive environments.

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

Technical Data

Performance

RELATIVE HUMIDITY

Measurement range	0 ... 100 % RH

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

with Vaisala HUMICAP® 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$_L$2   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	17 s
with grid + steel netting filter	50 s
with sintered filter	60 s

TEMPERATURE

Measurement range	-70 ... +180 °C (-94 ... +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	Pt1000 RTD Class F0.1 IEC 60751

Accuracy over temperature range
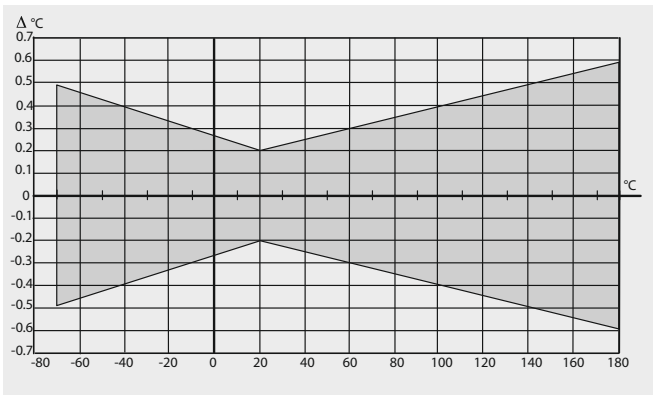
OTHER VARIABLES

Optionally available	dew point 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-AlS$_i$10Mg (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 (for HMP368)	BALLVALVE-1
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	210664
Protection cover (for use in the presence of combustible dust, ATEX)	214101 II 1 D IP65 T = 80 °C

HMD60/70 Humidity and TemperatureTransmitters 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.

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)

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.

Technical Data

60 Series: 2-wire, 4 to 20 mA Output

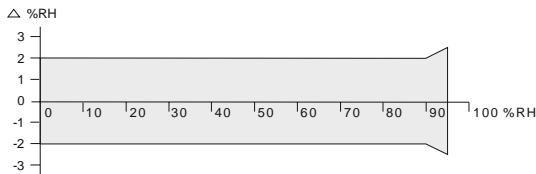|		
Duct mount	RH only	HMD60U
	RH & T	HMD60Y
	T only	HMD60T

70 Series: 3-wire, Variable Voltage Output

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

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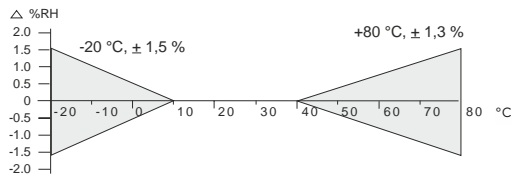
Measurement range
duct mount   0 ... 100 %RH*

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

Temperature (Y and T Models)

Linearity	better than 0.1 °C
Sensor	Pt 1000 RTD Class F0.3 IEC 60751
Measurement range	-20 ... +80 °C (-4 ... 176 °F) **

Accuracy
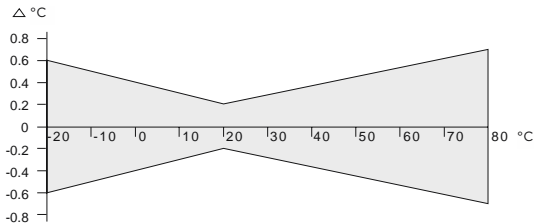
** Optional temperature scales are available on request.

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 ... 10 V	19 ... 35 V	16 ... 24 V

See User´s guide for other output signals

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 mm²

Sensor protection
standard	membrane filter (part no. DRW010525)
optional	stainless steel sintered filter (part no. HM46670SP)

Humidity sensor
HUMICAP180	15778HM

Cable thread-through
bushing for 7 ... 10 mm (PG9)	
bushing for NPT1/2" cable glands	242020
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

Dimensions

Dimensions in mm (inches)
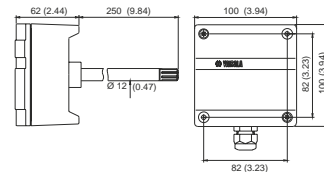
HM70 Handheld Humidity and TemperatureMeter for Spot-Checking Applications

The Vaisala HUMICAP® Handheld Humidity and Temperature Meter HM70 is a high-performance, portable humidity reference. From left to right: MI70 indicator, probes HMP75, HMP76 and HMP77.

Features/Benefits

- Designed for spot-checking and field calibration
- Multilingual user interface
- Shows measurement trends graphically
- Proven Vaisala HUMICAP® Sensor technology
- 3 probe alternatives, temperature measurement ranges between -70 and +180 °C
- 2 probes: also dew point and CO_2 probes can be connected simultaneously
- Displays various humidity parameters
- Sensor preheat and chemical purge options for demanding conditions
- 6-point NIST traceable calibration (certificate included)

The Vaisala HUMICAP® Handheld 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.

Vaisala HUMICAP® Technology

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.

Chemical Purge

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 dew point, carbon dioxide and moisture in oil probes, allowing measurements in several multiparameter applications.
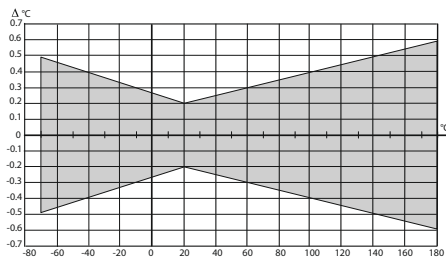
MI70 Link

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

RELATIVE HUMIDITY

Measurement range	0 ... 100 %RH

Accuracy (including non-linearity, hysteresis and repeatability)

at +15 ... +25 °C (+59 ... +77 °F)	±1 %RH (0 ... 90 %RH)
	±1.7 %RH (90 ... 100 %RH)
at -20 ... +40 °C (-4 ... +104 °F)	±(1.0 + 0.008 x reading) %RH
at -40 ... +180 °C (-40 ... +356 °F)	±(1.5 + 0.015 x 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 RTD Class F0.1 IEC 60751

OTHER VARIABLES AVAILABLE:

dew point, frost point, absolute humidity, mixing ratio, wet bulb temperature, water content, vapor pressure, saturation vapor pressure, enthalpy, water activity

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

Menu languages	English, Chinese, French, Spanish, German, Russian, Japanese, Swedish, Finnish
Display	LCD with backlight, graphical trend display of any parameter, character height up to 16 mm
Max. no. of probes	2
Power supply	Rechargeable NiMH battery pack with AC-adapter 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

Accessories

Weatherproof Carrying Cases

for MI70 and HMP75/77 probe	MI70CASE3
for MI70 and HMP76 probe	MI70CASE4
Soft Carrying Case for MI70 and HMP75/77 probe	MI70SOFTCASE

Transmitter connection cables for

HMT330 & HMT120/130	211339
HMT310	DRW216050
HMW90 Series, HMDW110 Series & GMW90 Series	219980
HMD/W60/70 Series	HMA6070
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

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

Vaisala INTERCAP® Humidity and TemperatureProbe 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. An optional RS485 output with Modbus support is also available.

Rugged Design

The HMP60 is designed for extreme conditions. The stainless steel 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	
+10 ... +30 °C	±0.5 °C
-40 ... +10, +30 ... +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	

ANALOG OUTPUTS

Accuracy at 20 °C	±0.2 % of FS
Temperature dependence	±0.01 % of FS/°C

Inputs and Outputs

Operating voltage	5 ... 28 VDC / 8 ... 28 VDC with
(Use lowest available operating	5 V output
voltage to minimize heating.)	8 ... 28VDC with loop power
	converter
Current consumption	1 mA average, max. peak 5 mA
Start-up time	
probes with analog output	4 s at operating voltage
	13.5 ... 16.5 VDC
	2 s at other valid operating voltages
probes with digital output	1 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

Operating Environment

|	
Operating temperature	-40 ... +60 °C
Electromagnetic compatibility	EN 61326-1: Electrical equipment for measurement, control and laboratory use – EMC requirements – for use in industrial locations.

Mechanics

Materials	
body	stainless steel (AISI 316)
grid filter	chrome coated ABS plastic
cable	polyurethane or FEP
Housing classification	IP65
Body thread	MI2x1 / 10 mm
Cable connector	4-pin M8 (IEC 60947-5-2)
Weight	
probe	17 g
probe with 0.3 m cable	28 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-1CB
Mounting bracket for converter	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	HMP50Z032SP
3 m PU	HMP50Z300SP
180 °C 3 m FEP	226902SP

Dimensions

in mm (inches)
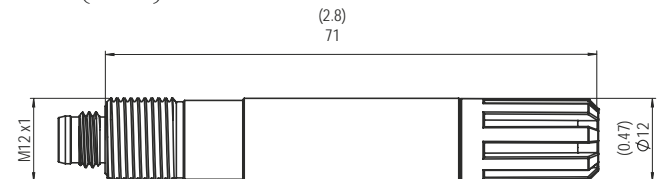
Vaisala HUMICAP ® Humidity and Temperature Probe HMP110

The HMP110 with excellent stability and high chemical tolerance.

Features/Benefits

- Miniature-size humidity transmitter
- Low power consumption and fast start-up 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. ±1.5 %RH measurement accuracy (0 ... 90 %RH)
- HMP110R replacement probe service available for easy maintenance
- Optional dew point calculation

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. An optional RS485 output with Modbus support is also available.

Robust Design

The stainless steel 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	±1.5 %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)

0 ... 90 %RH	±1.1 %RH
90 ... 100 %RH	±1.8 %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 Class F0.1 IEC 60751

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	±2 °C
depression = ambient temperature - dew point	

ANALOG OUTPUTS

Accuracy at 20 °C	±0.2 % of FS
Temperature dependence	±0.01 % of FS/°C

Inputs and Outputs

Operating voltage	5 ... 28 VDC / 8 ... 28 VDC with
(Use lowest available operating	5 V output
voltage to minimize heating)	8 ... 28 VDC with loop power converter
Current consumption	1 mA average, max. peak 5 mA
Start-up time	
HMP110 probes with analog output	4 s at operating voltage 13.5 ... 16.5 VDC
	2 s at other valid operating voltages
HMP110D probes with digital output	1 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 (HMP110D)	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

Operating Environment

|	
Operating temperature range	-40 ... +80 °C
Electromagnetic compatibility	EN 61326-1: Electrical equipment for measurement, control and laboratory use – EMC requirements – for use in industrial locations.

Mechanics

Materials

body	stainless steel (AISI 316)
grid filter	chrome coated ABS plastic
cable	polyurethane or FEP
Housing classification	IP65
Body thread	MI2x1 / 10 mm
Cable connector	4-pin M8 (IEC 60947-5-2)

Weight

probe	17 g
probe with 0.3 m cable	28 g

Options and Accessories

Sensor protection

plastic grid	DRW010522SP
membrane filter	DRW010525SP
stainless steel sintered filter	HM46670SP
4 ... 20 mA loop power converter	UI-CONVERTER-1CB
Mounting bracket for converter	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	HMP50Z032SP
standard 3 m	HMP50Z300SP
80 °C 1.5 m	225777SP
80 °C 3 m	225229SP
180 °C 3 m FEP	226902SP
connection cable for HM70	219980

Dimensions

Dimensions in mm (inches)
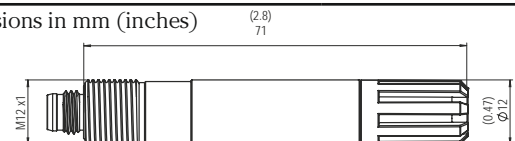
HMP155 Humidity and Temperature Probe

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

Features/Benefits

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

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

Long-term Stability

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

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

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. For the additional temperature probe, an installation kit is available to be used with DTR502 radiation shield.

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	±0.6 %RH (0 ... 40 %RH)*
uncertainty (+20 °C /+68 °F)	±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 ltemperaturel)°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 Class F0.1 IEC 60751

Response time with additional temperature
probe in 3 m/s air flow

63 %	<20 s
90 %	<35 s

OTHER VARIABLES

dew point/frost point temperature,
wet bulb temperature, mixing ratio

Dimensions

Dimensions in mm

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
	optional membrane filter
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 ... 28 VDC*

*Note: minimum operating voltage 12 V with 0 ... 5 V output
and 16 V with 0 ... 10 V output, probe heating, chemical purge or
XHEAT.

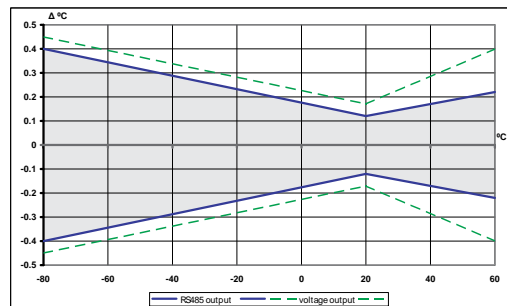|	
Outputs	
voltage output	0 ... 1 V, 0 ... 5 V, 0 ... 10 V
resistive Pt100 (4-wire connection)	
RS485	

Average current consumption
(+15 VDC, load 100 kOhm)

0 ... 1 V output	<3 mA
0 ... 10 V output	+0.5 mA
RS485	<4 mA
during chemical purge	max. 110 mA
with warmed probe	max. 150 mA
Settling time at power-up	
voltage output	2 s
RS485	3 s

HMK15 Humidity Calibrator

three step plugs to fit all chamber holes (12 mm, 13.5 mm and 18.5 mm)

transit covers for secure transportation and long-term storage

thermometer with calibration certificate

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 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.

FINAS Accredited Measurement Standards Laboratory

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

Technical Data

General

The standard HMK15 consists of the following parts:

- Two salt chambers, chamber covers and transit covers
- Base plate
- Thermometer
- 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_2SO_4 salt	97 %RH	19732HM	(±2.0 %RH)

*Uncertainties given at +20 °C

Ion exchanged water	19767HM
Extra salt chambers	19766HM
Carrying bag	HM27032
Set of rubber plugs	19746HM

HMM100 Humidity Module for Environmental
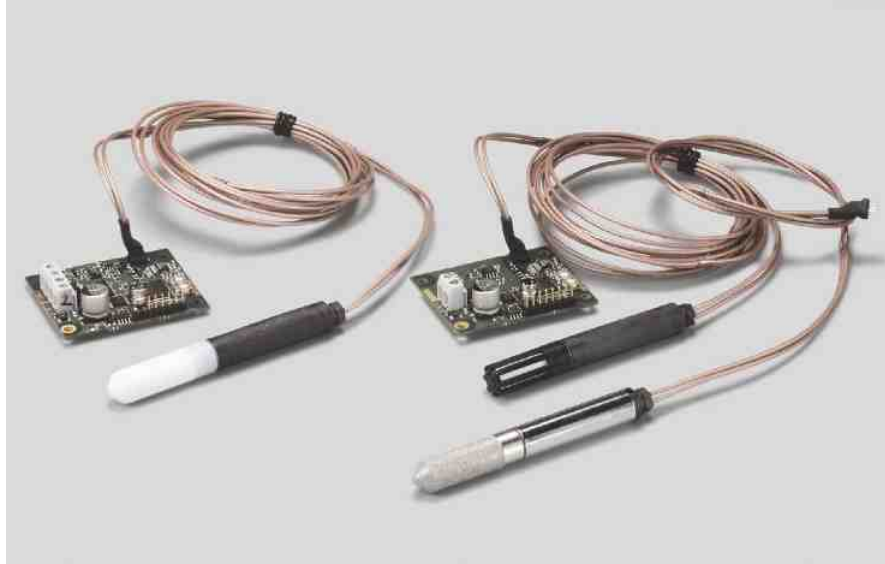
The Vaisala HUMICAP® Humidity Module HMM100.

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 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 dew point (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	Applicable parts of EN61326-1, Generic Environment

Input and Outputs

Operating voltage	
2-wire model	24 VDC
3-wire model	10 ... 35 VDC or 9 ... 24 VAC
	15 ... 35 VDC or 14 ... 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 mm² (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
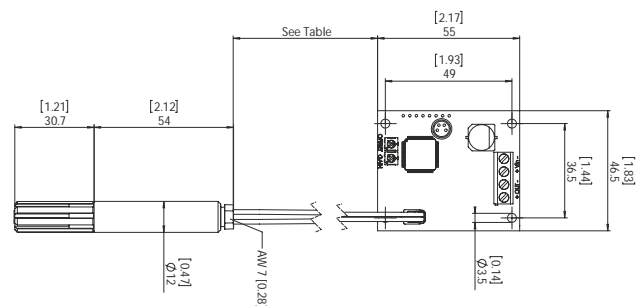
WXT520

Прибор WXT520 имеет цепь автоматического управления, включающую обогрев при низких температурах.

Характеристики/Преимущества

- Измеряет 6 важнейших метеорологических параметров
- Высокая точность и стабильность
- Малая потребляемая мощность – работает также с солнечными панелями
- Компактность, малый вес
- Простота установки с помощью одного винта
- Отсутствие подвижных частей
- Предусмотрена функция обогрева
- Конфигуратор фирмы Vaisala для ПК
- USB разъем
- корпус IP66 с монтажным комплектом
- Объекты применения: метеостанции, сети с плотным расположением узлов, порты, пристани

WXT520

Поставлямый фирмой Vaisala универсальный метеокомплекс WXT520 измеряет атмосферное давление, относительную влажность, осадки, температуру, а также скорость и направление ветра.

Для измерения скорости и направления ветра прибор WXT520 оборудован датчиком фирмы Vaisala типа WINDCAP®, использующим ультразвук для определения скорости и направления горизонтального ветра. Группа из трех датчиков, расположенных на равном расстоянии друг от друга в горизонтальной плоскости представляет собой собственную разработку фирмы Vaisala. Измерения атмосферного давления, температуры и относительной влажности совмещены в модуле PTU с использованием емкостного измерения каждого параметра. Замена модуля легко производится без контакта с датчиками.

Метеокомплекс WXT520 устойчив к затоплению, заливанию и потерям на испарение при измерении осадков.

Акустическое измерение осадков

Измерение осадков метекомплексом WXT520 основано на уникальном датчике фирмы Vaisala RAINCAP® Sensor, регистрирующем удар каждой отдельной капли. Сигналы, исходящие от ударов, пропорциональны объему капель. На основании этого сигнал каждой капли может преобразовываться непосредственно в суммарные осадки.

Прибор WXT520 измеряет суммарные осадки, интенсивность и длительность дождя – и все это в реальном времени.

Датчик RAINCAP® Sensor фирмы Vaisala это единственный из существующих на рынке датчиков осадков, который не требует техобслуживания.

Технические данные

Ветер

СКОРОСТЬ

Диапазон	0 ... 60 м/с
Время реагирования	250 мс
Точность	
0 ... 35 м/с	±0.3 м/с или ±3%,
	в зависимости от того, какая из величин больше
35 м/с... 60 м/с	±5%
Выходные разрешения и	0.1 м/с, 0.1 км/ч,
единицы	0.1 миля/ч, 0.1 узлов

НАПРАВЛЕНИЕ

азимут	0 ... 360°
Время реагирования	250 мс
Точность	±3°
Выходное разрешение и единица	1°

Жидкие атмосферные осадки

ДОЖДЬ	кумулятивные осадки после последнего автоматического или ручного сброса на ноль
Выходные разрешения и единицы	0.01 мм, 0.001 дюйма
Точность	5%*
ПРОДОЛЖИТЕЛЬ-НОСТЬ ДОЖДЯ	регистрирует прирост каждых десяти секунд при обнаружении падения капли воды
Выходное разрешение и единица	10 с
ИНТЕНСИВНОСТЬ ДОЖДЯ	скользящее осреднение за одну минуту с шагом в десять секунд
Диапазон	0 ... 200 мм/ч (чем больше диапазон, тем меньше точность)
Выходные разрешения и единицы	0.1 мм/ч, 0.01 дюймов/ч
ГРАД	суммарное число ударов по чувствительной поверхности(**)
Выходные разрешения и единицы	0.1 ударов/см^2, 0.01 ударов/дюйм^2, 1 удар
ПРОДОЛЖИТЕ-ЛЬНОСТЬ	добавляет прирост каждых десяти секунд при регистрации града любой интенсивности
Выходное разрешение и единица	10 с
ИНТЕНСИВНОСТЬ ГРАДА	скользящее осреднение за одну минуту с шагом в десять секунд(**)
Выходные разрешения и единицы	0.1 ударов/см^2, 0.01 ударов/дюйм^2, 1 удар/ч

Температура воздуха

Диапазон	-52 ... +60 ℃ (-60 ... +140 °F)
Точность датчика при +20 ℃	±0.3 ℃ (±0.5 °F)
Точность в температурном диапазоне (см. диаграмму ниже) (**)	
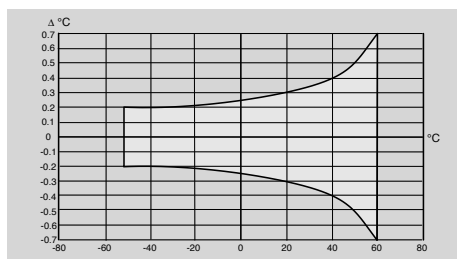
Выходные разрешения и единицы	0.1 ℃, 0.1 °F

Атмосферное давление

Диапазон	600 ... 1100 гПа
Точность	±0.5 гПа при 0 ... +30 ℃ (+32 ... +86 °F)±1
	±1 гПа при -52 ... +60 ℃ (-60 ... +140 °F)
Выходные разрешения и единицы	0.1 гПа, 10 Па, 0.0001 бар, 0.1 мм.рт.ст., 0.01 дюйма рт.ст

Относительная влажность

Диапазон	0 ... 100 % отн.влажности
Точность	±3 % в пределах 0 ... 90 % отн.влажности ±5 % в пределах 90 ... 100 % отн.влажности
Выходное разрешение и единица	0.1 % отн.влажн.

Общие сведения

Рабочая температура	-52 ... +60 ℃ (-60 ... +140 °F) (**)
Температура хранения	-60 ... +70 ℃ (-76 ... +158 °F)
Рабочее напряжение	5 ... 32 В пост.тока
Типичная потребляемая мощность:	ток 3 мА при 12 В пост.тока (по умолчанию)
Напряжение обогрева	5 ... 32 В пост.тока (или пер.тока, макс. 30 В действующего напряжения)
Последовательный интерфейс данных	SDI-12, RS-232, RS-485, RS-422, кабель USB
Масса	650 г
Корпус	IP65
Корпус с монтажным комплектом	IP66

Преимущества

- Оптимальное сочетание параметров
- Простота эксплуатации и интеграции
- Центр метеорологических параметров
- Возможность добавления аналоговых датчиков
- Компактный, легкий
- Низкое энергопотребление
- Выходная сила тока (мА) подходит для промышленных сфер применения
- Малозатратный

Преобразователь Vaisala WXT530 — это уникальный набор датчиков с комбинацией параметров, позволяющей выбирать оптимальные настройки для конкретной сферы применения. Преобразователь серии WXT530 представляет собой универсальный интегрированный структурный элемент для аппликаций связанных с погодой. Серия WXT530 улучшает уровень контроля погодных условий.

Универсальность

WXT530 представляет собой набор инструментов, предоставляющих различные комбинации шести наиболее важных метеорологических параметров: атмосферного давления, температуры, влажности, осадков, скорости и направления ветра. Пользователь может выбрать преобразователь с необходимыми метеорологическими параметрами, большим разнообразием режимов цифровой связи и широким диапазоном параметров напряжения. Существует также модель с подогревом. Наличие режима низкого энергопотребления делает возможным использование солнечных панелей. Серия WXT530 компании Vaisala практически не

требует технического обслуживания и отличается экономичностью.

Интеграция

Устройства данной серии поддерживают различные варианты аналогового входа для дополнительных аналоговых датчиков сторонних производителей. С помощью встроенных преобразователей аналоговых сигналов в цифровые можно превратить преобразователь метеоданных WXT530 в компактный, бюджетный центр метеорологических параметров. Дополнительные параметры включают датчик солнечной радиации и наружный датчик температуры. Кроме того, аналоговый выход мА для измерения скорости и направления ветра подходит

для различных промышленных сфер применения. WXT530 превышает стандарт МЭК IEC60945.

Надежная производительность

Преобразователь серии WXT530 оснащен уникальной технологией полупроводниковых датчиков Vaisala. Для измерения скорости и направления ветра прибор WXT530 оборудован датчиком фирмы Vaisala типа WINDCAP®, использующим ультразвук для определения скорости и направления горизонтального ветра. Измерения атмосферного давления, температуры и относительной влажности совмещены в модуле PTU с использованием емкостного измерения каждого параметра. Замена модуля легко производится без контакта с датчиками. Измерение осадков WXT520 основано на уникальном акустическом датчике фирмы Vaisala RAINCAP®, который устойчив к затоплению, заливанию и потерям на испарение при измерении осадков.

Технические данные

Барометрическое давление

Диапазон	600 ... 1100 гПа
Погрешность (для датчиков)	±0,5 гПа при 0 ... +30 °C (+32 ... +86 °F) ±1 гПа при -52 ... +60 °C (-60 ... +140 °F)
Выходные разрешения	0,1 гПа, 10 Па, 0,001 бар, 0,1 мм рт.ст., 0,01 дюйма рт.ст.

Температура воздуха

Диапазон	-52 ... +60 °C (-60 ... +140 °F)
Погрешность (для датчиков) при +20 °C (+68 °F)	±0,3 °C (0,17 °F)
Выходные разрешения	0,1 °C (0,1 °F)

Относительная влажность

Диапазон	0 ... 100 % отн. влажности
Погрешность (для датчиков)	±3 % отн. влажности при 0 ... 90 % отн. влажности ±5 % отн. влажности при 90 ... 100 % отн. влажности
Выходные разрешения	0,1 % отн. влажности
Интервал измерений PTU	1 ... 3600 с (= 60 мин), с шагом в одну секунду

Атмосферные осадки

ОСАДКИ	Кумулятивные осадки после последнего автоматического или ручного сброса на ноль
Площадь водосбора	60 см²
Выходные разрешения	0,01 мм (0,001 дюйма)
Погрешность при полевых измерениях для долгосрочной аккумуляции	Лучше чем 5 %, в зависимости от погодных условий
ПРОДОЛЖИТЕЛЬНОСТЬ ДОЖДЯ	Регистрирует прирост каждых десяти секунд при обнаружении падения капли воды
Выходные разрешения	10 с
ИНТЕНСИВНОСТЬ ДОЖДЯ	Скользящее осреднение за одну минуту с шагом в десять секунд
Диапазон	0 ... 200 мм/ч (чем больше диапазон, тем меньше точность)

Входы и выходы

Рабочее напряжение	6 ... 24 В пост. тока (-10 % ... +30 %)
Среднее потребление электроэнергии	
Минимальное	0,1 мА при 12 В пост. тока (режим ожидания SDI-12)
Типичное	3 мА при 12 В пост. тока (с интервалами измерения по умолчанию)
Максимальное	15 мА при 6 В пост. тока (с постоянным измерением всех параметров)
Подогрев Типичное напряжение	Варианты: пост. тока, пер. тока, двухполупериодное выпрямленное напряжение пер. тока
Цифровые выходы	SDI-12, RS-232, RS-485, RS-422
Протоколы передачи данных	SDI-12 v1.3, ASCII автоматический и опрашиваемый, NMEA 0183 v3.0 с возможностью запроса

Ветер

СКОРОСТЬ ВЕТРА

Диапазон	0 ... 60 м/с
Время отклика	0,25 с
Доступные переменные	среднее, максимальное и минимальное
Погрешность	±3 % при 10 м/с
Разрешение на выходе	0,1 м/с (км/ч, миль/ч, узлов)

НАПРАВЛЕНИЕ ВЕТРА

Азимут	0 ... до 360°
Время отклика	0,25 с
Доступные переменные	среднее, максимальное и минимальное
Погрешность	±3 при 10 м/с
Разрешение на выходе	1°

ИНТЕРВАЛ МЕЖДУ ИЗМЕРЕНИЯМИ

Средняя продолжительность	1 ... 3600 с (= 60 мин), с шагом в 1 с, на основе образцов, собираемых с частотой 4, 2 или 1 Гц (настраиваемый параметр)
Интервал обновления	1 ... 3600 с (= 60 мин), с шагом в 1 с

Варианты аналогового входа

Параметр	Элемент	Диапазон	Вход	Возбуждение	Разрешение
Температура PT1000	Резистор	800 ... 1330 Ω	2-проводной 4-проводной	2,5 В	116 бит
Солнечная радиация K&Z CMP3	Термоэлемент	0 ... 25 мВ	4 MΩ	-	12 бит
Измерение уровня IRU-9429S	Напряжение	0 ... 2,5 В 0 ... 5 В 0 ... 10 В	>10 kΩ	-	12 бит
Опрокидываю щееся ведерко RG13 RG13	Частота	0 ... 100 Гц	18 kΩ	3,5 В	-

Варианты аналогового выхода мА

Скорость ветра	0 ... 20 мА или 4 ... 20 мА
Направление ветра	0 ... 20 мА или 4 ... 20 мА
Сопротивление нагрузки	200 Ω макс.

Общие условия

Класс защиты корпуса	IP65 (без монтажного комплекта) IP66 (с прилагаемым монтажным комплектом)
Температура хранения	-60 ... +70 °C (-76 ... 158°F)
Температура	-52 ... +60 °C (-60 ... +140 °F)
Относительная влажность	0 ... 100 % отн. влажности
Давление	600 ... 1100 гПа
Ветер	0 ... 60 м/с

Цифровые барометры серии PTB210

ПРИМЕНЕНИЕ

- **Аэропорты**
- **Агрология**
- **Станции погоды**
- **Платформы и корабли**
- **Лазерные интерферометры**
- **Испытательные стенды**

РАЗЛИЧНЫЕ ДИАПАЗОНЫ ДАВЛЕНИЯ

Цифровые барометры серии PTB210 сконс-труированы для различных диапазонов давления. Имеются барометры с двумя базовыми конфигурациями: последователь-ным выводом для 500…1100 гПа и 50…1300 гПа, а также аналоговый выход с различными масштабированиями между 500…1300 гПа для 0…5 В и 0…2.5 В.

ДЛЯ ТЯЖЕЛЫХ УСЛОВИЙ

Барометры серии PTB210 являются отличным решением для применения вне помещения. Они сконструированы для работы в широком диапазоне температур, и корпус электроники обеспечивает защиту стандарта IP65 против распыляемой воды. Устойчивый к коррозии корпус в комбинации с компактным размером PTB210 обеспечивают легкую установку и беспроблемную работу.

PTB210 можно совместить с приемником статического давления Vaisala. Такая комбинация обеспечивает точное измерение при любых условиях ветра.

ТОЧНЫЕ И СТАБИЛЬНЫЕ ИЗМЕРЕНИЯ

Все барометры PTB210 настроены и откалиброваны при помощи элекронных рабочих стандартов. Барометр повышенной точности, который отрегулирован и откалиброван в соответствии с высокоточными стандартами работает в диапазоне 500…1100 гПа.

В составе барометров PTB210 используется силиконовый емкостной датчик давления BAROCAP®, разработанный на фирме Vaisala. Данный датчик имеет отличные характеристики гистерезиса и повторяемос-ти, а также температурную и долговремен-ную стабильность. Все барометры PTB210 поставляются с сертификатом заводской калибровки.

ТЕХНИЧЕСКАЯ ИНФОРМАЦИЯ PTB210

РАБОЧИЙ ДИАПАЗОН

Диапазон давления (заказывается отдельно)	
последовательный выход	500…1100 гПа
	50…1300 гПа
аналоговый выход	500…1300 гПа
	800…1060 гПа
	600…1060 гПа
	900…1100 гПа
Диапазон рабочей температуры	-40…+60 °C
Диапазон влажности	не конденсат

ТОЧНОСТЬ

Последовательный выход (в гПа)

Диапазон давления	500…1100		50…1300
	Класс А	Класс В	
Нелинейность*	±0.10	±0.15	±0.20
Гистерезис*	±0.05	±0.05	±0.10
Повторяемость*	±0.05	±0.05	±0.10
Погрешность калибровки**	±0.07	±0.05	±0.10
Общая точность (20°C)***	±0.15	±0.20	±0.35
Температурная зависимость (-40…+60 °C)****	±0.20	±0.20	±0.40
Общая точность (-40…+60 °C)***	±0.25	±0.30	±0.50
Долговременная стабильность (гПа/год)	±0.25	±0.30	±0.50

Аналоговый выход

Нелинейность*	±0.20 гПа
Гистерезис*	±0.05 гПа
Повторяемость*	±0.05 гПа
Погрешность калибровки**	±0.15 гПа
Общая точность (20°C)***	±0.30 гПа
Температурная зависимость (-40…+60 °C)****	±0.50 гПа
Общая точность (-40…+60 °C)***	±0.60 гПа
Долговременная стабильность	±0.10 гПа / год

* Определено как ±2 стандартных предела отклонений от конечной точки нелинейности, ошибки гистерезиса или ошибки повторяемости

** Определено как ±2 стандартных предела отклонения от точности рабочего стандарта, включая прослеживаемость NIST

*** Определено как сумма квадратов (RSS) конечных точек нелинейности, ошибок гистерезиса, ошибки повторяемости и калибровки погрешности при комнатной температуре

****Определено как ±2 стандартных предела отклонения температурной зависимости в рабочем диапазоне

ОБЩИЕ

(* заводские установки)

Последовательный выход

Потребление тока	
рабочий режим	< 15 мА
режим низкой энергии	< 0.8 мА
режим простоя	0.2 мА
Выключение	ON/OFF
Время установки при включении	2 с

Последовательный Вв/Выв (заводская уст.*)	RS 232C
	RS 232C/ TTL (дополнение)
	RS 485, неизолированный (дополнение)
четность	нет, четн.*, нечет.
биты данных	7*, 8
стоп биты	1*, 2
Скорость передачи	300, 600, 1200, 2400, 4800, 9600*,19200
Время ответа	1 с*
Разрешение	0.01 гПа (1 измерение)
	0.05 гПа (20 измерений)

Аналоговый выход

Выходы	0…5 VDC, 0…2.5 VDC (указ при заказе)
Потребление тока	
обычный режим	< 8 мА
режим простоя	0.2 мА
Выключение	ON/OFF
Время ответа	500 мс
Разрешение	300 мВ
Скорость измерений	3 измерения/с

Все модели

Напряжение питания (защита от обр.пол.)	8…18VDC
Максимальное давления	5000гПа абс.
Разъем давления	M5 (10-32) внутренняя резьба
Монтаж	установка на зубец для 1/8'' I.D. трубки
Разъем	розеточный 9-конт. SubD
Корпус	
электроника	IP65
датчик	IP53
Материал корпуса	PC пластик
Длина кабеля питание/выход	1,2,3,5 или 10 м
Вес	
Прибор	110 г
Кабель	28 г/м

Полная электромагнитная совместимость в соответствии с EN50081-1 и EN50082-1 стандартами

BAROCAP® является зарегистрированной торговой маркой Vaisala. Спецификации могут изменяться без предварительного уведомления. © Vaisala Oyj
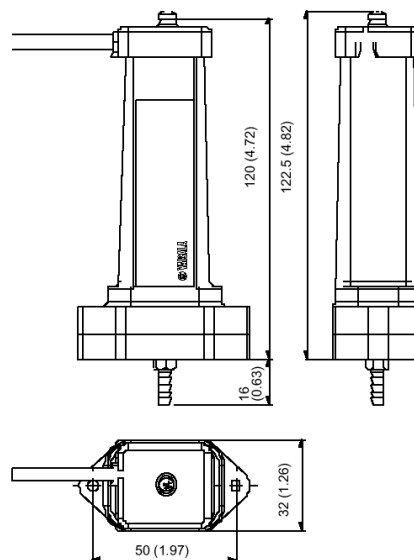
Размеры в мм (дюймах)

Образцовый барометр PTB330TS

Работоспособное устройство PTB330TS включает в себя цифровой барометр PTB330, ручной индикатор MI70, дополнительный датчик HMP155 для измерения влажности и температуры, дополнительное ПО MI70 Link для ПК, руководство пользователя и погодоустойчивый футляр для перевозки с наплечным ремнем.

Футляр для транспортировки PTB330TS

Образцовый барометр PTB330TS позволяет легко выполнять точные измерения в полевых условиях. В этом портативном устройстве объединены цифровой барометр PTB330 и ручной индикатор MI70, что позволяет использовать его в качестве эталона. Для точного измерения влажности и температуры можно применять дополнительный датчик HMP155.

Устройство PTB330TS подходит для всевозможных эталонных измерений в промышленных и метеорологических целях.

PTB330TS поставляется в прочном погодоустойчивом футляре для транспортировки, который легко носить и транспортировать. Детали размещены на защитной поролоновой вставке, а принадлежности и руководство

пользователя размещены в крышке. В футляре также имеется отдельный внутренний настольный футляр, в котором устанавливается барометр. Для удобства в комплект входит наплечный ремень. Длительность работы от аккумулятора составляет до 11 часов при непрерывном использовании и до 30 дней в режиме регистрации данных.

Особенности и преимущества

- Портативный эталонный прибор с автономным питанием и возможностью регистрации данных.

- Измерение барометрического давления с помощью цифрового барометра Vaisala BAROCAP® PTB330:
  - превосходная долгосрочная стабильность;
  - точность измерений;
  - повышенная надежность благодаря дублированию.

- Дополнительная возможность измерения влажности и температуры с помощью HMP155:
  - датчик Vaisala HUMICAP®180R – непревзойденная долгосрочная стабильность;
  - новый быстрый датчик для измерения температуры;
  - химическая промывка.

- Многоязычный пользовательский интерфейс (девять языков).

- Возможность регистрации данных и их передачи в компьютер посредством ПО MI70 Link.

- Доступны услуги по калибровке согласно сертификации SO/IEC 17025.

- Для профессионального применения в метеорологии, авиации, лабораториях и промышленности с высокими требованиями.

Цифровой барометр PTB330

Датчик HMP155

Ручной индикатор MI70, показывающий преобладающее давление в гПа

Цифровой барометр PTB330

Цифровой барометр Vaisala BAROCAP® PTB330 – это барометр нового поколения, разработанный для широкого диапазона высокоточных измерений атмосфероного давления. Для измерения давления в PTB330 применяется собственный датчик абсолютного давления Vaisala на основе кремниевых параметрических диодов – Vaisala BAROCAP®. Он обеспечивает высокую точность измерений и превосходную долгосрочную стабильность работы.

Высокая точность

Серия PTB330 обладает чрезвычайно высокой точностью. Барометры класса А для областей применения с высокими требованиями подвергаются точной регулировке и калибровке с применением высокоточного калибратора давления. Все барометры PTB330 оснащаются заводским сертификатом калибровки, который соответствует требованиям Национального института стандартов и технологий США (NIST). Кроме того, можно воспользоваться услугами по калибровке согласно сертификации ISO/IEC 17025.

