VAISALA

Product Catalogue

Contents

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VAISALA

OPT100 Optimus DGA Monitor

For power transformers

Advanced DGA monitoring

- Maintenance-free operation without consumables
- Intuitive user experience
- Smart analysis tools
- Oil sampling with vacuum gas extraction
- Long-term measurement stability through autocalibration and IR reference measurement
- Total gas pressure detects air leaks without oxygen sensors
- Robust mechanics
- Easy installation
- Manufactured in Vaisala's cleanroom
- Optional O_2 and N_2 measurement

Vaisala OPT100 Optimus™ DGA Monitor is the solution for safe-guarding critical transformers in harsh environments. It delivers out-of-the-box performance, eliminates false alarms, and gives you long-term, stable measurements for all fault gases.

Prevent transformer failure

Over 50 percent of serious power transformer faults can be detected and severe failures prevented ahead of time with the right online monitoring tools. Vaisala OPT100 Optimus™ DGA Monitor is robust and intuitive to use with real-time, trouble-free fault gas monitoring. Optimus™ is the culmination of decades of experience, extensive research, and it builds on customer needs. Made with safety and reliability in mind, it is ready for the most demanding operating environments.

Intuitive and smart design

The web-based user interface eliminates the need for additional software. Optimus™ can be connected to an existing control and monitoring system using digital communication and relays, or used as a standalone monitoring device. And in case of a disturbance such as a power outage, self-diagnostics enable automatic self-recovery. Optimus™ can be installed in less than 2 hours: connect oil, power, and data – and you're set.

Reliable data – no false alarms

With autocalibration and IR reference measurement, Optimus™ provides reliable gas trending data at all times. Vacuum gas extraction eliminates fluctuation caused by oil temperature or pressure, and the hermetically sealed and protected optics prevent sensor contamination. Moisture and hydrogen are measured directly in the oil with our capacitive thin-film polymer HUMICAP® sensor and solid-state sensors. The IR sensor is based on Vaisala core measurement technology and components manufactured in our own cleanroom. With the data, you can make critical operational decisions.

Robust construction

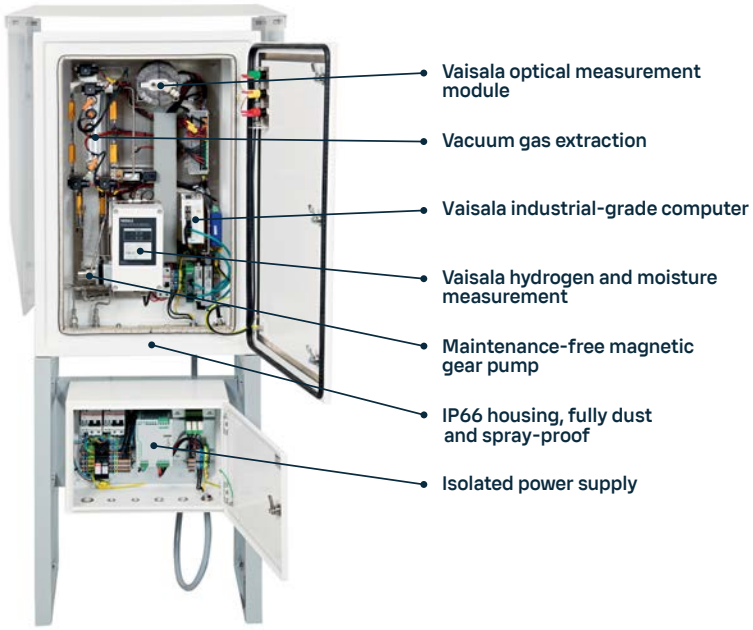
Stainless steel pipes, IP66-rated housing, as well as a magnetic drive gear pump and valves bring ensure performance and durability – from the arctic to the tropics. Optimus™ has no consumables to service or replace.

Air leak detection using total gas pressure

Oxygen accelerates the aging of transformers, potentially cutting years from their operational life. Optimus™ DGA Monitor measures the total dissolved gas pressure of the sampled oil volume and detects any air leaks on sealed transformers even without oxygen sensors. In case of an air leak into the transformer's tank, the majority of the dissolved gases are nitrogen and oxygen, and the proportion of fault gases in the pressure value is negligible. The pressure trend of the dissolved gasses gives a reliable indication of a leak, as nitrogen is the dominant component, and it is not formed or consumed in reactions inside the transformer. With the optional oxygen sensor, Optimus™ DGA Monitor can also detect if there is abnormal oxidation active that is consuming oxygen in the transformer.

DGA diagnostics with Duval Triangles

The publicly available and commonly used dissolved gas analysis method for transformer fault diagnostics purposes, Duval Triangles (IEC 60599, Annex B), is available as an optional feature. The user interface displays the progression of data points from the past year overlaid on top of Duval Triangles.



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Technical data

Measurement specification

Parameter [1]	Range	Accuracy [2] [3]	Repeatability [3]
Methane (CH_4)	0–10 000 ppm_v	±4 ppm or ±5 % of reading	10 ppm or 5 % of reading
Ethane (C_2H_6)	0–10 000 ppm_v	±10 ppm or ±5 % of reading	10 ppm or 5 % of reading [4]
Ethylene (C_2H_4)	0–10 000 ppm_v	±4 ppm or ±5 % of reading	10 ppm or 5 % of reading
Acetylene (C_2H_2)	0–5000 ppm_v	±0.5 ppm or ±5 % of reading	1 ppm or 5 % of reading
Carbon monoxide (CO)	0–10 000 ppm_v	±4 ppm or ±5 % of reading	10 ppm or 5 % of reading
Carbon dioxide (CO_2)	0–10 000 ppm_v	±4 ppm or ±5 % of reading	10 ppm or 5 % of reading
Hydrogen (H_2)	0–5000 ppm_v	±15 ppm or ±10 % of reading	15 ppm or 10 % of reading
Moisture [5] (H_2O)	0–100 ppm_w [6]	±2 ppm [7] or ±10 % of reading	Included in accuracy
Oxygen (O_2) [8]	0–50 000 ppm_v	±200 ppm or ±10 % of reading	Included in accuracy
Nitrogen (N_2) [8]	0–150 000 ppm_v	±5000 ppm or ±15 % of reading	Included in accuracy
Total gas pressure	0–2000 hPa	±10 hPa or ±2 % of reading	10 hPa or 5 % of reading

1) *ppm values are defined as µl/l according to IEC 60567 standard conditions.*
2) *Accuracy specified is the accuracy of the sensors during calibration gas measurements.*
3) *Whichever is greater.*
4) *Repeatability of ethane measurement is specified with averaging of five measurements.*
5) *Measured as relative saturation (%RS).*
6) *Upper range limited to saturation.*
7) *Calculated ppm value is based on average solubility of mineral oils.*
8) *Optional parameter.*

Measurement operation

Measurement cycle duration	1–1.5 h (typical)
Response time for fault gases (T63)	One measurement cycle [1]
Warm-up time until first measurement data available	Two measurement cycles
Initialization time to full accuracy	Two days
Data storage	At least 10 years [2]
Expected operating life	> 15 years

1) *Three cycles for ethane and hydrogen.*
2) *Data storage may run out of space after 20 years of measurements. To keep the old data, it is recommended to download it every 10 years.*