Надежность благодаря дублированию

По выбору заказчика барометр PTB330 может быть оснащен одним, двумя или тремя датчиками BAROCAP®. При использовании двух или трех датчиков

барометр непрерывно сравнивает показания датчиков давления между собой и предоставляет информацию о том, соответствуют ли они заданному критерию внутренней разности. Эта уникальная функция обеспечивает дублирование при измерении давления. Следовательно, пользователи всегда получают стабильные и надежные данные о давлении, а также предупреждения о необходимости технического обслуживания или повторной калибровки барометра.

Дополнительный датчик HMP155 для измерения влажности и температуры

Новый датчик для измерения влажности и температуры Vaisala HUMICAP® HMP155 обеспеивает надежное измерение влажности и температуры.

Долгосрочная стабильность работы

В HMP155 используется сенсор нового поколения Vaisala HUMICAP®180R, обладающий превосходной стабильностью и стойкостью к наиболее жестким условиям. Датчик имеет цельную конструкцию, и он защищен с помощью тефлонового фильтра, который обеспечивает максимальную защиту от воды, пыли и грязи.

Быстрое измерение температуры

Кроме того, благодаря малому времени отклика дополнительный датчик для

измерения температуры HMP155 идеально подходит для измерений в средах с быстро меняющейся температурой.

Ручной индикатор MI70 для проведения выборочной проверки

Индикатор измерений Vaisala MI70 удобен в использовании и предназначен для выборочных измерений, к которым предъявляются высокие требования. Он идеально подходит для проведения в полевых условиях проверки и калибровки стационарных приборов Vaisala.

Удобный пользовательский интерфейс и экран для отображения трех параметров

Индикатор MI70 оснащен многоязычным пользовательским интерфейсом с меню, а также четким графическим ЖК-дисплеем. Измерительный прибор может одновременно отображать и регистрировать в памяти до трех параметров измерения. Можно одновременно подключать один или два датчика либо передатчика.

Цифровой барометр PTB330 для профессиональной метеорологии, авиации и промышленности

Цифровой барометр Vaisala BAROCAP® PTB330 с новым дисплеем отображения трендов

Цифровой барометр Vaisala BAROCAP® PTB330 представляет собой прибор нового поколения, разработанный для ширкого спектра высокоточных измерений атмосферного давления. Измерение давления барометром PTB330 базируется на встроенном кремниевом емкостном датчике абсолютного давления Vaisala BAROCAP® Sensor. Он обеспечивает высокую точность и превосходную долговременную стабильность.

Характеристики/Преимущества

- Датчик Vaisala BAROCAP®
- Высокая точность измерений
- Превосходная долговременная стабильность
- Повышенная надежность благодаря резервированию
- Графическое отображение трендов с сохранением истории данных за 1 год
- Атмосферное давление, приведенное к уровню моря, и давление на уровне аэродрома (QFE, QNH)
- Для нужд профессиональной метеорологии и авиации, лабораторий, в промышленности, когда предъявляются повышенные требования к измерению давления

Высокая точность

Серия продукции PTB330 отличается высокой точностью. Барометры класса А для наиболее ответственных случаев применения точно отрегулированы и откалиброваны с помощью высокопрецизионного калибратора давления. Барометры класса В регулируются и калибруются с использованием электронного рабочего эталона. Все барометры PTB330 поставляются с сертификатом заводской калибровки, выполняемой в соответствии с методикой Национального института стандартов и технологий (NIST).

Надежность за счет резервирования

Барометр PTB330 может по выбору клиента содержать один, два или три датчика BAROCAP®. В случае использования двух или трех датчиков, барометр постоянно сравнивает показания датчиков давления и выдает информацию о том, находятся ли они в рамках уставленных внутренних критериев расхождения. Эта уникальная характеристика обеспечивает резервирование измерения давления. Таким образом, пользователь

постоянно получает стабильные и надежные показания давления, а также предупреждение о необходимости обслуживания или перекалибровки барометра.

QNH и QFE

Барометр PTB330 можно настроить на компенсацию для давлений QNH и QFE, используемых главным образом в авиации. Параметр QNH представляет собой вличину давления, приведенную к уровню моря на базе высоты над уровнем моря и окружающей температуры в точке измерения. Величина QFE представляет собой давление, скорректированное по высоте, при небольших отклонениях по высоте над уровнем моря, например, атмосферное давление на уровне аэродрома.

Графический дисплей

Барометр PTB330 оборудован многоязычным графическим дисплеем, позволяющим пользователю следить за измерительными трендами. Графики автоматически обновляются по ходу измерений, и система обеспечивает сохранение истории измерений в течение одного года. Помимо измерения текущих величин давления барометр PTB330 также предоставляет коды и тренды атмосферного давления Всемирной метеорологической организации.

Применения

Барометр PTB330 может с успехом использоваться в авиации, профессиональной метеорологии и в промышленности, когда предъявляются повышенные требования к измерению давления, например, при высокоточном лазерном интерферометрическом измерении или при анализе выхлопных газов на стендах испытания двигателей.

Технические данные

Рабочие характеристики

ДИАПАЗОН АТМОСФЕРНОГО ДАВЛЕНИЯ 500 ... 1100 ГПА

	Класс A	Класс B
Линейность *	±0.05 гПа	±0.10 гПа
Гистерезис*	±0.03 гПа	±0.03 гПа
Воспроизводимость*	±0.03 гПа	±0.03 гПа
Погрешность калибровки **	±0.07 гПа	±0.15 гПа
Точность при +20 °С (+68 °F) ***	±0.10 гПа	±0.20 гПа

ДИАПАЗОН АТМОСФЕРНОГО ДАВЛЕНИЯ 50 ... 1100 ГПА

	Класс B
Линейность *	±0.20 гПа
Гистерезис*	±0.08 гПа
Воспроизводимость*	±0.08 гПа
Погрешность калибровки **	±0.15 гПа
Точность при +20 °С ***	±0.20 гПа

ТЕМПЕРАТУРНАЯ ЗАВИСИМОСТЬ ****

500 ... 1100 гПа	±0.1 гПа
50 ... 1100 гПа	±0.3 гПа

ОБЩАЯ ТОЧНОСТЬ -40 ... +60 °С (-40 ... +140 °F)

	Класс A	Класс B
500 ... 1100 гПа	±0.15 гПа	±0.25 гПа
50 ... 1100 гПа		±0.45 гПа

ДОЛГОВРЕМЕННАЯ СТАБИЛЬНОСТЬ

500 ... 1100 гПа	±0.1 гПа /год
50 ... 1100 гПа	±0.1 гПа /год

* Определен(а) как ±2 предельных среднеквадратичных отклонения конечной нелинейности, ошибки гистерезиса или воспроизводимости.

** Определена как ±2 предельных среднеквадратичных отклонения погрешности рабочего эталона, включая соответствие национальным эталонам института NIST.

*** Определена как корень из суммы квадратов (RSS) конечной нелинейности, ошибки гистерезиса, воспроизводимости и погрешности калибровки при комнатной температуре.

**** Определена как ±2 предельных среднеквадратичных отклонения температурной зависимости в диапазоне рабочих температур

Рабочие условия

Диапазон давления	500 ... 1100 гПа , 50 ... 1100 гПа
Диапазон температуры	
Рабочая	-40 ... +60 °С (-40 ... +140 °F)
С местным дисплеем	0 ... +60 °С (+32 ... +140 °F)

Программные средства передачи данных

Программное обеспечение MI70 Link Interface	Microsoft® Windows OS
Требования:	Microsoft® Excel

Входы и выходы

Питающее напряжение	10 ... 35 В пост.тока
Чувствительность по питающему напряжению	Пренебрежимо малая

Типичное энергопотребление при +20 °С
(Uвх. 24 В пост.тока, один датчик давления)

RS-232	25 mA
RS-485	40 mA
U$_{вых.}$	25 mA
I$_{вых.}$	40 mA
Дисплей и подсветка	+20 mA
Последовательный ввод/вывод	RS232C, RS485/422
Единицы давления	гПа, мбар, кПа, Па, д.рт.ст, мм.водн.ст, мм рт.ст, торр, фунт/дюйм2

	Класс A	Класс B
Разрешение	0.01 гПа	0.1 гПа
Время установления при включении (один датчик)	4 с	3 с
Быстрота реагирования (один датчик)	2 с	1 с
Чувствительность по ускорению	Пренебрежимо малая	
Разъем для давления	M5 (10-32) с внутренней резьбой	
Штуцер давления	Заершенный фитинг на трубу с внутр.диаметром быстроразъемный соединитель с отсечным клапаном на шланг 1/8"	
Предел максимального давления	5000 гПа абс.	
Соответствие	Стандарт EMC EN61326-1:1997+ Am1:1998 + Am2:2001: Промышленная окружающая среда	

Механические характеристики

Материал корпуса	G AlSi10 Mg (DIN 1725)
Защитное исполнение корпуса	IP65 (NEMA4)
Масса	1 - 1.5 кг

Аналоговый выход (опция)

Токовый выход	0 ... 20 mA, 4 ... 20 mA	
Выход «напряжение»	0 ... 1 В, 0 ... 5 В, 0 ... 10 В	
Точность в диапазоне давления	500 ... 1100 гПа	50 ... 1100 гПа
При +20 °С	±0.30 гПа	±0.40 гПа
При -40 ... +60 °С	±0.60 гПа	±0.75 гПа

Аксессуары

Кабель последовательного интерфейса	19446ZZ
USB-RJ45 кабель последовательного соединения	219685
Комплект программируемого интерфейса	215005
Комплект для настенного монтажа	214829
Комплект для наружной установки (защита от атмосферных воздействий)	215109
Монтажный комплект для стойки или трубопровода	215108
Модуль электропитания	POWER-1
Модуль аналогового выхода с температурной компенсацией	AOUT-1T
Изолированный модуль RS-485	RS485-1
DIN рейку комплект	215094

Трансмиттер давления, влажности и температуры PTU300 для ответственных случаев применения

Трансмиттер совмещенного измерения давления, влажности и температуры PTU300 фирмы Vaisala представляет собой весьма разносторонний и многофункциональный прибор.

Один трансмиттер - три измеряемых параметра

Поставляемый фирмой Vaisala совмещенный трансмиттер давления, влажности и температуры PTU300 производит измерение атмосферного

Характеристики /Преимущества

- Измерение атмосферного давления, влажности и температуры в одном приборе-трансмиттере
- Может поставляться с двумя датчиками атмосферного давления, что обеспечивает повышенную надежность
- Последовательный интерфейс RS-232C с протоколом NMEA для использований в системах GPS
- Опционный дисплей, RS-485, аналоговый выход и реле
- Опционный модуль питания
- Калибровка в соответствии с требованиями Национального института стандартов и технологии США (NIST)
- Монтажный комплект HMT330MIK для наружного использования
- Объекты и цели применения: мониторинг окружающей среды, калибровочные лаборатории, GPS-метеорология, оценка присутствия в атмосфере водяного пара, способного конденсироваться; метеостанции.
- Поддержка протокола Modbus (RTU/TCP)

давления с двумя классами точности, а также влажности и температуры.

Вы можете выбрать измерительную головку, наилучшим образом соответствующую вашим конкретным потребностям: PTU301 для лабораторий, PTU303 для наружного использования, обогреваемую головку PTU307 для метеоизмерений в сложных условиях, или PTU30T, измеряющую только давление и температуру.

Опробованная технология чувствительных элементов фирмы Vaisala

Трансмиттер PTU300 использует чувствительные элементы, отличающиеся высокой точностью и превосходной долговременной стабильностью: Vaisala BAROCAP® используется для измерения давления, а Vaisala HUMICAP® для измерения влажности. В качестве термочувствительного элемента используется платиновый резистивный датчик (RTD).

Графический дисплей отображения трендов

Трансмиттеры серии PTU300 имеют большой цифровой и графический дисплей, позволяющий пользователю легко просматривать рабочие данные, измерительные тренды и историю измерений за один год. Опционный дата-логгер с часами реального времени

позволит формирование истории измерения за период более четырех лет, и изменять масштаб для желаемого момента или отрезка времени. Резервная батарея часов реального времени гарантирует надежную регистрацию измеренных данных.

Сигнализатор дисплея позволяет прослеживать любой измеряемый параметр со свободным конфигурированием нижнего и верхнего предела.

Сбор данных и (беспроводная) передача на ПК

Зарегистрированные данные измерений могут просматриваться на дисплее или передаваться на персональный компьютер с программным обеспечением Microsoft Windows®. Трансмиттер может также подключаться к сети опционным интерфейсом (W)LAN, обеспечивающим (беспроводную) связь Ethernet.

Кабель USB-RJ45 позволяет без затруднений подключить сервисный порт PTU300 к ПК. PTU300 может также использовать коммуникационный протокол MODBUS и с соответствующим вариантом соединения обеспечивает связь MODBUS RTU (RS485) или MODBUS TCP/IP (Ethernet).

Гибкость калибровки

Быстрая одноточечная калибровка в условиях эксплуатации легко осуществляется с использованием портативного измерителя влажности HM70 фирмы Vaisala.

Последовательная связь

PTU300 поставляется со стандартным последовательным интерфейсом RS-232. Выходной формат совместим с основными приемниками GPS и закодированными сообщениями протокола NMEA. По заказу может поставляться интерфейс RS-485.

Комплект для наружного монтажа

По желанию заказчика может поставляться дополнительный комплект для наружного монтажа HMT330MIK. Он обеспечивает надежные измерения метеорологических параметров.
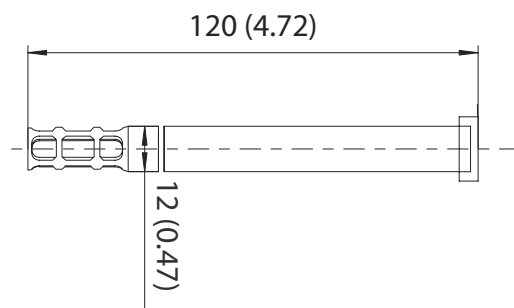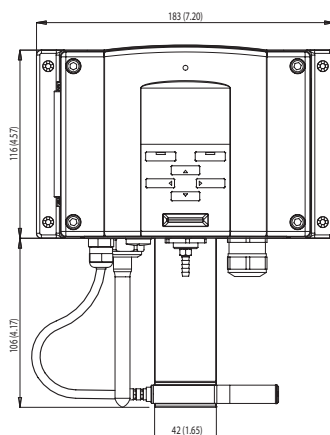
Модели PTU300

PTU301 для настенного монтажа

Размеры

Размеры в мм (дюймах)

120 (4.72)

12 (0.47)

PTU301 с коротким кабелем измерительной головки

Размеры

Размеры в мм (дюймах)

183 (7.20)

116 (4.57)

106 (4.17)

42 (1.65)

PTU303 для наружной установки

Размеры

Размеры в мм (дюймах)

Ø 12 (0.47)

M9x1

37.5 (1.48)

78.5 (3.09)

98.5 (3.88)

Модели PTU300
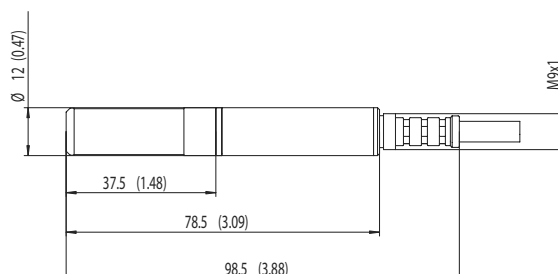
PTU307 обогреваемая измерительная головка для ответственных метеорологических установок

Размеры

Размеры в мм (дюймах)
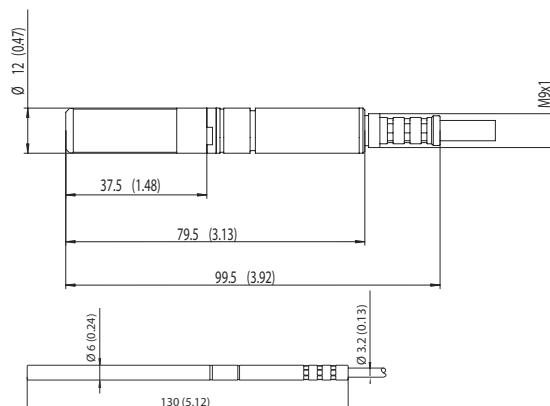
PTU30T для измерения давления и температуры

Размеры

Размеры в мм (дюймах)

Технические данные

Рабочие характеристики

АТМОСФЕРНОЕ ДАВЛЕНИЕ

	500 ... 1100 гПа	500 ... 1100 гПа	50 ... 1100 гПа
Диапазон давления		500 ... 1100 гПа, 50 ... 1100 гПа	
Точность	КЛАСС А	Класс В	
Линейность	±0.05 гПа	±0.10 гПа	±0.20 гПа
Гистерезис *	±0.03 гПа	±0.03 гПа	±0.08 гПа
Воспроизводимость *	±0.03 гПа	±0.03 гПа	±0.08 гПа
Погрешность калибровки**	±0.07 гПа	±0.15 гПа	±0.20 гПа
Точность при +20 ℃***	±0.10 гПа	±0.20 гПа	±0.30 гПа
Температурная зависимость ****	±0.1 гПа	±0.1 гПа	±0.3 гПа
Общая точность (-40 ... +60 ℃/-40 ... +140 °F)	±0.15 гПа	±0.25 гПа	±0.45 гПа
Долговременная стабильность /год	±0.1 гПа	±0.1 гПа	±0.2 гПа
Время отклика (100 % отклик)			
один чувствительный элемент	2 с•	с•	1 с•
Единицы давления	гПа , мбар, кПа, Па, д.рт.ст, мм.водн.ст, мм рт.ст, торр, фунт/дюйм2		

* Определен(а) как ±2 предельных среднеквадратичных отклонения конечной нелинейности, ошибки гистерезиса или воспроизводимости и калибровки.
** Определена как ±2 предельных среднеквадратичных отклонения погрешности рабочего эталона, включая соответствие национальным эталонам института NIST
*** Определена как корень суммы квадратов (RSS) конечной нелинейности, ошибки гистерезиса, воспроизводимости и погрешности калибровки при комнатной температуре.
****Определена как ±2 предельных среднеквадратичных отклонения температурной зависимости в диапазоне рабочих температур

ОТНОСИТЕЛЬНАЯ ВЛАЖНОСТЬ

Диапазон измерений отн.влажности	0 ... 100 %
Точность, включая нелинейность, гистерезис и возобновляемость при +15 ... +25 ℃	±1 % (0 ... 90 %)
	±1.7 % (90 ... 100 %)
при -20 ... +40 ℃	±(1.0 + 0.008 х показание) % отн.вл.
при -40 ... +60 ℃	±(1.5 + 0.015 х показание) % отн.вл.
Погрешность заводской калибровки (+20 ℃)	
(Определена как ±2 предельных среднеквадратичных отклонения. Возможны небольшие колебания, см. также сертификат калибровки.)	± 0.6 % (0 ... 40 %)
	± 1.0 % (40 ... 97 %)
Чувствительный элемент	
для типичных применений	Vaisala HUMICAP® 180 или 180R*
для применений с химически очищаемым /обогреваемым датчиком	Vaisala HUMICAP® 180C или 180RC*

Время отклика (90 %) при +20 ℃ (+68 °F) в неподвижном воздухе

с решетчатым фильтром	8 с / 17 с*
с решетчатым + стальным сетчатым фильтром	20 с / 50 с*
с керамическим фильтром	40 с / 60 с*

* с датчиком HUMICAP® 180R или 180RC

ТЕМПЕРАТУРА

Диапазон измерений, все датчики	-40 ... +60 ℃ (-40 ... +140 °F)
Точность при +20 ℃ (+68 °F)	± 0.2 ℃ (± 0.4 °F)
Единицы температуры	℃, °F

Дисплей показывает также тренды давления ВМО ΔP 3ч и тенденции 0 ... 9.

ТОЧНОСТЬ В ТЕМПЕРАТУРНОМ ДИАПАЗОНЕ
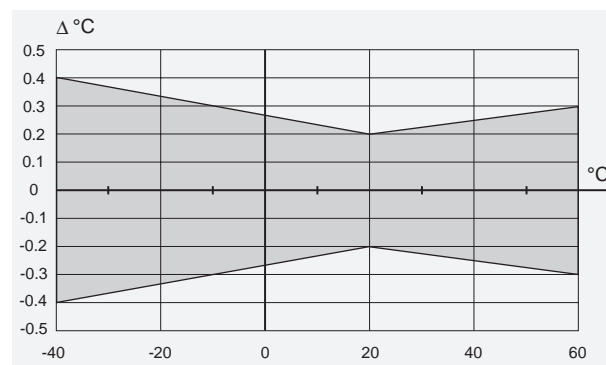
Датчик температуры	PT100 RTD 1/3 класс В IEC 751

Рабочие условия

Рабочая температура	-40 ... +60 ℃ (-40 ... +140 °F)
с дисплеем	0 ... +60 ℃ (+32 ... +140 °F)
Диапазон влажности	без конденсации
Электромагнитная совместимость	EN61326-1:1997 + Am1:1998 +Am2:2001; Промышленная среда

Входы и выходы

|	
Рабочее напряжение	10 ... 35 В пост.тока, 24 В пост.тока
с опционным модулем питания	100 ... 240 В пер.тока, 50/60 Гц
Потребляемая мощность при +20 ℃ (Uin 24 В пост.тока)	
RS-232	макс. 28 мА
U_{out} 3 х 0 ... 1 V/0 ... 5 V/0 ... 10 V	макс. 33 мА
I_{out} 3 х 0 ... 20 мА	макс. 63 мА
дисплей и подсветка	+20 мА
во время хим.чистки	макс. +110 мА
во время обогрева датчика	+120 мА
Время установления при включении (один чувств.элемент)	
класс А	4 с
класс В	3 с
Внешние нагрузки	
выходы тока	R_L < 500 Ом
0 ... 1 В выход	R_L > 2 кОм
0 ... 5 В и 0 ... 10 В выходы	R_L > 10 кОм

Рекомендуемое сечение провода	0.5 мм² (AWG 20) скрученный
Цифровые выходы	RS-232, RS-485 (опц.)
Протоколы	Команды ASCII, MODBUS RTU
Сервисное присоединение	RS-232, USB
Релейные выходы (опц.)	0.5 A, 250 В пер.тока
Интерфейс Ethernet (опц.)	
Поддерживаемые стандарты	10/100Base-T
Разъем	(RJ45)
Присвоение адреса IPv4	DHCP (автоматич.), статич
Протоколы	Telnet, MODBUS TCP/IP
Программная поддержка	Vaisala MI70 link
Интерфейс WLAN (опц.)	
Поддерживаемые стандарты	802.11b
Тип антенного разъема	RP-SMA
Присвоение адреса IPv4	DHCP (автоматич.), статич
Протоколы	Telnet, MODBUS TCP/IP
Безопасность	WEP 64/128,WPA
Программная поддержка	Vaisala MI70 link

Проверка права доступа / криптографическая защита (сеть WLAN)

Открыто / без криптозащиты

Открыто / протокол защиты данных WEP

Защищенный доступ WPA: предварительно выданный ключ / TKIP

Защищенный доступ WPA: предварительно выданный ключ / CCMP (известный также как WPA2)

Опциональный дата-логгер с часами реального времени

Регистрируемые параметры	макс. четыре, тренд/мин. /макс.величины
Интервалы регистрации	10 сек (фикс.)
Макс. период регистрации данных	4 года 5 месяцев
Зарегистрированные точки	13.7 миллионов точек на параметр
Срок службы батареи	мин. 5 лет
Дисплей	ЖКД с подсветкой, отображение графических трендов любого параметра
Языки меню	Английский, финский, французский, немецкий, японский, китайский, испанский, шведский, русский
Аналоговые выходы (опционные)	
выход тока	0 ... 20 мА, 4 ... 20 мА
выход напряжения	0 ... 1 В, 0 ... 5 В, 0 ... 10 В
Влажность и температура	
точность при +20 °С	±0.05%, вся шкала
температурная зависимость	±0.005%/°С, вся шкала

Давление	500 ... 1100 гПа	50 ... 1100 гПа
точность при +20 °С	±0.30 гПа	±0.40 гПа
точность при -40 ... +60 °С	±0.60 гПа	±0.75 гПа
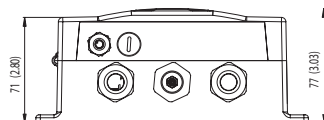
Механическая часть

Ввод кабеля	M20 x 1.5 для кабеля диаметром 8 ... 11 мм/0.31 ... 0.43"
Фиттинг установки в воздуховод	1/2" NPT
Кабельный разъем пользователя (опционный)	серия M12 8-штырьковый (втычный)
вариант 1	гнездовая часть с черным кабелем длиной 5 м (16.4 футов)
вариант 2	гнездовая часть с винтовыми зажимами
Диаметр кабеля изм. головки	
PTU303	6.0 мм
другие измер. головки	5.5 мм
Материал корпуса	G-AlSi 10 Mg (DIN 1725)
Класс защитного исполнения	IP 65 (NEMA 4)
Вес	
в зависимости от выбранной измерительной головки	1.5 ... 2.0 кг

Аксессуары

Кабель и программное обеспечение для ПК	215005
USB-RJ45 кабель последовательной связи	219685
Соединительный кабель для HM70	211339
Пластина для настенного монтажа (пластмассовая)	214829
Комплект установки на стойке (мачте)	215108
Защита от осадков	215109
Комплект установки на профиле DIN	211477
Комплект установки в воздуховоде, PTU303/307	210697
Кабельный сальник и AGRO, PTU303/307	HMP247CG
Защита от солнечной радиации, PTU303/307/30T	DTR502B
Комплект установки для метеоизмерений	HMT330MIK
Комплект установки в воздуховоде (T датчик)	215003

Размеры

Размеры в мм (дюймах)
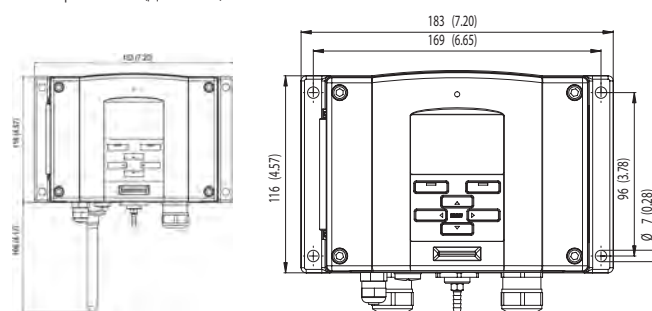
SPH10/20 Static Pressure Headsfor Minimizing Wind Induced Error

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

Vaisala Differential Pressure Transmitter PDT101

Vaisala Differential Pressure Transmitter PDT101 with current output (black) and voltage output (green).

Features

- Easy mounting on wall, DIN rail or panel
- 2 pressure ranges (Pa and in H$_2$O)
- Accessible zero and span adjustment potentiometers
- ¼" brass tubing connections
- LED status indicator
- Specially designed for critical and regulated environments
- Euro style detachable connector
- NIST traceable (certificate included)

Operating Environment

Vaisala Differential Pressure Transmitter PDT101 is designed especially for demanding life science and high technology cleanroom applications. The PDT101 transmitter is ideal for incorporating into the Vaisala Veriteq Continuous Monitoring System to measure and monitor the critical environmental parameters as required in regulated environments.

Performance

The PDT101 offers high accuracy, sensitivity and stability with accuracy 0.40% of span providing a highly reliable and repeatable measurement. The sensor uses a micro-machined, ultra-thin silicon diaphragm which provides inherent sensor repeatability and stability. The sensor enables precise measurement and control in high performance cleanrooms. The PDT101 transmitter is available with voltage output (3-wire) or current output (2-wire).

Zero and span adjustment screws are available on every PDT101 model. Both adjustments are accessible from the front of the unit.

Applications

The PDT101 is suitable for high performance cleanroom environments in the life science, semiconductor and electronics industries. As part of a continuous monitoring system, it is highly suitable for regulated environments where continuous, documented and redundant data is a requirement to meet FDA regulations. The compact design is well suited for mounting in a cleanroom or in the adjacent corridor with LED indicator lights for quick and easy power status spotcheck.

Technical Data

Performance

Measurement ranges (bidirectional)	±60 Pa
	±0.25 in H_2O
Overpressure	
proof pressure	1.0 bar
burst pressure	1.7 bar
static pressure	1.7 bar
Pressure type	differential, gauge, vacuum and compound
Accuracy (incl. non-linearity, hysteresis, repeatability and zero/span calibration settings)	0.4 % span
Long-term stability	≤0.5 % span/year
Response time (10 ... 90 %)	250 ms
Warm-up time	15 s
Compensated temperature range	+2 ... +54 °C
	(+35.6 ... +129.2 °F)
Temperature dependence	±(0.065 Pa + 0.054 % of reading) / °C
	or
	±(0.00015 in H_2O + 0.03 % of reading) / °F
	(reference 21 °C or 70 °F)
Mounting position	
error (zero adjustable)	≤1 %/g (calibration in vertical position is standard)
Adjustments (front accessible)	
zero	±5 % span
span	±3 % span

Operating Environment

Operating temperature	-18 ... +70 °C (-0.4 ... +158 °F)
Storage temperature	-40 ... +82 °C (-40 ... +179.6 °F)
Electromagnetic compatibility (EN 61326-1), basic immunity test requirements	

Note: If used in an electromagnetic field of 3 V/m, with narrow frequency area of 80 - 120 Mhz, it is possible that the current output of PDT101 can deviate max. 0.8% (with accuracy specified 0.4%).

Inputs and Outputs

Process connection	1/4" barbed fittings
Output signal	
2-wire	4 ... 20 mA
3-wire	0 ... 5 VDC (user selectable 0 ... 10 VDC)
Operating voltage	
2-wire output 4 ... 20 mA	12 ... 36 VDC
3-wire output 0 ... 5 VDC	11.5 ... 36 VDC
3-wire output 0 ... 10 VDC	14 ... 36 VDC or 24 VAC
Max. loop resistance	
for 4 ... 20 mA	≤ (Supply voltage - 12V)/0.022 A
Supply current	max. 20 mA for 4 ... 20 mA output signal

Optical process diagnostics	LED visual indicator
Electrical connection	Euro style pluggable terminal block accepts 12...26 AWG wire (0.13 up to 3.31 mm²)

Mechanics

Medium (measured gas)	clean and dry air, non-conducting and non-corrosive gases
Material	
process connection	brass
sensor element	silicon, aluminium, glass
case	NEMA type 1 fire-retardant ABS 1 (meets UL94-5VA)
Mounting	threaded fastener for wall mounting or DIN rail type EN50022
Housing classification	IP40
Weight	0.07 kg

Dimensions

Dimensions in mm
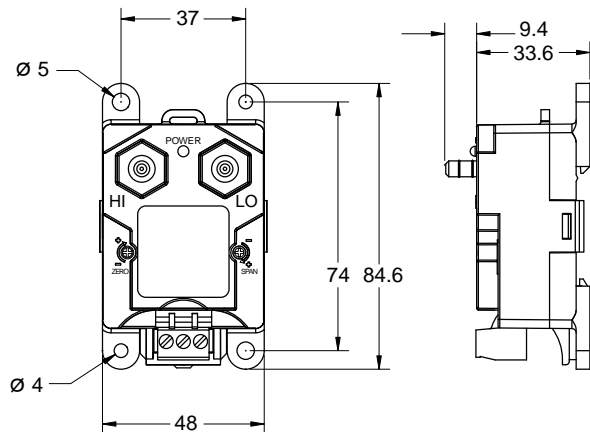
Order Information for PDT101

PDT101 - XXX

Measurement range: **P** (+/-60 Pa) or **W** (+/-0.25 in H_2O)

Accuracy: **4** (0.4 % span)

Output: **C** (current) or **V** (voltage)

Vaisala Differential Pressure Transmitter PDT102

Vaisala Differential Pressure Transmitter PDT102 with process valve actuator and test jacks.

Operating Environment

Vaisala Differential Pressure Transmitter PDT102 is a high performance instrument designed primarily for life science and high technology cleanroom applications. The front panel includes zero and span adjustment potentiometers for convenient adjustment. The PDT102 transmitter is ideal for incorporating into the Vaisala Veriteq Continuous Monitoring System to measure and monitor the critical environmental parameters as required in regulated environments.

Performance

The PDT102 offers very high accuracy, sensitivity and stability with two options for accuracy, 0.25% or 0.50% of span providing a highly reliable and repeatable measurement. The sensor uses a micro-machined, ultra-thin silicon diaphragm which provides inherent sensor repeatability and stability. The sensor enables precise measurement and control in high performance cleanrooms. The PDT102 transmitter is available with voltage output (3-wire) or current output (2-wire).

Available Options

Online monitoring of the PDT102 is simple using the optional process valve actuator and the front access test jacks. The front access test jacks provide online process reference signal or calibration signal without disconnecting power supply wiring. Measurements can be made using a standard multimeter.

Technical Data

Performance

Measurement ranges (bidirectional)	±50 Pa
	±0.25 in H_2O
Overpressure	
proof pressure	0.7 bar
burst pressure	1.7 bar
static pressure	1.7 bar
Pressure type	differential, gauge, vacuum and compound
Accuracy (incl. non-linearity, hysteresis, repeatability and zero/span calibration settings)	0.25 % span or 0.5 % span, depending on choice
Repeatability	
for 0.25 % span accuracy	0.03 %
for 0.5 % span accuracy	0.05 %
Electrical resolution	1×10^{-4} span
Long-term stability	≤0.5 % span/year
Response time (10 ... 90 %)	250 ms
Warm-up time	15 s
Compensated temperature range	+2 ... +57 °C (+35.6 ... +134.6 °F)
Temperature dependence	±(0.036 Pa + 0.036 % of reading) / °C or ±(0.0001 in H_2O + 0.02% of reading) /°F (reference 21 °C or 70 °F)
Mounting position	
error (zero adjustable)	≤0.25 %
Adjustments (front accessible)	
zero	±5 % span
span	±3 % span

Operating Environment

Operating temperature	-29 ... +70 °C (-20.2 ... +158 °F)
Storage temperature	-40 ... +82 °C (-40 ... +179.6 °F)
Electromagnetic compatibility (EN 61326-1), basic immunity test requirements	

Note: If used in an electromagnetic field of 3 V/m, with narrow frequency area of 80 - 120 Mhz, it is possible that the current output of PDT102 can deviate max. 0.3% (with accuracy specified 0.25%).

Inputs and Outputs

Process connection	1/8 NPT female according to ANSI/ASME B1.20.1
Output signal	
2-wire	4 ... 20 mA
3-wire	0 ... 5 V
Operating voltage	12 ... 36 VDC
Max. loop resistance	
for 4 ... 20 mA	≤ (Supply voltage - 12V)/0.022 A
Supply current	
for 0 ... 5 V output	max. 10 mA
for 4 ... 20 mA output	max. 20 mA
Electrical connection	Screw terminals, 12 ... 22 AWG (0.33 up to 3.31 mm²)

Mechanics

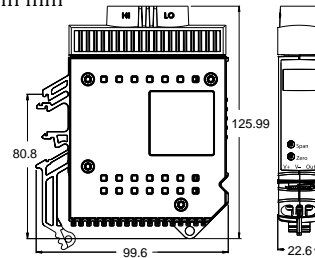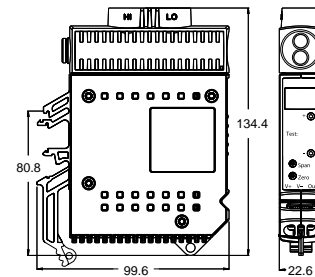|	
Medium (measured gas)	clean and dry air, non-conducting and non-corrosive gases
Material	
process connection	brass
sensor element	silicon, aluminium, glass
case	Polycarbonate, glass filled (UL94-V-1)
Mounting	DIN rail types EN 50022, EN 50035 and EN 50045
Housing classification	IP30
Weight	0.16 kg

Dimensions

Dimensions in mm

Figure 1

Figure 2 with Process Valve Actuator and Test Jacks

Order Information for PDT102

PDT102 - XXXT

Measurement range:
P (+/-50 Pa) or **W** (+/-0.25 in H_2O)

Accuracy: **2** (0.25 % span) or **5** (0.5 % span)

Output: **C** (current) or **V** (voltage)

Option: (blank) or **T**

WA15 Wind Set for High PerformanceWind 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 per revolution. This generates a pulse output from the phototransistor.

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

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.

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 ±2.8°.

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
Dimensions	
Junction box	125 x 80 x 57 mm
Crossarm length	800 mm
Mounting to a pole mast with a nominal outside diameter	60 mm
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 ... 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 µs
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 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Material	
housing	AlMgSi, grey anodized
cups	PA, reinforced with carbon fibre
Dimensions	240 (h) × 90 (Ø) 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 ... 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 µs
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 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Material	
housing	AlMgSi, grey anodized
wave	Alsi 12 anodized
Dimensions	300 (h) × 90 (Ø) 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

WA25 Wind Set

The WA25 resists snow build-up and ice formation. The result is accurate wind measurement in cold environments.

The Vaisala Wind Set WA25 is a high-quality cup and vane wind measurement station designed for arctic conditions.

The WA25 consists of a Vaisala Anemometer WAA252, a Vaisala Wind Vane WAV252, an optional crossarm, a power supply and cabling.

Heating provides resistance to snow and ice

Most of the heating power is consumed where it is needed most – in the cups and vane. Foil heaters, integrated into the cups and vane, prevent snow buildup and ice formation.

Heating power is also supplied to the sensor shafts, bearings and bodies. This keeps the sensor bodies free of ice, which is important for maintaining the aerodynamic performance.

Anemometer with excellent linearity

The WAA252 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 per revolution. This generates a pulse output from a 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 WAV252 is a counterbalanced, low threshold, optoelectronic wind vane providing a 6-bit GRAY-coded message. Turned by the vane, the disc creates changes in the code received by the phototransistors. The code is changed in steps of 5.6°.

Complete package available

The anemometer and vane are designed to be mounted on Vaisala crossarms.

Technical data

Vaisala Wind Set WA25

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
Power supply	WHP25
Set of bearings and gasket	16644WA
Heated cup assembly	WA35066
Heated tail assembly	WA35336

Features/Benefits

- Non-freezing, high-performance wind set

- Cups and vane, sensor bodies and bearings are heated to prevent snow buildup and ice formation

- Accurate wind speed and direction measurement

- Low measurement starting threshold

- Conical anemometer cups provide excellent linearity

Technical data

Vaisala Anemometer WAA252

Wind speed

Measurement range	0.4 ... 75 m/s
Starting threshold	< 0.5 m/s *
Distance constant	2.7 m
Characteristic transfer function	$U = 0.39 + 0.10 \times R$
(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	$U_{in} = 24$ VDC ± 10%, max. 3.2 A
Typical power consumption ($U_{in} = 24$ VDC)	
	72 W below +2 °C (+36 °F) (heating on)
	1 W above +6 °C (+43 °F) (heating off)
Output	0 ... 750 Hz square wave
Transducer output level	
with $I_{out} < +5$ mA	high state > 11V
with $I_{out} > -5$ mA	low state < 1.5V
Plug 6-PIN	MIL-C-26482 type
Recommended connector at cable end	SOURIAU MS3116F10-6P
Operating temperature	-55 ...+55 °C (-67 ...+131 °F)
Storage temperature	-60 ...+70 °C (-76 ...+158 °F)
Material	
housing	AlMgSi, grey&black anodized
cups	PC, reinforced with glassfibre
Dimensions	264 (h) × 90 (Ø) mm
Swept radius of cup wheel	91 mm
Weight	800 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;
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 errors vs. speed with "the simple transfer function" used.

RANGE (m/s)	0-5	5-10	10-15	15-20	20-24	24-29	29-34	34-39	39-44	44-48	48-58
ERROR (m/s)	-0.2	-0.1	±0.0	+0.1	+0.2	+0.3	+0.4	+0.5	+0.6	+0.7	+0.8

Vaisala Wind Vane WAV252

Wind direction

Measurement range	0 ... 360°
Starting threshold	< 0.4 m/s
Resolution	±2.8°
Damping ratio	0.3
Overshoot ratio	0.4
Delay distance	< 0.5 m
Accuracy	better than ±3°

General

Operating power supply	24 VDC ± 10%, max. 2.1 A
Typical power consumption ($U_{in} = 24$ VDC)	
	50 W below +2 °C (+36 °F) (heating on)
	1 W above +6 °C (+43 °F) (heating off)
Output code	6-bit parallel GRAY
Output levels	
With $I_{out} < +3$ mA	high state > 11V
With $I_{out} > -3$ mA	low state < 1.5V
Plug 10-PIN	MIL-C-26482 type
Recommended connector at cable end	SOURIAU MS3116F12-10P
Operating temperature	-55 ...+55 °C (-67 ...+131 °F)
Storage temperature	-60 ...+70 °C (-76 ...+158 °F)
Material	
housing	AlMgSi, grey&black anodized
vane	carbon fibre + glassfibre
Dimensions	355 (h) × 90 (Ø) mm
Swept radius of vane	218 mm
Weight	850 g

Test compliance

Wind tunnel tests	ASTM standard method D5366-93
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;
Generic Environment

WM30 Wind Sensor for Mobile Applications

The WM30 provides accurate wind measurement in a compact and economical package.

The Vaisala Wind Sensor WM30 is a compact and economical wind speed and direction sensor. The rotating cup anemometer at the top of the unit provides a linear response to wind speed. The vane, which is attached to the body of the unit, provides a fast response to wind direction.

Accurate wind measurement

The shape, dimensions, and material of the cups contribute to accurate measurement. The cups are carefully tested to give linear response between the wind speed and the angular velocity of the cup wheel.

The wind vane is located directly beneath the cup assembly and is made of a durable, lightweight material that ensures fast response and low inertia.

Flexible outputs

A relay contact output is provided for wind speed. The wind speed can be recorded either by counting the number of pulses within a fixed time period, or by measuring the time between successive pulses.

A potentiometer detects the position of the vane. The potentiometer features low starting and running torque, linear resistance and a long operation life. It has a single wiper with an open gap of less than 5 degrees. With constant voltage supplied to the potentiometer, the output voltage is directly proportional to the azimuth angle.

Optimal for low-power applications

The electronics are designed specifically for applications where low power consumption is essential.

Built for harsh conditions

The cups and vane are made of reinforced PA plastic which guarantees a rigid structure even at the highest wind speeds.

The electronics are located inside an anodized aluminium core which creates not only a firm body, but a watertight enclosure for the electronics as well. This provides full protection against water, dust, pollutants and electromagnetic interference.

Easy installation

A mast adapter for a 30 mm tube is supplied with the sensor. An installation kit for larger tube diameters, 50 ... 110 mm, is available as an option.

Technical data

Wind speed

Measurement range	0.5 ... 60 m/s
Starting threshold	< 0.4 m/s
Distance constant	2 m
Transducer output	1 Hz ~ 0.7 m/s
Accuracy (within range 0.4 ... 60 m/s)	
wind speed < 10 m/s	± 0.3 m/s
wind speed > 10 m/s	± 2%
Characteristic transfer function	$U = -0.24 + 0.699 \times F$
(where U = wind speed [m/s], F = output frequency [Hz])	

Wind direction

Measurement range	
WMS301 with 1-wiper potentiometer	0 ... 355°
WMS302 with 2-wiper potentiometer	0 ... 360°
Starting threshold	< 1.0 m/s
Damping ratio	0.3
Overshoot ratio	0.4
Delay distance	0.6 m
Accuracy	better than ±3°

General

Supply voltage	3 ... 15 VDC
Electrical connections	5-pin male with 12 mm threads
Recommended connector at cable end	BINDER 99 1436 814 05
Operating temperature	-40 ... +55 °C (-40 ... +131 °F)
Storage temperature	-60 ... +65 °C (-76 ... +149 °F)
Material	
housing	AlMgSi, gray anodized
cups	PA, reinforced with carbon fibre, black
vane	PA, reinforced with fiberglass, white
Dimensions	265 (h) × 360 (Ø) mm
Weight	360 g

Accessories

Mounting adapter	WMS30KIT
Sensor connector	19370
Sensor connector and cable, 10 m	19904

Test compliance

Wind tunnel tests	ASTM standard method D5366-93
	ASTM standard method D5096-90

Complies with EMC standard EN61326-1:1997 + Am1:1998 + Am2:2001; Generic Environment

WMT700 WINDCAP®

Vaisala

WINDCAP®   WMT700   60°
                                                                                                , WMT700

        .   .

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        WMT700

                        7-

        № 8   ,

                                        9   36

WMT700   24   36

Серия WMT700 предназначена для профессионального применения.

датчика WMT700. Для сведения к минимуму вмешательства птиц можно использовать комплект защиты от птиц.

60

WMT700

Технические характеристики

Скорость ветра

Диапазон измерений	
701	от 0 до 40 м/с
702	от 0 до 65 м/с
703	от 0 до 75 м/с
Точность	±0,1 м/с или 2 % от показаний, в зависимости от того, какая из двух величин больше
Пороговое значение начала измерения	0,01 м/с
Разрешение	0,01 м/с
Время отклика	250 мс

Направление ветра

Диапазон измерений	от 0 до 360°
Точность	+/-2°
Пороговое значение начала измерения	0,01 м/с
Разрешение	0,01°
Время отклика	250 мс

Выходы

Интерфейс связи	
связь (данные)	RS485, RS422, RS232, SDI-12
связь (сервис)	RS485
аналоговый выход, скорость ветра	напряжение, ток, частота
аналоговый выход, направление ветра	напряжение, ток, потенциометр
Коммуникационный профиль	WMT70, ASCII, NMEA (стандартный и расширенный), SDI-12, ASOS, MES 12, по техническим условиям заказчика
Скорость в бодах	300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Возможные усреднения	макс. за 3 600 с
Интервал обновления считывания	макс. 4 Гц
Единицы	
цифровые выходы	м/с, узлы, миль/ч, км/ч
аналоговые выходы	В, мА
частотные выходы	Гц (двухтактный, с понижением напряжения, с повышением напряжения)
Режим работы	автоматический или опросный
Эффективная температура	градусы Цельсия

Общие сведения

Подогрев[1]	0 Вт, 30 Вт, 150 Вт или 250 Вт
Температура	
рабочая[1]	от -10 до +60 °C, от -40 до +60 °C или от -55 до +70 °C
хранения	от -60 до +80 °C
Рабочее напряжение	от 9 до 36 В постоянного тока (макс. 40 В)
Напряжение подогрева	от 24 до 36 В постоянного тока (макс. 40 В)
Требование по мощности питания для подогрева	
преобразователей	40 Вт
преобразователей и кронштейнов	200 Вт
преобразователей, кронштейнов и корпуса	350 W
Степень защиты	IP66 и IP67

Материалы

корпус, кронштейны	нержавеющая сталь AISI316
головки преобразователей	кремний-органическое соединение
монтажный комплект	нержавеющая сталь AISI316
поверхность корпуса соединителя	никелированная латунь

Размеры

высота	348 мм
ширина	250 мм
длина	285 мм
Вес	1,8 кг
Одобрения	CE, CE-TICK

[1]Для условий замерзания необходимо выбрать соответствующую комбинацию подогрева и диапазонов температуры.

Стандарты испытаний

Ветер	ISO16622; MEASNET
ЭМС	IEC61000-4-2 ... 6; CISPR22
Условия окружающей среды	IEC60068-2-1,2,6/34,30,31,67,78; IEC60529; VDA 621-415
Морские условия	DNV; требования Ллойда, IEC60945

Принадлежности

Устройство проверки достоверности данных	WMT70Verifier
Клетка от птиц	WMT70BirdKit
Жердочка для птиц	WS425BirdPerch
Инструмент для натяжения кабеля	237888SP
Распределительный блок и 2 м кабеля (подключены)	ASM210719SP
Кабель, 2 м (кабельный разъем и открытые выводы)	227567SP
Кабель, 10 м (кабельный разъем и открытые выводы)	227568SP
Кабель, 15 м (кабельный разъем и открытые выводы)	237890SP
Кабель RS485, 2 м (кабельный разъем и открытые выводы)	228259SP
Кабель RS485, 10 м (кабельный разъем и открытые выводы)	228260SP
Кабель MAWS, 10 м	227565SP
Кабель AWS520, 10 м; экран подключен к выводу заземления	229807SP
Кабель AWS520, 10 м; экран не подключен к выводу заземления	227566SP
Кабель с адаптером для последовательного выхода WS425	227569SP
Кабель с адаптером для аналогового частотного выхода WS425	227570SP
Кабель с адаптером для аналогового выхода напряжения WS425	227571SP
Адаптер для FIX70	228869
Fix70 (также подходит для инвертированного монтажа)	WMT70FixSP
Монтажный переходник, 60 мм (POM)	WMT700FIX60-POM
Монтажный переходник, 60 мм (RST)	WMT700FIX60-RST
Адаптер для FIX30/FIX60	228777
FIX30	WS425Fix30
FIX60	WS425Fix60

Vaisala Wind Tower System WTS140

Wind Measurement System for Complex Terrain

Overview

The Vaisala WTS140 wind measurement system is designed for accurately monitoring wind conditions in complex terrain using mechanical sensor technology. The WTS140 system fulfills the IEC61400-12-1 requirements, and is the best choice for demanding terrain or Class B site conditions. The sensor package is a solid choice when terrain is an issue, and financing requires strict guidelines. When financing your wind farm, the WTS140 will provide reliable and trustworthy data for your investment.

A Complete and Reliable Measurement System

Vaisala's core expertise is weather measurement. We research, design, develop and manufacture weather sensors. Vaisala has weather installations in all parts of the world, in every climate, and we've even sent a weather sensor to Mars! We have applications in many industry fields, including Meteorology, Energy, Airports, Roadways, and Maritime.

The WTS140 system was developed specifically for site assessment and power curve verification in complex terrain. The main component of the system is the Thies first class anemometer, a high-performing sensor designed for complex terrain. Along with the Measnet calibrated wind sensors, the WTS140 standard package comes with:

- Sensor booms and supports for lattice towers
- All necessary cabling
- Data logger for collecting measurements
- Your option of 1, 2 or 3 measurement levels for 60, 80 or 100 meter towers
- Vaisala's combined air temperature and relative humidity sensor at the top measurement level
- Precision barometric pressure sensor
- Lightning surge protection

The system can be equipped with an additional Vaisala air temperature and humidity sensor, pyranometer, and/or Vaisala ultrasonic wind sensor. Standard power supply options are mains power or external 24VDC feed. The power system can accommodate a battery charger for optional solar panels.

Convenient Access to Your Measurement Data

Vaisala's WTS system collects, stores and transmits data utilizing a fully digital design, which minimizes interference and results in a

Vaisala Wind Tower System WTS140

continuous data set. Extensive quality checks in the sensors and data logger ensure high quality data. Vaisala's powerful data logger reads the signals from the sensors and stores the data in internal memory for later download to a computer. A 2GB CF-memory card able to store up to 1 year of 10 minute wind data and other observations is standard with the WTS140 system.

Wind and weather data is transmitted from the site to either Vaisala for managing, or directly to the customer. Data transfer from the site to your office is easy using a flash memory to collect data directly from the site, or through GPRS cellular service remotely.

Vaisala Service

Service packages from Vaisala help you manage data collection, full system monitoring, and data display. We can collect, host, monitor, inspect and distribute the data according your needs. Two standard service packages are available, or we can customize a service package to meet your needs.

System Components	Equipment	Specifications	Description
Wind	Thies anemometer	Thies range is 0.3 to 75 m/s and 0 to 360º Thies accuracy is < 3% of measured value or < 0.3 m/s and 1.5º for direction Thies anemometer Measnet calibrated accuracy is ± 0.1 m/s (4 to 16 m/s) Class B, classification index B 3.0	Thies first class sensor for measurement of wind speed and direction
Relative humidity, temperature, dew point	HMP110	Relative humidity range is 0 to 100% (± 2%) Temperature range is -40°C to +80°C (± 0.2°C) Dew point range is -40 °C to +80 °C	Humidity and temperature probe
Barometric pressure	BARO-1QML	Pressure range is 500 to 1100 hPa, ± 0.2 hPa	Barometric pressure sensor
Sensor booms		By default 4.5 m extruded aluminium, 100 cm sensor support tube	Telescopic booms with hinge for easy maintenance access
Automatic Weather Station	WTE301	QML201C data logger, 4-band GSM/GPRS modem Mains/Solar or external 24VDC power supply Power consumption, measurement system: 0.5A (12VDC, 3 level system) Heater power consumption: 10A (24VDC, 3 level system) Internal batteries 52Ah (12VDC, estimated 9 days backup for measurement)	Integrated automatic weather station one compact enclosure. All external wiring uses connectors for easy installation.
Optional components	WMT702	WMT702 range is 0 to 65 m/s and 0 to 360º WMT700 Measnet calibrated accuracy is better than ± 0.1 m/s (4 to 16 m/s)	Ultrasonic wind sensor
	Metek uSonic-3 Basic	3D ultrasonic wind sensor, range ±50 m/s three axis	3D ultrasonic wind sensor
	HMP155	0 to 100% Relative Humidity, -80 to +60°C for temperature	Humidity and temperature probe
	CMP3	300 to 2800 nm / 0 to 2000 W/m^2	Solar radiation sensor (pyranometer)

Vaisala Wind Tower System WTS150

Economical Wind Measurement System for Uniform Terrain

Features / Benefits

- System is designed specifically for Class A conditions (uniform terrain)
- Measnet calibrated, Class 1 wind sensor
- Powerful data logger to collect and store information
- Continuity of data, especially if system is equipped with Vaisala's ultrasonic wind sensor at the top measurement level
- Vaisala service package to collect, monitor and report your observation data
- System is flexible and can be customized to meet your needs with additional sensors or services

Overview

The Vaisala WTS150 is an economical wind measurement system that utilizes mechanical wind sensors for collecting wind data in an area of uniform terrain. The WTS150 is designed for site assessment in IEC Class A conditions, and provides accurate data in all climate conditions.

Weather Expertise

Vaisala's core expertise is weather measurement. We research, design, develop and manufacture weather sensors. Vaisala has weather installations in all parts of the world, in every climate, and we've even sent a weather sensor to Mars! We have applications in many industry fields, including Meteorology, Energy, Airports, Roadways, and Maritime.

Compliant System, Competitively Priced

The WTS150 wind measurement system is the most cost effective solution for a compliant system. It is built around Vaisala's WAA151 Class 1 anemometer, which is Measnet calibrated. Additional equipment as part of the system includes:

- Sensor booms and supports for lattice towers
- All necessary cabling
- Data logger for collecting measurements
- Your option of 1, 2 or 3 measurement levels for 60, 80 or 100 meter towers
- Vaisala's combined air temperature and relative humidity sensor at the top measurement level
- Precision barometric pressure sensor
- Lightning surge protection

A feature of this system is not only do you receive the Measnet calibrated, Class 1 mechanical wind sensor, but you also have the option to add an ultrasonic wind sensor at the top measurement level, while still remaining cost effective. Anticipating the addition of ultrasonic sensors to the IEC standard, you can begin using them along with your mechanical sensors. Using both sensor technologies will allow you to fill in data gaps and receive continuous wind measurement data.

Vaisala Wind Tower System WTS150

Standard power supply options are mains power or external 24VDC feed. The power system can accommodate a battery charger for optional solar panels.

Convenient Access to Your Measurement Data

Vaisala's WTS system collects, stores and transmits data utilizing a fully digital design, which minimizes interference and results in a continuous data set. Extensive quality checks in the sensors and data logger ensure high quality data. Vaisala's powerful data logger reads the signals from the sensors and stores the data in internal memory for later download to a computer. A 2GB CF-memory card able to store up to 1 year of 10 minute wind data and other observations is standard with the WTS150 system.

Wind and weather data is transmitted from the site to either Vaisala for managing, or directly to the customer. Data transfer from the site to your office is easy using a flash memory to collect data directly from the site, or through GPRS cellular service remotely.

Vaisala Service

Service packages from Vaisala help you manage data collection, full system monitoring, and data display. We can collect, host, monitor, inspect and distribute the data according your needs. Two standard service packages are available, or we can customize a service package to meet your needs.

System components	Equipment	Specifications	Description
Wind	WAA151	WAA151 range is 0.4 to 75 m/s WAA151 accuracy is ± 0.5 m/s Class A, classification index A 1.7 WAA151 Measnet calibrated accuracy is ± 0.1 m/s (4 to 16 m/s)	WAA: High performance cup anemometer for measurement of wind speed (Measnet calibrated) WAV: Wind vane for measurement of wind direction
	WAV151	WAV151 range is 0 to 360º WAV151 accuracy is better than ± 3º	
Relative humidity, temperature, dew point	HMP110	Relative humidity range is 0 to 100% (± 2%) Temperature range is -40°C to +80°C (± 0.2°C) Dew point range is -40 °C to +80 °C	Humidity and temperature probe
Barometric pressure	BARO-1QML	Pressure range is 500 to 1100 hPa, ± 0.2 hPa	Barometric pressure sensor
Automatic Weather Station	WTE301	QML201C data logger, 4-band GSM/GPRS modem Mains/Solar or external 24VDC power supply Power consumption, measurement system: 0.4A (12VDC, 3 level system) Heater power consumption: 5A (24VDC, 3 level system) Internal batteries 52Ah (12VDC, estimated 11 days backup for measurement)	Integrated automatic weather station in one compact enclosure. All external wiring uses connectors for easy installation.
Optional components	WMT702	WMT702 range is 0 to 65 m/s and 0 to 360º WMT700 Measnet calibrated accuracy is better than ± 0.1 m/s (4 to 16 m/s)	Ultrasonic wind sensor
	Metek uSonic-3 Basic	3D ultrasonic wind sensor, range ±50 m/s three axis	3D ultrasonic wind sensor
	HMP155	0 to 100% Relative Humidity, -80 to +60°C for temperature	Humidity and temperature probe
	CMP3	300 to 2800 nm / 0 to 2000 W/m^2	Solar radiation sensor (pyranometer)

Vaisala Wind Tower System WTS250

Cold Climate Measurement System with Fully Heated Mechanical Wind Sensors

Overview

The Vaisala WTS250 measurement system is the new standard for monitoring wind conditions in harsh, cold climates, and/or where icing occurs frequently during the winter season. Its fully heated sensors have proven their performance and reliability in the most demanding environments around the world.

Vaisala's core expertise is weather measurement. We research, design, develop and manufacture weather sensors and have extensive experience designing and testing sensors for use in snow and ice conditions and extreme temperatures. We have applications in a variety of industries where having accurate, continuous weather data is critical in order to properly plan and keep operations running smooth. These applications include Energy transmission, Airports, and Roadway maintenance.

A Complete and Reliable Measurement System

The WTS250 utilizes Vaisala's fully heated WAA252 mechanical wind sensors. These sensors are designed for harsh climates, providing the best data results possible during icing conditions. The WAA252 mechanical wind sensor is Measnet calibrated and contains heating in the cups, sensor bodies and bearings, allowing you to receive continuous wind speed data. The wind sensor can be considered a Class 1 sensor, based on its design, aerodynamics and specifications. The WTS 250 system also includes:

- Sensor booms and supports for lattice towers
- All necessary cabling
- Data logger for collecting measurements
- Your option of 1, 2 or 3 measurement levels for 60, 80 or 100 meter towers
- Vaisala's combined air temperature and relative humidity sensor at the top measurement level
- Precision barometric pressure sensor
- Lightning surge protection

Features / Benefits

- System is designed specifically to monitor wind conditions in cold climates
- Fully heated mechanical wind speed and direction sensors – heating in cups, vane, sensor bodies and bearings
- Measnet calibrated Vaisala WAA252 mechanical wind sensor
- Powerful data logger to collect and store information
- Continuity of data, especially if system is equipped with Vaisala's ultrasonic wind sensor WMT700 at the top measurement level
- Service package managed by Vaisala where weather experts are monitoring your data, not a third party
- System is flexible and can be customized to meet your needs with additional sensors or services

With the WTS250 system you also have the option to add Vaisala's WMT700 ultrasonic wind sensor at the top measurement level. Using both sensor technologies will allow you to fill in data gaps, and receive as much continuous wind measurement data as possible, no matter how extreme the weather gets.

Vaisala Wind Tower System WTS250

Heating of the system requires mains power to operate effectively in cold conditions, or customer-supplied stand alone power can be utilized.

Convenient Access to Your Measurement Data

Vaisala's WTS system collects, stores and transmits data utilizing a fully digital design, which minimizes interference and results in a continuous data set. Extensive quality checks in the sensors and data logger ensure high quality data. Vaisala's powerful data logger reads the signals from the sensors and stores the data in internal memory for later download to a computer. A 2GB CF-memory card able to store up to 1 year of 10 minute wind data and other observations is standard with the WTS250 system.

Wind and weather data is transmitted from the site to either Vaisala for managing, or directly to the customer. Data transfer from the site to your office is easy using a flash memory to collect data directly from the site, or through GPRS cellular service remotely.

Vaisala Service

Service packages from Vaisala help you manage data collection, full system monitoring, and data display. We can collect, host, monitor, inspect and distribute the data according your needs. Two standard service packages are available, or we can customize a service package to meet your needs.

System Components	Equipment	Specifications	Description
Wind	WAA252	WAA252 range is 0.4 to 75 m/s WAA252 accuracy is ± 0.5 m/s WAA252 Measnet calibrated accuracy is ± 0.1 m/s (4 to16 m/s)	WAA: High performance cup anemometer for measurement of wind speed (Measnet calibrated)
	WAV252	WAV252 range is 0 to 360º WAV252 accuracy is better than ± 3º	WAV: Wind vane for measurement of wind direction
Relative humidity, temperature, dew point	HMP110	Relative humidity range is 0 to 100% (± 2%) Temperature range is -40°C to +80°C (± 0.2°C) Dew point range is -40 °C to +80 °C	Humidity and temperature probe
Barometric pressure	BARO-1QML	Pressure range is 500 to 1100 hPa, ± 0.2 hPa	Barometric pressure sensor
Automatic Weather Station	WTE301	QML201C data logger, 4-band GSM/GPRS modem, external 24VDC power supply required Power consumption, measurement system: 0.4A (12VDC, 3 level system) Heater power consumption: 15A (24VDC, 3 level system) Internal batteries 52Ah (12VDC, estimated 11 days backup for measurement)	Integrated automatic weather station in one compact enclosure. All external wiring uses connectors for easy installation.
Optional components	WMT702	WMT702 range is 0 to 65 m/s and 0 to 360º WMT700 Measnet calibrated accuracy is better than ± 0.1 m/s (4 to 16 m/s)	Ultrasonic wind sensor
	Metek uSonic-3 Basic	3D ultrasonic wind sensor, range ±50 m/s three axis	3D ultrasonic wind sensor
	HMP155	0 to 100% Relative Humidity, -80 to +60°C for temperature	Humidity and temperature probe
	CMP3	300 to 2800 nm / 0 to 2000 W/m² Power supply and telemetry options available upon request	Solar radiation sensor (pyranometer)

Vaisala Wind Tower System WTS520

Cost Effective Wind Measurement System with Ultrasonic Wind Sensors

Overview

The Vaisala WTS520 is an economical wind measurement system for monitoring conditions using ultrasonic wind sensor technology. The WTS520 is a great choice for existing wind farm operations and the ultrasonic sensors provide maintenance-free operations in non-freezing conditions.

Reliable Measurement System with Ultrasonics

Vaisala's core expertise is weather measurement. We research, design, develop and manufacture weather sensors, including several versions of ultrasonic wind sensors. The WTS520 is built around Vaisala's WMT52 ultrasonic wind sensor. This sensor has one of the lowest life-cycle costs in the industry. Ultrasonic sensors are more sensitive to changes in wind speed and eliminate over-speeding. The WMT52

sensor provides reliable sensing without any moving parts, giving you stable measurements over time and low operating costs. The WTS520 standard wind measurement system also includes:

- Sensor booms and supports for lattice towers

- All necessary cabling

- Data logger for collecting measurements

- Your option of 1, 2 or 3 measurement levels for 60, 80 or 100 meter towers

- Vaisala's combined air temperature and relative humidity sensor at the top measurement level

- Precision barometric pressure sensor

- Lightning surge protection

The system can be equipped with an additional Vaisala air temperature and humidity sensor and

pyranometer. Standard power supply options are mains power or external 24VDC feed. The power system can accommodate a battery charger for optional solar panels.

Convenient Access to Your Measurement Data

Vaisala's WTS system collects, stores and transmits data utilizing a fully digital design, which minimizes interference and results in a continuous data set. Extensive quality checks in the sensors and data logger ensure high quality data. Vaisala's powerful data logger reads the signals from the sensors and stores the data in internal memory for later download to a computer. A 2GB CF-memory card able to store up to 1 year of 10 minute wind data and other observations is standard with the WTS520 system.

Vaisala Wind Tower System WTS520

Wind and weather data is transmitted from the site to either Vaisala for managing, or directly to the customer. Data transfer from the site to your office is easy using a flash memory to collect data directly from the site, or through GPRS cellular service remotely.

Vaisala Service

Service packages from Vaisala help you manage data collection, full system monitoring, and data display. We can collect, host, monitor, inspect and distribute the data according your needs. Two standard service packages are available, or we can customize a service package to meet your needs.

System Components	Equipment	Specifications	Description
Wind	WMT52	WMT52 range is 0 to 60 m/s and 0 to 360º WMT52 accuracy is ± 0.3 m/s or ±3%, whichever is greater and ±3º for direction	Ultrasonic wind sensor for measurement of wind speed and direction
Relative humidity, temperature, dew point	HMP110	Relative humidity range is 0 to 100% (± 2%) Temperature range is -40°C to +80°C (± 0.2°C) Dew point range is -40 °C to +80 °C	Humidity and temperature probe
Barometric pressure	BARO-1QML	Pressure range is 500 to 1100 hPa, ± 0.2 hPa	Barometric pressure sensor
Automatic Weather Station	WTE301	QML201C data logger, 4-band GSM/GPRS modem Mains/Solar or external 24VDC power supply Power consumption, measurement system: 0.25A (12VDC, 3 level system) Heater power consumption: 2A (24VDC, 3 level system) Internal batteries 52Ah (12VDC, estimated two weeks backup for measurement)	Integrated automatic weather station in one compact enclosure. All external wiring uses connectors for easy installation.
Optional components	HMP155	0 to 100% for Relative Humidity, -80 to +60°C for temperature	Humidity and temperature probe
	CMP3	300 to 2800 nm / 0 to 2000 W/m^2 Stand alone power supply and telemetry options available upon request	Solar radiation sensor (pyranometer)

Vaisala Wind Tower System WTS700

High Performance Wind Measurement System with Ultrasonic Wind Sensors

Overview

The Vaisala WTS700 is a state of the art wind measurement system for all needs in professional wind power applications. Its Measnet calibrated ultrasonic wind sensors are a perfect choice for conditions where no compromises in measurement accuracy are accepted.

High Performance Measurement System with Investment Grade Ultrasonics

The WTS700 wind measurement system utilizes Vaisala's Measnet calibrated WMT700 ultrasonic wind sensor to produce highly accurate wind data for use in all wind farm applications. Although ultrasonic sensors are still being considered as a standard option for IEC specifications, Vaisala has obtained wind tunnel tests and data from deployed meteorological wind towers in order to prove that ultrasonic sensors provide more consistent and higher quality data than mechanical sensors. Measnet calibrated wind tunnel tests show that issues with poor azimuth response

are no longer valid with modern design, including Vaisala's WMT700. Better measurement performance from the ultrasonic sensors produces high quality data for analysis, and the continuous data availability reduces uncertainty of the dataset – investment grade measurements!

The WMT700 sensor provides accurate, reliable sensing without any moving parts. Heated versions are available and the sensor detects both wind speed and direction from a single sensor, which means less booms are required for wind vanes. The WTS700 wind measurement system boasts the Measnet calibrated WMT700 ultrasonic wind sensors, and also includes:

- Sensor booms and supports for lattice towers
- All necessary cabling
- Data logger for collecting measurements
- Your option of 1, 2 or 3 measurement levels for 60, 80 or 100 meter towers
- Vaisala's combined air temperature and relative humidity sensor at the top measurement level

- Precision barometric pressure sensor
- Lightning surge protection built into the WMT700 ultrasonic wind sensor

The system can be equipped with an additional Vaisala air temperature and humidity sensor and pyranometer. Standard power supply options are mains power or external 24VDC feed. The power system can accommodate a battery charger for optional solar panels. Ultrasonic

Vaisala Wind Tower System WTS700

wind sensors require additional power, but Vaisala is making every effort possible to reduce consumption, researching ways to make the sensor as efficient as possible.

Convenient Access to Your Measurement Data

Vaisala's WTS system collects, stores and transmits data utilizing a fully digital design, which minimizes interference and results in a continuous data set. Extensive quality checks in the sensors and data logger ensure high quality data. Vaisala's powerful data logger reads the signals from the sensors and stores the data in internal memory for later download to a computer. A 2GB CF-memory card able to store up to 1 year of 10 minute wind data and other observations is standard with the WTS700 system.

Wind and weather data is transmitted from the site to either Vaisala for managing, or directly to the customer. Data transfer from the site to your office is easy using a flash memory to collect data directly from the site, or through GPRS cellular service remotely.

Vaisala Service

Service packages from Vaisala help you manage data collection, full system monitoring, and data display. We can collect, host, monitor, inspect and distribute the data according your needs. Two standard service packages are available, or we can customize a service package to meet your needs.

System Components	Equipment	Specifications	Description
Wind	WMT702	WMT702 range is 0 to 65 m/s and 0 to 360º WMT702 accuracy is ± 0.2 m/s or 3% of reading, whichever is greater and ± 2º for direction WMT700 Measnet calibrated accuracy is better than ± 0.1 m/s (4 to 16 m/s)	Ultrasonic wind sensor for measurement of wind speed and direction Heating options: 1) Transducers 2) Transducers and arms
Relative humidity, temperature, dew point	HMP110	Relative humidity range is 0 to 100% (± 2%) Temperature range is -40°C to +80°C (± 0.2°C) Dew point range is -40 °C to +80 °C	Humidity and temperature probe
Barometric pressure	BARO-1QML	Pressure range is 500 to 1100 hPa, ± 0.2 hPa	Barometric pressure sensor
Automatic Weather Station	WTE301	QML201C data logger, 4-band GSM/GPRS modem, Mains/Solar or external 24VDC power supply Power consumption, measurement system: 0.7A (12VDC, 3 level system) Heater power consumption: 30A (24VDC, 3 level system) Internal batteries 52Ah (12VDC, estimated 5 days backup for measurement)	Integrated automatic weather station in one compact enclosure. All external wiring uses connectors for easy installation.
Optional components	Metek uSonic-3 Basic	3D ultrasonic wind sensor, range ±50 m/s three axis	3D ultrasonic wind sensor
	HMP155	0 to 100% for Relative Humidity, -80 to +60°C for temperature	Humidity and temperature probe
	CMP3	300 to 2800 nm / 0 to 2000 W/m² Stand alone power supply and telemetry options available upon request	Solar radiation sensor (pyranometer)

Vaisala FS11 датчик видимости для определения RVR

- **Специально сконструирован для определения максимальной величины видимости на взлетно-посадочной полосе (RVR)**
- **Соответствует спецификациям FAA и ICAO для измерений видимости**
- **Точные и прослеживаемые измерения**
- **Механическая конструкция, мощный подогрев соответствуют нормативам FAA**
- **Диапазон до 75 км**
- **Может также использоваться для измерений аэронавигационной и SYNOP (сводка приземных данных с наземной стации) видимостей**
- **Составная волокнистая мачта соответствует требованиям в аэропортах**

НАУЧНО-ДОСТОВЕРНАЯ ПОСЛЕДОВАТЕЛЬНОСТЬ КАЛИБРОВКИ

Каждый Vaisala F11 откалиброван при помощи научно-достоверной эталонной последовательности. Характеристика рассеяния устройства калибровки может быть легко отслежена через эталонный датчик видимости FS11, который непрерывно работает на открытом испытательном поле фирмы Vaisala вместе с измерителем дальности видимости и другими приборами.

НИЗКИЕ ТРЕБОВАНИЯ К ОБСЛУЖИВАНИЮ

FS11 объединяет новые технологии, которые измеряют и компенсируют эффекты затухания за счет загрязнения окна. Он обеспечивает поддержку точности измерений за счет рекомендуемого интервала между чистками окна и удлиняет этот интервал. Система работает, отображая полное отражение от поверхности окна. Она автоматически компенсирует ошибки в измерениях видимости, возникающие за счет загрязнения окна.

Усовершенствованная самодиагностика и модульная конструкция позволяют сократить время на техническое обслуживание. Устройство измерения и дополнительный измеритель яркости фона (LM21) являются независимыми и могут быть легко заменены, как предварительно откалиброванные части.

НАДЕЖНАЯ РАБОТА В СУРОВЫХ ПОГОДНЫХ УСЛОВИЯХ

Для обеспечения надежной работы в суровых погодных условиях, в FS11 совмещены четыре главных особенности конструкции. Это, во-первых, технология компенсации загрязнения окна. Во-вторых, это конструкция оптических головок «головкой вниз», которая защищает фактически от всех частиц, переносимых ветром (даже тех, которые летят горизонтально). Эффективные обогреватели – третья особенность, каждый со своим отображением температуры и механизмом контроля для предотвращения оседания снега во время сильной снежной бури. Наконец, имеется схема отображения просвета оптического пути, чтобы убедиться, что никакие препятствия не мешают измерению.

ТЕХНИЧЕСКАЯ ИНФОРМАЦИЯ

РАБОЧАЯ

Диапазон измерений (MOR)
5…75,000 м; среднее за 1 , 3 и 10 минут
Точность + 10 % в диапазоне 5…10,000 м
+ 20 % в диапазоне 10,000…75,000 м
Точность измерения рассеяния + 3 %

ОПТИЧЕСКАЯ

Принцип работы
Измерение прямого рассеяния
Угол рассеяния 42°
Источник света
Близкий к инфракрасному светодиод
Оптический мониторинг
Измерение загрязнения окна
и схема компенсации
Измерение блокировки оптического пути
Контроль стабильности источника света

ЭЛЕКТРИЧЕСКАЯ

Питание от сети переменного тока
100/115/230 В ± 10 %, 50-60 Гц
Потребление электроэнергии 300 ВА максимум
(60 ВА + 240 ВА размораживающие обогреватели)
Выходы Серийная линия RS-232 или
оптоизолированная RS-485 (2-провода) или
дополнительный модем данных
Отдельная RS-232 обслуживающая линия

МЕХАНИЧЕСКАЯ

Размеры (ВхШхГ) 2.8 м x 0.9 м x 0.5 м
Вес 37 кг
Мачта
Ломающаяся, составная, волокнистая мачта

ОКРУЖАЮЩАЯ СРЕДА

Рабочая температура
- 40…+65 °С, дополнительно –55…+ 65 °С
Рабочая влажность 0…100 %
Скорость ветра до 60 м/с

ЭЛЕКТРОМАГНИТНАЯ СОВМЕСТИМОСТЬ

CE-согласованный
Согласование заверено в соответствии со
следующими директивами ЭМС

Предмет согласования	Стандарт
Излучение	EN55022
Восприимчивость к радиоизлучению	
	IEC 1000-4-3, 10 V/m
Проводимое излучение	EN55022
Проводимая восприимчивость	IEC 1000-4-6
EFT устойчивость	IEC 1000-4-4
ESD устойчивость	IEC 1000-4-2
Выброс напряжения	IEC 1000-4-5
Гармоники для сети питания	IEC 1000-3-2

ВСПОМОГАТЕЛЬНЫЕ ДЕТАЛИ/ ДОПОЛНЕНИЯ

Комплект калибровки	FSA11
Датчик яркости фона	LM21
Резервирование от батареи	FSB101
Обычное время резервирования 30 мин при 25°С	
Модем для связи на большом расстоянии (>1 км)	DMX501
Ограничительные огни	FS11OBS

Vaisala Background Luminance Sensor LM21

Vaisala Background Luminance Sensor LM21 is an intelligent, standalone precision photometer.

The Vaisala Background Luminance Sensor LM21 is a state of the art luminance sensor for Runway Visual Range (RVR) assessment. The background luminance has an effect on the distance from which the pilot can see the runway lights.

Resembles Human Eye

The LM21 is a precision photometer with a verified photopic spectral response. The LM21 measures the total amount of light coming in from an angle of 6 degrees, and converts the measured data to cd/m2. The LM21 sends the measurement data to the interface unit of a Vaisala transmissometer or forward scatter visibility sensor. The interface unit combines both the visibility and background luminance data into the same message and sends it to the main RVR computer.

The LM21 can be connected to the Vaisala Transmitter LT31, and Forward Scatter Sensor FS11. The LT31 and FS11 are connected using a RS-485 serial line.

Comprehensive Self-Diagnostics

The LM21 is an intelligent, stand-alone sensor. To ensure reliable and uninterrupted operation, the LM21 has extensive self-monitoring functions

with high power heating features. The LM21 measures and compensates for the attenuation effect of window contamination. It ensures that measurement accuracy is maintained between window cleaning, and also extends the cleaning interval. The optical path clearance monitoring circuitry verifies that measurement is not affected by obstructions.