Field performance

Parameter	Typical variance to laboratory DGA [1] [2]
Acetylene (C_2H_2)	±1 ppm or ±10 % of reading
Hydrogen (H_2)	±15 ppm or ±15 % of reading
Other gases (CH_4, C_2H_6, C_2H_4, CO, CO_2)	±10 ppm or ±10 % of reading
Moisture (H_2O)	±2 ppm or ±10 % of reading

1) *Compared with gas chromatography result from an oil sample considering also laboratory uncertainty. Performance of the gas-in-oil measurement may also be affected by oil properties and other chemical compounds dissolved in oil.*
2) *ppm values are defined as µl/l according to IEC 60567 standard conditions.*

Calculated parameters

Total dissolved combustible gases (TDCG)	Combined total of H_2, CO, CH_4, C_2H_6, C_2H_4, and C_2H_2
24 h average	Available for single gases, moisture, TDCG, and total gas pressure
Rate of change (ROC)	Available for single gases and TDCG for 24 h, 7 d, and 30 d periods
Gas ratios [1]	Available ratios: • CH_4/H_2 • C_2H_2/C_2H_4 • C_2H_2/CH_4 • C_2H_6/C_2H_2 • C_2H_4/C_2H_6 • CO_2/CO • O_2/N_2

1) *Calculated from 24 h average values. See standard IEC 60599.*

Power supply

Operating voltage	OPTPSU1: 100–240 V AC, 50–60 Hz, ±10 % OPTPSU2: 110–220 V DC, ±10 %
Overvoltage category	III
Maximum power consumption	500 W
Typical power consumption at +25 °C (+77 °F)	100 W

Outputs

RS-485 interface	
Supported protocols	Modbus RTU, DNP3 (optional feature)
Galvanic isolation	2 kV RMS, 1 min
Ethernet interface	
Supported protocols	Modbus TCP, HTTP, HTTPS, DNP3 (optional feature), IEC 61850 (optional feature)
Galvanic isolation	4 kV AC (50 Hz, 1 min)
Relay outputs	
Number of relays	3 pcs, normally open (NO) or normally closed (NC), user- selectable
Trigger type	Gas alert with user-selectable limits
Max. switching current	6 A (at 250 V AC) 2 A (at 24 V DC) 0.2 A (at 250 V DC)
Auxiliary device interface	
Maximum power	48 W
Voltage output	24 V DC
User interface	
Interface type	Web-based user interface, can be operated with standard web browsers

Mechanical specifications

Oil fitting	Stainless steel Swagelok® fitting for 10 mm (0.39 in) outer diameter tubing.
Max. length of oil pipe to transformer for mineral oil	Max. 10 m (33 ft) with 7 mm (0.28 in) inner diameter tubing [1)] Max. 5 m (16 ft) with 4 mm (0.15 in) inner diameter tubing
Max. length of pipe to transformer for ester liquid	Max. 10 m (33 ft) with 8 mm (0.31 in) inner diameter tubing
Housing material	Marine aluminum (EN AW-5754) (DGA Monitor), stainless steel AISI 316 (OPTPSU)
Installation options	Ground Mounting Set, Wall Mounting Set, Antivibration Wall Mounting Set

1) Bigger pipe volume will increase response time.

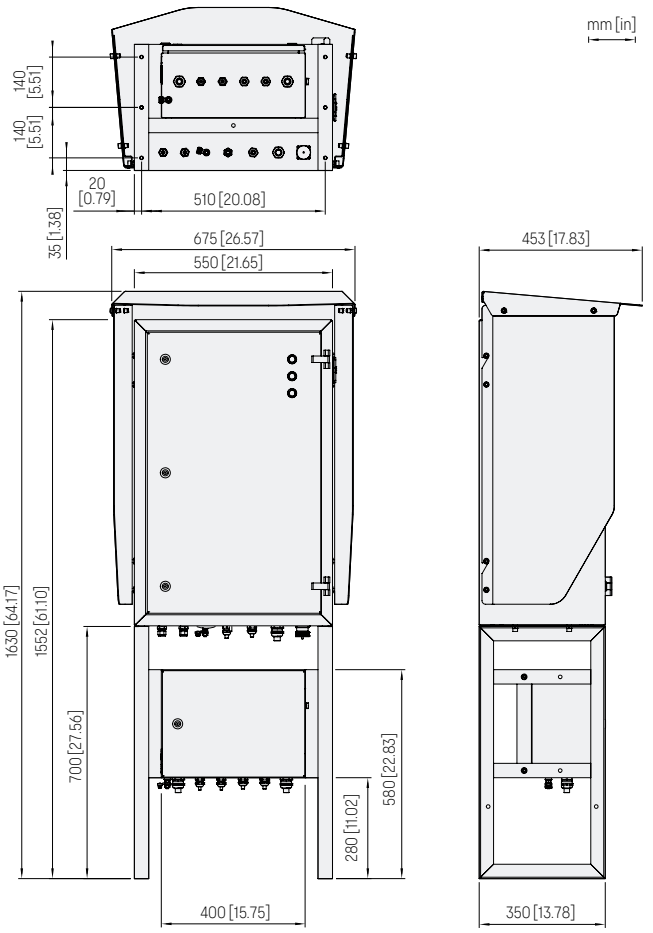
Operating environment

Transformer liquid type [1)]	Mineral oil or ester liquids
Required minimum fire point of insulation liquid [2)]	+125 °C (+257 °F)
Transformer oil pressure at oil inlet	Max. 2 bar (absolute) continuous Burst pressure 20 bar (absolute)
Transformer insulation liquid temperature at oil inlet	Max. +100 °C (+212 °F) Min. +0 °C (+32 °F) for ester liquids Min. temperature for mineral oil depends on the pour point of the mineral oil.
Ambient humidity range	0–100 %RH, condensing
Ambient temperature range in operation	−40 ... +55 °C (−40 ... +131 °F)
Storage temperature range	−40 ... +60 °C (−40 ... +140 °F)
IP rating	IP66

1) Selected when ordering the device.
2) "The fire point [of transformer oil] is normally approximately 10 °C [18 °F] higher than the closed flash point." Heathcote, Martin J. The J & P Transformer Book. 13th ed. Elsevier, 2007.

Compliance

EU directives and regulations	EMC Directive (2014/30/EU) Low Voltage Directive (2014/35/EU) OPT100 is specifically designed to be installed as part of another type of equipment that is excluded from the RoHS directive (2011/65/EU) scope.
EMC immunity	EN 61326-1, industrial environment IEC 61000-6-5, class 4
EMC emissions	FCC 47 CFR 15, section 15.107, class A ISED ICES-003, section 5(a)(i), class A
Safety	IEC/EN/UL/CSA-C22.2 61010-1
Environmental	IEC 60068-2-1 IEC 60068-2-2 ISO 6270-1:2017, constant humidity condensation atmosphere, C5 ISO 9227:2017, salt fog, C5 IEC 61010-1:2010/AMD1:2016, pollution degree 4 (outdoor), 3 (industrial area), 2 (device internal)
Compliance marks	CE, China RoHS, EAC, RCM



Dimensions with Ground Mounting Set

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MHT410 Moisture, Hydrogen, and Temperature Transmitter

For online transformer condition monitoring

Features and benefits

- Measures moisture and hydrogen directly in transformer oil
- Compatible with mineral oil, natural ester oil, synthetic ester oil, and silicone oil
- Easy to install
- Provides early warning on potential transformer faults
- Unique probe design allows for direct measurement in oil
- 5-year standard warranty
- Robust design providing reliable operation and no false alarms
- Maintenance-free operation
- No cross-sensitivity to other gases
- Indigo520 compatible, with easy access to measurement data

Vaisala MHT410 Moisture, Hydrogen and Temperature Transmitter provides reliable online monitoring of insulating oil in power transformers.