Easy to Calibrate

The calibration of the LM21 is traceable to international measurement standards for luminous intensity. The Vaisala Field Calibrator LMA21 is a unique field calibration device that is available for quick field calibration. It provides a stabilized and diffused white light beam for the LM21 calibration.

The calibration coefficients for light intensity have been defined during factory calibration, and stored in the LMA21 memory. The calibration is done automatically when the LMA21 is connected to the Vaisala Background Luminance Sensor LM21. The LM21 reads the calibration coefficients from the LMA21 memory and performs the calibration. The status and result of the calibration is displayed with 5 LED indicators on the cover of the LMA21.

The Vaisala Background Luminance Sensor LM21 measures the ambient light level or background luminance in RVR applications. In the picture, the LM21 is installed on the Vaisala Transmissometer LT31.

Technical Data

Operational

Measuring range	2 ... 40 000 cd/m²
Measurement accuracy	10 %

Optical

Spectral response	400 ... 700 nm, Photopic according to CIE standards
Peak wavelength	553 nm
Field of view	6°
Effective diameter of reception lens	24 mm

Electrical

Connection	power/signal cable provided
Power supply	10 VDC to 38 VDC, or alternatively 8 VAC to 28 VAC, 6 W
Heater power supply	28 VAC, 50 W
Output signal	RS-485 (RS-232), frequency output
Overvoltage protection	power supply lines and output lines are protected by current limiters and transient suppressors

Environmental

Operating temperature	-55 ... +65 °C
Operating humidity	0 ... 100 %RH

Mechanical

Weight	1.2 kg
Cable length	2.3 m
Color	white
Housing	aluminum, weatherproof
Mounting	with a mounting clamp onto the LM21 Support Arm of LT31 or Optional Support Arm of FS11

Electromagnetic compatibility

The LM21 sensor is CE-compliant. This compliance has been verified according to the following EMC directives:

IEC 61326-1	Industrial Class
EN 61326-1	Industrial Class

Dimensions

Dimensions in mm.

1. *Length: 142 mm*

2. *Width (with plug): 126 mm*

3. *Width (without plug): 100 mm*

4. *Height (without bracket): 137 mm*

5. *Height (with bracket): 215 mm*
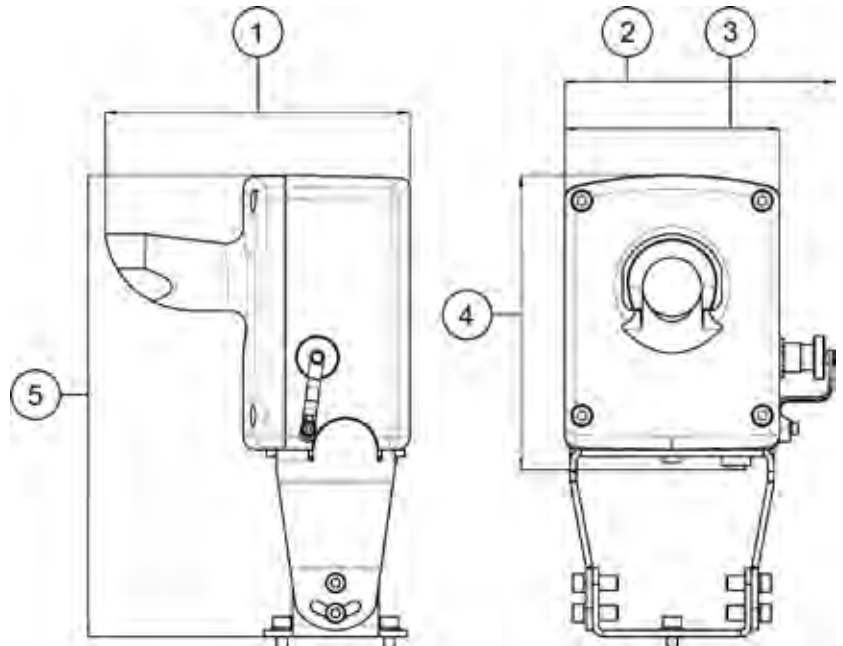
Трансмиссометр Vaisala LT31
RVR с новыми видеосенсорами

Точное и надежное определение дальности видимости на ВПП уменьшает время простоя аэропорта и увеличивают безопасность его работы. Трансмиссометр Vaisala LT31 – это соответствующее установленным требованиям устройство наблюдения за дальностью видимости на ВПП, непрерывно предоставляющее данные о видимости, с минимальными требованиями к техническому обслуживанию.

Диапазон измерений от 10 до 10 000 м

Трансмиссометр LT31 представляет собой высокоточное и надежное решение для автоматического измерения дальности видимости на ВПП. Диапазон измерения

Трансмиссометр Vaisala LT31 обеспечивает точное и надежное измерение с помощью одной базисной линии, которое подходит для аэропортов категории CATIIIb.

Возможности и преимущества

- Одна базисная линия для диапазона измерения метеорологической оптической дальности от 10 до 10 000 м
- Новейший источник белого света
- Автоматическое выравнивание с контролем качества в стандартной комплектации
- Автоматическая калибровка в стандартной комплектации
- Внутренний резервный аккумулятор
- Совместимость с трансмиссометрами Vaisala MITRAS и SKOPOGRAPH II Flamingo
- Компенсация загрязнения окна
- Соответствует требованиям ИКАО и ВМО для систем дальности видимости на ВПП и видимости
- Основан на десятилетиях опыта практической работы
- Передовая самодиагностика

метеорологической оптической дальности составляет 10–10 000 м, покрывая весь необходимый диапазон наблюдения за дальностью видимости на ВПП (CATI ... CATIIIb), а также диапазон, который необходим для аэронавигационной видимости (видимость, установленная ИКАО). Точность устройства LT31 соответствует требованиям ИКАО и ВМО.

Полный диапазон измерения достигается с помощью системы одной базисной линии, что делает измерение простым и экономным.

Белый светодиод обеспечивает источник света широкого спектра

В качестве источника света устройство LT31 оснащено белым светодиодом. Белый свет необходим для более высокой точности измерения коэффициента пропускания. ВМО рекомендует использовать для трансмиссометров источники света широкого спектра (белые), т. к. источники света узкого спектра (например, лазеры или цветные светодиоды) при наличии определенных явлений погоды приведут к ошибке измерений.

Автоматическая калибровка с помощью встроенного датчика прямого рассеяния

Калибровка трансмиссометров обычно основана на визуальном наблюдении. Для надежной и точной калибровки необходима очень высокая видимость, устойчивое состояние и опытный квалифицированный персонал.

Запатентованный компанией Vaisala метод автоматической калибровки трансмиссометров основан на встроенном датчике прямого рассеяние и датчике текущей погоды. Система автоматически определяет смещение и соответственно регулирует настройки датчика. Погодные условия не должны быть такими идеальными, как в случае ручной калибровки. Трансмиссометр LT31 автоматически распознает подходящие условия.

Автоматическое точное выравнивание

Одним из основных источников ошибок при измерении коэффициента пропускания является неточность выравнивания. Для проверки и регулировки выравнивания также необходим опытный квалифицированный персонал.

Для поддержания точности измерений прибор LT31 выполняет автоматическую оптимизацию выравнивания. Кроме того, точность выравнивания постоянно оценивается автоматически, без вмешательства персонала.

Встроенный датчик прямого рассеяния.

Автоматическое точное выравнивание также обеспечивает простоту установки прибора LT31. Качество выравнивания в суровых климатических условиях обеспечивается благодаря двойной мачте. Внешняя труба служит экраном для защиты от ветра и солнечной радиации. Внутренняя опорная конструкция ограждена от температурного и механического влияния, вызванного солнечной радиацией и ветровой нагрузкой.

Уменьшение загрязнения

Обычно осадки вызывают повышенный уровень загрязнения окна. Прибор LT31 оснащен длинными узкими кожухами для защиты от непогоды, уменьшающими уровень загрязнения окна из-за осадков.

Для осадков или пыли, отклоняющихся под действием ветра, прибор оснащен мощным воздуходувным устройством. Воздуходувное устройство создает воздушную завесу перед окном прибора. Воздушная завеса устроена таким образом, чтобы не нарушать траекторию измерений и не вызывать ошибки измерения, что являлось проблемой при использовании воздуходувного устройства обычной конструкции.

Автоматическая компенсация загрязнения окна

Загрязнение окна является значительным источником ошибок в работе трансмиссометров. Для поддержания высокой точности необходимы частые чистки окна. Однако эффекты загрязнения можно автоматически компенсироваться, если точно измерять коэффициент пропускания окна.

В приборе LT31 загрязнение окна компенсировать самым точным способом: путем измерения коэффициента пропускания непосредственно через стекло окна.

Комплексная самодиагностика

Прибор LT31 имеет передовую самодиагностику, предоставляющую подробные сведения о состоянии всех функциональных блоков. Кроме того, эта функция помогает определить возможные технические проблемы. Ведется запись сведений о важных эксплуатационных ситуациях прибора, предупреждениях и оповещениях.

Внутренний резервный аккумулятор

Прибор LT31 может быть оборудован внутренним резервным аккумулятором. Эта возможность обеспечивает стабильность доступности данных в течение коротких перерывов питания, например в процессе запуска резервных генераторов.

Фактическая компенсация загрязнения окна на основе V-образных окон.
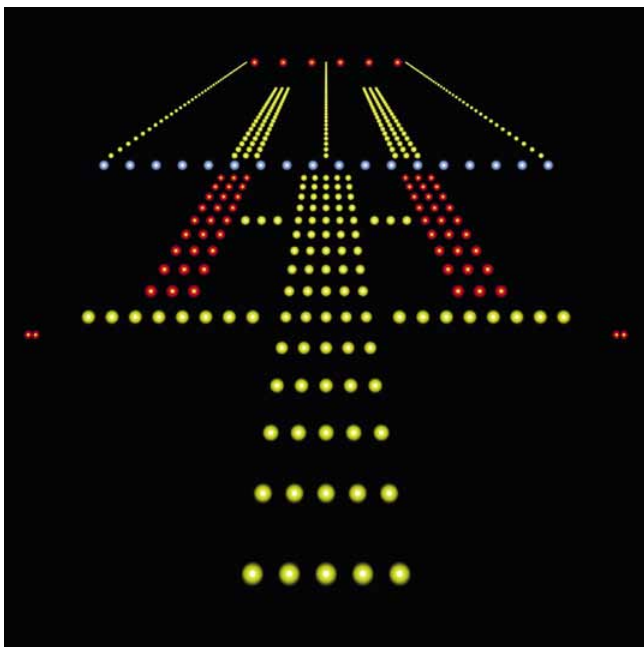
Огни ВПП ночью.

Передача данных о текущей погоде

Дополнительная возможность передачи данных о текущей погоде с точек определения дальности видимости на ВПП предоставляет полную картину о преобладающих погодных условиях в пределах всего аэропорта. Благодаря нескольким пунктам наблюдения за текущей погодой можно легко наблюдать за приближением погодных фронтов и наличием локальных дождей. Встроенный датчик текущей погоды предоставляет сведения о типе и интенсивности осадков с целью составления регулярных авиационных сводок погоды (METAR) и извещений о местной погоде.

Датчик яркости фона LM21

Дополнительный датчик LM21 предоставляет средства измерения уровня внешней освещенности или фоновой освещенности при наблюдении дальности видимости на ВПП. Датчик яркости фона используется для измерения освещенности фона, на котором видны огни или разметка ВПП.

Технические данные

Эксплуатационные характеристики

ДИАПАЗОН ИЗМЕРЕНИЯ

Базисная линия (м)	Диапазон измерения метеорологической оптической дальности (м)	Диапазон коэффициента пропускания
30	10 ... 10 000	<0,01 % ... 100 %
50	25 ... 10 000	<0,2 % ... 100 %
75	37,5 ... 10 000	<0,2 % ... 100 %

Разрешение измерения коэффициента пропускания	20 бит
Точность	в соответствии со спецификациями ИКАО и ВМО для дальности видимости на ВПП и видимости
Источник света	белый светодиод
Компенсация загрязнения окна	автоматическая, прямое измерение коэффициента пропускания окна
Калибровка	автоматическая с помощью встроенного датчика прямого рассеяния
Выравнивание	автоматическое точное выравнивание с сервоприводом

Условия окружающей среды

Диапазон температур	-40 ... +60 °C
Влажность	0 ... 100 % относит. влажности
Ветер	60 м/с
ЭМС	IEC/EN 61326-1
Электробезопасность	IEC/EN 60950-1

Сообщения данных

LT31	стандартное, включая полный отчет о состоянии
MITRAS	стандартное сообщение (для замены)
SKOPOGRAPH II Flamingo	стандартное сообщение (для замены)

Электрические характеристики

|	
Питание	100/115/230 В перем. тока, ±10 %, 50–60 Гц
Потребление энергии	макс. 800 Вт со всеми функциями
Интерфейсы	
данные	RS232/RS485/модем (дополнительно)
обслуживание	RS232
Резервный аккумулятор (дополнительно)	стандартное время резервной работы 1 ч при +20 °C
Заградительные огни (дополнительно)	

Механические характеристики

Одна базисная линия для полного диапазона измерений

Длина базисной линии	25 ... 75 м (рекомендуется 30)
Высота измерения	2,5 м
Вес	
Блок передатчика LTT111	85 кг
Блок приемника LTR111	82 кг
Устройство для обдува окна	

Передача данных о текущей погоде (дополнительно)

Определение	7 разных типов осадков (дождь, переохлажденный дождь, морось, переохлажденная морось, дождь со снегом, снег, ледяная крупа)
Отчеты	49 кодов из таблицы кодов WMO4680

Размеры

Размеры в мм

длина	1022 мм
ширина	420 мм
высота	2685 мм
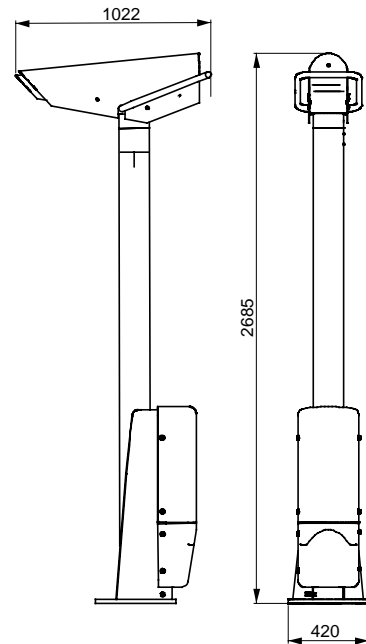
PWD10, PWD12, PWD20 и PWD22
Датчики видимости и текущей погоды

Датчики видимости и текущей погоды серии PWD от Vaisala обеспечивают проверенный уровень точности и надежности. Они представляют собой семейство продукции, растущее с Вашими потребностями.

Тысячи датчиков видимости и текущей погоды фирмы Vaisala установлены в разных уголках мира, обеспечивая высокую надежность и точность измерений на различных объектах и в различных климатических условиях. Поставляемые фирмой Vaisala детекторы текущей погоды и датчики видимости серии PWD предоставят Вам требуемый спектр измерений метеорологической дальности видимости, характеристик пониженной видимости, идентификации типа осадков, измерений интенсивности/количества выпавших осадков и форматов отчетов (кодовые таблицы ВМО и американской национальной метеослужбы NWS).

Апробированные принципы измерения текущей погоды

Детекторы текущей погоды PWD12 и PWD22 определяют тип осадков посредством точной оценки содержания воды в осадках, используя емкостное устройство (чувствительный элемент Vaisala RAINCAP®) и совмещают эту информацию с измерениями видимости методом прямого рассеяния и температуры. Эти три независимых измерения обрабатываются с помощью сложного алгоритма для выдачи точной оценки типа погоды в соответствии с кодовыми таблицами ВМО и NWS.

Точное измерение видимости

Датчики серии PWD Vaisala, откалиброванные с помощью высокоточного трансмиссометра, используют при измерении метеорологической дальности видимости хорошо проверенный принцип прямого рассеяния. Датчик видимости хорошо защищен от загрязнения: оптические компоненты направлены вниз, а линзы защищены

от осадков, брызг и пыли с помощью кожухов-козырьков. Такая погодозащищенная конструкция датчиков PWD обеспечивает высокую точность измерений и уменьшает потребность в техобслуживании.

В зимних условиях рекомендуется использовать специальные обогреватели козырьков во избежание накопления льда и снега.

Экономичные решения по измерению видимости на дорогах

Датчик видимости PWD10 фирмы Vaisala, с диапазоном измерения 10...2000 метров, представляет собой экономичное и надежное решение по измерению видимости на дорогах. Датчик PWD10 рекомендуется для дорожных метеосистем, предупреждающих водителей, например, о недостаточной видимости.

Для сложных дорожных метеосистем

Датчик текущей погоды PWD12 фирмы Vaisala производит точные измерения видимости и текущей погоды в сложной дорожной обстановке, когда плохая видимость представляет серьезную угрозу безопасности и существенно снижает интенсивность движения. Датчик текущей погоды PWD12 фирмы Vaisala, имеющий диапазон измерения 10...2000 метров, представляет собой идеальное решение для дорожных метеосистем. Датчик PWD12 также указывает причину ухудшения видимости, предоставляя тем самым полную картину сложившихся погодных условий. Способность прибора обнаруживать осадки и идентифицировать их тип предоставляет дорожным службам ценную информацию для текущего планирования деятельности по содержанию дорог.

PWD12 - идеальный выбор для дорожных метеосистем.

Датчик текущей погоды PWD22 фирмы Vaisala.

Датчик PWD22 рекомендуется использовать в автоматических системах метеонаблюдения.

Для использования в метеорологии и авиации

Датчик текущей погоды PWD22 фирмы Vaisala, имеющий диапазон измерения 10...20000 метров, представляет собой совмещенный датчик текущей погоды и видимости (действующий по принципу измерения прямого рассеяния). Датчик PWD22 рекомендуется использовать на автоматических метеостанциях (особенности на станциях с малым энергопотреблением), используемых для общей метеорологии и авиации. Способность датчика PWD22 обнаруживать замерзающие осадки

позволяет давать предупреждения о погодных условиях, представляющие угрозу безопасности дорожному и воздушному движению.

Датчик PWD22 оборудован двумя чувствительными элементами Vaisala RAINCAP® для улучшения чувствительности обнаружения при слабых осадках - датчик обнаруживает даже слабую морось. Датчик PWD22 также выдает отчеты о текущей погоде в формате кода WMO METAR, поэтому его легко встраивать в автоматические системы метеонаблюдений (AWOS).

Датчики серии PWD могут использоваться при планировании содержания дорог.

Везде, где нужны измерения видимости

Датчик видимости PWD20 фирмы Vaisala, имеющий более широкий диапазон измерения 10...20000 метров, предоставляет возможность измерения видимости на самых различных объектах, включая порты, прибрежные зоны, вертолетные площадки, ветроэнергоцентры, то есть фактически везде, где существует необходимость измерения видимости.

Простота установки

Датчики PWD имеют высоту менее одного метра. Все они имеют компактную и легковесную конструкцию и поставляются с кабелем и разъемом для обеспечения простоты установки, которая может производиться различными способами на любой существующей мачте.

Происшествий нет!

Расширяемые возможности измерений

Возможности измерений датчиков серии PWD от Vaisala могут быть расширены по мере возрастания Ваших потребностей в измерениях. Все датчики серии PWD могут быть экономно модифицированы с расширением их возможностей измерения, что сохраняет их ценность для владельца на многие годы.

При условиях, подобных показанным на снимке, датчик текущей погоды PWD22 сообщит только о ясной погоде и дальности видимости до 20 км.

PWD22 представляет собой совмещенный датчик текущей погоды и видимости (действующий по принципу измерения прямого рассеяния). Это идеальное решение для автоматических метеостанций, используемых для общей метеорологии и авиации.

Поставляемые фирмой Vaisala датчики текущей погоды и видимости серии PWD предоставят Вам требуемый спектр измерений:

• Метеорологическая дальность видимости

• Характеристики ухудшенной видимости

• Идентификация типа осадков

• Измерение интенсивности/ количества выпадения осадков

• Форматы отчетов WMO 4680 (SYNOP) и 4678 (METAR)

Детектор текущей погоды PWD10 фирмы Vaisala рекомендуется для дорожных метеосистем, предупреждающих водителей, например, об ухудшении видимости, а PWD12 - для сложных дорожных метеосистем, включающих различные мероприятия, например, планирование содержания дорог.

Детектор текущей погоды PWD20 фирмы Vaisala рекомендуется для измерения видимости в других местах, например, в портах, прибрежных зонах, на вертолетных площадках и в ветроэнергоцентрах.

Возможности измерений датчиков серии PWD от Vaisala могут быть расширены, если возрастут ваши потребности в измерениях.

Все датчики серии PWD могут быть экономично модифицированы с расширением возможностей измерения, что сохраняет их ценность для владельца на многие годы.

Технические данные

Текущая погода

PWD12

Идентифицирует	4 различных типа осадков (дождь, морось, дождь со снегом, снег) туман, дымка, мгла (дым, песок) или ясно
Отчеты	Кодовые таблицы WMO 4680 (SYNOP) и NWS Поддержка 39 различных кодов из кодовой таблицы WMO 4680

PWD22

Идентифицирует	7 различных типов осадков (дождь, переохлажденный дождь, морось, переохлажденная морось, дождь со снегом, снег, ледяная крупа) туман, дымка, мгла (дым, песок) или ясно.
Отчеты	Кодовые таблицы WMO 4680 (SYNOP), 4678 (METAR) и NWS Поддержка 49 различных кодов из кодовой таблицы WMO 4680

Измерение осадков

Измеряет	интенсивность, количество выпавших осадков и количество свежевыпавшего снега
Чувствительность обнаружения осадков	0.05 мм/ч или менее, в течение 10 минут

Измерение видимости

Принцип работы	измерение прямого рассеяния

PWD10 и PWD12

Метеорологическая дальность видимости	10...2000 м (32...6500 футов)

PWD20 и PWD22

Метеорологическая дальность видимости	10...20 000 м (32...65 600 футов)
Точность	±10%, в диапазоне 10...10 000 м
	±15%, в диапазоне 10...20 км

Электрическая часть

Питание	12 В пост.тока...50 В пост.тока (электроника)
	24 В пер.тока или 24 В пост.тока для опции обогрева
Потребляемая мощность	

PWD10 и PWD20

	3 Вт (электроника с обогревом отпотевания @12 В пост.тока)

PWD12 и PWD22

	6 Вт
Опции	2 Вт (датчик освещенности с обогревом отпотевания) 65 Вт (опция обогрева)
Выходы	RS-232, RS-485 три программируемых релейных регулятора, перестраиваемые задержки и порог срабатывания сигнализации видимости, реле сигнала отказа 0 ... 1 мА , 4 ... 20 мА аналоговый ток

Механическая часть

Размеры	40.4 (ширина) х 69.5 (длина) х 19.9 (высота) см (15.91" (ширина) х 27.36" (длина) х 7.83" (высота))
Вес	3 кг (6,61 фунта)

Окружающие условия

Рабочая температура	-40 ... +60 ℃
Рабочая отн. влажность	0 ... 100 %
Класс защиты	IP66

Электромагнитная совместимость

Соответствует требованиям CE

Соответствие проверено согласно следующим директивам по электромагнитной совместимости

Объект проверки	стандарт
Излучаемые помехи	CISPR 16-1,16-2
Восприимчивость к излучаемым помехам	IEC 61000-4-3,10 V/m
Кондуктивные помехи	CISPR 16-1,16-2
Восприимчивость к кондуктивным помехам	IEC 61000-4-6
Устойчивость к наносекундным импульсным помехам	IEC 61000-4-4
Устойчивость к электростатическим разрядам	IEC 61000-4-2
Устойчивость к микросекундным импульсным помехам большой энергии	IEC 61000-4-5

Аксессуары/Опции

Датчик освещенности PWL111 для автоматических систем метеонаблюдений

Подогреватели козырька для зимних условий

Кронштейн для установки на мачту

Комплект трубных зажимов для установки на вершине мачты

Калибровочный комплект PWA12

Кабель для обслуживания 16385ZZ

Размеры
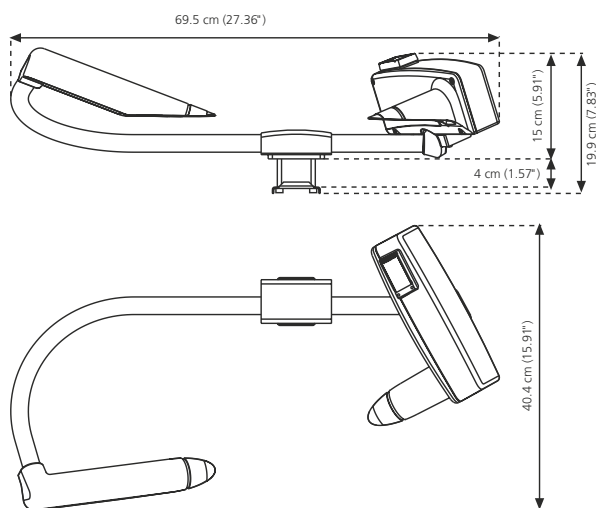
Осадкомер Vaisala QMR101

Осадкомер QMR101 представляет собой экономичный и точный дождевой осадкомер, изготовленный из пластика, морозоустойчивый и отличающийся высокой стойкостью к воздействию УФ излучения. QMR101 оборудован саморазгружающейся опрокидывающейся ложечкой емкостью 0,2 мм. Благодаря небольшому размеру, малому весу и прочной конструкции он особенно хорошо подходит для переносных решений и временной установки. QMR101 устанавливается на траверсу датчика и имеет готовый кабель с разъемом.

Осадкомер Vaisala QMR102

Осадкомер QMR102 представляет собой дождевой осадкомер аэродинамической формы, разработанный для минимизации воздействия ветра, снижающего объем улавливаемых осадков. Применение в изготовлении стойкого к УФ-излучению датчика делает осадкомер очень надежным инструментом. Собранный дождь измеряется в хорошо зарекомендовавшем себя механизме "опрокидывающегося ведра" емкостью 0,2 мм. QMR102 устанавливается в грунт или на дополнительную подставку, он поставляется с 6-метровым кабелем с разъемом.

DRD11A Rain Detector

Vaisala DRD11A Rain Detector

Rain and snow are quickly and accurately detected with the DRD11A Rain Detector. The DRD11A operates via droplet detection rather than by signal level threshold.

A special delay circuitry allowsabout two-minute intervalbetweenraindrops beforeassuming an OFF (no rain)position. This enables the sensorto accurately distinguish betweenrain cessation and lightrain.

The DRD11A also features an analog Rain Signal for estimating rain intensity. Since this signal is proportional to the percentage of moist or wet area on the sensorplate, rain intensity has a directimpact on the amplitude andvariation of this analog signal.

The DRD11A sensor is positionedat a 30° angle. This design,together with the internal heatingelement, ensures that the surfacedries quickly, an essential factorincalculating intensity. The sameheating element also protects thesurface from fog and condensedmoisture, and is activated at low temperatures in order to melt snow, thus allowing snow detection. Sensor performance is not affected by reasonableamounts of dirt and dust due todroplet detection.

The DRD11L is a low heating power model of the DRD11A. Itis intended to be used in areaswith only rain or wet/moist snow precipitation.

Technical Data

Sensor

Capacitive principle, thick layer sensor
RainCap™ with a thin glass shield. Integrated heater element.

Sensitivity of Rain Detection

Minimum wet area	0.05 cm²
OFF-delay (active)	< 5 min

Physical

Sensor plate	
Sensing area	7.2 cm²
Angle	30°
Housing material	Polypropylene
Windshield and support bracket	Aluminum
Moisture shield	Polyurethane
Dimensions	(h × w × l)
With wind shield	110 × 80 × 175 mm
Without wind shield	90 × 46 × 157 mm
Weight	500 g
Cable length	4 m

Electrical

Supply voltage	12 VDC ± 10 %
Supply current	
Typical less than	150 mA
Maximum	260 mA
Heater OFF	25 mA
Sensor plate	
Heating power	0.5 ... 2.3 W
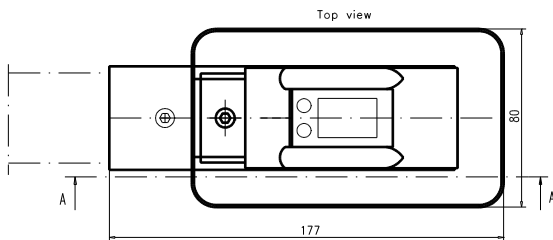
Output

Rain ON/OFF	
Open collector, active low signal corresponds to rain	
Maximum voltage	15 V
Maximum current	50 mA
Analog output	1...3 V (wet...dry)
Frequency output	1500...6000 Hz,
	non-calibrated

Input

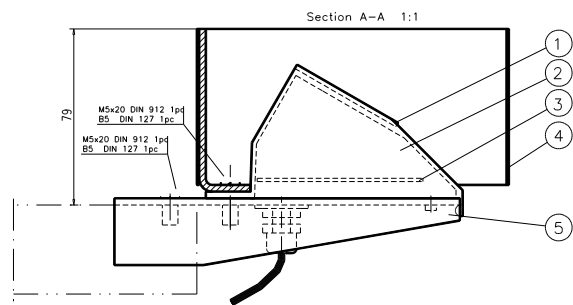|	
Control to switch heater OFF	
Open circuit input enables the heater.	
Connection to GND disables the heater.	
Contact rating min.	15 V, 2 mA

Ground Wiring

Separate ground wires for signal and heater

Temperature Range

Operating	-15...+55 °C (+5...+131 °F)
Storage	-40...+65 °C (-40...+149 °F)

Mounting

By one screw (M5 x 20 mm) to sensor arm

1. *Sensor, RainCap™*
2. *Polyurethane moisture shield*
3. *Component assembly*
4. *Wind shield*
5. *Mounting plate*

RG13H

Датчик осадков RG13 состоит из корпуса и воронки из алюминиевого сплава с точно подобранной прокладкой сверху для создания отверстия 400 см^2. Лоточный механизм на основе отливки из алюминиевого сплава смонтирован внутри корпуса.

Датчик осадков с обогревом RG13H на основе опрокидывающегося лотка обеспечивает опробованный и надежный метод отслеживания осадков также и при температурах ниже 0°С. Датчик RG13H имеет внутренний обогреватель. Обогреватель включается при температуре ниже +4°С. Потребление энергии обогревателем составляет 38 Вт/ 40 В пост. тока.

Спецификации осадкомера RG13H

Свойство	Описание/Значение
Тип датчика /преобразователя	Опрокидывающийся механизм/геркон
Точность	$\pm$ 1 %
Чувствительность	0.2 мм
Емкость	Нелимитирована
Диаметр воронки	225 мм
Отверстие (открытая область)	400 см^2
Материал	Некоррозирующий алюминиевый сплав LM25
Размеры	390 (в) $\times$ 300 ($\varnothing$) мм
Вес	2.5 кг
Макс. номинал тока	500 мА
Напряжение пробоя	400 В пост.тока
Емкостные замыкающие контакты	0.2 pF
Время существования (операции)	10^8 закрытий
Время закрытия	< 100 мс (для 0.2 мм дождя)
Диапазон температуры (рабочий)	-20 ... +85 °С

Vaisala Present Weather Detector PWD52

Automated observation networks need to operate with maximum reliability. Maritime and aviation observing systems need to operate in extremely harsh conditions. Meteorological institutes face challenging productivity and performance requirements. The Vaisala Present Weather Detector PWD52 answers these needs with a mixture of robustness, dependability, versatility and reliability. The PWD52 delivers a wide visibility measurement range and dependable present weather reporting.

Accurate Visibility Measurement

Calibrated with reference to a highly accurate transmissometer, the PWD52 uses the proven forward-scatter measurement principle to measure Meteorological Optical Range (MOR). The sensor optics are well-protected against contamination: the optical components point downwards and hoods protect the lenses against precipitation, spray and dust. This weather-proof design helps sustain accurate measurement results.
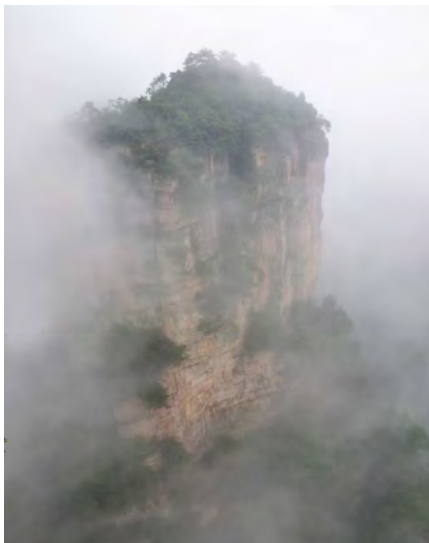
Proven Measurement Principles

The PWD52 identifies precipitation type by accurately estimating the water content of precipitation using the Vaisala RAINCAP® sensor element, and combines this information with optical forward scatter and temperature measurement. These three independent measurements are processed through sophisticated algorithms to produce an accurate evaluation of the precipitation type according to the WMO and NWS code tables.

Robust and Dependable

Three measurement methods are used in the PWD52 continuously, independently, and simultaneously thus reducing false alarm rates to a minimum. The identification of precipitation type is reliable due to sophisticated algorithmic processing of complementary data from multiple sources. These factors together produce exceptionally dependable data.

The downward-facing sensor hoods protect the optical surfaces from contamination, resulting in low maintenance needs and costs.

Features/Benefits

- Accurate, traceable measurement of prevailing visibility
- Detects precipitation type
- Measures the intensity and accumulation of precipitation
- Estimates snow accumulation
- Robust and dependable
- Weather-proof design reduces need for maintenance
- Easy to install, easy to integrate

The optional hood heaters prevent the buildup of ice and/or snow in the optical path.

Solid Track Record

Thousands of PWD series sensors have been installed all around the world. They have undergone rigorous test programs. In the field, PWD sensors have demonstrated very low failure rates. They have proved their robustness in the harshest climates and most demanding conditions, ranging from offshore to desert and from airport to roadside.

Technical Data

Visibility measurement

Operating principle	Forward scatter measurement
Measurement range (MOR)	10 ...35000 m
Accuracy	±10 %, range 10 m ...10000 m
	±20 %, range 10 km … 35 km

Present weather

Identifies	7 different types of precipitation (rain, freezing rain, drizzle, freezing drizzle, mixed rain/snow, snow, ice pellets)
	Fog, mist, haze (smoke, sand) or clear
Reports	WMO 4680 (SYNOP), 4678 (METAR), and NWS code tables; 49 different codes supported from the WMO 4680 code table-

Precipitation measurement

Measures	Precipitation type, intensity, accumulation and amount of new snow
Precipitation detection sensitivity	0.05 mm/h or less, within 10 minutes

Electrical

Power supply	12 - 50 VDC (electronics)
	24 VAC or 24 VDC for hood heater option
Power consumption	6 W
Options	
luminance sensor	2 W (24 V)
hood heaters	65 W (24 V)
Outputs	RS-232 or RS-485 (2-wire)
	Three programmable relay controls (open collector), visibility alarm threshold and delays configurable, fault alarm relay
	0 ...1 mA, 4 ...20 mA analog current

The PWD52 is well suited for meteorological and environmental observation networks.

Environmental

Operating temperature	-40 ...+60 ˚C(-40 ...+140 ˚F)
Operating humidity	0 ...100 %RH
Protection class	IP66

Electromagnetic compatibility

CE-compliant

Compliance has been verified according to the following EMC directives

Verification subject	Standard
Radiated emissions	CISPR 16-1, 16-2
Radiated susceptibility	IEC 61000-4-3, 10 V/m
Conducted emissions	CISPR 16-1, 16-2
Conducted susceptibility	IEC 61000-4-6
EFT immunity	IEC 61000-4-4
ESD immunity	IEC 61000-4-2
Surge	IEC 61000-4-5

Mechanical

Weight	3 kg (6.61 lb.)
Dimensions	222 mm (h) x 695 mm (w) x 432 mm (d)
	(8.73" (h) x 27.35 " (w) x 16.99"(d))
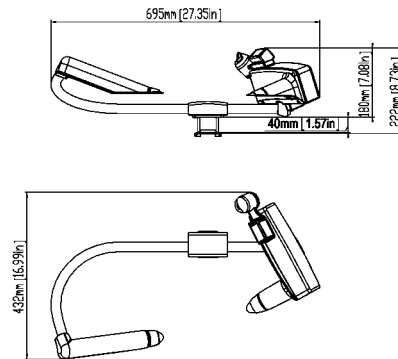
Accessories/options

Interface unit with power supplies	115/230VAC
Pole Mast	
Hood heaters for winter conditions	
Support arm for mast installations	
Pole clamp kit for mast top installations	
Luminance sensor PWL111	
Calibration set PWA12	
Maintenance cable 16385ZZ	

Погодные дорожные камеры Vaisala

Цветная видеокамера Vaisala дистанционно контролирует дорожные условия, что позволяет Вам напрямую увидеть критическую информацию на понятных своевременных изображениях. Цветная видеокамера имеет фиксированное поле обзора и направление обзора, которое регулируется вручную при установке. В ней применяется полностью интегрированная технология захвата изображения, которая позволяет использовать один канал связи для данных RWIS и для видео изображений.

Получите все преимущества вибрирующего цвета! Камера обладает высоким разрешением, вибрацией цвета, четкостью и достоверностью изображений. Данные доступны в формате JPEG через RS-232 или NTSC.

Камера PTZ (с приводом наклона/поворота и увеличительным объективом)

Камера PTZ Vaisala позволяет Вам видеть несколько мест при помощи одной камеры. Камера PTZ снабжена датчиком цвета прогрессивной развертки, автофокусом и выходом комбинированного видеоизображения. Она не имеет механических ограничений поворота благодаря возможности бесступенчатого вращения в любом направлении (быстрый наклон 180° и вращение 360°), а также отличается изменяемой скоростью поворота и наклона, бесступенчатым наклоном и автоматическим поворотом изображения.

Камера PTZ снабжена линзами с оптическим увеличением 23:1 и с 64 заданными положениями приближения, фокуса, поворота и наклона. Можно отрегулировать изображения по положению и приближению, выбрав до восьми заданных видов захвата и передачи изображения. Функция работы при слабом освещении позволяет камере возвращать изображения ночью или в неблагоприятных условиях, изображения предоставляются в формате JPEG для облегчения просмотра.

Эти камеры предлагают решение "все в одном" для клиентов, которым требуется захват изображений на метеорологических станциях. Одну или несколько камер можно установить на метеорологической станции ROSA (ESS).