Real-time measurement

Vaisala Moisture, Hydrogen and Temperature Transmitter MHT410 provides an accurate real-time measurement result for critical parameters measured in oil, enabling reliable conclusions on the transformer's condition. With its unique probe design, MHT410 delivers accurate measurement and trend data about the health of the transformer in real time.

Enabling proactive maintenance decisions

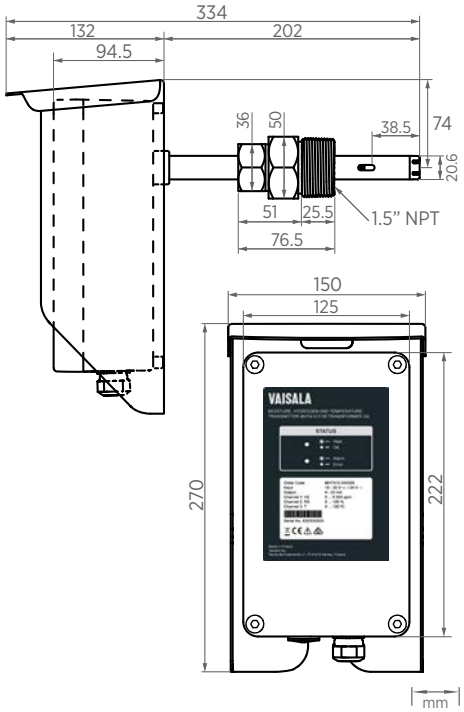
All of the transmitter's measured parameters are available through digital and analog outputs, providing information on transformer fault situations and enabling timely, proactive maintenance decisions to minimize expensive service shutdowns and outages.

MHT410 is also compatible with the Vaisala Indigo500 series transmitters. With its local graphical display, Indigo520 is a great addition to MHT410. It helps you to identify data trends at the site, as well as power the MHT410 with a single-wire solution.

Robust and maintenance-free operation

MHT410 is designed for ease of use in demanding environments. It has undergone extensive testing to ensure it withstands wide temperature changes, vibration, and harsh outdoor conditions. The transmitter has no consumables or moving parts that could break, and is encased in an IP66-rated metal housing equipped with a weather shield.

Every unit is individually tested for a pressure of at least 10 bar and also withstands vacuum conditions. Special attention has been given to EMC tolerance: for example, all electrical connections are isolated. MHT410 can also tolerate short-term power outages.



Technical data

Measurement performance

Hydrogen	
Measurement range (in oil)	0–5000 ppm_v
Accuracy [1) 2)]	±10 % of reading or ±15 ppm_v (whichever is greater)
Repeatability	±10 % of reading or ±15 ppm_v (whichever is greater)
Minimum detection limit	15 ppm_v
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 % of full response: 2 h (when sensor is not in reference cycle)
Warm-up time	2 h, 12 h for full specification
Sensor	Catalytic palladium-nickel alloy film solid-state sensor
Moisture in oil	
Measurement range (in oil)	0–100 %RS / a_w 0–1
Response time (90 % of full response at +20 °C (+68 °F) in still oil)	10 min
Sensor	HUMICAP® 180L2
Accuracy (including non-linearity, hysteresis, and repeatability):	
0–90 %RS	±2 %RS (a_w ± 0.02)
90–100 %RS	±3 %RS (a_w ± 0.03)
Temperature	
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

1) The H_2 accuracy specified is the accuracy during calibration against gas in oil standard. Field performance may be affected, for example, by variation in hydrogen solubility (partition coefficients) between different mineral oils.
2) The H_2 accuracy specified is applicable in the oil temperature specified (−20 ... +75 °C (−4 ... +167 °F)).

Inputs and outputs

Operating voltage	15–30 V DC, 24 V AC (±15 %) (power supply input is galvanically isolated) [1)]
Power consumption	Typical 4 W, maximum 12 W
Analog output (current) [1)]	
Channels	3 isolated 4–20 mA (loop-powering)
External load	Max. 500 Ω
Error status indication in case of device error	3.5 mA default, user-configurable for each channel
mA output accuracy at +20 °C (+68 F)	±0.125 % full scale
Temperature dependence of the analog outputs	±0.006 % / °C full scale
Digital outputs [1)]	
Interfaces	Isolated RS-485 half-duplex RS-485 (Service Port, non-isolated)
Protocols	Modbus® RTU, DNP3, serial ASCII
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

1) Max. isolation voltage 1.5 kV DC.

Mechanical specifications

Mechanical connection on transmitter	1.5″ NPT (male)
Cable gland (optional, for use with Indigo520)	M20×1.5 for cable diameter 5 ... 9 mm (0.20–0.35 in)
Cable gland (optional)	M20×1.5 for cable diameter 8 ... 11 mm (0.31–0.43 in)
Cable gland (optional)	M20×1.5 for cable diameter 11 ... 14.5 mm (0.43–0.57 in)
Conduit fitting (optional)	1/2″ NPT
Interface cable (optional, pre-assembled)	5 m (16 ft 5 in), 9.2 mm (0.36 in) outer diameter
Interface cable (optional)	10 m (33 ft), 9.2 mm (0.36 in) outer diameter
Interface cable (optional, for use with Indigo520)	10 m (33 ft), 6.2 mm (0.24 in) outer diameter
Housing material	AlSi 10 Mg
Transmitter weight without cables	4.1 kg (9.04 lb)
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 (5 bara nominal)
Factory warranty	5 years

Operating environment

Oil type	Mineral oil / Natural ester oil / Synthetic ester oil / Silicone oil
Operating temperature of probe head	−40 ... +120 °C (−40 ... +248 °F)
Operating temperature of enclosure	−40 ... +60 °C (−40 ... +140 °F)
Storage temperature	−40 ... +60 °C (−40 ... +140 °F)
Operating humidity	0–100 %RH, condensing
Pressure tolerance (probe, short-term)	Max. 10 bara
Pressure tolerance (probe, continuous)	Max. 4 bara
Integrated protection for short power outages	> 3 s
IP rating	IP66

Compliance

EU directives and regulations	EMC, RoHS
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B (when DC powered)
Environmental	ISO 6270-1:2017, constant humidity condensation atmosphere, C5-M ISO 9227:2017, salt fog, C5-M ISO 12994-6, Paints and varnishes — Corrosion protection of steel structures by protective paint systems, part 6, C5
Compliance marks	CE, EAC, RCM, UKCA