Vaisala Navigator WID 733

Map view of Vaisala RoadDSS Navigator

The Vaisala RoadDSS Navigator is a hosted web user interface for viewing past, present and future road weather data. The application displays data collected by the Vaisala Global Data Management Center, which handles data collection from the road weather networks around the world. The application consists of a set of dynamic web pages that can be viewed with a simple Internet connection. The Vaisala RoadDSS Navigator also features GIS maps which are optimized to clearly display road weather data, including Thermal Mapping and mobile weather observations, where available. The Navigator user interface is part of the Vaisala RoadDSS Software Suite and provides the added functionality of providing detailed reporting. The reports save you time in compiling information from the system making your job easier. Navigator also includes detailed alerting functionality that continuously monitors specific parameters you make decisions on, and then provides you with notification as soon as those

thresholds are reached. Vaisala RoadDSS Navigator was designed by Vaisala customers, which means it fits into your operations more naturally.

Customizable Views

The Vaisala RoadDSS Navigator has been designed with user convenience in mind. You can easily customize the application to suit your needs. This will allow you to view only the important and relevant information, which will help you focus quickly and easily on the job at hand.

Browse Observations and Forecasts with Ease

The application has many features that make browsing the data very easy. For instance, with the powerful Time Slider feature you can quickly see on the map page all the observations and any forecasts that are available for 24 hours on either side of the actual time. This gives an unparalleled overview of past, present and future conditions at a glance. It also takes less time to

train staff on how to use the program, which results in a quicker return on investment.

Features/Benefits

- Easy-to-use interface with customizable views
- No need to install software on clients – works with latest versions of Microsoft Internet Explorer and Mozilla Firefox browsers
- Easy to implement and maintain
- See real-time data on a map, table or graph
- Alerting and Alarming Feature
- Easy access to service from anywhere with an Internet connection
- GIS maps optimized for displaying road weather data
- Historical data available
- Compare and contrast road weather observations with other road information all in the same application
- Configurable e-mail and SMS alerts
- Supports animation of radar, satellite and other map based information where available
- Generate reports quickly and in a printer friendly format
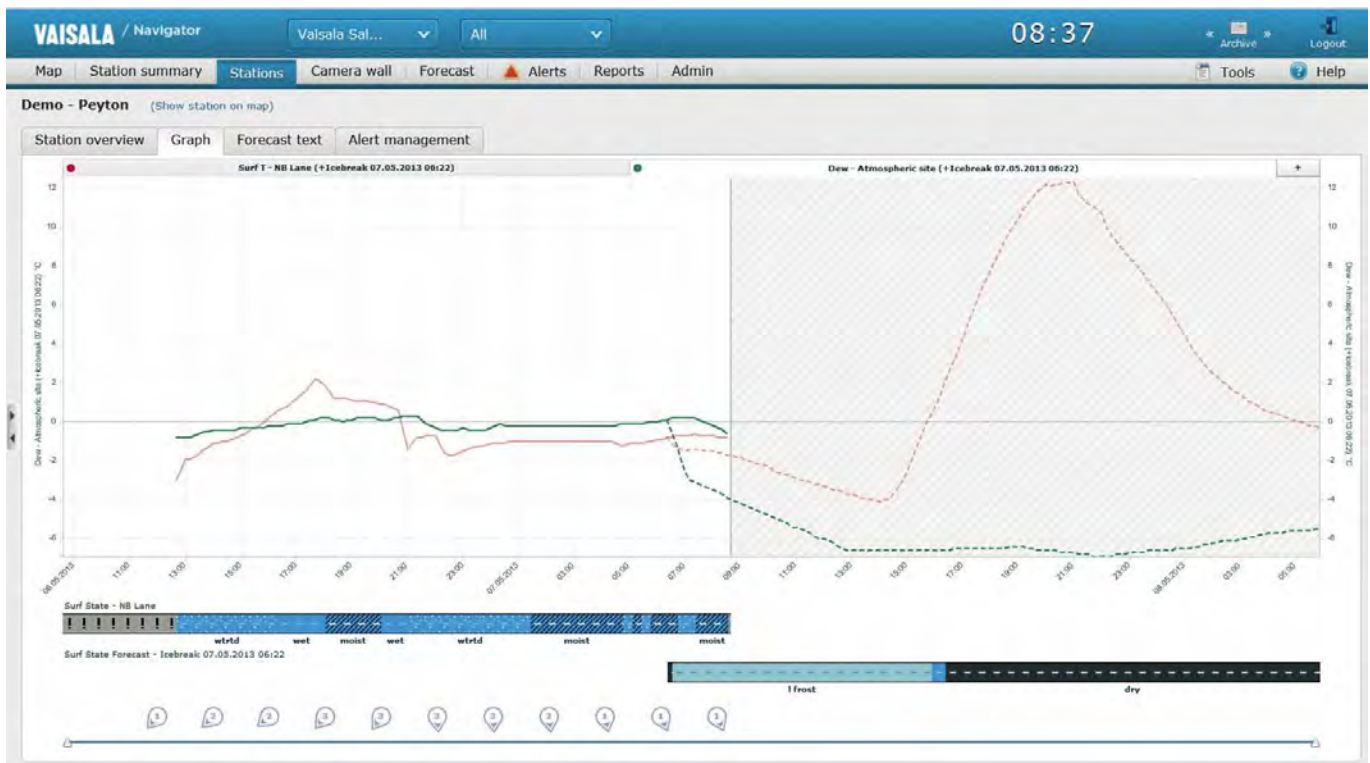- Station data export for easy data analysis offline

All the Relevant Data in the Same Application

One of the key features in the Vaisala RoadDSS Navigator is it has the ability to compare and contrast road weather information with other relevant data. Where available this could include weather radar, satellite and traffic counting data, all in the same application. With all this data in the same place you can easily see how the weather affects traffic flow, and plan your actions accordingly. In addition, some features can be conveniently animated for easy representation of moving weather events and developing situations that need monitoring.

Радиозонд RS92-SGP

телеметрии всегда обнаруживаются. Цифровой передатчик также потребляет меньше энергии, чем аналоговый, и имеет больше каналов в метеорологическом частотном диапазоне.

Соответствие стандарту института ETSI для диапазона 400 МГц

Радиозонд RS92-SGP полностью соответствует требованиям стандарта EN 302 054 Европейского института стандартов связи (ETSI) по цифровым радиозондам, действующим в частотном диапазоне 400 МГц, EN 302 054. Этот стандарт предназначен для регулирования использования метеорологического диапазона частот 400 МГц с целью улучшения доступности метеорологических данных во всем мире.

Устройство предполетной проверки радиозонда Vaisala ground check set GC25

Предполетная проверка радиозонда RS92-SGP фирмы Vaisala осуществляется посредством устройства предполетной проверки Ground Check Set GC25 и системы зондирования. Система зондирования автоматически считывает коэффициент калибровки через телеметрическую линию. Устройство GC25 используется для восстановления датчика влажности, удаления химических загрязнителей и обеспечения превосходной точности измерения относительной влажности. Установка нужной частоты передатчика производится посредством простой прокрутки на экране дисплея.

Калибровка на CAL-4

Датчики давления, температуры и относительной влажности радиозонда RS92-SGP прокалиброваны на калибровочном устройстве CAL-4. Это, разработанное на фирме Vaisala, встроенное калибровочное устройство является наиболее передовым устройством подобного типа, предназначенным для массового производства датчиков давления, температуры и относительной влажности.

Преимущества

- Самый высокий в мире уровень эффективности измерений атмосферного давления, температуры и относительной влажности воздуха
- Технология GPS с корреляцией кода для постоянного обеспечения доступности данных о ветре
- Устойчивая передача соответствует требованиям стандарта EN 302 054 Европейского института стандартов связи (ETSI)

Признанное превосходство в измерениях давления, температуры и относительной влажности воздуха

Полностью цифровой радиозонд RS92-SGP фирмы Vaisala предлагает самый высокий в мире уровень эффективности измерений атмосферного давления, температуры и относительной влажности воздуха, благодаря великолепным характеристикам используемых индивидуальных датчиков давления, температуры и влажности фирмы Vaisala.

GPS с корреляцией кода

Радиозонд RS92-SGP фирмы Vaisala оборудован надежным приёмником GPS с корреляцией кода. Этот приемник имеет быстродействующую поисковую машину, обеспечивающую отслеживание всех спутников, находящихся в пределах видимости. Фильтрация и усиление сигналов GPS обеспечивают великолепное отношение сигнал-помеха: радиозонд RS92-SGP отличается высокой устойчивостью к влияниям радаров или других источников радиочастотных помех. В случае отказа независимая сторожевая схема немедленно произведет возврат радиозонда в исходное состояние для сведения к минимуму пропусков наблюдений. В результате этого обеспечивается постоянная выдача данных о ветре с момента запуска радиозонда до высоты разрыва оболочки.

Полностью цифровая передача данных

Чисто цифровая передача данных радиозонда RS92-SGP предлагает важные преимущества по сравнению с аналоговой передачей данных. Обеспечивается великолепная доступность данных во время зондирования, а ошибки

Технические данные

Метеорологические датчики

ДАТЧИК ТЕМПЕРАТУРЫ	ТИП: ЕМКОСТНЫЙ ПРОВОЛОЧНЫЙ
Диапазон измерений	+60 °C to -90 °C
Время отклика (63.2%, поток 6 м/с)	
1000 гПа	< 0,4 с
100 гПа	< 1 с
10 гПа	< 2,5 с
Разрешение	0,1 °C
Точность	
Общая погрешность зондирования*	0,5 °C
Воспроизводимость калибровки**	0,15 °C
Воспроизводимость результатов зондирования ***	
1080 - 100 гПа	0,2 °C
100 - 20 гПа	0,3 °C
20 - 3 гПа	0,5 °C

ДАТЧИК ВЛАЖНОСТИ	ТИП: ТОНКОПЛЕНОЧНЫЙ КОНДЕНСАТОР, ПОДОГРЕВАЕМЫЙ ДВОЙНОЙ ДАТЧИК
Диапазон измерений	0 - 100 % отн.вл
Разрешение	1 % отн.вл.
Время отклика	
6 м/с, 1000 гПа, +20 °C	< 0,5 с
6 м/с, 1000 гПа, -40 °C	< 20 с
Точность	
Общая погрешность зондирования*	5 %
Воспроизводимость калибровки**	2 %
Воспроизводимость результатов зондирования ***	2 % отн.вл.

ДАТЧИК ДАВЛЕНИЯ	ТИП: СИЛИКОНОВЫЙ
Диапазон измерений	1080 гПа - 3 гПа
Разрешение	0,1 гПа
Точность	
Общая погрешность зондирования*	
1080 - 100 гПа	1 гПа
100 - 3 гПа	0,6 гПа
Воспроизводимость калибровки**	
1080 - 100 гПа	0,4 гПа
100 - 3 гПа	0,3 гПа
Воспроизводимость результатов зондирования ***	
1080 - 100 гПа	0,5 гПа
100 - 3 гПа	0,3 гПа

Габариты и вес

Габариты	220 x 80 x 75 мм
Вес с литиевой батареей (RS92-SGPL)	Как правило 160 г [1]
Вес с алкалайновыми (сухими) батареями (RS92-SGPD, RS92-SGPA)	Как правило 280 - 290 г [1]

[1] Вес не включает в себя оснастки, разматывателя, парашюта и т.п.

Батарея

Коды заказа с различными типами батарей	
RS92-SGPD	алкалайновая (сухая), 9 В ном.
RS92-SGPL	литиевая, 9 В ном.
RS92-SGPA	сухая батарея для AUTOSONDE, 9 В ном.
Время работы	135 мин.

Телеметрия

Тип передатчика	перестраеваемый
Частотный диапазон	403 МГц
Диапазон перестройки	400.15 - 405.99 МГц
Устойчивость частоты, вероятность 90 %	± 2 кГц
Девиация, от минимума до максимума	4,8 кГц
Ширина полосы излучения	В соответствии с EN 302 054
Выходная мощность (режим высокой мощности)	мин. 60 мВт
Модуляция	GFSK (гауссовская частотная манипуляция)
Линия нисходящей связи Data downlink	2400 бит/с, цифров
Цикл измерения	1 с

GPS-приемник с корреляцией кода (Избирательная доступность SA отменена, фактор снижения точности при определении положения в пространстве PDOP<4)

Число каналов	12
Погрешность позиционирования, горизонтальная	10 м
Погрешность позиционирования, вертикальная	20 м
Погрешность измерения скорости ***	0,15 м/с
Погрешность измерения направления ****	2 градуса

* при уровне доверительной вероятности 95,5 % правило 2-sigma (k=2), общая погрешность, включая следующее:
- Возобновляемость
- Долговременная устойчивость
- Влияние условий измерения
- Динамический эффект (например, время отклика)
- Влияние электроники измерений

Для относительной влажности T > -60 °C
Для давления T < 35 °C

** Среднеквадратичное отклонение разницы двух последовательных калибровок, k=2 уровень доверительной вероятности
*** Среднеквадратичное отклонение разниц при двойном зондировании
**** Среднеквадратичное отклонение разниц при двойном зондировании, скорость ветра более 3 м/с

CL31 Ceilometer for Cloud Height Detection

The Vaisala Ceilometer CL31 is a compact and lightweight instrument for cloud base height and vertical visibility measurements. It detects three cloud layers simultaneously. The CL31 employs a pulsed diode laser LIDAR (light detection and ranging) technology. The CL31 is ideal for aviation and meteorological applications.

Measurement starts from ground level

The enhanced single-lens technology applied in the CL31 ensures excellent performance starting at a height of virtually zero. This is due to the strong and stable signal over the whole measurement range. The single-lens technology provides unsurpassed reliablity during precipitation, low clouds and ground based obscurations, which are the most critical phenomena in aviation safety.

Fast measurement

Fast measurement helps to detect thin cloud patches below a solid cloud base. The CL31 provides a full backscatter profile for data visualization and research purpose.

The CL31 beam can be directed either vertically or tilted. The tilting option together with the novel optics design provides enhanced performance during precipitation by improving the protection given by the shield. In the measurement unit, a tilt angle sensor automatically corrects the measured cloud distance reading to vertical cloud base height.

Extensive self-diagnostics

The CL31 is fully automatic. In addition to cloud height data, the messages contain instrument status information based on comprehensive self-diagnostic routines. In case of a malfunction the diagnostics help users to identify the failed module. The CL31 features practical modularity and its easy-access door ensures fast servicing and high data availability.

Easy installation and maintenance

The CL31 is easy to install. It has a radiation shield that protects the unit during precipitation and against excessive heat or cooling in extreme temperatures. The automatic window blower with heater improves performance by keeping the window clean and dry. In cold conditions heating prevents frost generation on the window.

Vaisala Ceilometer CL31 measures cloud base height and vertical visibility in all weather - good or bad.

Features/Benefits

- Measurement range from 0 to 7.6 km (from 0 to 25,000 feet).
- Second-generation, advanced single-lens optics provides excellent performance also at low altitudes
- Reliable operation in all weather; unsurpassed performance in vertical visiblity and cloud detection during precipitation
- Extensive self-diagnostics with fault analysis

- Modular design for easy installation and maintenance
- Fast measurement enables detection of thin cloud layers below a solid cloud base

- Latest technology from the world-leading manufacturer - based on the experience from more than 5000 installed Vaisala ceilometers worldwide

Technical Data

Performance

Measurement range	0 ... 25,000 ft. (7.6 km)
Reporting cycle	programmable, 2 ... 120 s
Reporting resolution	5 m/10 ft., units selectable
Distance measurement accuracy against	
hard target	greater of ±1 % or ±5 m
Laser	InGaAs diode, 910 mm
Eye safety	Class 1M IEC/EN60825-1

Electrical

Power (*	100/115/230 VAC ±10%,
	50 ... 60 Hz
	max. 310 W including heating
Interfaces	
data	RS232 / RS485 / Modem / LAN
maintenance	RS232
baud rate	
RS232 / RS485	300 ... 57,600
modem V.21, V.22	300 ... 1200
Back-up battery	Internal, 2 Ah

Data Messages

Cloud hits (up to 3 layers) and status information
Cloud hits, status and backscatter profile
Cloud hits and internal monitoring data
Emulation of CT12K, CT25K, LD-25/40
Sky Condition (optional)

Mechanical

Dimensions	
total	1190 x 335 x 324 mm
measurement unit	620 x 235 x 200 mm
Weight	
total	32 kg
measurement unit	13 kg
Tilt positions	Vertical or 12° tilted

Automatic window blower / heater
Radiation shield and pedestal
Service access through a door
Optical filters for protection against direct
sunlight

Environmental

Temperature range	-40 ... +60 °C (-40 ... +140 °F)
	(Optional -55 ... +60 °C (-67 ... +140 °F)
Humidity	0 ... 100 % RH
Wind	55 m/s
Housing classification	IP66
Vibration	Lloyds Register / IEC60068-2-6
	5 ... 13.2 Hz ±1.0 mm
	13.2 ... 100 Hz ± 0.79 mm
EMC	IEC/EN 61326
Electrical Safety	IEC/EN 60950

Accessories / Options (*

Cable termination box Termbox-1200 with extra transient
protection
PC maintenance cable QMZ101
Shock absorbing mounting pad CT35022 for ship installations
Modem DXL421
Attachment mechanics for radio modem antenna CLRADIOKIT
Graphical User Interface for Ceilometers CL-VIEW
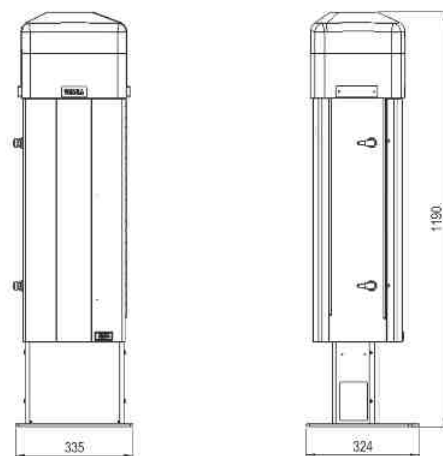Boundary Layer View Software for Ceilometers BL-VIEW
Bird deterrent device CL31BIRDKIT
Air Quality Plug and Play Package for Ceilometer   CLAQPACKAGE
with laptop and pre-installed functionality of
CL- and BL-VIEW

(* Please specify power and optional accessories when ordering.

Dimensions

Dimensions in mm

CL51 Ceilometer for High-Range Cloud Height

The Vaisala Ceilometer CL51 is designed to measure high-range cirrus cloud heights without surpassing the low and middle layer clouds, or vertical visibility in harsh conditions.

The CL51 employs a pulsed diode laser LIDAR (Light Detection And Ranging) technology, where short, powerful laser pulses are sent out in a vertical or near-vertical direction. The reflection of light (backscatter) caused by clouds, precipitation or other obscuration is analyzed and used to determine the cloud base height.

Measurement from the ground level

The enhanced single lens technology applied in the CL51 ensures excellent performance starting at a height of virtually zero. The signal is strong and stable over the whole measurement range.

The CL51 is able to detect three cloud layers simultaneously. If the cloud base is obscured due to precipitation or ground-based fog, the CL51 reports Vertical Visibility. The CL51 is able to provide the backscatter profile over the full measurement range. This information provides a possibility for an advanced boundary layer and atmospheric analysis.

Designed for harsh weather

The CL51 has a shield with a blower and heater, which allows steady operation in precipitation and under extreme temperatures. Reliable solar protection is ensured by optical filters. A tiltable shield further protects the instrument

from precipitation and specular reflection from ice crystals. The tilt angle measurement and correction is automatic.

Self-diagnostics

In addition to cloud height data, the fully automatic CL51 outputs messages with information on the instrument status. The information is based on comprehensive self-diagnostic routines. In case of a malfunction the diagnostics help the user to identify the failed module.

Maintenance

Periodic maintenance of the CL51 is normally limited to window cleaning. There is no need for adjustments in the field. The automatic window blower with heater improves performance by keeping the window clean and dry. In cold conditions heating prevents frost generation on the window. Any malfunction is automatically reported in the data and status messages.

CL51

Features/Benefits

- Cloud reporting range up to 13 km (43,000 feet)
- Second-generation, advanced single-lens optics with excellent performance also at low altitudes
- Modular design for easy installation and maintenance
- Reliable operation in all weather: unsurpassed performance in precipitation
- Detection of Cirrus clouds

- Backscatter profiling over full range up to 15 km
- Field-proven, fully automatic 24/7 operation in all weather conditions
- Extensive self-diagnostics with fault analysis
- Based on robust and affordable laser diode technology
- Latest technology from the world leading manufacturer - installed base over 5,000 Ceilometers worldwide

Technical Data

Performance

Cloud reporting range	0 ... 13 km (0 ... 43,000 ft.)
Backscatter profiling range	0 ... 15 km (0 ... 49,200 ft.)
Reporting cycle	programmable 6 ... 120 s, or polling
Reporting resolution	10 m /33ft, units selectable
Distance measurement accuracy against a hard target	greater of ±1% or ±5 m
Laser	InGaAs diode, 910 nm
Eye safety	Class 1M IEC/EN 60825-1

Electrical

Power (*	100/115/230 VAC
	±10 %, 50 ... 60 Hz
	max. 310 W incl. heating
Interfaces	
Data	RS232/RS485/Modem /LAN
Maintenance	RS232
Bits per second	
RS232/RS485	300 ... 115,200
Modem V.21, V.22,	300 ... 1200
Backup battery	Internal, 2Ah

Data Messages

Cloud hits (up to 3 layers) and status information
Cloud hits, status and backscatter profile
Emulation of CL31 and LD-40
Sky Condition (optional)

Mechanical

Dimensions	
Total	1531 x 364 x 354 mm
Measurement unit	834 x 266 x 264 mm
Weight	
Total	46 kg
Measurement unit	18.6 kg
Tilt positions	Vertical or 12° tilted

Automatic window blower/heater
Radiation shield and pedestal
Service access through a door
Optical filters for protection against direct sunlight

Environmental

|	
Temperature range	-55 ... +60 °C (-67 ... +140 °F)
Humidity	0 ... 100 %RH
Wind	55 m/s
Housing classification	IP65
Vibration	Lloyds Register/IEC 60068-2-6
EMC	IEC/EN 61326
Electrical safety	IEC/EN 60950

Accessories and Options (*

Cable termination box Termbox-1200 with extra transient protection
PC maintenance cable QMZ101
Shock absorbing mounting pad CT35022 for ship installations
Modem DXL421
Attachment mechanics for radio modem antenna CL51RADIOKIT
Graphical User Interface for Ceilometers CL-VIEW
Boundary Layer View Software for Ceilometers BL-VIEW
Bird deterrent device CL51BIRDKIT
Air Quality Plug and Play Package for   CLAQPACKAGE
Ceilometer with laptop and pre-installed
functionality of CL- and BL-VIEW

(* Please specify power and optional accessories when ordering.
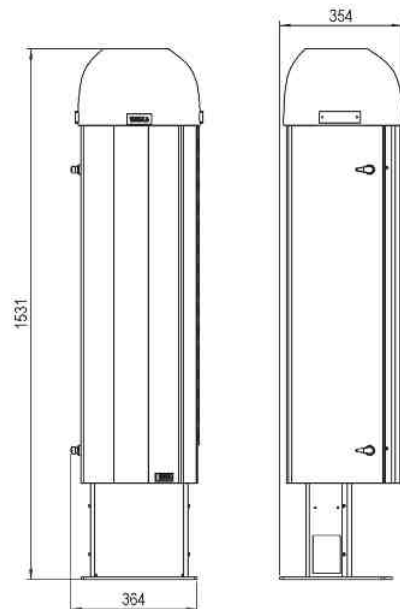
Vaisala Sigmet Digital Receiver and Signal Processor RVP900
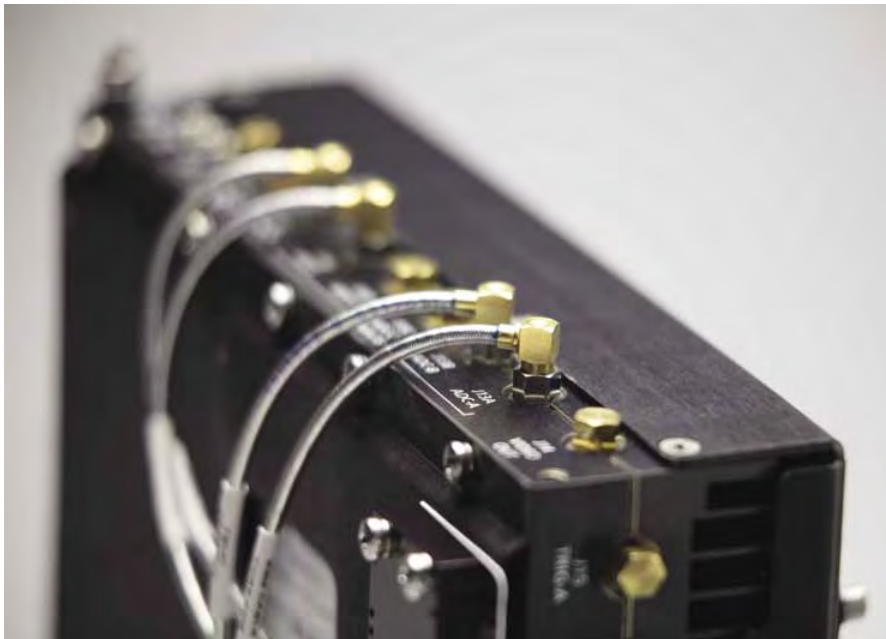
Vaisala Sigmet Digital Receiver and Signal Processor RVP900™

Benefits

- The RVP900™ provides comprehensive digital IF and signal processing functions on an open Linux PC platform
- 100 MHz, 16-bit IF sampling improving sensitivity and dynamic range in 5 independent channels
- 38.4 Billion multiply accumulates cycles per second which is a x5 increase over the RVP8™
- Ethernet interface allowing the RVP900™ to be PC independent. The next generation hardware is the next faster PC chip.
- Independent and parallel FIR filtering allowing dual pulse width and dual frequency strategies on each receive channel
- Dual Polarization, Wide Dynamic Range, and Pulse Compression ready.

Experience and Innovation

The people who brought you the "Gold Standard" in Weather Radar Signal Processing now bring you the RVP900™. The highly successful RVP8™ with over 400 units delivered, has been improved.

It's All in One Box

The RVP900™ consolidates all of the RVP8™ hardware and functions into a single package. The IF Digital Receiver (IFDR) provides I/Q samples directly to a PC Linux server over a CAT5 E Ethernet link. No longer are users limited to computer servers with multiple PCI slots. This reduces the cost and increases the server options available for use with the RVP900™.

Also, by eliminating four components, the RVP900™ improves reliability of the system and reducing the cost of spares and maintenance. It does all this in approximately the same mechanical footprint of the RVP8™ IFD. In addition, the RVP900™ has substantially improved capabilities for dynamic range, sensitivity, and sampling rate.

Performance – Our Fastest Processor Ever

The RVP900™ can perform 38.4 billion multiply-accumulate cycles per second and the flexibility in choosing computer servers allows us to select the fastest processors and motherboards on the market. The overall computational power is 5X faster than the RVP8™.

This allows the use of multiple, advanced processing algorithms simultaneously which improves your data.

28 Years of Quality Products and Support

You can integrate the RVP900™ into your own software or you may choose to purchase the IRIS software for Linux workstations. For a radar upgrade or a new installation, when you specify the RVP900™, you can be assured that you have specified the new industry standard.

Technical Data

IF Digital Receiver

FIVE IF INPUTS

IF Range	5-120 MHz
Saturation Level	+8.0 dBm @ 50Ω
Dynamic Range (dependant on matched filter)	90 to >105 dB
Optional single and dual polarization	
wide dynamic range	>120 dB
A/D Resolution	16 bits
Sampling Rate	50 - 100 MHz
Master Clock jitter	<1.0 picosec
Multiply/accumulate cycles per second (5X greater than RVP8/IFD)	38.4 billion Hz
Pulse Repetition Frequency	50 Hz to 20 KHz
Impulse Response	3024 FIR taps
	(Up to 80 microseconds)
Minimum Range Resolution	15 meters
	(accuracy of ±1.5 m)
Maximum Range	1024 km
Maximum number of range bins	4200

PHASE STABILITY

Klystron:	Better than 0.1 degrees
Magnetron (for 1.0 microsecond pulse):	Better than 0.5 degrees

IF WAVEFORM GENERATOR

Two 16-bit TxDAC outputs	5-65 MHz
	>65 dB SNR
	+13dBm @ 50Ω
TxDDS output	5-105 MHz
	>65 dB SNR
	+13dBm @ 50Ω

MISCELLANEOUS I/O

RS-422	20 Differential Line Pairs
TTL/CMOS Lines	20 open-ended lines
Analog input	6 differential pairs ±10V

Signal Processor

Processing Modes	PPP, FFT/DFT, Random Phase 2nd trip filtering/recovery
Data Outputs (8 and 16 bit)	Zh, Zv, Zhv, V, W, SQI, ZDR, LDR, RHOHV, PHIDP, and KDP
Optional Data Outputs	HCLASS, I/Q
Dual Polarization	Alternating, Simultaneous, H-Only, V-Only
High Sensitivity Rhv STAR mode Processing	>3dB improvement in detectability
Azimuth Averaging	2 to 1024 Pulses
Dual PRF Velocity De-aliasing	2:3, 3:4, or 4:5 for 2X, 3X, or 4X de-aliasing
Clutter Filters	IIR, Fixed and Adaptive Width GMAP >55 dB rejection

Physical and Environmental

INPUT POWER

Digital Receiver:	85-264 VAC 50/60 Hz or 12-36 VDC
Signal Processor:	100 - 240V, 50 - 60Hz

ENVIRONMENTAL

Digital Receiver: (non-condensing) R.H.	-40 ˚C - 50 ˚C operating, 0 - 95%
Signal Processor: (non-condensing) R.H.	10 ˚C - 35 ˚C operating, 8 - 90%

RELIABILITY

Digital Receiver:	>50,000 Hours MTBF (at 25 ˚C), < 1 hour MTTR

Метеорологический радар WRM100

Превосходные характеристики и надежность

WRM100 - это магнетронный доплеровский метеорологический радар с одинарной поляризацией (С-диапазон) фирмы Vaisala. Данный тип метеорологического радара является наиболее широко используемым благодаря относительно низкой стоимости. Рабочие характеристики магнетронных систем, использующих современную технику приема и

Характеристики

- Магнетронный передатчик мощностью 250 кВт с твердотельным модулятором, с минимальным техобслуживанием

- Легковесная V-образная стойка Vaisala

- Антенна с 1-градусным нижним лепестком ширины диаграммы направленности

- Шкаф модульной конструкции для передатчика, приемника, контроллера, процессора и дегидратора

- На базе программного обеспечения Sigmet RVP900, RCP8 и IRIS

- Цифровой приемник ПЧ широкого динамического диапазона

- Встроенная автоматическая калибровка

- Полностью программируемое сканирование

- Встроенные средства комплексной диагностики (BITE)

- Встроенный плоскоэкранный дисплей для местного обслуживания

- Дистанционное управление/контроль

- Подавление радиопомех по зеркальному каналу >80 дБ (>100 дБ с фильтрами Vaisala WG).

- Динамический диапазон >99 дБ (импульс 2 мкс). Опционный широкий динамический диапазон >115 дБ

обработки данных, успешно конкурируют с более дорогими клистронными системами.

Модульная конструкция системы включает в себя высокоэффективную антенну со стойкой и общий шкаф, в котором расположены передатчик, приемник, блоки питания, дегидратор и процессор. Компоненты системы были разработаны и опробованы с прицелом на длительный срок службы и малую потребность в техобслуживании. Преимуществами радара являются высокое качество данных и готовность к работе в критических условиях окружающей среды.

WRM100 базируется на передовой серии продукции обработки сигналов и данных Sigmet. Процессоры Sigmet представляют собой мировой стандарт, используемый в радиолокационных сетях, например, в американской сети US NEXRAD, канадской Environment Canada, испанской Spanish INM, а также в различных международных аэропортах для обнаружения сдвига ветра оборудованием TDWR (доплеровским радаром наблюдения за погодой в аэропортах). Органичный интерфейс с ПО Sigmet IRIS обеспечивает комплекс характеристик формирования, отображения и прогнозирования параметров радиолокационного контроля. Возможна также интеграция с другими системами фирмы Vaisala, например, с сетями обнаружения молний, осадкомерами, системами предупреждения о сдвиге ветра на малых высотах (LLWAS) и системами приземной погоды.

Разработка для дистанционного использования

Для большинства заказчиков существенное значение имеет возможность эксплуатации и управления радаром в дистанционном режиме. Комплексные характеристики дистанционного управления, встроенных средств диагностики (BITE) и активного мониторинга радара WRM100 позволяют координировать работу и обслуживание радара с централизованного поста.

Детальный уровень сообщений о неисправностях дает обслуживающему персоналу возможность точной оценки проблемы до выезда на место расположения радара.

Защита инвестиции на будущее

Срок службы современной метеорадиолокационной системы может превышать 15 лет, в течение которых технический прогресс не стоит на месте. Модульный подход фирмы Vaisala и использование принятых стандартов открытых интерфейсов позволяют производить текущую модернизацию радаров WRM100. Например, система может приобретаться с готовностью к двойной поляризации или обновляться на местах до двойной поляризации. Sigmet имеет тридцатилетний опыт проведения совместимой модернизации систем обработки данных и сигналов метеорологических радаров.

Метеорологический радар - это как правило самая крупная единичная инвестиция метеослужбы. В некоторых случаях для полной реализации современной сети метеорологических радаров может потребоваться несколько лет. Фирма Vaisala имеет более 70 лет опыта по поставкам оборудования, а также по долгосрочной поддержке и обслуживанию клиентуры.

Технические данные

Передатчик

Тип	Коаксиальный магнетрон
Рабочий диапазон частот	5.5-5.7 ГГц
Пиковая мощность	250 кВт
Средняя мощность	до 300 Вт
Рабочий цикл	0.12 %
Ширина импульсов	0.5, 0.8, 1.0, 2.0
Частота повторения импульсов	200 - 2400 Гц
Модулятор	Твердотельный
Стабильность фазы	<0.5 град. среднеквадр.

Антенна

Тип	Параболический отражатель с центральным питанием
Диаметр	4.5 м
Усиление (типовое)	45 дБ
Ширина диаграммы направленности	<1 град.
Пиковая величина бокового лепестка (типичн.)	-28 дБ
Пиковая величина по гориз.оси (типичн.)	-33 дБ
Поляризация	Линейная горизонтальная
Масса	620 кг

Стойка

Тип	V-образная, возвышение относительно азимута
Диапазон угла возвышения	-2 ... 108 градусов
Макс. скорость сканирования	40 град. /сек.
Ускорение	20 град. /сек.^{2}
Точность позиционирования	0.1 град.
Масса	900 кг. (всего с антенной 1520 кг)
Двигатели	Бесщеточные серводвигатели пер.тока

Приемник-преобразователь из РЧ в ПЧ

Тип	Двухступенчатый, двухканальный понижающий преобразователь ПЧ
Динамический диапазон	>99 дБ (импульс 2 мкс)
Опционный расширенный динамический диапазон	>115 дБ
Промежуточная частота	442/60 МГц
Подавление радиопомех по зеркальному каналу	>80 дБ (100 дБ с фильтрами Vaisala WG).
Диапазон настройки	5.5 - 5.7 ГГц
Коэффициент шума	< 2 дБ

Цифровой приемник и сигнальный процессор RVP900

Тип	VAISALA SIGMET RVP900
Оцифровка ПЧ	16 бит, 100 МГц на 5 каналах
Разрешение по дальности	N*15 м
Число элементов разрешения по дальности	до 4050
Исправление искажений скорости	Двойн. частота повторения импульсов(PRF) 2x, 3x, 4x
Исправление искажений дальности	методом случайной фазы
Фильтры помех	фиксированные, адаптивные или GMAP для подавления помех до >55 дБ

Контроллер радара

Тип	VAISALA SIGMET RCP8 с IRIS/Radar
Режимы сканирования	PPI, RHI, объемный, секторный, ручной
Местный дисплей	В реальн.времени, ascope, встроен. диагностика (BITE), отображение результатов

Техническая спецификация системы

ФИЗИЧЕСКИЕ РАЗМЕРЫ

ШКАФ (ШИР. Х ВЫС. Х ГЛУБ.)	600 x 1800 x 1150 мм
ОХЛАЖДЕНИЕ	кондиционер
МАССА	365 кг
Общая высота	1890 мм

ОКРУЖАЮЩИЕ УСЛОВИЯ ШКАФА

Рабочие	+10 ° ... +40 °C, отн.влажн. 0 ... 95%, без конденсации
Рекомендация	+15 °... +25 °C
Хранение	-50° ... +50 °C

ОКРУЖАЮЩИЕ УСЛОВИЯ АНТЕННЫ/СТОЙКИ

Рабочие	-40 ° ... +55 °C, отн.влажность 0 ... 95%, без конденсации
Хранения	-50 ° ... +60 °C

ПИТАНИЕ НА ВХОДЕ

Напряжение	230/400 В пер.тока + 10 %, 50-60 Гц + 5 %

ПОТРЕБЛЯЕМАЯ МОЩНОСТЬ

Шкаф	2650 Вт
Антенна /стойка	1050 Вт (макс.), 200 Вт (типичн.)

ИБП

Размеры (шир. х выс. х глуб.)	305 x 817 x 702 мм
Масса	165 кг
Время работы	не менее 30 мин

Опции

Готовность к двойн. поляр.

Заводская готовн. антенны и основания к двойн. поляр

Обтекатель	Типовой 6.7 м, многослойный с пенопластовой сердцевиной, произвольная панель

Автоматическая калибровка

Мониторинг мощности, передаваемой вперед или назад

Метеорологический радар WRM200

- Магнетронный передатчик мощностью 250 кВт с твердотельным модулятором, с минимальным техобслуживанием

- Обработка режима высокой чувствительности для восстановления потери чувствительности в режиме STAR

- Облегченная V-образная стойка от Vaisala

- Антенна с 1-градусным нижним лепестком ширины диаграммы направленности

- Интегральная развязка по поперечной поляризации >35 дБ

- Точное согласование горизонтального и вертикального луча

- Шкаф модульной конструкции для передатчика, приемника, контроллера, процессора, дегидратора и поляризационно-волноводного узла

- На базе программного обеспечения Sigmet RVP900, RCP8, IRIS

- Двухканальный цифровой приемник ПЧ

- Встроенная автоматическая двухканальная калибровка

- По зеркальному каналу >80 дБ (>100 дБ с фильтрами Vaisala WG)

- Динамический диапазон >99 дБ (импульс 2 мкс)

- Встроенный плоскоэкранный дисплей для местного обслуживания

- Дистанционное управление/контроль

- HydroClass™ для распознавания целей объектов в реальном времени (град, снежная крупа, дождь, снег, мокрый снег или неметеорологические объекты)

- Точная коррекция ослабления сигнала

- Оценка количества осадков на базе KDP

- Опция: панельный обтекатель антенны с малыми потерями

Двойная поляризация привносит новое измерение

WRM200 - это Vaisala новый магнетронный доплеровский метеорологический радар С-диапазона с двойной поляризацией фирмы Vaisala. Радар работает либо в режиме STAR (одновременные передача и прием горизонтальной (H) и вертикальной (V) поляризации), либо в режиме LDR (режим линейной деполяризации, во время которого идет передача только H, и прием H и V). Режим STAR позволяет использовать высокочувствительный эстиматор мощности, что повышает возможность обнаружения на величину до 10 дБ по сравнению с конкурентами. В зависимости от режима переменными параметрами поляризации могут быть ZDR, RHOHV, PHIDP, KDP и LDR. При этом задача поляризационного радара заключается не только в формировании и отображении упомянутых выходных параметров, но прежде всего в расширении технических возможностей радара для предоставления рабочих прогнозов погоды.