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VAISALA

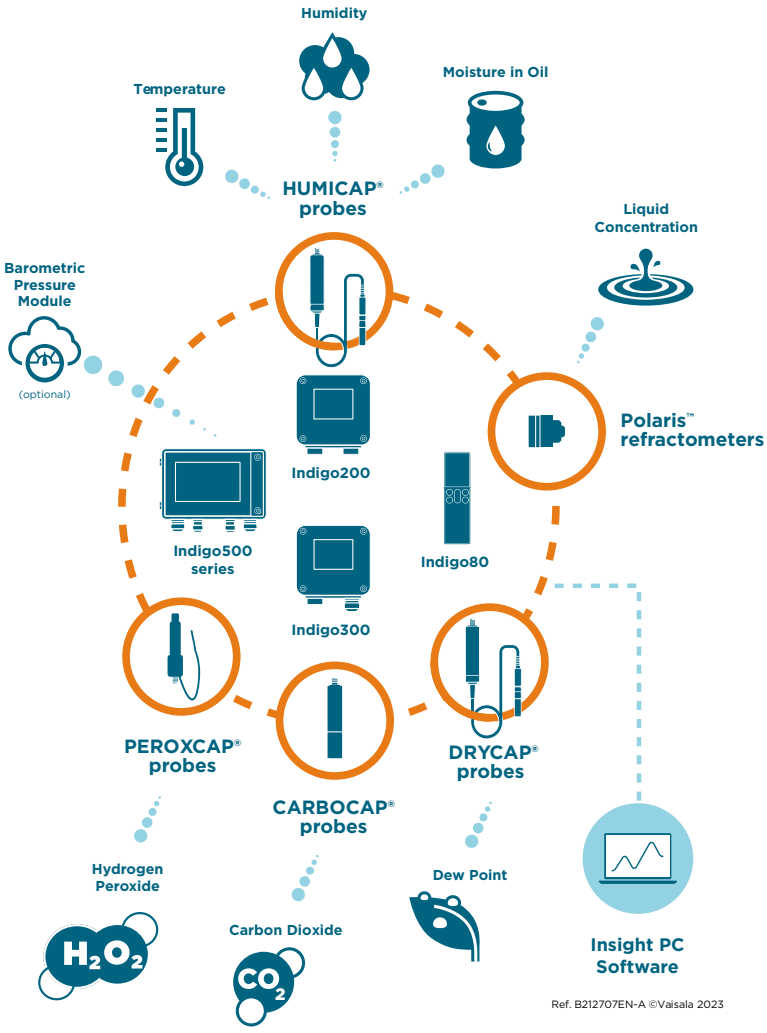
INDIGO

Probes
Transmitters
Software
Applications

Brochure

Modular measureme system to fit every n

Interchangeable probes, robust transmitters, and Vaisala Insight software create a strong Indigo ecosystem to ensure energy efficiency, safety, and end-product quality in your operations. The modular plug-and-play design makes Indigo probes and transmitters easy to install, use, and maintain.



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The Vaisala Indigo Family in brief

- **Fits your needs.** The modular design allows you to choose the elements that are a perfect fit for your measurement needs.
- **Reliable.** Ensures accurate and stable measurements with world-leading measurement sensor technology and robust transmitter design.
- **Simple to install, use, and maintain.** The plug-and play design ensures smooth installation, calibration, and maintenance of measurement devices.
- **Easy access to data.** Access measurement data visualization, and probe configuration with the Indigo transmitter or Vaisala Insight software.
- **Future-proof measurements.** All probes feature Modbus RTU over RS-485 for flexible connectivity. Indigo transmitters provide additional connectivity options with analog and relay outputs.

Probes with high accuracy and stability

- Comprehensive probe selection for measuring various parameters
- Based on premium Vaisala sensor technologies
- Use stand-alone or with Indigo transmitters
- Modern, compact design

Robust transmitters with value-adding functionalities

- Plug-and-play probe connection
- Dual-probe model enables multi-parameter measurement
- Easy data evaluation and visualization
- Additional connectivity, power, and wiring options

Insight software for easy self-service and data visualization

- User-friendly graphical interface
- Quick access to probe data
- Smooth field calibration
- Easy probe configuration
- Connect up to six devices simultaneously
- Data logging functionality

What combination is the best for you?

Indigo compatible probes

Humidity and temperature probes

	HMP1 ambient measurement in indoor spaces and wall-mounting	HMP3 general-purpose use and duct-mounting	HMP4 high-pressure or vacuum environments	HMP5 high temperature environments
				
MEASUREMENT RANGE	0 ... 100 %RH -40 ... +60 °C (-40 ...+140 °F)	0 ... 100 %RH -40 ... +120 °C (-40 ... +248 °F)	0 ... 100 %RH -70 ... +180 °C (-94 ... +356 °F)	0 ... 100 %RH -70 ... +180 °C (-94 ... +356 °F)
ACCURACY AT +23 °C (+73.4 °F)	±1.0 %RH (0 ... 90 %RH) ±0.2 °C (±0.36 °F)	±0.8 %RH (0 ... 90 %RH) ±0.1 °C (±0.18 °F)	±0.8 %RH (0 ... 90 %RH) ±0.1 °C (±0.18 °F)	±0.8 %RH (0 ... 90 %RH) ±0.1 °C (±0.18 °F)
OPERATING ENVIRONMENT TEMPERATURE	-40 ... +60 °C (-40 ... +140 °F)	probe head -40 ... +120 °C (-40 ... +248 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head -70 ... +180 °C (-94 ... +356 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head -70 ... +180 °C (-94 ... +356 °F) probe body -40 ... +80 °C (-40 ... +176 °F)
OPERATIONAL PRESSURE			< 100 bar	
OUTPUT PARAMETERS	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio
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Indigo-compatible humidity and temperature probes are based on the space-proof Vaisala HUMICAP® technology, the world's first thin-film capacitive humidity sensor. Vaisala HUMICAP™ sensors guarantee quality and reliability, with a reputation for accuracy, excellent long-term stability, and negligible hysteresis.

Indigo-compatible humidity probes are suitable for a wide range of applications from industrial processes to life science and building automation. They provide a comprehensive list of output parameters, including relative humidity, temperature, dew point temperature, wet bulb temperature, absolute humidity, mixing ratio, water vapor pressure, and enthalpy. All probes are supplied with RS-485 non-isolated Modbus RTU output.

HMP7 high-temperature and/or condensing environments	HMP8 high-pressure or leak-tight installation	HMP9 rapidly changing environments	TMP1 demanding temperature measurements
			
0 ... 100 %RH -70 ... +180 °C (-94 ... +356 °F)	0 ... 100 %RH -70 ... +180 °C (-94 ... +356 °F)	0 ... 100 %RH -40 ... +120 °C (-40 ... +248 °F)	-70 ... +180 °C (-94 ... +356 °F)
±0.8 %RH (0 ... 90 %RH) ±0.1 °C (±0.18 °F)	±0.8 %RH (0 ... 90 %RH) ±0.1 °C (±0.18 °F)	±0.8 %RH (0 ... 90 %RH) ±0.1 °C (±0.18 °F)	±0.06 °C (±0.108 °F) *
probe head -70 ... +180 °C (-94 ... +356 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head -70 ... +180 °C (-94 ... +356 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head -40 ... +120 °C (-40 ... +248 °F) probe body -40 ... +60 °C (-40 ... +140 °F)	probe head -70 ... +180 °C (-94 ... +356 °F) probe body -40 ... +80 °C (-40 ... +176 °F)
< 10 bar	< 40 bar		
Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Temperature Water vapor saturation pressure
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*) when including the ISO17025 accredited calibration

Dew point probes

Indigo-compatible dew point probes feature Vaisala's trusted DRYCAP® technology, specifically designed for humidity measurement in dry environments. The DRYCAP® sensor is particularly renowned for its reliable performance in hot and very dry environments. These probes excel in a range of applications, from drying processes to compressed air, dry chambers, and industrial ovens. All probes are supplied with RS-485 non-isolated Modbus RTU output.

	DMP5 high temperatures	DMP6 very high temperatures	DMP7 leak-tight installation	DMP8 high-pressure or leak-tight installation
				
MEASUREMENT RANGE	Dew point -40 ... +100 °C (-40 ... +212 °F) Td/f Temperature 0 ... +180 °C (+32 ... +356 °F) Mixing ratio 0 ... 1000 g/kg (0 ... 7000 gr/lbs) Absolute humidity 0 ... 600 g/m3	Dew point -25 ... +100 °C (-13 ... +212 °F) Td/f Mixing ratio 0 ... 1000 g/kg (0 ... 7000 gr/lbs)	Dew point -70 ... +80 °C (-94 ... +176 °F) Td/f Temperature 0 ... +80 °C (+32 ... +176 °F) Relative humidity 0 ... 70 %RH Concentration by volume 10 ... 2500 ppm	Dew point -70 ... +80 °C (-94 ... +176 °F) Td/f Temperature 0 ... +80 °C (+32 ... +176 °F) Relative humidity 0 ... 70 %RH Concentration by volume 10 ... 2500 ppm
ACCURACY	Dew point ±2 °C (±3.6 °F) Td/f Temperature ±0.4 °C (±0.72 °F) at +100 °C (+212 °F) Mixing ratio ±12 % of reading Absolute humidity ±10 % of reading (typical)	Dew point ±2 °C (±3.6 °F) Td/f Mixing ratio ±12 % of reading	Dew point Up to ±2 °C (±3.6 °F) Td/f Temperature ±0.2 °C at room temperature Relative humidity ±0.004 %RH + 20% of reading (RH <10 %RH, at + 20 °C) Concentration by volume 1 ppm + 20% of reading (at + 20 °C, 1 bar)	Dew point ±2 °C (±3.6 °F) Td/f Temperature ±0.2 °C at room temperature Relative humidity ±0.004 %RH + 20% of reading (RH <10 %RH, at + 20 °C) Concentration by volume 1 ppm + 20% of reading (at + 20 °C, 1 bar)
OPERATING ENVIRONMENT TEMPERATURE	probe head -40 ... +180 °C (-40 ... +356 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head +100 ... +350 °C (+212 ... +662 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head -40 ... +80 °C (-40 ... +176 °F) probe body -40 ... +80 °C (-40 ... +176 °F)	probe head -40 ... +80 °C (-40 ... +176 °F) probe body -40 ... +80 °C (-40 ... +176 °F)
OPERATIONAL PRESSURE			0 ... 10 bar (0 ... 145 psia)	0 ... 40 bar (0 ... 580 psia)
OUTPUT PARAMETERS	Absolute humidity Relative humidity Dew point temperature Temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Enthalpy Water vapor saturation pressure Mixing ratio	Dew point temperature Water concentration Dew/frost point temperature Water mass fraction Water vapor pressure Mixing ratio	Absolute humidity Relative humidity Dew point temperature Temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Enthalpy Water vapor saturation pressure Mixing ratio	Absolute humidity Relative humidity Dew point temperature Temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Enthalpy Water vapor saturation pressure Mixing ratio
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Carbon dioxide (CO_2) probes

Indigo-compatible carbon dioxide (CO_2) probes are based on Vaisala's unique CARBOCAP® technology that provides exceptional stability. They are ideal for applications such as incubators, greenhouses, food storage and transport, animal shelters, and demand-controlled ventilation. They can even be installed outdoors.

	GMP251 %-level measurements	GMP252 ppm-level measurements
		
MEASUREMENT RANGE	0 … 20 % CO_2	0 … 10,000 ppm CO_2 (up to 30 000 ppm CO_2 with reduced accuracy)
ACCURACY	At 5 %CO_2 ±0.1 %CO_2 At 0 … 8 %CO_2 ±0.2 %CO_2 At 8 … 20 %CO_2 ±0.4 %CO_2	0 … 3000 ppm CO_2 ±40 ppm CO_2 3000 … 10 000 ppm CO_2 ±2 % of reading Up to 30 000 ppm CO_2 ±3.5 % of reading
LONG-TERM STABILITY	At 0 … 8 %CO_2 ±0.3 %CO_2/year At 8 … 12 %CO_2 ±0.5 %CO_2/year at 12 … 20 %CO_2 ±1.0 %CO_2/year	0 … 3000 ppm CO_2 ±60 ppm CO_2/year 3000 … 6000 ppm CO_2 ±150 ppm CO_2/year 6000 … 10 000 ppm CO_2 ±300 ppm CO_2/year
OPERATING ENVIRONMENT TEMPERATURE	-40 … +60 °C (-40 … +140 °F)	–40 … +60 °C (–40 … +140 °F)
OUTPUT OPTIONS	0 … 5/10 V (scalable), min. load 10 kΩ 0/4 … 20 mA (scalable), max. load 500 Ω RS-485: Modbus, Vaisala Industrial Protocol	0 … 5/10 V (scalable), min. load 10 kΩ 0/4 … 20 mA (scalable), max. load 500 Ω RS-485: Modbus, Vaisala Industrial Protocol
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Vaporized hydrogen peroxide (H2O2) probes

Indigo-compatible vaporized hydrogen peroxide (H2O2) probes feature Vaisala's unique PEROXCAP® technology, which enables accurate and repeatable measurement of vaporized H2O2, relative humidity / saturation (%RH / %RS), and temperature during bio-decontamination with a single probe.

	HPP271 H2O2 vapor concentration	HPP272 H2O2 vapor concentration, relative saturation, humidity, and temperature
		
MEASUREMENT RANGE	0 … 2000 ppm +5 … +50 °C (+41 … +122 °F)	10…2000 ppm +5 … +50 °C (+41 … +122 °F) 0 … 100 %RS 0 … 100 %RH
ACCURACY	At +10 … +25 °C (+50 … +77 °F) , 10 … 2000 ppm H2O2 ±10 ppm or 5 % of reading (whichever is greater)	At +10 … +25 °C (+50 … +77 °F) , 10 … 2000 ppm H2O2 : ±10 ppm or 5 % of reading (whichever is greater) ±4 %RS At +25 °C (77 °F), 0 ppm H2O2 0 … 90 %RH ±1 %RH
OPERATING ENVIRONMENT TEMPERATURE	+0 … +70 °C (+32 … +158 °F)	+0 … +70 °C (+32 … +158 °F)
OUTPUT PARAMETERS	Vaporized hydrogen peroxide concentration by volume Water concentration by volume	Absolute H2O2 and H2O H2O ppm by volume, water vapor saturation pressure (H2O and H2O+H2O2) dew point temperature vapor pressure (H2O and H2O2)
OUTPUT OPTIONS	RS-485, not isolated; do not use termination on the RS-485 line	RS-485, not isolated; do not use termination on the RS-485 line
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Moisture-in-oil probe

Indigo-compatible probe MMP8 incorporates the Vaisala HUMICAP 180L2 sensor, which is optimized for moisture in oil applications. The probe is suitable for demanding moisture measurement in a range of oils such as transformer, hydraulic, and lubrication oils and includes a CIGRE recommended traceable calibration certificate.