Радар WRM200 предоставляет следующие преимущества:

- Гидрометеорологическая идентификация
- Коррекция ослабления сигнала
- Улучшение качества данных
- Улучшенная оценка осадков

HydroClass™ - и Вы видите больше

Программное обеспечение HydroClass™ использует поляризационные измерения для классификации распознаваемых объектов по категориям: град, снежная крупа, дождь, снег, мокрый снег или неметеорологические объекты (такие, как отражения от морской поверхности, птицы, насекомые, ветровые турбины, помехи или военные дипольные отражатели). В то время, как традиционная доплеровская фильтрация помех позволяет устранять сигналы неподвижных целей, программа HydroClass™ способна фильтровать также движущиеся неметеорологические объекты. В результате достигается лучшее качество данных и более точное

предупреждение об опасных погодных явлениях, таких как град.

Эффективность S-диапазона по цене С-диапазона

Ослабление сигнала из-за влияния интенсивных осадков долгое время составляло проблему метеорологических радаров С-диапазона, в результате которой предпочтение зачастую отдавалось радарам S-диапазона, особенно в условиях тропических ливневых дождей. Однако радары с двойной поляризацией позволяют осуществлять точную коррекцию ослабления сигналов в реальном времени. В результате использование WRM200 обеспечивает такую же точность измерения осадков, что и система S-диапазона, которая, как правило, стоит в два или три раза дороже.

Опыт, инновативность и надежность

Линия продукции Sigmet фирмы Vaisala имеет тридцатилетний опыт поставки систем обработки сигналов и данных для приложений с двойной поляризацией и предлагает большее число систем обработки данных с двойной поляризацией, чем любой другой производитель. Vaisala и Sigmet, как часть компании Vaisala, продолжают разработку приложений с двойной поляризацией в сотрудничестве с уважаемыми в мировом научно-исследовательском сообществе консультантами.

Технические данные

Производительность системы

Режимы	STAR или LDR
Стабильность фазы	<0,5 град. (среднеквадрат.)
Макс. RhoHV	>0,99

Передатчик

Тип	Коаксиальный магнетрон
Рабочий диапазон частот	5.5-5.7 ГГц
Пиковая мощность	250 кВт
Средняя мощность	макс. 300 Вт
Рабочий цикл	0.12 %
Ширина импульсов	0.5, 0.8, 1.0, 2.0 мкс
Частота повторения импульсов	200 - 2400 Гц
Модулятор	Твердотельный

Антенна

Тип	Параболический отражатель с центральным питанием
Диаметр	4.5 м
Усиление (типовое)	45 дБ
Ширина диаграммы направленности	<1 градус
Пиковая величина бокового лепестка (типичн.)	-28 дБ
Пиковая величина по гориз.оси (типичн.)	-33 дБ
Интегральная кросс-поляризация	<-35 дБ
Ориентация H/V (угол отклонения от оси)	<0.1 град
Масса	620 кг

Стойка

Тип	V-образная, возвышение относительно азимута
Диапазон возвышения	-2 ... 108 град
Макс. скорость сканирования	40 град. /сек.
Ускорение	20 град. /сек.[2]
Точность позиционирования	< 0.1 град.
Масса	910 кг. (всего с антенной 1530 кг.)
Двигатели	Бесщеточные серводвигатели пер.тока

Приемник-преобразователь из РЧ в ПЧ

Тип	Двухступенчатый, двухканальный понижающий преобразователь ПЧ
Динамический диапазон	>99 дБ (импульс 2 мкс) > опцион 115 дБ
Промежуточная частота	442/60 МГц
Подавление радиопомех по зеркальному каналу	>80 дБ (>100 дБ с фильтрами Vaisala WG)
Диапазон настройки	5.5 - 5.7 ГГц
Коэффициент шума	< 2 дБ

Цифровой приемник и сигнальный процессор RVP900

Тип сигнального процессора	VAISALA SIGMET RVP900
Оцировка ПЧ	16 бит, 100 МГц в 5 каналах
Разрешение по дальности	N*15 м
Число элементов разрешения по дальности	до 4200

Исправление искажений скорости	Двойн. частота повторения импульсов(PRF) 2x, 3x, 4x
Исправление искажений дальности	методом случайной фазы
Фильтры помех	фиксированные, адаптивные или GMAP для подавления помех до >55 дБ
Высокочувствительная обработка режима STAR:	усиление обнаружения >3 дБ

Контроллер радара

Тип	VAISALA SIGMET RCP8 с IRIS/Radar
Режимы сканирования	PPI, RHI, объемный, секторный, ручной
Местный дисплей	В реальн.времени, ascope, встроен. диагностика (BITE), отображение результатов

Технические спецификации системы

ФИЗИЧЕСКИЕ РАЗМЕРЫ

ШКАФ (ШИР. X ВЫС. X ГЛ.)	600 x 1800 x 1150 мм
ОХЛАЖДЕНИЕ	кондиционер
МАССА:	380 кг
Общая высота	1890 мм

ОКРУЖАЮЩИЕ УСЛОВИЯ ШКАФА

Рабочие	+10 ° ... +40 °C, отн.влажн. 0 ... 95%, без конденсации
Рекомендация	+15 °... +25 °C
Хранение	-50° ... +50 °C

ОКРУЖАЮЩИЕ УСЛОВИЯ АНТЕННЫ/СТОЙКИ

Рабочие	-40 ° ... +55 °C, отн.влажность 0 ... 95%, без конденсации
Хранения	-50 ° ... +60 °C

ПИТАНИЕ НА ВХОДЕ

Напряжение	230/400 В пер.тока + 10 %, 50-60 Гц + 5 %

ПОТРЕБЛЯЕМАЯ МОЩНОСТЬ

Шкаф	2650 Вт
Антенна /стойка	1050 Вт (макс.), 200 Вт (типичн.)

ИБП

Размеры (шир. x выс. x глуб.)	305 x 817 x 702 мм
Масса	165 кг
Время работы	не менее 30 мин

Опции

Обтекатель	Типовой 6.7 м, многослойный с пенопластовой сердцевиной, произвольная панель
Автоматическая калибровка	
Мониторинг мощности, передаваемой вперед или назад	

Vaisala Weather Radar WRK100

High-Performance and Reliability

The WRK100 is Vaisala's single polarization C-band klystron Doppler Weather Radar. The modular system design consists of a high-performance antenna and pedestal and a double cabinet that contains the transmitter, receiver, power supplies, dehydrator and processor. The various components have been engineered and tested for long-life and low-maintenance in even the harshest environments. The benefit is high-data quality and availability for critical weather service operation.

Like all Vaisala Weather Radars, the WRK100 incorporates the advanced Vaisala Sigmet family of signal and data processing products. Vaisala Sigmet processors are the world standard, used in radar networks such as the US NEXRAD, Environment Canada, Spanish INM and at various international airports for TDWR wind shear detection applications. Vaisala Sigmet software provides comprehensive radar product generation, display and forecasting features. Integration to other Vaisala systems such as lightning detection networks, rain gauge, LLWAS and surface weather is available.

Engineered for Remote Operation

For most customers, unattended remote operation is essential. The WRK100's comprehensive remote control, BITE and active monitoring features allow radar maintenance to be coordinated from a central facility. The detailed level of fault reporting allows maintenance personnel to accurately assess any problem before traveling to the radar site. The benefit is reduced MTTR and higher data availability.

Investment Protection for the Future

The service life of a modern weather radar system can be over 15 years, during which time there will be major technology advances. Vaisala's modular approach and use of accepted open interface standards is designed to make the WRK100 upgradeable in the future. For example, the system can be purchased as dual-pol ready, or upgraded in the field to dual polarization.

Technical Data

Transmitter

Type	Klystron VKC8387
Operating frequency range	5.6 - 5.65 GHz
Peak power	250 kW
Average power	max 550 W
Duty cycle	0.0022
Pulse widths	Typical 0.5, 1.0, 2.0, max 5.0 µs
PRF	250 to 2125 Hz
Modulator	Solid State
Phase stability	≤0.1 deg rms

Antenna

Type	Center-fed parabolic reflector
Diameter	4.5 m
Gain (typical)	45 dB
Beam width	<1 degree
Peak side lobe (typical)	-28 dB
Peak on horizontal axis (typical)	-33 dB
Polarization	Linear horizontal
Weight	620 kg

Pedestal

Type	Semi yoke elevation over azimuth
Elevation range	-2 to 108 degrees
Maximum scan rate	40 deg/sec
Acceleration	20 deg/sec^2
Position accuracy	0.1 deg
Weight	900 kg (total with antenna 1520 kg)
Motors	Brushless AC servo

RF-to-IF Receiver

Type	Dual stage IF downconverter
Dynamic range	>99 dB (2 µs pulse)
Optional wide dynamic range	>115 dB
IF frequency	442/60 MHz
Image rejection	>80 dB (>100dB with Vaisala WG filters)
Phase stability	0.1 deg rms
Tuning range	5.5 - 5.7 GHz
Noise figure	< 2 dB

Radar Controller

Type	Vaisala SIGMET RCP8 with IRIS/Radar
Scan modes	PPI, RHI, Volume, Sector, Manual
Local display	Real time, ascope, BITE, products

Digital IF Receiver and Signal Processor RVP900

Type	Vaisala Sigmet RVP900
IF digitizing	16 bits, 100 MHz in 5 channels
Range resolution	N*15 m
Number of range bins	Up to 4050
Velocity dealiasing	Dual PRF 2x, 3x, 4x
Range dealiasing	by phase coding
Clutter filters	fixed, adaptive or GMAP to >55 dB clutter cancellation

System Specifications

PHYSICAL DIMENSIONS

Cabinet (w x h x d)	1400 x 1800 x 1300 mm
Cooling	Air-conditioned and forced air
Weight	977 kg
Total height	1890 mm

CABINET ENVIRONMENT

Operating	+5 °C to +40 °C, 0 to 95 %RH, non-condensing
Recommended	+15 °C to +25 °C
Storage	-50 °C to +50 °C without oil
	-10 °C to +50 °C with oil

ANTENNA/PEDESTAL ENVIRONMENT

Operating	-40 °C to +55 °C, 0 to 95 %RH, non-condensing
Storage	-50 °C to +50 °C

INPUT POWER

Voltage	230/400 VAC +10 %, 50-60 Hz ±5 %

POWER CONSUMPTION

Cabinet	max. 8720 W with UPS
	max. 7850 W without UPS
Antenna/pedestal	1050 W (max.), 200 W (typical)

Options

Dual pol ready	Factory prepared antenna and pedestal for dual pol
Radome	6.7 m, foam core sandwich, random panel
Automatic calibration	
Forward and reverse transmitted power monitoring	

Vaisala Weather Radar WRK200

Dual Polarization Adds New Dimension

The Vaisala Weather Radar WRK200 is a dual polarization C-band Klystron Doppler Weather Radar. The radar operates in either Simultaneous Transmit and Receive of H and V (STAR) mode or Linear Depolarization Mode (LDR) mode , during which H alone is transmitted and both are received. STAR mode enables use of the high sensitivity power estimator increasing detectability by up to 10 dB versus the competition. The polarization variables, depending on the mode, are ZDR, RHOHV, PHIDP, KDP and LDR. However, the goal of polarization radar is not only to produce and display these outputs; it is also to expand the capabilities of the radar for the operational forecaster.

The WRK200 provides the following benefits:

- Hydrometeor identification
- Attenuation correction
- Data quality improvement
- Improved rainfall estimates, based on KDP

S-Band Performance at a C-Band Price

Attenuation by intervening heavy precipitation has been a long-standing problem with C-band weather radars, making S-band radars preferable, especially in tropical environments where heavy rain is common. However, with dual polarization, the radar performs accurate, real-time attenuation corrections. The benefit is that you can obtain the same precipitation measurement accuracy using the WRK200 as with an S-band system that costs typically two or three times more.

More Accurate Precipitation Measurement

Eliminating non-meteorological targets and correcting attenuation can substantially improve precipitation measurement. However, the WRK200

Features/Benefits

- Vaisala's light-weight, semi-yoke-style pedestal
- 1 degree beamwidth low side lobe antenna
- High sensitivity mode processing to recover sensitivity loss in STAR mode
- >35 dB integrated cross-polarization isolation
- Image rejection >80 dB (>100dB with Vaisala WG filters).
- Dynamic range > 99 dB (2µs pulse)
- Feed forward control loop to allow extremely fast and precise antenna movement
- Dual channel digital IF receiver
- Precision horizontal and vertical beam matching
- Built around Vaisala Sigmet RVP900 signal processor
- Integral flat screen display for local maintenance
- Remote control/monitoring
- Rainfall estimation based on KDP
- Accurate attenuation correction
- 250 kW klystron transmitter with low-maintenance solid-state modulator
- Option: Built-in dual channel receiver calibration

goes further by providing KDP-based measurement of the precipitation rate. Unlike the reflectivity (Z), KDP is directly proportional to the precipitation rate, independent of the radar calibration and unbiased by intervening clutter or partial beam blockage. This makes the KDP very robust in measuring moderate and heavy rain.

Technical Data

System Performance

Modes	STAR or LDR
Phase stability	<0.1 deg rms
Maximum RhoHV	>0.99

Transmitter

Type	Klystron VKC8387
Operating frequency range	5.6 - 5.65 GHz
Peak power	250 kW
Average power	max 550 W
Duty cycle	0.0022
Pulse widths	Typical 0.5, 1.0, 2.0, max 5.0 µs
PRF	250 to 2125 Hz
Modulator	Solid state

Antenna

Type	Center-fed parabolic reflector
Diameter	4.5 m
Gain (typical)	45 dB
Beam width	<1 degree
Peak side lobe (typical)	-28 dB
Peak on horizontal axis (typical)	-33 dB
Integrated cross-pol isolation	≤ -35 dB
H/V alignment (squint angle)	<0.1 degrees
Weight	620 kg

Pedestal

Type	Semi yoke elevation over azimuth
Elevation range	-2 to 108 degrees
Maximum scan rate	40 deg/sec
Acceleration	20 deg/sec^2
Position accuracy	0.1 deg
Weight	910 kg (total with antenna 1530 kg)
Motors	Brushless AC servo

RF-to-IF Receiver

Type	Dual stage, dual channel IF downconverter
Dynamic range	> 99 dB (2 µs pulse) >115 dB option
IF frequency	442/60 MHz
Image rejection	>80 dB (>100dB with Vaisala WG filters)
Phase stability	0.1 deg rms
Tuning range	5.5 - 5.7 GHz
Noise figure	< 2 dB

Radar Controller

Type	Vaisala Sigmet RCP8 with IRIS/Radar
Scan modes	PPI, RHI, Volume, Sector, Manual
Local display	Real time, ascope, BITE, products

Digital IF Receiver and Signal Processor RVP900

Type	Vaisala Sigmet RVP900
IF digitizing	16 bits, 100 MHz in 5 channels
Range resolution	N*15 m
Number of range bins	Up to 4200
Velocity dealiasing	Dual PRF 2x, 3x, 4x
Range dealiasing	by phase coding
Clutter filters	fixed, adaptive or GMAP to >55 dB clutter cancellation
High sensitivity STAR mode processing:	>3 dB detection gain

System Specifications

PHYSICAL DIMENSIONS

Cabinet (w x h x d)	1400 x 1800 x 1300 mm
Cooling:	Air-conditioned and forced air
Weight	992 kg
Total height	1890 mm

CABINET ENVIRONMENT

Operating	+5 °C to +40 °C, 0 to 95 %RH, non condensing
Recommended	+15 °C to +25 °C
Storage	-50 °C to +50 °C without oil
	-10 ° to +50 °C with oil

ANTENNA/PEDESTAL ENVIRONMENT

Operating	-40 °C to +55 °C, 0 to 95 %RH, non condensing
Storage	-50 °C to +60 °C

INPUT POWER

Voltage	230/400 VAC ±10 %, 50 - 60 Hz ± 5 %

POWER CONSUMPTION

Cabinet	8720W max. with UPS
	7850W max. without UPS
Antenna/pedestal	1050 W (max), 200 W (typical)

Options

Radome	6.7 m, foam core sandwich, random panel
Automatic calibration	
Forward and reverse transmitted power monitoring	

Дистанционный датчик состояния поверхности дороги DSC111 фирмы Vaisala

Характеристики и преимущества

- Дистанционный контроль состояния дорожной поверхности
- Спектроскопический принцип измерения, определяющий наличие
  • Воды • Льда
  • Слякоти • Снега или инея
- Уникальное измерение сцепления с дорожной поверхностью
- Экономичные измерения видимости
- Точные измерения даже в условиях интенсивного движения
- Безопасная для глаз лазерная технология
- Простота монтажа и обслуживания
- Низкие затраты на техобслуживание
- Надежная конструкция, стойкая к атмосферным воздействиям
- Простота встраивания в дорожную метеостанцию Vaisala ROSA; может также использоваться автономно с опциональными устройствами солнечной батареи/ /gsm

Уникальный датчик DSC111 исключает эксплуатационные сбои, которые ранее имели место в связи с установкой дорожных метеостанций.

Благодаря удаленной установке отсутствует необходимость вскрытия дорожной поверхности или перекрывания движения. Датчик может устанавливаться на стойке, рядом с дорогой, или в качестве дополнительного устройства дорожной метеостанции Vaisala ROSA.

Спектроскопический принцип измерения позволяет производить точные количественные измерения воды, льда и снега. Вода и лед измеряются независимо друг от друга, что позволяет датчику DSC111 выдавать точные отчеты о состоянии дорожной поверхности.

Датчик DSC111 обеспечивает точное определение наличия кристаллов льда, заблаговременно до того, как дорога станет скользкой для движения. При этом специалисты дорожных служб имеют в зимнее

время возможность отслеживать все погодные составляющие, приводящие к возникновению опасной для движения дорожной поверхности, для принятия соответствующих мер. Дополнительная возможность датчика DSC111 по измерению видимости предоставляет компактное, эффективное и исключительно экономичное решение по измерению метеорологической дальности видимости. Это расширяет возможности прибора DSC111 по обнаружению условий плохой видимости без использования внешних технических средств.

Дополнительные датчики можно подключать непосредственно к DSC111 для формирования универсальной автономной метеостанции. Производятся следующие измерения:
- температуры поверхности и воздуха
- поверхностной и глубинной температуры
- относительной влажности
- текущей погоды
- видимости
- скорости и направления ветра
- атмосферного давления

Датчик DSC111 подтвердил свои возможности в течение двух лет интенсивных полевых испытаний в сотрудничестве с клиентурой фирмы Vaisala. В настоящее время прибор DSC111 работает на сотнях объектов по всему миру.

Технические данные

Электрическая часть

Питание	9 ... 30 В пост.тока
Потребляемая мощность при работе	1.2 Вт при -10°C
	Макс. 1.9 Вт при температурах ниже -10°C
Потреблямая мощность обогрева линз	0 ... 4 Вт, настраиваемая пользователем
Интерфейсы	RS-485 изолир., RS-232
Разъемы	3 x M12 (5 штырьков)
1:	RS-485 и питание, вилочный
2:	RS-232, вилочный
3:	RS-485 и питание, гнездовой
	Разъем для подключения DST111
Кабели	3 ... 150 м
	Один конец без разъема
	Кабель 0,6 м для подключения DST111

Окружающие условия

Поддерживаемые датчики	DST111, PWD10/12/20/22, WXT520, WMT50, аналоговые датчики посредством DRA411
Рабочая температура	-40 ... +60 °C
Рабочая отн.влажность	0 ... 100 %
CE соответствие	IEC(EN) 61326-1, использование на промышленных объектах
Безопасный	для глаз лазер класса 1
Вибрация	IEC 60068-2-6, уровень 2 G

Установка

Расстояние измерения при отключенном измерении видимости	2 ... 15 м
Расстояние измерения при включенном измерении видимости	8 ... 15 м
Зона измерения диам.	20 см на расст. 10 м
Угол установки над горизонтальной осью	30 ... 85°
Может устанавливаться на стандартном кронштейне датчика DM32ARM	
с поперечным сечением 40 мм х 40 мм	

Диапазон измерения

Толщина слоя	0.1 ¡C
Воды	0.00 ... 2 мм
Льда	0.00 ... 2 мм
Снега	0.00 ... 10 мм
Разрешение	0.01 мм
Коэффициент сцепления	0.01 ... 1.00
Разрешение	0.01 ед.
Состояния поверхности	сухая, влажная, мокрая, снег/иней, лед, слякоть
Видимость (дополнительная характеристика)	
Диапазон измерения видимости	10 ... 2000 м
Разрешение	1 м
Точность (туман и снегопад)	±20 % (средн.)
Быстродействие	60 с

Механические свойства

Габариты (мм)	448 x 210 x 133
Масса	3.7 кг

На снимке представлен дистанционный датчик состояния поверхности дороги DSC111 с дистанционным датчиком температуры поверхности дороги DST111

Vaisala DL1000-1400 Temperature

The 1000/1400 temperature data loggers include the VL-series for regulated environments and the SP-series for non FDA/GxP regulated industries. The VL-series of data loggers, together with vLog VL software, provide a superior, high accuracy solution for use in FDA/GxP regulated environments by ensuring tamperproof files and electronic records that meet 21 CFR Part 11 requirements. The SP-series provides a compact, easily deployable, highly accurate measurement and recording device. Coupled with vLog SP software for downloading, displaying, analyzing and reporting of recorded environmental data, the SP-series was designed for use in non FDA/GxP regulated environments. Optional browser-based viewLinc software provides 24/7 multi-stage alarm notification and remote monitoring for both the VL and SP series of data loggers.

Features/Benefits

- Industry-leading precision and accuracy
- Printed reports for any time period
- 10-year battery
- Validation and continuous monitoring with the same model
- Two year limited warranty
- Superior alternative to chart recorders and hard-wired systems
- Traceable to SI units through national metrology institutes.*
- Timebase calibrated over the operating temperature range
- Adjustable time based recording
- Snap-in logger cradle for easy network connectivity
- Two probe options give high accuracy – from -90 °C to +70 °C

* Measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or ISO/IEC 17025 accredited calibration laboratories.

Applications

Ideal for Monitoring & Validation of:

- Refrigerators & Freezers (to -90 °C)
- Incubators
- Stability Chambers
- Warehouses
- Ambient conditions

Technical Data

General

Size	85 x 59 x 26 mm (3.4 x 2.3 x 1") 76 g (2.7oz)
Interfaces	RS-232 serial, USB, Ethernet, WiFi, PoE network interface available
Mounting	3M Dual Lock™ Fasteners
	Snap-in connector locks provide secure probe connections
PC Software	Graphing & Reporting Software
	vLog SP for SP-series
	vLog VL for VL-series
	viewLinc for continuous monitoring & alarming
	OPC Server to add on to existing OPC compatible monitoring systems
Internal Clock	Accuracy ±1 min. /month -25 °C to +70 °C (-13 °F to +158 °F)
Electromagnetic Compatibility	FCC Part 15 and CE
Power Source	Internal 10-year lithium battery
	(Battery life specified with sample interval of 1 min. or longer)
Logger Operating/	-40 °C to +85 °C (-40 °F to +185 °F)
Storage Range	0 %RH to 100 %RH non-condensing

Internal Temperature Sensor

Series	Sensor Type
1000-21x	Precision-tolerance epoxy-encapsulated NTC thermistor

Memory

Data Sample Capacity	
1000-2XX	48,100 12-bit samples
1400-44X	85,300 12-bit samples
Memory Type	Non-volatile EEPROM
Memory Modes	User selectable: wrap (FIFO) or stop when memory is full. User selectable start time. User selectable stop time (VL series only).
Sampling Rates	User-selectable (in 10 second intervals) from once every 10 seconds to once a day.

Recording Span: 1000-2xx

	NUMBER OF CHANNELS ENABLED	
SAMPLE INTERVAL	1	2
10 Seconds	5.5 Days	2.7 Days
1 Minute	1.1 Months	16.7 Days
5 Minutes	5.5 Months	2.7 Months
15 Minutes	1.3 Years	8.3 Months
1 Hour	5.4 Years	2.7 Years

VL-1000-21x   *VL-1000-22x*

Recording Span: 1400-44x

	NUMBER OF CHANNELS ENABLED			
SAMPLE INTERVAL	1	2	3	4
10 Seconds	9.8 Days	4.9 Days	3.2 Days	2.4 Days
1 Minute	1.9 Months	29.6 Days	19.7 Days	14.8 Days
5 Minutes	9.8 Months	4.9 Months	3.2 Months	2.4 Months
15 Minutes	2.4 Years	1.2 Years	9.8 Months	7.4 Months
1 Hour	9.7 Years	4.8 Years	3.2 Years	2.4 Years

VL-1400-44x

Vaisala DL1700 Thermocouple Data Logger

Applications

- Ideal for extreme temperatures from -240 °C to 1760 °C
- Accepts type J, K, T, E, R and S thermocouples
- No programming or complicated equations required
- Highly accurate replacement for bulky data acquisition systems
- Traceable to SI units through national metrology institutes.*

* Measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or ISO/IEC 17025 accredited calibration laboratories.

The Vaisala DL1700 series data loggers provide highly accurate temperature data acquisition and are ideal for demanding environments. The DL1700 data loggers can be used with Vaisala software, either viewLinc or vLog, to download, display, and analyze environmental data. The viewLinc monitoring system provides 24/7 multi-stage alarm notification, remote, real-time monitoring and gap-free data. The vLog software is a simple solution for validation/mapping applications. All reports are customizable and can be exported to spreadsheets and PDF to provide records that meet the requirements of 21 CFR Part 11 and Annex 11.

Easy to use with standard thermocouples, these compact data loggers can offer up to five channels of data in temperatures ranging from -240 °C to +1760 °C.

We offer models for both validated and non-validated applications. Choose the DL1700 VL series for GxP-compliant environments and the DL1700 SP series for non-validated applications.

Technical Data

General

Size	3.4 x 2.1 x 1" (85x59x26mm); 60g (2.7 oz)
Operating Range	-40 °C to +85 °C (-40 °F to +185 °F) and
	0 %RH to 100 %RH (non-condensing)
Interfaces	RS-232 serial, USB, Ethernet,
	WiFi network interface available
Mounting	3M Dual Lock™ fasteners
Software	viewLinc for Monitoring, Alarming & Reporting
	vLogVL for Validation/Mapping GxP environments
	vLogSP for graphing & reporting non-GxP environments
	OPC Server to add Vaisala loggers to
	any OPC-compatible monitoring system
Internal Clock	Accuracy: ±1 min./month at -25°C to +70°C
Electromagnetic Compatibility	FCC Part 15 and CE
Power Source	Internal 10-year lithium battery
	(Battery life specified with sample interval
	of 1 min. or longer)

Data Logger Inputs

1700 MODEL	NUMBER OF CHANNELS ENABLED		
	Thermocouple	CJT	Total
1700-54T	4	1	5

Note: One channel is designated for Cold Junction Temperature (CJT) reference using an on-board precision-tolerance thermistor.

Thermocouple Input Channels

COMPATIBLE THERMOCOUPLE TYPES: J, K, T, E, R, S
INITIAL ACCURACY:

Input Range	Resolution	Initial Accuracy
-7.2 to +55.4 mV	0.016 mV	±0.042 mV @ +25 °C (+77 °F)

INPUT IMPEDANCE: 10M OHMS

Input Range	Resolution	1-Year Accuracy
-7.2 to +55.4 mV	0.016 mV	±0.055 mV @ +25 °C (+77 °F)

Additional error at 3 V/m RF field from
450 MHz ... 580 MHz: ±0.350 mV
And at 3 V conducted RF from 3 MHz … 80 MHz: ±1.0 mV

Temperature Accuracy

	TYPE K	TYPE J	TYPE T	TYPE E	TYPE R	TYPE S
Temperature Measurement Range	-220 °C to +1370 °C (-364 °F to +2498 °F)	-130 °C to +900 °C (-202 °F to +1652 °F)	-240 °C to +350 °C (-400 °F to +662 °F)	-110 °C to +740 °C (-166 °F to +1364 °F)	-50 °C to +1760 °C (-58 °F to +3200 °F)	-50 °C to +1700 °C (-58 °F to +3092 °F)
Instrument Temperature Accuracy at mid-range*	±1.3 °C (±2.3 °F)	±1.0 °C (±1.8 °F)	±1.2 °C (±2.2 °F)	±0.70 °C (±1.3 °F)	±4.4 °C (±7.9 °F)	±5.1 °C (±9.2 °F)
Resolution at mid-range	0.37 °C (0.67 °F)	0.29 °C (0.52 °F)	0.34 °C (0.61 °F)	0.20 °C (0.36 °F)	1.3 °C (2.3 °F)	1.5 °C (2.7 °F)

* Listed accuracies are for data logger only at 25°C (+77°F). They do not include the accuracy of the thermocouple probe or cold junction compensation or electromagnetic interference.

Cold Junction Temperature Channel

|	
Measurement Range	-40 °C to +85 °C
	(-40 °F to +185 °F)
Accuracy	±0.25 °C over +20 °C to +30 °C
	(±0.45 °F over +68 °F to +86 °F)
	±0.35 °C over -25 °C to +70 °C
	(±0.63 °F over -13 °F to +158 °F)

ACCESSORIES:

Thermocouple probe	EPT-22T-20T
Type	T
Conductors	Copper/Constantan
Operating range	-200°C to 200°C (-328°F to 392°F)
Length	6.096 meters
Error	±1°C to ±1.5%

Memory

Memory Type	Non-volatile EEPROM
Data Sample Capacity	135,165 12-bit samples
Memory Modes	User-selectable wrap (FIFO) or stop when
	memory is full. User-selectable start time.
Sampling Rates	User-selectable from once
	every 10 seconds to once a day.
	(Battery life specified with sample interval of
	1 min. or longer)
Recording Span	Recording span depends upon sample interval
	selected and number of channels enabled.

Vaisala DL1016-1416 Multi-application Temperature Data Logger
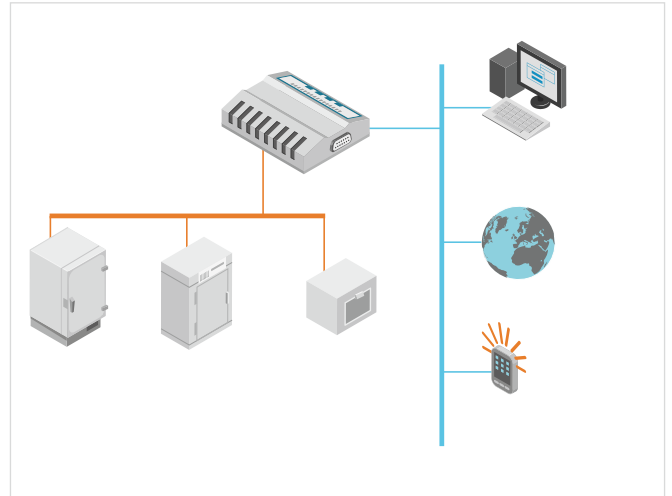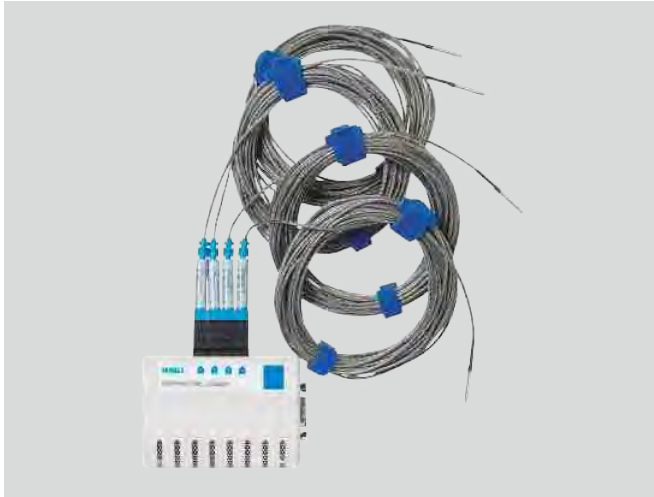
Features/Benefits

- Industry-leading precision and accuracy
- Real-time monitoring & alarming with viewLinc
- Reliable validation/mapping with vLog
- Easy connectivity to your existing network – wired or wireless
- Validation and continuous monitoring with the same data logger
- Superior alternative to chart recorders and hard-wired systems
- Traceable to SI units through national metrology institutes.*

MODEL NUMBERS & CHANNELS

- VL-1016-22V
  Two external channels for validatable applications
- VL-1416-44V
  Four external channels for validatable applications
- SP-1016-22V
  Two external channels
- SP-1416-44V
  Four external channels

Vaisala's multi-application temperature data loggers monitor temperatures in up to four applications with one logger – ultra-low temperature freezers, freezer/refrigerators and incubators.

The DL1016-1416 data loggers can be used with Vaisala software, either viewLinc or vLog, to download, display, and analyze environmental data. The viewLinc monitoring system provides 24/7 multi-stage alarm notification, remote, real-time monitoring and gap-free data.

The vLog software is a simple solution for validation/mapping applications. All reports are customizable and can be exported to spreadsheets and PDF to provide records that meet the requirements of 21 CFR Part 11 and Annex 11.

Choose the DL1016-1416 VL series data logger for GxP-compliant environments and the DL1016-1416 SP series for non-GxP applications.

Technical Data

General

Size	85 x 59 x 26 mm (3.4 x 2.3 x 1") 76 g (2.7oz)
Interfaces	RS-232 serial, USB, Ethernet, WiFi, PoE network interface available
Mounting	3M Dual Lock™ Fasteners
	Snap-in connector locks provide secure probe connections
PC Software	vLog Graphing & Reporting Software
	viewLinc for continuous monitoring & alarming
	OPC Server to add Vaisala recorders
	to any OPC-compatible monitoring system
Internal Clock	Accuracy ±1 min. /month 0 °C to +50 °C (32 °F to +122 °F)
Electromagnetic Compatibility	FCC Part 15 and CE
Power Source	Internal 10-year lithium battery
	(Battery life specified with sample interval of 1 min. or longer)

Technical Data

Temperature Range & Accuracy

Sensor	"V" Range External Probe
Calibrated	-90 °C to +50 °C
Measurement Range	(-130 °F to +122 °F)
Operating	-95 °C to +70 °C
Range	(-139 °F to +158 °F)
Initial Accuracy*	±0.25 °C over -90 °C to +50 °C
	(±0.45 °F over -130 °F to +122 °F)
One Year Accuracy*	±0.35 °C over -90 °C to +50 °C
	(±0.63 °F over -130 °F to +122 °F)
Resolution	0.01 °C at +25 °C
	(0.02 °F at +77 °F)

1016 Series

Data Sample Capacity	68,600 16 bit samples

1416 series

Data sample Capacity	101,375 16 bit samples

1016 and 1416 series

Memory type	non-volatile EEPROM
Memory Modes	User-selectable rates from once every 10 seconds to once per day. (Battery life specified with sample interval of 1 min. or longer)
Sampling Rates	User-selectable rates from once every 10 seconds to once per day. (Battery life specified with sample interval of 1 min. or longer)

Data Logger

Operating Range	0 °C to +50 °C (+32 °F to +122 °F)
	0 %RH to 100 %RH non-condensing
Storage Range	-40 °C to +85 °C (-40 °F to +185 °F)
	0 %RH to 100 %RH non-condensing

Recording Span: 1016-22V

	NUMBER OF CHANNELS ENABLED	
SAMPLE INTERVAL	1	2
1 Minute	1.5 Months	23.8 Days
5 Minutes	7.6 Months	3.8 Months
15 Minutes	1.9 Years	11.5 Months
1 Hour	7.8 Years	3.9 Years

*Specification for external channels is for a probe calibrated to the specified channel of the data logger, with the logger at 0 °C to +50 °C (+32 °F to +77 °F)

Recording Span: 1416-44V

	NUMBER OF CHANNELS ENABLED			
SAMPLE INTERVAL	1	2	3	4
1 Minute	2.3 Months	1.1 Months	23.5 Days	17.6 Days
5 Minutes	11.3 Months	5.6 Months	3.7 Months	2.8 Months
15 Minutes	2.8 Years	1.4 Years	11.3 Months	8.5 Months
1 Hour	11.5 Years	5.7 Years	3.8 Years	2.8 Years

Thermistor Probes

|	
Sensor	"V" Range External Probe
Operating Range	-95 °C to +70 °C
	(-139 °F to +158 °F)
Connector Color Code	Blue
Sensor Tip	Stainless Steel, Diameter: 3.2 mm (1/8"), Length: 38 mm (1.5")
	Sealed Teflon Tip Diameter: 3 mm (0.12"), Length: 28 mm (1.1")
Probe Length	3 m (10') and 7.6 m (25') lengths available
Cable Construction	2 mm (0.07") Diameter, Teflon coated cable

Immersion/Dry Probes

DESCRIPTION/LENGTH	PART NUMBER
Thermistor V Range probe 25'	235139SP
Thermistor V Range probe 10'	235218SP
Thermistor immersion V Range probe 25'	235140SP
Thermistor immersion V Range probe 10'	235217SP

Temperature Probe Accessories

EPT-TDB-2: Thermal Damping Block, for use in refrigerators and freezers. Simulates a glycol bottle to reduce alarms generated by opening and closing a door.