	MMP8
	
MEASUREMENT RANGE	Water activity 0 … 1 aw Temperature -40 … +180 °C (-40 … +356 °F)
T90 RESPONSE TIME	10 min
ACCURACY	Water activity ±0.01 aw (±1 %RS) Water concentration in oil 10 % of the reading Temperature ±0.2 °C (0.36 °F) at +20 °C (+68 °F)
OPERATING ENVIRONMENT TEMPERATURE	probe head -40 … +180 °C (-40 … +356 °F) probe body -40 … +80 °C (-40 … +176 °F)
OPERATING PRESSURE RANGE	0 … 40 bar (0 … 580 psia)
OUTPUT PARAMETERS	Relative saturation (%RS) Temperature (°C) Water activity Water concentration in oil (ppmv)
OUTPUT OPTIONS	RS-485, not isolated
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Indigo Transmitters

Host devices for indigo smart probes

Vaisala Indigo transmitters offer many features that complement Indigo-compatible probes. They enable real-time data visualization and access to probe configurations. They also offer additional connectivity, supply voltage, and wiring options compared to using a stand-alone smart probe.

	INDIGO500 TRANSMITTER SERIES		INDIGO300 TRANSMITTER	INDIGO200 TRANSMITTER SERIES	
	Indigo520	Indigo510	Indigo300	Indigo202	Indigo201
					
DISPLAY	Touchscreen color LCD display or non-display with LED indicator	Touchscreen color LCD display or non-display with LED indicator	Color LCD display with LED indicator	Color LCD display	Color LCD display or non-display with LED indicator
COMMUNI-CATION	Modbus TPC/IP	Modbus TPC/IP	Analog output	RS-485, Modbus RTU	Analog output
ANALOG OUTPUTS	4 pcs	2 pcs	3 pcs (pre-configured)	No	3 pcs
RELAYS	2 pcs	No	No	2 pcs	2 pcs
ANALOG INPUTS	1 pc	No	No	No	No
POWERING	15 ... 35 VDC 24 VAC 100 ...240 VAC PoE+	11 ... 35 VDC 24 VAC	15 ... 30 VDC 24 VAC	15 ... 30 VDC 24 VAC	15 ... 30 VDC 24 VAC
GALVANIC ISOLATION	Yes	Yes	No	No	No
DATA LOGGING	10 years' storage with 24 h interval logging	10 years' storage with 24 h interval logging	No	No	No
REMOTE ACCESS VIA INSIGHT PC SOFTWARE	Yes	Yes	Yes	Yes	Yes
ENCLOSURE	Metal, IP66, NEMA4	Metal, IP66, NEMA4	Metal, IP66	Plastics, IP65	Plastics, IP65
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Barometric pressure measurement

The Indigo520 transmitter with the barometric pressure measurement module combined with one or two of the Indigo-compatible humidity and temperature measurement probes is a unique combination of a meteorological-grade barometer in a single industrial device. Measure three parameters simultaneously: barometric pressure, humidity and temperature. The device incorporates Vaisala's proprietary, space-proof HUMICAP® and BAROCAP® technologies.

Software

Vaisala insight PC software

Vaisala Insight PC Software provides quick access to the configuration options and calibration data of Indigo-compatible probes. Probes can be detached from the process and connected to a PC with a USB cable to access Insight PC software. The software, which features an intuitive graphical user interface, also allows probe field calibration and adjustments. It also enables easy testing and evaluation – the 48-hour data logging functionality allows data to be recorded from up to six devices simultaneously, with easy export to an Excel-readable format.

- Configurate devices to fit perfectly to your needs
- Calibrate and adjust probes on-site
- Run tests and analyze results with 48h data logging functionality

Indigo80 handheld indicator

For portable diagnostics

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

Features

- Dual-probe, high-accuracy portable diagnostics and data logging tool. Log up to a month's worth of measurement data.
- Industry standard USB-C interface for data uploads and battery charging. Lithium-ion battery provides a typical operation time of 10 hours.
- Robust, durable aluminum body is resistant to chemicals and dust.
- Multilingual, menu-based user interface available in 10 languages. View live measurement data as numbers or graphs.
- Intuitive user interface that guides the user if needed. Designed to be easy to use.

INDIGO80 Handheld Indicator	
	
OPERATING ENVIRONMENT	Temperature -20 ... +50 °C (-4 ... +122 °F) Humidity 20 ... 85 %RH, when Ta ≤ +40 °C (+104 °F)
MAX. NUMBER OF CONNECTED PROBES	2
DATA LOGGING CAPACITY	Up to 5.5 million real-time data values
LOGGING INTERVAL	1 s ... 12 h
LOGGING DURATION	1 min ... memory full
ALARM	Audible alarm function
SUPPORTE LANGUAGES	English, Chinese, Finnish, French, German, Italian, Japanese, Portuguese, Spanish, Swedish
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Indigo80 handheld probes

	HMP80N Humidity and temperature handheld probe	HMP80L Humidity and temperature handheld probe	DMP80A Dew point and temperature handheld probe	DMP80B Dew point and temperature handheld probe
				
MEASUREMENT RANGE	0 … 100 %RH -20 … +60 °C (-4 …+140 °F)	0 … 100 %RH -50 … +120 °C (-58 … +248 °F), shorttime measurement range -50 … +180 °C (-58 …+356 °F)	Dew point -40 … +60 °C (-40 …+140 °F) Td/f Temperature 0 … +60 °C (+32 … +140 °F) Mixing ratio 0 … 150 g/kg (0 … 1050 gr/lbs) Absolute humidity 0 … 130 g/m3	Dew point -70 … +60 °C (-94 … +140 °F) Td/f Temperature -10 … +60 °C (+14 …+140 °F) Relative humidity 0…70 %RH Concentration by volume 10 … 2500 ppm
ACCURACY AT +23 °C (+73.4 °F)	±0.8 %RH (0 … 90 %RH) 0.1 °C (0.18 °F)	±0.8 %RH (0 … 90 %RH) 0.1 °C (0.18 °F)	Dew point Up to ±2 °C (±3.6 °F) Td/f Temperature ±0.2 °C (±0.36 °F) at room temperature Mixing ratio ±12 % of reading Absolute humidity 0 … 130 g/m3	Dew point Up to ±2 °C (±3.6 °F) Td/f Temperature ±0.2 °C (±0.36 °F) at room temperature Relative humidity (RH <10 %RH, at +20 °C): ±0.004 %RH + 20 % of reading Concentration by volume (at + 20 °C, 1 bar) 1 ppm + 20 % of reading
OPERATING ENVIRONMENT TEMPERATURE	probe head -20 … +60 °C (-4 …+140 °F) probe body -10 … +60 °C (-14 …+140 °F)	probe head -50 … +120 °C (-58 … +248 °F) probe body -10 … +60 °C (-14 …+140 °F)	-10 … +60 °C (+14 …+140 °F)	-10 … +60 °C (+14 …+140 °F)
OPERATING PRESSURE OF PROBE HEAD			0 … 20 bar (absolute) (0 … 290 psi (absolute))	0 … 20 bar (absolute) (0 … 290 psi (absolute))
OUTPUT PARAMETERS	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Temperature Wet-bulb temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Water vapor saturation pressure Enthalpy Mixing ratio	Absolute humidity Relative humidity Dew point temperature Temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Enthalpy Water vapor saturation pressure Mixing ratio	Absolute humidity Relative humidity Dew point temperature Temperature Dew/frost point temperature Water concentration Water mass fraction Water vapor pressure Enthalpy Water vapor saturation pressure Mixing ratio
IP RATING	Cable attached IP67 Without cable IP55	Cable attached IP67 Without cable IP55	Cable attached IP67 Without cable IP55	Cable attached IP67 Without cable IP55
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Indigo for Vaisala's process refractometers

	PR53AC	PR53AP	PR53GC
			
MEASUREMENT	Measure Brix and other liquid concentrations	Measure Brix and other liquid concentrations	Measure concentrations of acids, alkaline solutions, alcohols, hydrocarbons, solvents, and various other solutions
BENEFIT	Inline measurement with instant productivity and material gains, and simplified process operation	Inline measurement with instant productivity and material gains, and simplified process operation	Inline measurement directly in pipeline, in production transport, and quality control
INDUSTRY	Food, beverage, dairy, and brewery	Food, beverage, dairy and brewery, including OEMs	Chemical, and other industries
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Accurate liquid concentration measurements

Vaisala Polaris® process refractometers are now Indigo compatible. Expand features with Indigo and get the most out of your measurement, including data logging, wash control, settings, measurement parameters and service updates. Select two analog or digital inputs for process refractometers and other Indigo compatible probes, and four configurable analog outputs to alarm relays, and ModBus TCP/IP digital protocol.

PR53GP	PR53SD	PR53W	PR53M
			
Measure concentrations of sugars/ Brix, acids, alkaline solutions, alcohols, hydrocarbons, solvents, and various other solutions	Measure TDS and other concentrations	Measure concentrations of aggressive chemicals: sulphuric acid (H_2SO_4), hydrochloric acid (HCl), sodium hydroxide (NaOH), and hydrofluoric acid (HF)	Measure concentrations of aggressive chemicals, including hydrochloric acid (HCl), sodium hydroxide (NaOH), sodium chloride (NaCl), sulphuric acid (H_2SO_4), and hydrofluoric acid (HF)
Inline measurement directly in pipelines and tanks, in production transport and perform quality control	Process optimization, black liquor, green liquor, brown stock washing, and other liquid concentrations in fiber and chemical recovery lines	Durability in the harshest conditions. Measure safely and accurately in large pipelines and tanks, The PR53W process refractometer is mounted in a membrane-lined valve body, with no metallic wetted parts included. This allows convenient flange mounting to 1 and 2 inch ANSI and DN50 and DN25 flanges.	Durability in the harshest conditions. Measure safely and accurately, the integrated ultra-pure PTFE flow cell has no metallic wetted parts, making it fully suitable to be in contact with aggressive chemicals. The PR53M mounts into ½ inch process line with a standard NTP-threaded connection.
Sugar, chemical, petrochemical, and other industries	Pulp, paper	Chemical, biochemical, mining and metal refining	Chemical, semiconductor
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Indigo for power transformers

Real-time moisture measurement for power transformers

Get robust and reliable always-on data about your power transformer's condition. Make smarter decisions on maintenance need and the next steps to take. Simply connect Vaisala's MHT410 and MMP8 probes to your Indigo transmitter.

- Monitor the moisture gradient between top and bottom oil in ONAN(F) cooled transformers
- Ensure you don't compromise your oil's dielectric strength
- Monitor the operational efficiency of an online oil dryer

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Indigo for outdoor measurement

Outdoor weather kit for accurate measurement data

Protect your measurements from weather without compromising the data. Indigo500MIK brings you a unique combination of a meteorological grade barometer in a single industrial device, combined with high-class humidity and temperature measurements. Get your professional grade measurements in robust, weatherproof enclosure.

All the measurement devices are well protected from the outdoor elements

- the probes are installed inside solar radiation shields
- the probe wires are located inside an aluminum enclosure
- the transmitter is covered by a rain shield

Solutions across the solar energy life cycle

It's no accident that Vaisala has developed its solar portfolio to overlay the most crucial stages in the solar lifecycle. Evolving the solar industry requires integrated, end-to-end solutions that empower stakeholders wherever they are — whether they're developers, funders, manufacturers, EPCs, asset managers, O&M contractors, energy traders, or anyone else.

Accordingly, we organize our solar solutions in several intuitive focus areas:

Development

Construction
and commissioning

Operations and
life management

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Applications that matter most

		Prospecting & development	Construction & commissioning	Operations & life management
		· Site prospection · Solar resource assessment · PV plant design/technology selection · Repowering	· Construction planning · Worker safety · Power performance testing	· Power performance monitoring · Asset management and protection · Retrofit and performance increase · O&M planning and worker safety · Minutes/hour/day ahead forecasting · Asset performance analysis/seasonal outlook
Sensors & systems	All-in one compact weather sensor (WXT536)			●
Sensors & systems	IEC-compliant weather station for PV plant performance monitoring (AWS810 Solar Edition)	●	●	●
Xweather digital services	Historian	●		
Xweather digital services	Forecaster			●
Xweather digital services	Thunderstorm Manager		●	●
Xweather digital services	Lightning Data	●	●	●

Solutions at a glance

Vaisala's measurement technologies and data services are ideally suited to a growing, evolving solar industry. Built on trusted principles and technology, they are validated and continuously used around the world. This, along with our global presence and service network, makes them the most easy-to-implement and reliable technologies available.

Automatic Weather Station AWS810 Solar Edition

Vaisala's AWS810 Solar Edition empowers maximum solar power plant performance with smart solar irradiance measurement and weather intelligence.

The smart, secure and modular AWS810 Solar Edition combines reliable measurements, data collection and processing, and connectivity so you can monitor the impact of weather and improve your solar power plant's performance. High-quality sensor data is included for global, diffuse and reflected solar irradiation including all key weather parameters, plus soiling sensors. The accurate, always-on and long-lasting design is IEC 61724-1 compliant and is built to last the entire lifespan of a solar power plant.

Key benefits:

- The smart, turnkey weather monitoring system includes built-in, comprehensive data security
- Modular design is easy to set up and expand with your needs, while ruggedized design and remote diagnostics ensure low life-cycle costs
- End-to-end weather and solar power measurement data, advanced analytics and actionable digital insights cover the whole solar energy life cycle

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Weather Transmitter WXT536

WXT536 is a compact, all-in-one multi-parameter weather sensor that provides crucial data without adding significant costs or complexity. These weather insights are important for safe construction and operations, as well as performance monitoring of photovoltaic (PV) plants as described in the IEC 61724-1:2021 standard.

Key benefits:

- Simplicity and efficiency courtesy of a compact, rugged design and proven measurement technology. With low power consumption and optional sensor heating, WXT536 requires almost no maintenance.

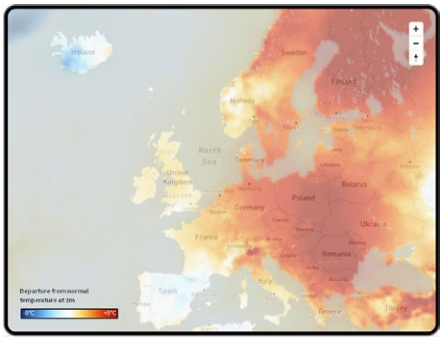
- Well-suited to solar operations and compliance needs due to its six measured parameters:

  - Rainfall
  - Wind speed
  - Wind direction
  - Air pressure
  - Temperature
  - Humidity

- Straightforward integration with Automatic Weather Station AWS810 Solar Edition, expansion with a wide range of connectivity options, and simple third-party integration.

Historian

Historian, part of our Xweather family of subscription based products, offers solar developers, consultants, and PV asset owners access to long-term historical solar and typical meteorological year (TMY) data to drive decisions, create comparison reports, and analyze output year over year. Historian helps you maximize value from solar projects with accurate, bankable time series tools, GIS visualizations, prospecting maps, solar climate variable analyses, and solar performance reconciliations.