Vaisala DL4000 Universal Data Logger
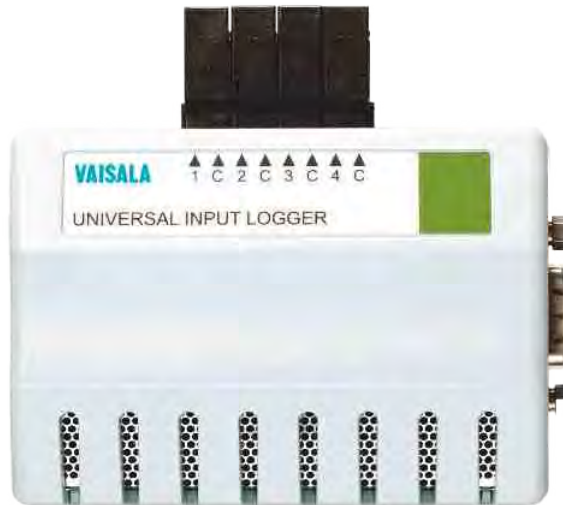
Features/Benefits

- 10-year battery and large onboard memory
- Single and multi-channel models with up to four input channels
- Easily set scaling and measurement units for recording
- Time-based digital recording in a range of sample intervals
- Multiple connectivity options - USB, Ethernet, WiFi
- Optional vNet cradle for Ethernet or Power over Ethernet connectivity
- Traceable to SI units through national metrology institutes.*
- Two year limited warranty

* Measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or ISO/IEC 17025 accredited calibration laboratories.

The 4000 series of data loggers are designed to interface with a wide range of transducers, transmitters, and sensors with a DC voltage or 0 - 20 mA current loop output. The 4000 is a simple solution for recording and monitoring pressure, flow, fluid level, PH, electrical properties, moisture and gas concentrations.

Ideal for use in standalone or networked applications, the 4000 Universal Input logger connects directly to a PC with USB or installs to an existing network via Ethernet, Power over Ethernet or WiFi. Each logger contains a 10-year battery and onboard memory for recording a wide range of variables at the point of measurement. With autonomous power and recording capacity, data is immune to network and power interruptions.

The DL4000 data loggers can be used with Vaisala software, either viewLinc or vLog, to download, display, and analyze environmental data. The viewLinc monitoring system provides 24/7 multi-stage alarm notification, remote, real-time monitoring and gap-free data. The vLog software is a simple solution for validation/mapping applications.

All reports are customizable and can be exported to spreadsheets and PDF to provide records that meet the requirements of 21 CFR Part 11 and Annex 11.

Choose the DL4000 VL series data logger for GxP-compliant environments and the DL4000 SP series for non-GxP applications.

Technical Data

General

Size	85 x 59 x 26 mm (3.4 x 2.3 x 1") 76 g (2.7 oz)
Operating Range	-40 °C to +85 °C
	(-40 °F to +185 °F) and 0 %RH to 100 %RH
	(non-condensing)
Interfaces	RS-232 serial
	USB
	Wifi module
	Ethernet and Power over Ethernet (vNet)
Mounting	3M Dual Lock™ fasteners
PC Software	
	Graphing & Reporting Software
	vLog SP for SP-series
	vLog VL for VL-series
	viewLinc for continuous monitoring & alarming
	OPC Server to add on to existing OPC compatible
	monitoring systems
Internal Clock	Accuracy ±1 min./month @ -25 °C to +70 °C
	(-13 °F to +158 °F)
Electromagnetic	FCC Part 15 and CE
Compatibility	EN 55022:2006
	EN 61000-4-2:2001
	EN 61000-4-3:2006
Power Source	Internal 10-year lithium battery
	(Battery life specified with sample interval of
	1 min. or longer)

Memory

Memory Type	Non-volatile EEPROM
Data Sample Capacity	120,000 12-bit samples
Memory Modes	User-selectable wrap (FIFO) or stop
	when memory is full. User-selectable
	start and stop times.
Sampling Rates	User-selectable from once every 10 seconds to
	once a day. (Battery life specified with
	sample interval of 1 min. or longer)
Recording Span	Recording span depends upon sample
	interval selected and number of
	channels enabled.
	Please see table above.

Recording Span

SAMPLE	NUMBER OF CHANNELS			
INTERVAL	1	2	3	4
10 seconds	13.8 days	6.9 days	4.6 days	3.4 days
1 minute	2.7 months	1.3 months	27.7 days	20.8 days
5 minutes	1.1 years	6.9 months	4.6 months	3.4 months
15 minutes	3.4 years	1.7 years	1.1 years	10.4 months
1 hour	13.6 years	6.8 years	4.5 years	3.4 years

Current Loop and Voltage Inputs

INPUT TYPE	CURRENT LOOP	ANALOG VOLTAGE
Available Ranges	0 to 20mA	0 to 5 VDC, 0 to 10 VDC
Resolution	5.5 μA	0.025 % F.S.
Accuracy	±0.15 % F.S. at +25 °C	±0.15 % F.S. at +25 °C
	(+77 °F)	(+77 °F)
Input Impedances	75 Ohms	>1 MOhm
Isolation	One common per logger	One common per logger
Overload	40 mA max. (reverse-	±24 VDC max. (reverse-
Protection	polarity protected)	polarity protected)

Channel Configurations

MODEL	1, 2 OR 4 CHANNELS
4000-405	0 to 5 VDC
4000-40A	0 to 10 VDC
4000-40C	0 to 20 mA

DMT132 Dewpoint Transmitter

The optional LED warning light tells the user when the defined dew point limit has been exceeded.

The Vaisala HUMICAP® Dewpoint Transmitter DMT132 is an affordable dew point measurement instrument designed to verify the functionality of refrigerant dryers. It is especially well suited for OEM dryer manufacturers.

Direct Measurement Cuts Costs

Direct outlet air dew point measurement provides accurate information about dryer functionality and is more reliable than the traditional method of measuring refrigerator temperature only. Knowledge of the real dew point ensures high quality compressed air at all times and enables customers to optimize dryer capacity. This helps to prevent investment in redundant dryer capacity and avoid unnecessary maintenance and costly malfunctions.

High Accuracy and Long-Term Stability

The DMT132 provides optimal performance in the operating range of refrigerant dryers. In the measurement range of -3 … 20 °C (+26.6 … +68 °F), where the refrigerator dryers typically operate, the Td accuracy is ±1°C (±1.8°F). The instrument incorporates the proven Vaisala HUMICAP® sensor, which is resistant to compressor oil and most other chemicals, thereby providing excellent long-term stability.

Quick Installation and Easy Field Checking

It takes just a few minutes to install the DMT132 directly into a dryer or compressed air line through a G1/2" ISO thread. Vaisala sampling cells can also be used. The loop-powered electronics mean that wiring is easy and power requirements are low. The DMT132 operating voltages can be as low as 10 VDC.

Verifying the performance of the DMT132 is easy with the compatible Vaisala hand-held DM70 or HM70 meters. The user can perform possible adjustments with the Vaisala HMK15 Humidity Calibrator.

Demand for dew point sensors to verify refrigerant dryers is increasing. Direct dew point measurement enables energy savings and improved efficiency.

Technical Data

Performance

DEW POINT

Measurement range	-20 ... +50 °C (-4 ... +122 °F) Td
Accuracy (at +20 °C (+68 °F)	±1 °C for -3...20 °C (+26.6 ...+68 °F) Td
	±2 °C for -15...-3 °C (+5 ...+26.6 °F) Td
	see accuracy graph below

* when dew point is below 0 °C (+32 °F), the transmitter outputs frostpoint

Response time at 20 °C (+68 °F) gas temperature and 1 bar pressure

-14 -> +3 °C (+7 -> +37 °F) Td	17 s (63%)
	40 s (90%)
+3 -> -14 °C (+37 -> +7 °F) Td	33 s (63%)
	85 s (90%)

CALCULATED VARIABLES

Dew point converted to atmospheric pressure	Tdf atm
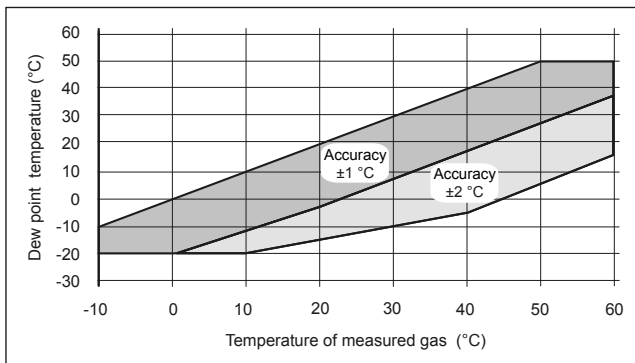
Operating Environment

Operating temperature	-10 ... + 60 °C (+14 ...+140 °F)
Operating pressure	0 ... 20 bar
Relative humidity	0 ... 100 %RH
Sample flow rate	no effect on measurement accuracy
Measured gases	non-corrosive gases

Outputs

Analog output (scalable)	4...20 mA, 2-wire
Resolution for current output	0.002 mA
Accuracy of analog outputs at +20 °C	±0.05% full scale
Typical temperature dependence	±0.005% of full scale/ °C
Connector	4-pin M8 (IEC 60947-5-2)

LED indication available for defined
dew point limit/ error state indication
RS485 serial line for service use

General

Sensor	Vaisala HUMICAP®180R
Recommended calibration interval (in refrigerant dryer application)	2 years
Mechanical connection	G 1/2" ISO
Operating voltage	10 .... 28 VDC
External load	max 100 ohm for supply voltages <20 VDC
	max 500 ohm for supply voltages 20...28 VDC
Weight	65 g (2.3 oz)
Housing material	PPS + 40% GF
Housing classification	IP65 (NEMA 4)
Storage temperature range	-40 ... + 80 °C (-40 ...+176 °F)
Start-up time	3 s

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

Options and Accessories

Tube filter	230602
Special cover set for HMK15 (calibrator fitting DMT132 and HMP60)	230914
NPT Adapter	210662SP
Sample cells	DMT242SC, DMT242SC2, DSC74,
	DSC74B, DSC74C, DMCOIL
Duct installation flange	DM240FA
Cables (several lengths available)	HMP50Z032, HMP50Z300SP,
	HMP50Z500SP, HMP50Z1000SP
Loop powered external display	226476
USB Service cable	219690
Connection cable to DM70/HM70	219980
LED plug	230388
ISO" 1/2 plug	218773
NPT1/2" plug	222507
Sealing ring set (3 pcs U-seal)	221525SP
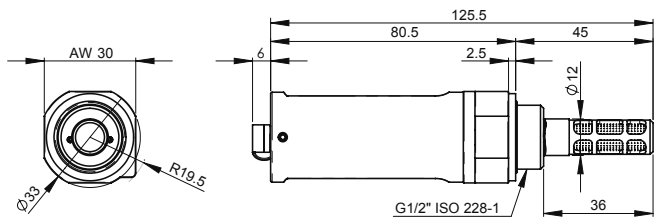
DMT143 Miniature Dewpoint Transmitter

The Vaisala DRYCAP® Dewpoint Transmitter DMT143 is an ideal choice for small compressed air dryers, plastic dryers and other OEM applications.

Vaisala DRYCAP®

The Vaisala DRYCAP® Dewpoint Transmitter DMT143 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 highly resistant to particulate contamination, oil vapor and most chemicals, and is insensitive to the flow rate.

Long Calibration Interval

The calibration interval of the DMT143 is two years. Additionally, the Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 can be used to confirm the performance of the DMT143 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 DMT143 has a variety of features to choose from, including different output, installation options and alarm LED.

Due to its small size and light weight, the DMT143 is quickly and easily installed in tight spaces or in small-size pipelines. The alarm LED indicates too high dew point in the process. The trigger point is preset at the factory. It can be later adjusted with the Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 or a PC.

Technical Data

Measured Parameters

DEW POINT TEMPERATURE	
Measurement range (typical)	-70 ...+60 °C (-94 ...+140 °F) T_d
Analog output scalings	
option 1	-80 ...+20 °C (-112 ...+68 °F) T_d
option 2	-80 ...+20 °C (-112 ...+68 °F) T_d dew point at ambient pressure
option 3	free scaling
Accuracy in air or N2	±2 °C (±3.6 °F) T_d (see graph below)
when the dew point is below 0 °C (32 °F), the transmitter outputs frostpoint	

Technical Data
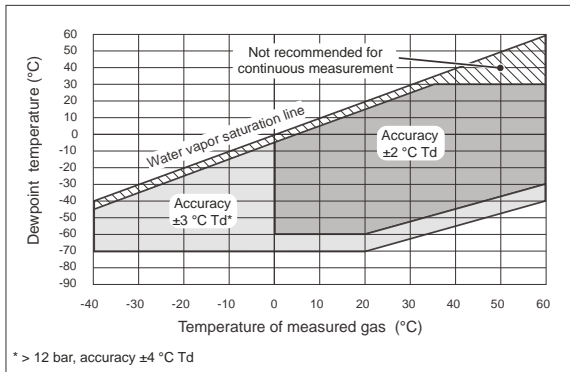
Dew point accuracy vs. measurement conditions

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

PPM VOLUME CONCENTRATION

Measurement range (typical)	10 ...40000 ppm
Accuracy at +20 °C (+68 °F), 1 bar	1 ppm + 20% of reading

Operating Environment

Measured gases	non-corrosive gases
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 below 0 °C (+32 °F) or pressure above 20 bar_a (290 psia) the supply voltage must be 24 ...28 VDC.

Outputs

Analog output (scalable)	4 ...20 mA (3-wire), 0 ...1 V/5 V, 1 ...5 V
Resolution for current output	0.002 mA
Resolution for voltage output	0.3 mV
Typical temperature dependence	0.005 % of span / °C
Digital output	RS-485, non-isolated
	Vaisala Industrial Protocol
Connector	4-pin M8 (IEC 60947-5-2)

General

Sensor	Vaisala DRYCAP® 180D
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	max 10mA + 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 (AISI316L)
Sensor protection	stainless steel sintered filter
Mechanical connection	ISO G1/2" or NPT 1/2
Housing classification	IP66 (NEMA 4)
Storage temperature range	-40 ...+60 °C (-40...+140 °F)
Weight	G-thread version 90g (3.2oz)
	NPT-thread version 100g (3.5oz)

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

Accessories

Connection cable for DM70	219980SP
USB connection cable	219690
Sampling cells	
basic sampling cell	DMT242SC
with Swagelok 1/4" male connectors	DMT242SC2
with quick connector and leak screw	DSC74SP
two-pressure sampling cell	DSC74BSP
cooling/venting coil	DMCOILSP

See DM70 / Portable Sampling Systems and Sampling Cells for further information about sampling cells available

Loop powered external display	226476
Loop powered external display with relays	234759

Dimensions

in mm
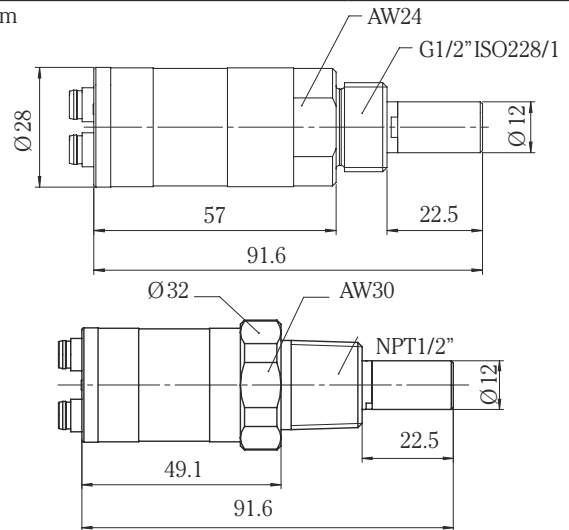
DMT143L Dewpoint Transmitter

Due to its wide measurement range and high long-term stability, the DMT143L is an ideal choice for low dew point industrial applications such as compressed air dryers, plastic dryers and other OEM applications.

Vaisala DRYCAP®

The Vaisala DRYCAP® Dewpoint Transmitter DMT143L provides reliable and stable measurements for industrial dryer applications. It is designed for extreme conditions.

DMT143L 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 suitable for low dew point 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 DMT143L adjusts the measurement, corrects dry-end drifts and continues to function. Calibration occurs quickly, and with corrections so minor, it will go unnoticed.

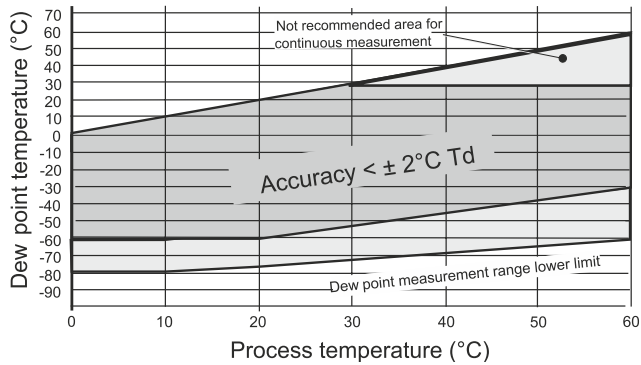## Compact, Rugged and Intelligent

Due to its compact size, DMT143L 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 traceable calibration. The recommended calibration interval is every two years.
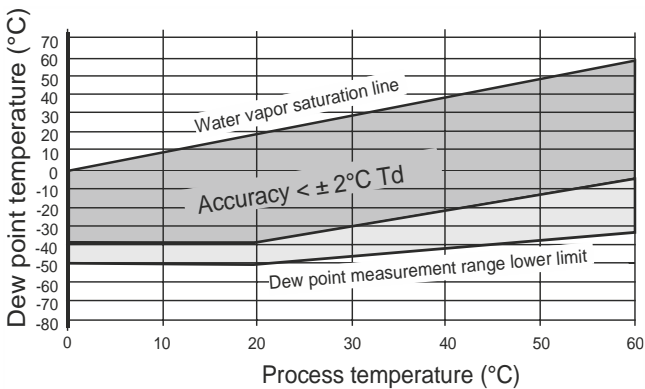
Technical Data

Dew Point Temperature

Measurement range (typical)	-60 ... +60 °C (-76 ... +140 °F)
Different analog output scalings available	
(when the dew point is below 0 °C (32 °F),	
the transmitter outputs frost point)	
Accuracy with DRYCAP® 180M	±2 °C (±3.6 °F)
	(see graph below)

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)	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	RS485

General

Sensor	DRYCAP® 180M
Optimal sensor for refrigeration dryers	DRYCAP® 180S
Operating voltage	18 - 28 VDC
Power consumption at 24 VDC	max. 220 mA
External load for analog output	max. 500 Ω
Probe material (wetted parts)	stainless steel (AISI 316L)
Sensor protection	stainless steel sintered filter (HM47280)
Mechanical connection	G½" ISO228-1 thread with bonded seal ring (U-seal)
Electronics housing material	stainless steel
Housing classification	IP66
Storage temperature range	-40 ... +60 °C, (-40 ... +140 °F)

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

Dimensions

Dimensions in mm (inches)
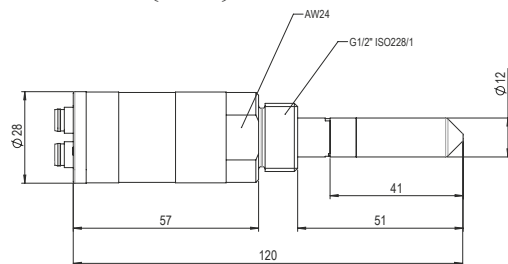
DMT152 Dewpoint Transmitter

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

Features/Benefits

- Compact
- Accurate
- Vaisala DRYCAP® technology with a polymer sensor
- Measures dew point 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

The Vaisala DRYCAP® Dewpoint Transmitter DMT152 is designed for measuring low dew point 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 highvoltage 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

DEW POINT TEMPERATURE

Measurement range	-80 ... -10 °C (-112 ... +14 °F) T_d
Accuracy	
-80 ... -40 °C (-112 ... -40 °F)	±2 °C (3.6 °F) T_d
-40 ... -20 °C (-40 ... -4 °F)	±3 °C (5.4 °F) T_d
Non-calibrated range	-100 ... -80 °C, -10 ... +20 °C T_d
	(-148 ... -112 °F, +14 ... +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

when dew point is below 0 °C (32 °F) the transmitter outputs frost point

Accuracy over temperature range
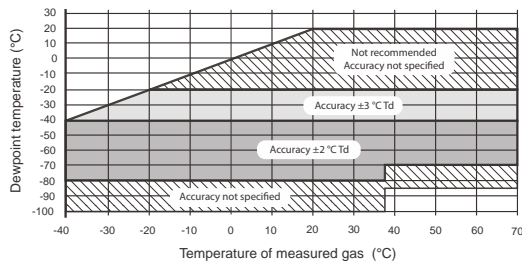
Response time 63 % [90 %] at a gas temperature of +20 °C (+68 °F) and pressure of 1 bar

-10 ... -80 °CTd	0.5 min [7.5 min]
-80 ... -10 °CTd	2 s [5 s]
Typical long-term stability	better than 2 °C (3.6 °F) /year

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

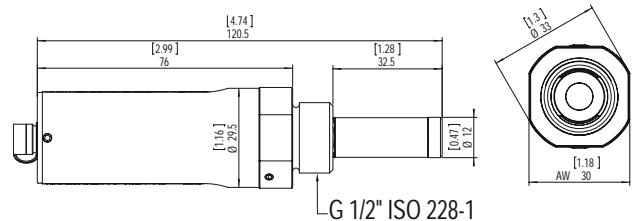|	
Temperature	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	0 ... 100 %RH (up to + 20 °C/68 °F)
Pressure	0 ... 50 bar (725 psia)
Measured gases	non-corrosive gases
Sample flow rate	no effect on measurement accuracy

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 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
Supply voltage fluctuation	max. 0.3 V
External load for	
voltage output	min. 10 kOhm
current output	max. 500 Ohm
Housing material (wetted parts)	AISI316L
Stainless steel mesh filter	Filter body AISI303, mesh
	AISI316L, grade 18 μm
Mechanical connections	ISO G½", NPT ½", UNF 3/4"- 16"
Housing classification	IP66
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
NW40 flange	225220SP

G 1/2" ISO 228-1

DMT242 Dewpoint Transmitter

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

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 dew point 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.
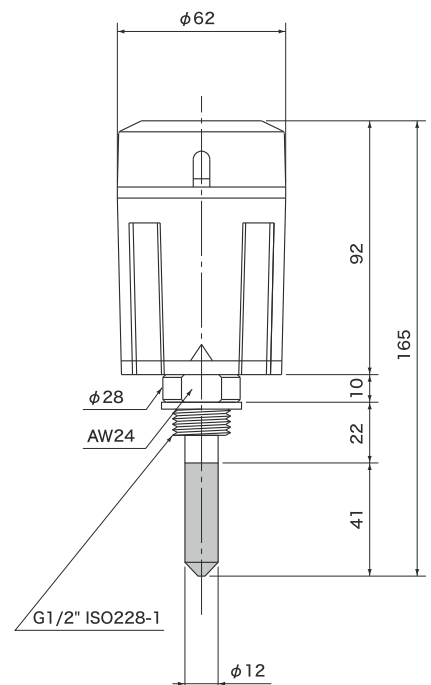
Compact, Rugged and Intelligent

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.

Features/Benefits

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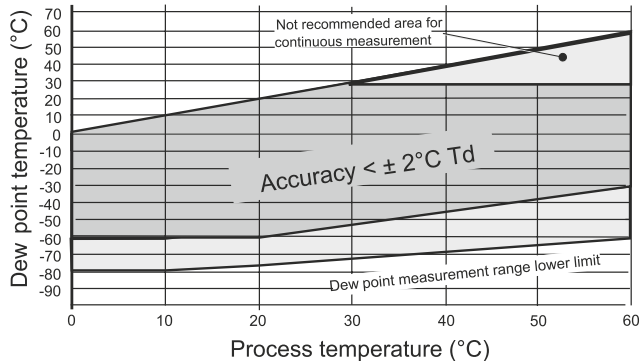- Compatible with Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70

Dimensions

Dimensions in mm (inches)

Technical Data

Dew Point 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 dew point is below 0 °C (32 °F),
the transmitter outputs frost point)

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

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)	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 mm²
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	G½" ISO228-1 thread with bonded seal ring (U-seal)
Electronics housing material	plastic (ABS/PC)
Housing classification	IP65 (NEMA4)
Weight	225 g
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.

DMT340 Series Dewpoint and Temperature Transmitters for Very Dry Conditions
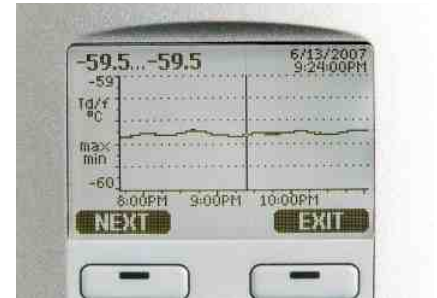
The display shows measurement trends, real-time data, and measurement history.

Features/Benefits

- Measures dew point from -70 ... +80 °C (-94 ... +176 °F) with an accuracy of ±2 °C (±3.6 °F)
- Vaisala DRYCAP® sensor provides accurate, reliable measurement with excellent long-term stability and a fast response time
- Condensation-resistant
- Unique auto-calibration feature
- Compatible with Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70
- NIST traceable calibration (certificate included)
- Graphical display and keypad for convenient operation
- Optional alarm relays and mains power supply module
- Analog outputs, RS232/485, WLAN/LAN
- MODBUS protocol support (RTU/TCP)

The Vaisala DRYCAP® Dewpoint and Temperature Transmitter Series DMT340 is designed for industrial low-humidity applications such as industrial drying, compressed air systems, semiconductor industry, dry rooms, baking ovens, and metal heat treatment.

Stability at Low Dew Points

The Vaisala DRYCAP® sensor is immune to particulate contamination, water condensation, oil vapor, and most chemicals. The sensor is condensation resistant and recovers perfectly if exposed to liquid water. Fast reaction time and stability make its performance unmatched also in dynamic and low dew point applications.

Unique Auto-Calibration Feature

The stability of the DMT340 series is due to its unique auto-calibration function, developed by Vaisala. This feature allows the transmitter to perform 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 so minor that it causes no disruption, ensuring easy maintenance and high performance. To maintain high performance, transmitters can be sent to Vaisala for calibration. Calibration intervals depend on the application; in normal conditions it is recommended to have calibration performed every two years.

Graphical Display of Measurement Data and Trends for Convenient Operation

The DMT340 features a large numerical and graphical display with a multilingual menu and keypad. It allows users to easily monitor operational data, measurement trends, and access measurement history for the past 12 months.

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

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

Versatile Outputs and Data Collection

The DMT340 can support up to three isolated analog outputs. Optional AC mains power and relay outputs are also available.

For serial interface the USB connection, RS232, and an optional RS485 can be used.

DMT340 is also capable of applying the MODBUS communication protocol and, together with an appropriate connection option, provides either MODBUS RTU (RS485) or MODBUS TCP/IP (Ethernet) communication.

The data logger, with real-time clock and battery backup, guarantees reliable logging of measurement data for over four years. The recorded data can be viewed on the local 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 service cable makes it easy to connect the DMT340 to a PC via the service port.

Easy Installation

DMT340 transmitters are delivered installation-ready, with a variety of installation options to choose from.

The Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70 is ideal for field-checking DMT340 transmitters.

The DMT341 is made for installations in dry rooms where the entire dew point transmitter needs to be inside the dry space. The concept is easy to clean and suitable also for cleanrooms.
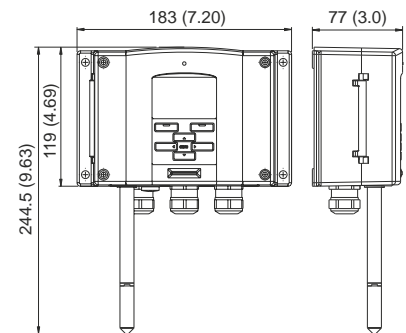
Specifications

DMT341 for Installations in Dry Spaces

Temperature range

Transmitter body	-40 … +60 °C
	(-40 … +140 °F)
With display	0 … +60 °C
	(+32 … +140 °F)

Dimensions

Dimensions in mm (inches)

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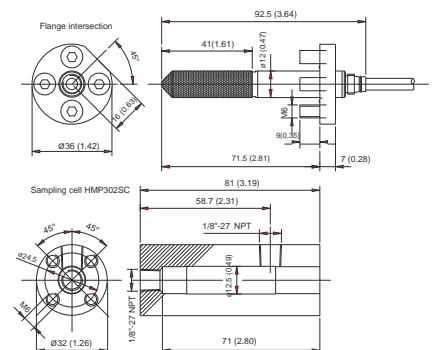
Probe Specifications

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"
Installation	
Flange	36 mm/1.4"
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 installation into pressurized or vacuum processes.
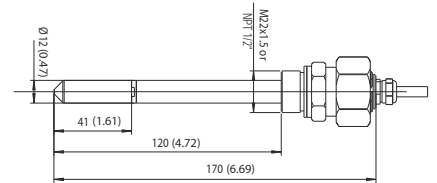
Probe Specifications

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"
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 a thread connection. The small probe is installed using Swagelok® connectors.
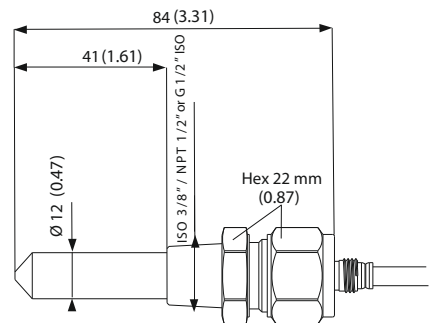
Probe Specifications

DMT347 with Small-Sized Probe

Pressure range	0 ... 10 bar/0 ... 145 psia
Mechanical durability	up to 10 bar/ 145 psia
Probe diameter	12 mm/0.5"
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 installation into pressurized processes where the probe needs to be able to be removed while the process is running. The probe depth is adjustable.
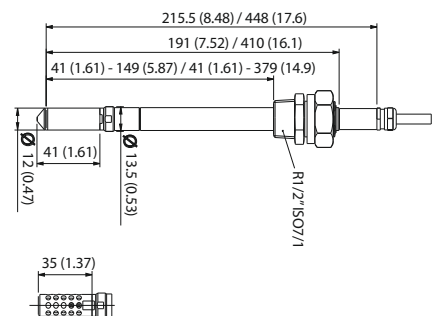
Probe Specifications

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"
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 (suitable for all models)

Technical Data

Measured Parameters

DEW POINT

Sensor	Vaisala DRYCAP®180M
Measurement range	-70 ... +80 °C (-94 ... +176 °F) Td
For continuous use	-70 ... +45 °C (-94 ... +113 °F) Td
Accuracy	
up to 20 bar/290 psia	±2 °C/±3.6 °F
	(see the accuracy graph below)
20 ... 50 bar/290 ... 725 psia	additional inaccuracy +1 °C Td
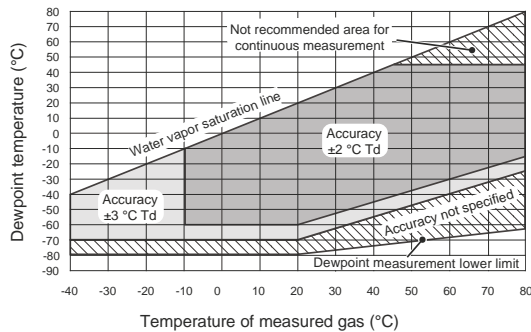
Dew point accuracy vs. measurement conditions

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

TEMPERATURE

Measurement range	0 ... +80 °C (+32 ... +176 °F)
Accuracy	±0.2 °C at room temperature
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751

RELATIVE HUMIDITY

Measurement range	0 ... 70 %RH
Accuracy (RH <10 %RH, at + 20 °C)	±0.004 %RH + 20% of reading

PPM

Measurement range (typical)	10 ... 2500 ppm
Accuracy (at + 20 °C, 1 bar)	1 ppm + 20% of reading

Other measurement parameters available (model-dependent): 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)
of 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 gases
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Industrial environment

Note: Transmitter with display test impedance of 40 ohm is used in IEC61000-4-5 (Surge immunity)

Inputs and Outputs

Operating voltage	10 ... 35 VDC, 24 VAC ±20 %
with optional power supply module	100 ... 240 VAC 50/60 Hz
Power consumption @ 20 °C (U_{in} 24VDC)	
RS232	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	max. + 110 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 ... 1V output	R_L > 2 kohm
0 ... 5V and 0 ... 10V outputs	R_L > 10 kohm
Wire size	0.5 ... 2.5 mm² (AWG 20 ... 14) stranded wires recommended
Digital outputs	RS232, RS485 (optional)
Protocols	ASCII commands, MODBUS RTU
Service connection	RS232, USB
Relay outputs	0.5 A, 250 VAC, SPDT (optional)
Ethernet interface (optional)	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP
WLAN interface (optional)	DHCP (automatic), static
Supported standards	802.11b
Antenna connector type	RP-SMA
IPv4 address assignment	
Protocols	Telnet, MODBUS TCP/IP
Security	WEP 64/128, WPA 2/802.11i
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, graphical trend display of any parameter
Menu languages	English, Chinese, Finnish, French, German, Japanese, Russian, Spanish, Swedish

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	female plug with 5 m (16.4 ft.) black cable
option 2	female plug with screw terminals
USB-RJ45 Serial Connection Cable	219685
Probe cable diameter	5.5 mm
Standard probe cable lengths	2 m, 5 m or 10 m
	(Additional cable lengths available, please see order forms for details)
Housing material	G-AlSi 10 Mg (DIN 1725)
Housing classification	IP 66
	IP65 (NEMA4X) with local display
Weight	
depending on selected probe, cable and modules	1.0 – 3.0 kgs

Dimensions

Dimensions in mm (inches)
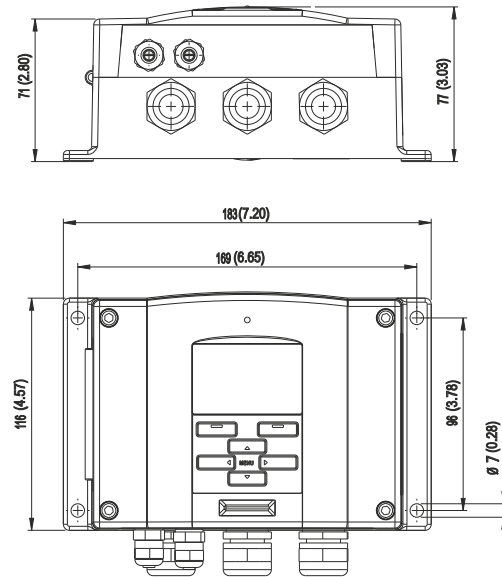
DRYCAP® is a registered trademark of Vaisala.

DMT345 and DMT346 Dewpoint Transmitters
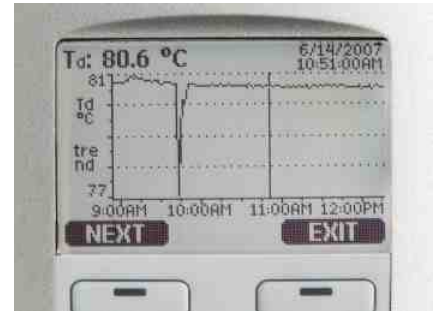
The large graphical display allows the user to check data at a glance.

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

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 is condensation-resistant and is immune to particulate contamination, oil vapor, and most chemicals. The DRYCAP® sensor is notable for its swift response time and rapid recovery after getting wet.

Measure Humidity Directly in Hot Processes

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

The accuracy and stability of the DMT345 and the DMT346 are due to their unique auto-calibration function, developed by Vaisala. This feature allows the transmitter to perform 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 so minor that it causes no disruption, ensuring easy 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 at temperatures up to 140 °C; however, it can operate safely at temperatures up to 180 °C.

Features/Benefits

- The DMT345 measures humidity at temperatures up to 180 °C (356 °F)
- The DMT346 measures humidity at temperatures up to 350 °C (+662 °F)
- Dew point accuracy ±2 °C (±3.6 °F)
- Vaisala DRYCAP® sensor provides accurate and reliable measurement with excellent long-term stability and fast response time
- Condensation-resistant
- Unique auto-calibration feature
- NIST traceable calibration (certificate included)
- Graphical display and keypad for convenient operation
- Optional alarm relays and mains power supply module
- Analog outputs, RS232/485, WLAN/LAN
- MODBUS protocol support (RTU/TCP)

The stainless steel probe is especially designed for high temperatures and has an optional installation flange for easy adjustment of the probe's installation depth and, therefore, more precise positioning.

DMT346: Reliable in Very Hot Processes

The DMT346 provides the best measurement performance at process temperatures between 140 °C and 350 °C.

The DMT346 includes a cooling set as standard. The cooling effect can be regulated by adding the cooling fins, or they can be removed from the set for optimal measurement performance.

The cooling system has no moving parts, and requires no additional power or cooling utilities, so there is no risk of sensor damage due to mechanical cooling failure.

Additionally, sensor warming minimizes the risk of condensation accumulating on the sensor. In low humidity conditions the combination of auto-calibration and DRYCAP® ensures accurate measurement.
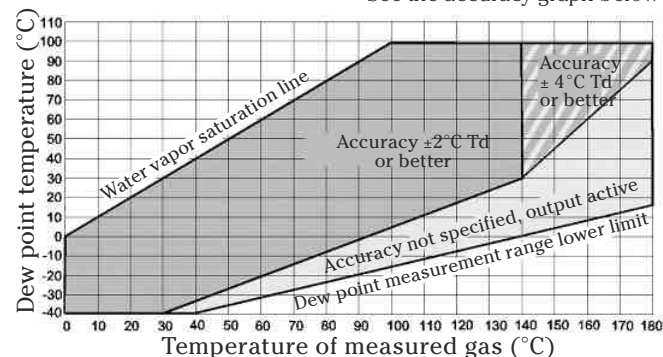
Graphical Display of Measurement Data and Trends for Convenient Operation

The DMT345 and DMT346 transmitters feature a large numerical and graphical display with a multilingual menu and keypad. It allows users to easily monitor operational data, measurement trends, and access measurement history for the past 12 months.

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

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

Versatile Outputs and Data Collection

DMT345 and DMT346 transmitters can support up to three analog outputs; an isolated galvanic power supply and relay outputs are also available.

For serial interface the USB connection, RS232, and RS485 can be used.

DMT345 and DMT346 are also capable of applying the MODBUS communication protocol and, together with an appropriate connection option, provide either MODBUS RTU (RS485) or MODBUS TCP/IP (Ethernet) communication.

The data logger, with real-time clock and battery backup, guarantees reliable logging of measurement data for over four years. The recorded data can be viewed on the local 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 service cable makes it easy to connect the DMT345/346 to a PC via the service port.

Units are delivered installation-ready.

Technical Data

Measured Variables DMT345

DEW POINT 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

Dew point accuracy vs. measurement conditions

Response time 63% [90%] flow rate 1 l/min and 1 bar pressure
from dry to wet	5 s [10 s]
from wet to dry including auto-calibration	45 s [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	Pt100 RTD Class F0.1 IEC 60751

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

DEW POINT 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
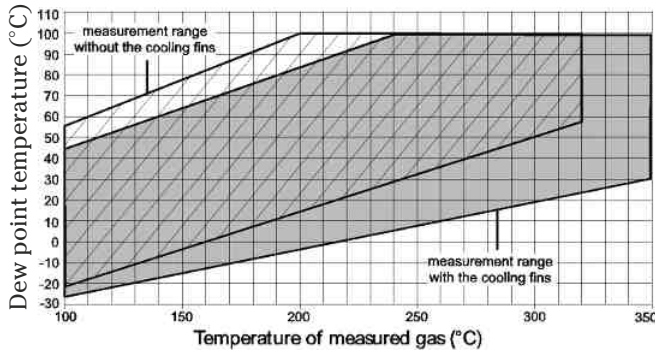
Dew point accuracy vs. measurement conditions

Response time 63% [90%] flow rate 1 l/min and 1 bar pressure

from dry to wet	5 s [10 s]
from wet to dry including auto-calibration	45 s [5 min]

MIXING RATIO DMT346

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

Operating Environment, DMT345 and DMT346

Mechanical durability	up to +180 °C (+356 °F) for DMT345
of probes	up to +350 °C (+662 °F) for DMT346
of 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
Electromagnetic compatibility	Complies with EMC standard EN61326-1, Industrial environment

Note: Transmitter with display test impedance of 40 ohm is used in IEC61000-4-5 (Surge immunity)

Inputs and Outputs, DMT345 and DMT346

Operating voltage	10 ... 35 VDC, 24 VAC ±20%
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 autocalibration	about 6 min

Power consumption @ 20 °C (U_{in} 24 VDC)

U_{out} 2x0 ... 1V/0 ... 5V/0 ... 10V	max. 25 mA
I_{out} 2x0 ... 20mA	max. 60 mA
RS232	max. 25 mA
display and backlight	+ 20 mA
during sensor purge	max. + 110 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

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 mm² (AWG 20) stranded wires recommended
Digital outputs	RS232, RS485 (optional)
Protocols	ASCII commands, MODBUS RTU
Service connection	RS232, USB
Relay outputs 2+2 pcs (optional)	0.5 A, 250 VAC, SPDT

Ethernet interface (optional)

Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP

WLAN interface (optional) DHCP (automatic), static

Supported standards	802.11b
Antenna connector type	RP-SMA
IPv4 address assignment	DHCP (automatic), static
Protocols	Telnet, MODBUS TCP/IP
Security	WEP 64/128, WPA WPA2/802.11i

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. four 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, graphical trend display
Menu languages	English, Chinese, Finnish, French, German, Japanese, Russian, Spanish, Swedish

Mechanics, DMT345 and DMT346

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	female plug with 5 m (16.4 ft.) black cable
option 2	female plug with screw terminals
USB-RJ45 Serial Connection Cable	219685
Probe cable diameter	5.5 mm
Standard probe cable lengths	2 m, 5 m or 10 m
	(Additional cable lengths available, please see order forms for details)
Housing material	G-AlSi 10 Mg (DIN 1725)
Housing classification	IP 66
	IP65 (NEMA4X) with local display

Weight

depending on selected probe, cable, and modules	1.0 – 3.0 kgs

DPT145 Multiparameter Transmitter for SF6 Gas

The Vaisala Multiparameter Transmitter DPT145 with the DILO DN20 connector.

Features/Benefits

- First transmitter to offer online measurement of seven SF6 parameters in one unit
- Measured parameters: dew point, pressure, temperature
- Calculated parameters: SF6 density, normalized pressure, dew point in atmospheric pressure, ppm
- Saves time and money across the board, from investment and installation to operation and servicing
- More reliable assessment of the condition of SF6 insulation due to online measurement
- Long calibration interval of years
- Digital output RS-485 with MODBUS

The Vaisala Multiparameter Transmitter DPT145 for SF6 Gas is a unique innovation that enables online measurement of dew point, pressure, and temperature. It also calculates four other values, including SF6 density. The DPT145 is especially well suited for integration into OEM systems.

Online Reliability

Online dew point measurement combined with pressure measurement provides an excellent assessment of the condition of the SF6 insulation. Sudden and minor leakages are immediately detected by the direct normalized pressure measurement, while online dew point measurement alerts the user to moisture issues, which can weaken the insulation properties of SF6 and cause rapid deterioration. With the DPT145, it is also easy to build a redundant solution for multiple parameters.

Savings Across the Board

A single transmitter, instead of several, saves time and money across the board, from investment to installation, operation and servicing. Lower assembly costs, fewer cables and connectors, minimized need for on-site visits and field operations - all these translate into cumulative savings. The long calibration interval results in further savings.

Risk-Free, Greener Solution

Online measurement enables gas trends to be followed via a data collection system, making monitoring fast, risk-free, and accurate. Using one instrument for monitoring seven different parameters means also fewer mechanical connections and reduces the risk of leaks. Monitoring is environmentally friendly because there is no need for sampling - no SF6 gas is released into the atmosphere.

The Fruit of Experience

Vaisala has over 70 years of extensive measurement experience and knowledge. The DPT145 brings together the proven DRYCAP® dew point sensor technology and BAROCAP® pressure sensor technology in one package, providing an innovative and convenient solution for monitoring SF6 gas.

The DPT145 with the weather shield.

Technical Data

Measured Parameters

|	
Dewpoint	-50 ... +30 °C (-58 ... +86 °F)
Pressure, absolute	1 ... 12 bar (14.5 ... 174 psi)
Temperature	-40 ... +80 °C (-40 ... +176 °F)

Calculated Parameters

Pressure, normalized to 20 °C (68 °F)	1 ... 12 bar (14.5 ... 174 psi)
SF6 or SF6/N2 mixture density	0 ... 100 kg/m^3
ppm moisture, by volume	40 ... 40 000 ppm
Dewpoint, converted to atmospheric pressure	-65 ... +30 °C (-85 ... +86 °F)

Performance

Dewpoint accuracy	±3 °C (±5.4 °F), see graph below
Dewpoint stability	typical drift < 2 °C (3.6 °F) /5 years
Pressure accuracy at 23 °C (73.4 °F)	±0.4 %FS
Pressure temperature dependence	±0.01 bar/10 °C (18 °F)
Pressure stability	typical drift < 1 %FS /5 years
Temperature accuracy	
0 ... 40 °C (+32 ... +104 °F)	±0.5 °C (± 0.9 °F)
-40 ... 80 °C (-40 ... +176 °F)	±1 °C (± 1.8 °F)
Density accuracy (pure SF6, 1 ... 12 bara)	
0 ... 40 °C (+32 ... +104 °F)	±1 %FS
-40 ... +60 °C (-40 ... +140 °F)	±2.2 %FS
PPM accuracy, typical (5...1000 ppm, 7 bar)	±(7 ppm + 15% of reading)
Sensor response time:	
Pressure response time	< 1 s
Dewpoint response time* 63% [90%] at 20°C and 1 bar	
-50 -> -10 °C Tdf	5 s [10 s]
-10 -> -50 °C Tdf	10 s [2.5 min]

* system equilibrium related response time is typically longer
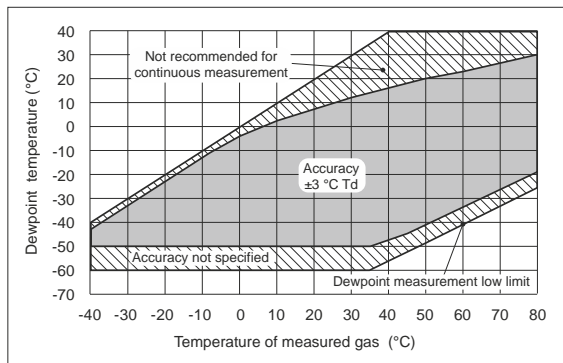
DPT145 Dewpoint Measurement Accuracy

Operating Environment

Operating temperature of electronics	-40 ... +60 °C (-40 ... +140 °F)
Operating Pressure	0 ... 50 bar (0...725 psi)
Relative humidity	0...100 %
Measured gases	SF$_6$, SF$_6$/N$_2$ mixture

Outputs

Digital output	RS-485, non-isolated, Vaisala protocol, MODBUS RTU protocol
Connector	4-pin M8

General

Sensor	Vaisala MPS1 multiparameter sensor
Operating voltage	15 ... 28 VDC
	20 ... 28 VDC in cold temperatures (-40 ... -20 °C (-40 ... -4 °F))
Supply current, during normal measurement	20 mA
during self-diagnostics	max. 300 mA pulsed
Housing material	AISI316L
Housing classification	IP66
	Weather shield to be used for continuous outdoor installations
Storage temperature range	
transmitter only	-40 ... +80 °C (-40 ... +176 °F)
shipment package	-20 ... +80 °C (-4 ... +176 °F)
Mechanical connection	DILO DN20, DILO DN8, ABB Malmkvist, or Alstom G1/2" compatible connector
	Every connection is helium leak tested at the factory.
Dimensional drawings	See the document B211165EN-B
Weight (with DILO adapter)	765 g (27.0 oz)

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

EN/IEC 61000-4-2, Electrostatic Discharge	8kV con / 15kV air
EN/IEC 61000-4-3, RF field immunity	10V/m (80MHz-4.2GHz)
EN/IEC 61000-4-4, Electric Fast Transient	±2kV power and signal
EN/IEC 61000-4-5, Surge	±2kV power line to ground / ±1kV signal line to ground and power line to line
EN/IEC 61000-4-6, Conducted RF Immunity	10Vemf power line and digital output
Mechanical vibration	
EN/IEC 60068-2-6, Fc Sinusoidal vibration	± 6 g, 5-500 Hz sweep 60 min/axis, 3-axis

Accessories

Connection cable for the MI70/DM70 hand-held	219980
USB connection cable	219690
Protection plug for connector	218675SP
1.5 m Shielded PUR cable with 90° connector	231519SP
3m Shielded PUR cable with 90° connector	231520SP
5 m Shielded PUR cable with 90° connector	231521SP
10 m Shielded PUR cable with 90° connector	231522SP
3.0m Shielded FEP cable with straight connector	226902SP
Weather shield	ASM210326SP

DPT146 Dewpoint and Pressure Transmitter

The DPT146 measures both dew point and process pressure. Monitoring compressed air is simpler and quicker, helping you to make more informed decisions.

The Vaisala Dewpoint and Pressure Transmitter DPT146 for Compressed Air makes monitoring compressed air simple and convenient. The DPT146 measures both dew point and process pressure simultaneously, and is the ideal choice for anyone using or monitoring compressed air.

Simple and Efficient Installation

One transmitter providing two of the most important compressed air measurements means reduced installation costs and a much easier setup – with only one instrument needing connection and wiring.

Make More Informed Decisions

Dew point measurement combined with process pressure measurement offers further unique advantages. When dew point data is coupled with live pressure input, conversions to atmospheric pressure or ppm are available online, leaving no ambiguity

in the information. As an example, regulative requirements of medical gas can be fulfilled easily and quickly.

A Unique Combination of Two World-Class Sensors

The DPT146 combines the knowledge of more than 20 years of sensor-technology development. Proven measurements from the DRYCAP® sensor for dew point and the BAROCAP® sensor for pressure are now combined into one easy-to-use transmitter.

Dimensions

Dimensions in mm (inches)
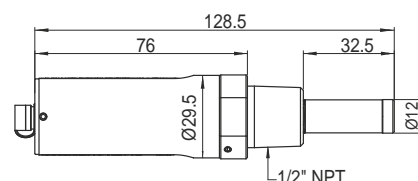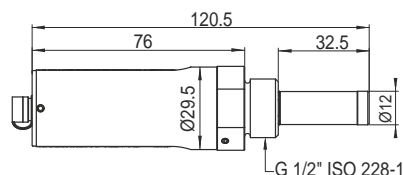
Features/Benefits

- The first transmitter that monitors both dew point and process pressure

- A simple and convenient transmitter for monitoring of compressed air

- Highly accurate humidity information thanks to dew point data coupled with live pressure input

- Proven sensor technology

- Compatible with the Vaisala Hand-Held DM70 for easy spot checking, local display and data logging

- Pressure: 1 ... 12 bar

- Dew point: -70 ... +30 °C (-94 ... +86 °F)

- Digital output RS-485 with MODBUS

Convenience with Proven Performance

Well-developed technology brings both proven results and convenience. Spot-checking and verification of dew point is easy thanks to fully compatible Vaisala DRYCAP® Hand-Held Dewpoint Meter DM70. The DM70 can also be used as a local display and data logger. Temperature measurement is available when the RS485 is in use.
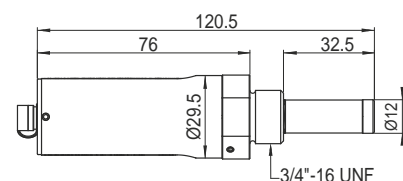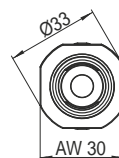
Technical Data

Measured Parameters

Dew point	-70 ... +30 °C (-94 ... +86 °F)
Pressure, absolute	1 ... 12 bar (14.5 ... 174 psi)
Temperature (available if output RS-485 only selected)	-40 ... +80 °C (-40 ... +176 °F)

Calculated Parameters

ppm moisture, by volume	1 ... 40 000 ppm
Dew point, converted to atmospheric pressure	-75 … +30 °C (-103 ... +86 °F)

Performance

Dew point accuracy	±2 °C (±3.6 °F)
Pressure accuracy at 23 °C (73.4 °F)	±0.4 %FS
Pressure temperature dependence	±0.01 bar / 10 °C (18 °F)
Temperature accuracy	
0 ... 40 °C (+32 ... +104 °F)	±0.5 °C (± 0.9 °F)
-40...80 °C (-40 ... +176 °F)	±1 °C (± 1.8 °F)
PPM accuracy (7 bar)	±(14 ppm + 12% of reading)
Sensor response time:	
Pressure response time	< 1 s
Dew point response time 63% [90%] at 20°C and 1 bar	
-50 -> -10 °C Tdf	5 s [10 s]
-10 -> -50 °C Tdf	10 s [2.5 min]
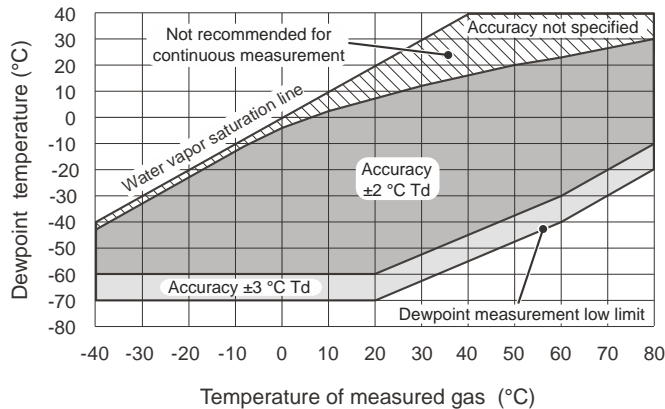
DPT146 Dewpoint Measurement Accuracy

Operating Environment

Operating temperature of electronics	-40 … +60 °C (-40 ... +140 °F)
Operating Pressure	0 … 50 bar (0…725 psi)

Relative humidity	0...100 %
Measured gases	Air/ non-corrosive gases
Sample flow rate	no effect on measurement accuracy

Outputs

Analog Outputs (2 channels)	
current output	0 … 20 mA, 4 … 20 mA
voltage output	0 … 5V, 0 …10V
Accuracy of analog outputs	± 0.01 V / ± 0.01 mA
Digital output	RS-485, non-isolated, Vaisala protocol,MODBUS RTU protocol
Connector	4-pin M8

General

Sensor	Vaisala MPS1 multiparameter sensor
Operating voltage	21 ... 28 VDC, current output
	20 ... 28 VDC, voltage output and/or use in cold temperatures (-40 ... -20 °C (-40 ... -4 °F))
	15 ... 28 VDC, RS485 only
Supply current	
during normal measurement	20 mA + load current
during self-diagnostics	300 mA + load current
External load for	
current output	max. 500 Ohm
voltage output	min. 10 kOhm
Housing material	AISI316L
Housing classification	IP66
Sensor protection	Mesh filter AISI303, grade 18 µm
Storage temperature range	
transmitter only	-40 … +80 °C (-40 ... +176 °F)
shipment package	-20 … +80 °C (-4 ... +176 °F)
Mechanical connection	ISO G1/2", NPT 1/2", UNF 3/4"-16
Recommended calibration interval	2 years
Weight (ISO1/2")	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 indicator /DM70 meter	219980
USB connection cable	219690
Sampling cells	DMT242SC, DMT242SC2, DSC74, DSC74B, DSC74C
Flange	DM240FA
Loop-powered external display	226476
ISO 1/2" plug	218773
NPT 1/2" plug	222507

DM70 Handheld Dewpoint Meter

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

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 unique autocalibration function
- Low maintenance need due to superior long-term stability
- Sensor withstands condensation
- Fast response, enhanced by Sensor Purge option
- Intuitive user interface
- Data can be logged and transferred to a PC via MI70 Link software
- Compact, small and light
- NIST traceable calibration (certificate included)

The Vaisala DRYCAP® Handheld 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. 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.

Vaisala DRYCAP® Technology

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.

Three Probes to Choose From

Three probe models, all with autocalibration, are available. The A and B models are both general purpose probes. The C model is specifically developed for SF_6 gas. The B and C probe models have an additional Sensor Purge feature that heats and dries the sensor, making the response from ambient to dry conditions exceptionally fast.

Intuitive User Interface

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, DMT132, DMT143, 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.
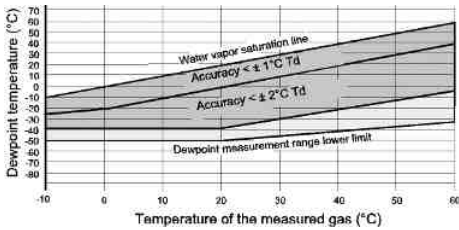
MI70 Link

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 DM70 to a PC.

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 T_d (32 -> -40 °F T_d)	20 s [120 s]
-40 -> 0 °C T_d (-40 -> 32 °F T_d)	10 s [20 s]
Dew point sensor	Vaisala DRYCAP® 180S

TEMPERATURE

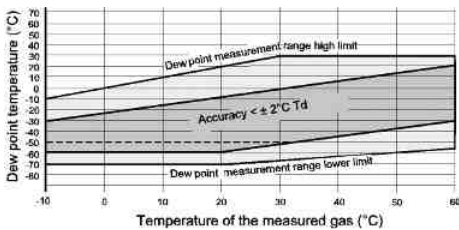|	
Measurement range	-10 ... +60 °C (+14 ... +140 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (±0.36 °F)
Typical temperature dependence of electronics	±0.005 °C/°C (±0.005 °F/°F)
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751

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) -60...+20 °C	±2 °C (±3.6 °F)
	(see graph)

Dew point accuracy vs. measurement conditions

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 RTD Class F0.1 IEC 60751

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 Measurement 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-adapter 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
Data logging 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

# Technical Data

Accessories

Connection cables for fixed Vaisala dew point transmitters	
for DMT242 transmitter	27160ZZ
for DMT340 series	211339
for DMT152, DMT143, and DMT132 transmitters	219980
for DMT142 transmitter	211917ZZ
Weatherproof Carrying Case	MI70CASE3
Soft Carrying Case	MI70SOFTCASE
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
Portable Sampling System	DSS70A
(see separate data sheet)	

Dimensions

Dimensions in mm (inches)

Cable length 1850 (72.83)
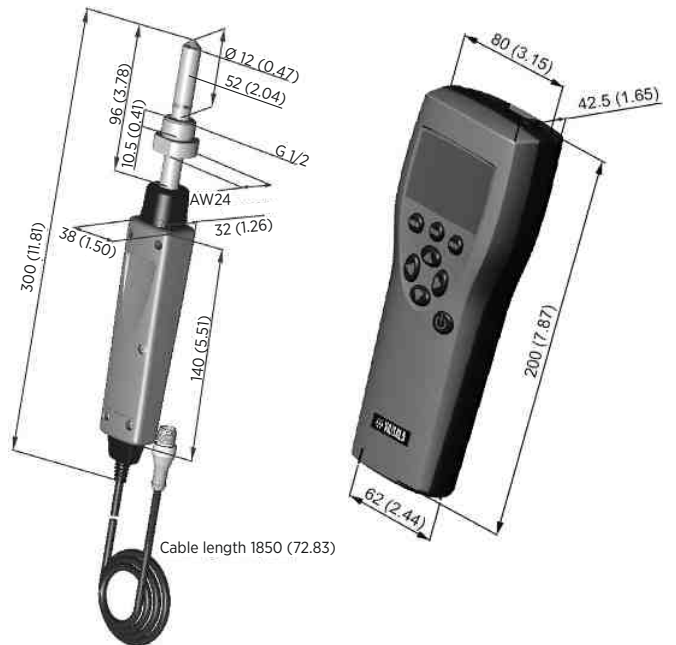
DSS70A Portable Sampling System

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. (The DSS70 includes the sampling system and case, but not the MI70.)

DSS70A Portable Sampling System

The DSS70A is designed to provide dew point 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 dew point 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. DSS70A is an accessory for DM70 Dewpoint Hand-held Meter.

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 dew point measurements in SF_6 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
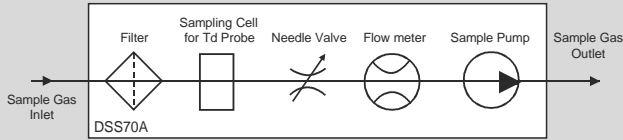
The DSS70A sampling system includes a filter to clean the dirty sample gas and a needle valve to control the sample flow rate with the flow meter. A sample pump is used to generate a sample flow from processes at ambient pressure.
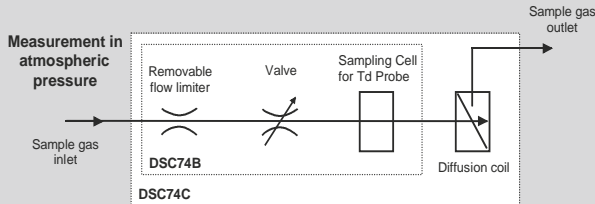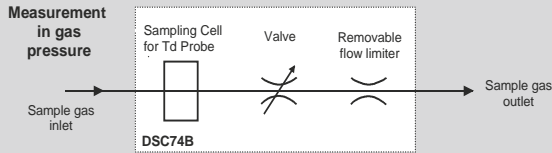
The DSC74B sampling cell enables the measurement of the sampled gas either in gas pressure up to 10 bar or in atmospheric pressure depending on the gas inlet and outlet. The DSC74C is like the DSC74B but with an additional coil to avoid back diffusion, the effect of surrounding moisture, in dew point 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, N2 and other non-toxic, inert gases
Sampled gas dew point	below 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) (included in the DSS70A)	max. +200 °C (+392 °F)
with stainless steel tube	specification according to stainless steel tube specification
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)

GM70 Handheld Carbon Dioxide Meter

The Vaisala CARBOCAP® Handheld 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 CO_2 instruments
- Short warm-up time
- Compact and versatile

The Vaisala CARBOCAP® Handheld 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 CO_2 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.

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 CO_2 transmitters.

Interchangeable Probes

The GM70 uses the same probes as Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220. 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 fixed CO_2 instruments. GMW90 and GMP220 probes can also 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 CO_2 measurement.

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 GM70 to a PC.

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 Measurement 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-adapter
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 CO₂ instruments	
GMT220 and GMD20	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
Weatherproof Carrying Case	MI70CASE3
Soft Carrying Case for diffusion handle and probe	MI70SOFTCASE
Battery, NiMH 4.8V	26755
Spare probe	GMP221, GMP222
(use the order form to define measurement range etc.)	
Nafion Membrane Tubing	212807GM

GMW80 Series Carbon Dioxide, Humidity

GMW80 series transmitters.

The Vaisala CARBOCAP® Carbon Dioxide, Humidity and Temperature Transmitter Series GMW80 is based on a second-generation technology for improved reliability and stability. The transmitters are designed to fulfill the needs for CO_2 measurements in standard demand-controlled ventilation applications. Temperature measurement is always included in the GMW80 series transmitters. The optional temperature set-point potentiometer, humidity measurement, relay and LED CO_2 level indication give you the flexibility needed for a variety of projects.

The CARBOCAP® sensors measure CO_2 accurately immediately when powered on. As they have a built-in reference measurement they do not need a lengthy learning phase before the measured values are correct. Proper operation can be verified immediately after snapping on the device cover.

Easy Installation

With modern buildings often having hundreds of sensors, the installation time per unit can be a significant cost factor. Returning to the building site to check sensor operation adds further costs.

The GMW80 series transmitters include a number of subtle design features that have been introduced to make installation and commissioning quick and easy. The pull-out tab makes opening the transmitter faster than before, while also doubling as a quality check slip and holder for the anti-tamper screw. The backplate can be twisted onto pre-mounted screws, and the wiring can be done easily on the clearly marked backplate. The electronics can be snapped on later when the building automation system is commissioned.

Reliable Operation

The GMW80 series transmitters are optimized for low maintenance. The second-generation, low-power CARBOCAP® technology enables a longer lifetime and superior stability than ever before. As the power consumption is low, the heat generated by the electronics does not distort the temperature inside the sensor. The internal reference in the CO_2 sensor guarantees the best stability and operation even in constantly occupied buildings without frequent readjustments.

The reliable operation and accurate measurement values of the GMW80 series transmitters contribute to the significant cost savings brought by demand-controlled ventilation.

Technical Data

Models

GMW86P	CO_2	CO_2 current and voltage output, Pt1000
GMW86PT	CO_2	CO_2 current and voltage output, Pt1000, Temp setpoint
GMW83RP*	CO_2+RH+T	Voltage outputs, Pt1000
GMW83DRP*	CO_2+RH+T	Voltage outputs, Pt1000, Display
GMW83	CO_2+T	Voltage outputs
GMW83T	CO_2+T	Voltage outputs, Temp setpoint
GMW83A	CO_2+T	Voltage outputs, CO_2 indicator LED:s
GMW83D	CO_2+T	Voltage outputs, Display
GMW84	CO_2+T	CO_2 current output
GMW84S	CO_2+T	CO_2 current output, Relay

*models with calibration certificate available

Performance

CARBON DIOXIDE

Measurement range	0 ...2000 ppm
Accuracy	
+20 ...+30 °C	±(30 ppm +3 % of reading)
+10 ...+20 °C, +30 ...+40 °C	±(35 ppm +3.7 % of reading)
+0 ...+10 °C, +40 ...50 °C	±(40 ppm +4.8 % of reading)
Stability in typical HVAC conditions	±(15 ppm + 2 % of reading) over 5 years
Warm-up time	1 min; 10 min for full specification
Response time (63 %)	60s
Carbon dioxide sensor	Vaisala CARBOCAP®GM10

TEMPERATURE

Measurement range	0 ...50 °C
Sensor (on P models)	Pt1000 RTD Class F0.15 IEC 60751
Sensor (for analog outputs)	Digital temperature sensor
Accuracy (GMW83, GMW84)	
+10 ...+30 °C	±0.5 °C
+0 ...+10 °C, +30 ...50 °C	±1 °C

HUMIDITY

Measurement range	0 ...95 %RH
Temperature range	+10 ...+30 °C
0 ...80 %RH	±3 %RH
80 ...95 %RH	±5 %RH
Temperature range	0 ...+10 °C, +30 ...+50 °C
0 ...95 %RH	±7 %RH
Stability in typical HVAC applications	±2 %RH over 2 years
Product lifetime	>15 years

Operating Environment

Operating temperature range	0 ...+50 °C (+32 ...122 °F)
Operating humidity range	0 ...95 %RH
	Dew point <30 °C (+86 °F)
Storage temperature range	-40 ...+70 °C (-40 ...158 °F)
Display models	-30 ...+70° C (-22 ...158 °F)
Electromagnetic compliance	EN61326-1, Industrial Environment

Mechanics

IP class	IP30
Housing material	ABS/PC UL-V0 approved
Housing color	White (RAL9003)
Output connector	Screw terminal
	max. wire size 2mm² (AWG14)
Weight	114 g (Plain and LED version)
	120 g (Setpoint version)
	124 g (Display version)

Inputs and Outputs

Supply voltage	18 ...35 VDC, 24 VAC ±20 % 50/60 Hz
Max. current consumption at 18 VDC	
GMW83/86	45 mA
GMW84	70 mA
Max power consumption at 30 VAC	
GMW83	0.7 W
GMW84	1.2 W
GMW86	1 W
Relay (GMW84S)	1 pc (max 50 VDC, 500 mA)
Outputs (see model table)	4 ...20 mA and/or 0 ...10V
CO_2 output scale	0 ...2000 ppm
Temperature output scale	0 ...50 °C
Humidity output scale	0 ...100 %RH
Passive temperature sensor (P models)	Pt1000 RTD
Temperature setpoint (T models)	10 KΩ potentiometer
LED CO_2 indicator levels (A model)	
flashing red	>2000 ppm
red	1200 ...2000 ppm
yellow	800 ...1200 ppm
green	<800 ppm

Spare Parts and Accessories

CO_2 module	GM10SP80
INTERCAP® sensor	15778HM

GMD20 Series Carbon Dioxide Transmitters
Demand Controlled Ventilation Applications

The GMD20 series transmitters are designed for use in ventilation-related applications.

Features/Benefits

- Versatile transmitters
- Reliable measurement with sensor inside the duct
- 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 is 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 GMD20 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 affected by dust, water vapor and most chemicals.

Versatile Transmitters

The GMD20 series transmitters can be used independently, or incorporated into building energy management systems. The series consists of duct mount units GMD20 and GMD20D. Version D has a display.

The duct units' compact sensor head design fits inside the ventilation duct, eliminating 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 two other options: one LonWorks® interface and a relay output. The relay output is standard with the display units.

Improve Indoor Air at Minimal Energy Costs

The use of the GMD20 series transmitters ensures the best possible control of air quality and results in considerable savings in energy consumption, maintenance and recalibration costs.

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

Inputs and Outputs

Outputs	0 ... 20 or 4 ... 20 mA and 0 ... 10 V
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 mm²
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

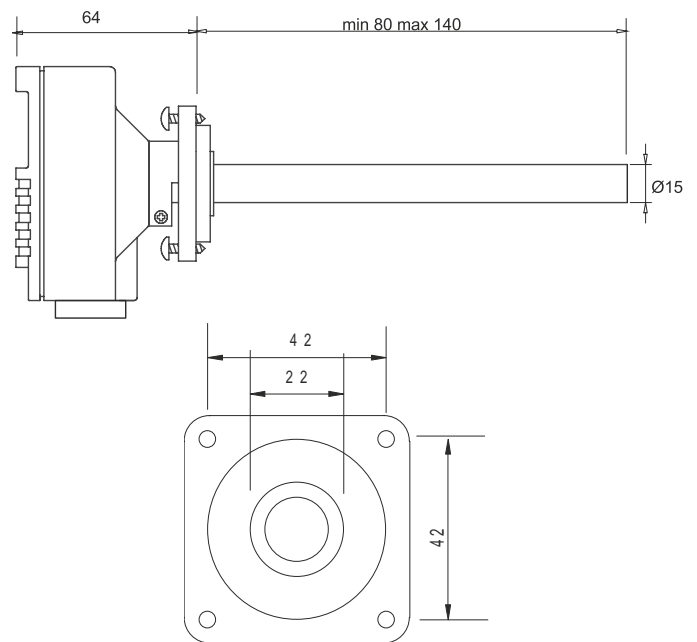|	
Housing material	ABS plastic
Housing classification (GMD20 electronics housing)	IP65
Weight: GMD20 (D)	140 g (170 g)

Accessories and Options

Display and relay option for GMD20	GMI21
Relay output option	GMR20
LonWorks® module with CO_2 signal	GML20
(Not available when display option is added)	
Serial COM adapter	19040GM
Hand-held meter for field verification	GM70

Dimensions

Dimensions in mm

GMD20 and GMD20D

Vaisala CARBOCAP Carbon Dioxide Probe GMP231

The Vaisala CARBOCAP® Carbon Dioxide Probe GMP231 withstands high temperature sterilization.

Features/Benefits

- Probe durable during heat sterilization up to +180 °C (+356 °F)
- Incubator can be sterilized with probe in place – saving time and reducing risk of cross-contamination
- Heat durability and superior long-term stability with next generation CARBOCAP® sensor
- Designed for OEM use in CO_2 incubators – installation options available
- CO_2 sensor measurement optimized for 5 %CO_2, measurement range up to 20 %CO_2
- 4-point NIST traceable calibration (certificate included) for CO_2
- Internal pressure and temperature measurement improves accuracy and stability
- Full temperature and pressure compensations available
- Sensor head heating for condensation prevention

The Vaisala CARBOCAP® Carbon Dioxide Probe GMP231 is designed to provide incubator manufacturers with accurate and reliable carbon dioxide measurements and sterilization durability at high temperatures. The probe is based on Vaisala's patented CARBOCAP® technology and a new type of infrared (IR) light source. These technologies allow for sterilization temperatures of up to 180 ˚C, enabling easier and more complete sterilization without the risk of cross contamination.

The probe is installed through the incubator wall, ensuring that only the IR sensor and optical components are exposed to the incubation environment. This allows the incubator to be sterilized with the probe in place, removing the need to decontaminate the probe separately. This saves time and reduces the risk of contamination.

The probe's sensor performance is optimized at 5 % CO_2 but the sensor measures CO_2 up to 20 % with high accuracy. In addition, the GMP231 can measure pressure and temperature for CO_2 measurement compensation purposes, ensuring the product remains stable and accurate in all CO_2 incubation conditions. The sensor is made of highly durable materials to achieve outstanding stability over both time and temperature. Since water vapor, dust, and most chemicals do not affect measurements, the GMP231 module is ideal for CO_2 incubator environments.

Technical Data

Performance

Measurement range	0 ... 20 %CO_2
Accuracy at 37 °C, 1013 hPa:	
Repeatability at	
0 ... 8 %CO_2	±0.1 %CO_2
8 ... 12 %CO_2	±0.2 %CO_2
12 ... 20 %CO_2	±0.4 %CO_2
Non-linearity at 0 ... 20 %CO_2	±0.1 %CO_2
Calibration uncertainty at 5 %CO_2	±0.1 %CO_2
Temperature dependence	
with compensation at	
3 ... 12 %CO_2, 20 ... 60 °C	±0.1 %CO_2
without compensation (typical)	-0.4 % of reading / °C
Pressure dependence	
with compensation at	
3 ... 12 %CO_2, 700 ... 1100 hPa	±0.015 % of reading / hPa
without compensation (typical)	+0.15 % of reading / hPa
Humidity dependence	
with compensation at	
0 ... 20 %CO_2, 0 ... 100 %RH	±0.9 % of reading (at 37 °C)
without compensation (typical)	+0.05 % of reading / %RH
O_2 dependence	
with compensation at	
0 ... 20 %CO_2, 0 ... 90 %O_2	±0.6 % of reading
without compensation (typical)	-0.08 % of reading / %O_2
Start-up time	10 s
Warm-up time for full spec.	1 min
Response time	
T63	< 30 s
T90	< 50 s
Long-term stability	
0 ... 8 %CO_2	<±0.2 %CO_2 / year
8 % ... 12 %CO_2	<±0.5 %CO_2 / year
12 % ... 20 %CO_2	<±1.0 %CO_2 / year

Operating Environment

Operating temperature for CO_2 measurement	0 ... 70 °C
Max. temperature durability in standby-mode (sensor head only)	up to +195 °C
Heat sterilization +180 °C durability	at least 120 cycles
Storage temperature	-40 ... +75 °C
Pressure (compensated)	500 ... 1100 hPa
operating	<1500 hPa
Humidity	0 ... 100 %, non-condensing
Condensation prevention	sensor head heating, when power on

Chemical tolerance

DMSO	
IPA (70 % isopropyl alcohol, 30 % water)	
H_2O_2 (2000 ppm), non-condensing	
Ethanol	
Acetic acid	
Electromagnetic compatibility	EN61326-1, Generic Environment

Inputs and Outputs

|	
Operating voltage	11 ... 30 VDC
when analog output in use	20 ... 30 VDC
Digital outputs	I²C 5 V, RS-485
	(2-wire with Vaisala industrial protocol)
Analog output	0 ... 20 mA (scalable) max. load 600 Ω
Power consumption	< 1 W (pulsed)

Mechanics

Probe housing material	
Housing	Metal coated plastic ABS+PC
Inner tube	Aluminum
Probe tube	PPSU
Filter	PTFE
Housing classifications	
sensor head	IP54
electronics housing	IP20
Connector	M12 / 8 pin
Weight	
probe (without cable)	150 g
probe (with cable	200 g

Accessories

M12 Connection Cable 0.9m w/ open ends	DRW240977SP
M12 Connection Cable 0.6m w/ Milli-Grid connector	ASM210903SP
Service cable for MI70	221801
Silicone plug	DRW240015SP
Attachment Bracket	DRW240247SP
PTFE filter	DRW240494SP
USB PC connection cable	221040
Calibration adapter for GMP231	239523

Dimensions

Probe tube max. diameter	30.2 mm
Probe tube min. diameter	24.8 mm
Probe tube length	118.5 mm
Sensor filter diameter	19 mm
Sensor filter length	12 mm
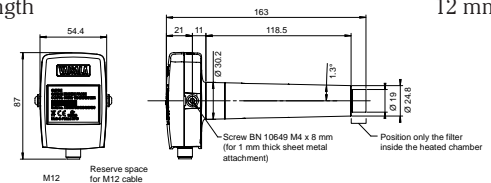
GMP343 Carbon Dioxide Probe for Demanding Measurements

Features/Benefits

- Excellent accuracy and stability

- Vaisala CARBOCAP® Sensor, a silicon-based non-dispersive infrared (NDIR) sensor

- A single-beam, dual-wavelength CO_2 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 CO_2 soil respiration, ambient CO_2 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 CO_2 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

* Always at least ±10 ppm CO_2.

Temperature compensation is performed by an integrated Pt1000 element

Technical Data

Effect on accuracy **with** pressure compensation:

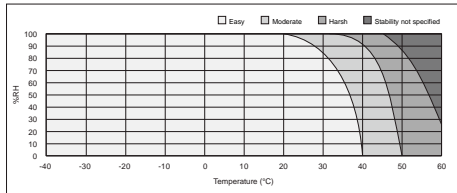| CO₂ range options	0 ... 1000 ppm	0 ... 2000 - 2 %
Pressure (hPa)	Accuracy (% of reading)	
900 ... 1050	±0.5	±1
700 ... 1300	±1	±2

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

* Always at least ±10 ppm CO₂.

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	
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