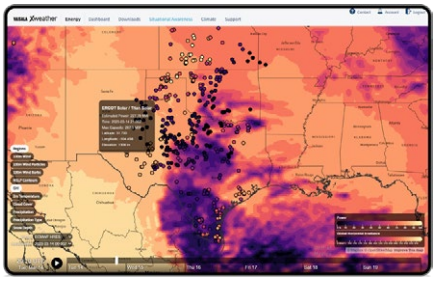


Key benefits:

- Trusted, bankable data derived from decades of satellite imagery, global weather data, and cutting-edge models.
- Accurate prediction of project success using highquality baselines.
- Visualization of climate trends and anomalies with 40+ years of historical temperature, wind speed, direct normal irradiance, and global horizontal irradiance data.
- Easy-to-use graphical interface and simple data integration through an API.

Forecaster

Forecaster, part of our Xweather family of subscription based products, uses cutting-edge weather and environmental modeling, robust data science, and powerful supercomputing to forecast the amount of power generated by solar projects up to ten days ahead.



This valuable data helps PV asset owners, project managers, and energy traders make confident, data-driven decisions at site-specific and regional levels to effectively manage investments, reduce future risks, and gain a competitive edge in energy markets.

Key benefits:

- Site-specific and regional solar energy forecasting, analysis, and verification tools.
- Accurate solar energy forecasts from 5 minutes to 240 hours ahead.
- Intuitive, map-based visualization of solar energy production across major electricity trading regions in the United States and parts of Canada.
- Easy access with a customizable dashboard or bring forecasts directly into your systems through an API.

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Thunderstorm Manager

Monitoring nearby thunderstorms is critical for protecting people, equipment and assets during the construction, commissioning and operation of solar power projects. Thunderstorm Manager, part of our Xweather family of subscription based products, delivers an all-in-one solution for lightning risk management, real-time storm monitoring and automated lightning alerts for any location worldwide.

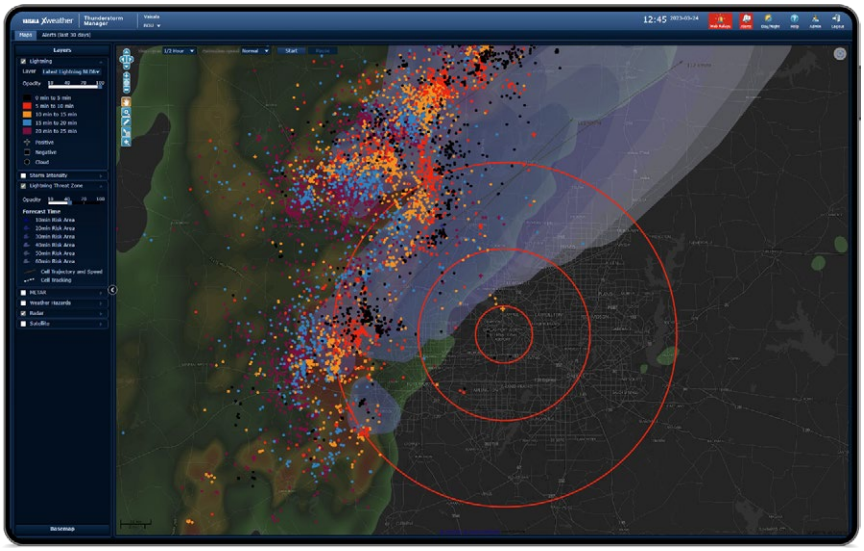
With real-time delivery from strike to alert in 30 seconds or less and 99.99% availability, Thunderstorm Manager delivers accurate, reliable lightning data wherever and whenever you need it.

Key benefits:

- Maximize safety, minimize downtime, and make safety decisions with confidence with multichannel alerts, all-clear notifications and API connectivity.
- Real-time lightning alerts for any site or location worldwide — including remote areas not covered by radar.
- Lightning Threat Zone visualizes storm cell trajectories and risk areas in 10-minute intervals up to 60 minutes in advance.
- Cloud-based software solution replaces the need to buy, install and maintain lightning detection equipment.

Applications:

- Improve site safety and protect technicians during construction, commissioning, and operations with real-time storm tracking and automated lightning alerts.
- Integrate lightning alerts into your systems and safety protocols with the secure API. Review the 30-day alert history to prioritize inspections, maintenance and repairs.
- Automatically warn construction crews and technicians with beacons and sirens to stop work and seek shelter. Send allclear notifications when it is safe to resume work.



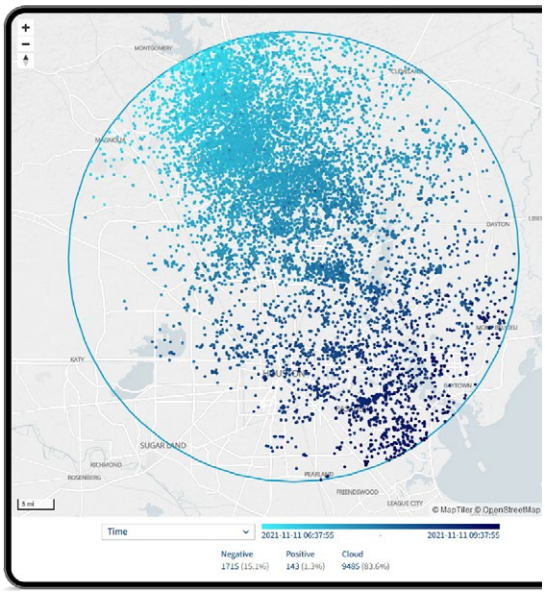
No one captures more lightning than Vaisala. Our industry-leading lightning detection networks detect 99.9% of thunderstorms worldwide, recording more than two billion lightning events every year with unmatched detection efficiency and locational accuracy. It's no wonder Xweather is the primary source of lightning data for the U.S. Armed Forces, National Weather Service, Federal Aviation Administration, and many electric utilities.

Xweather lightning data

Safety and operational efficiency are critical priorities for the solar energy industry. Xweather lightning data provides fast and easy access to real-time and historical lightning data to help energy companies manage lightning risk at every stage in the solar energy life cycle.

Key benefits:

- Quick and easy access to real-time and historical lightning data for data-driven safety and planning practices, advanced risk assessments and incident reporting.
- Global coverage and outstanding locational accuracy, even for remote sites beyond the reach of radars and satellites. Data feeds boast greater than 99.99% uptime with a latency of 30 seconds or less.
- Choose from a variety of delivery methods, file types and APIs for maximum flexibility in bringing lightning data into your systems, processes, and protocols. Or use the visual web interface for instant, intuitive data access.
- Extensive data for each lightning event includes event type (cloud-to-ground stroke or in-cloud pulse), date and time with millisecond accuracy, precise latitude and longitude, peak current and polarity, Strike Damage Potential, and more.
- Eliminates the need to purchase, install, operate and maintain your own lightning detection sensors.



Applications:

- Accurately assess a site's lightning risk when prospecting locations for PV plants.
- Protect onsite technicians and avoid costly downtime during the construction, commissioning, and operation of solar power projects.
- Improve your incident response, inspection, and maintenance processes by intelligently identifying ground strikes with greater potential to cause damage or start fires.
- Fast and easy access to comprehensive historical lightning data to enhance reporting for management, legal teams, unions, and external stakeholders.

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