M212305EN-F.1

User Guide

Intrinsically Safe Humidity and Temperature Transmitter Series

HMT370EX



VAISALA

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1. About this document

1.1 Version information

Table 1 Document versions (English)

Document code	Date	Description
M212305EN-F.1	September 2026	NEPSI certificate updated.

Document code	Date	Description
M212305EN-F	March 2025	Indigo80 compatibility information added. Analog output testing in Insight PC software moved to the Diagnostics view. Configuration options for environmental compensation, filtering, and calculation coefficients moved to the Measurements menu in Insight PC software, separate Probe menu removed. Insight PC software Advanced mode requirements for configuration revised. Added information about temporary settings when configuring a detached probe. FCC compliance statement added. Added information about clipping and error limits in analog output configuration. Weather shield installation information added. HMP378F and HMP378H parameter names updated. Sleep mode removed from local display. Updated local display example views. Added sections: • FCC Part 15 compliance statement (page 16) • Pole mounting and attaching weather shield (page 88) • Indigo80 handheld indicator (page 114) • Connecting HMT370EX transmitter and probes to Indigo80 handheld indicator (page 115) • Analog output overrange behavior (page 120) • Temporary environmental settings with detached probe (page 131) • Calibration and adjustment with Indigo80 and reference probe (page 133) Updated sections: • Basic features and options (page 18) • Available measurement parameters (page 22) • HMP378F probe option for measuring oil moisture and temperature (page 80) • HMP378H probe option for measuring JET A-1 fuel moisture and temperature (page 81) • Local display overview (page 99) • Insight main view with transmitter (page 112) • Analog output configuration overview (page 120) • Environmental compensation and measurement settings overview (page 126) • Configuring pressure compensation (page 127) • Configuring filtering factor (page 128) • Configuring calculation coefficients (page 129) • Spare parts and accessories (page 157)

Document code	Date	Description
M212305EN-E	February 2024	Updated IP rating specification. Regional certifications updated: FM certification for Canada added, removed MET and CSA certifications. Updated sections: • Regional safety certification overview (page 27) • US/CAN (FM) safety certification information (page 52) • Specifications (page 146)

1.2 Related manuals

For the latest versions of these documents, see docs.vaisala.com.

Table 2 Related manuals

Document code	Description
M212306EN	Vaisala HMT370EX Intrinsically Safe Humidity and Temperature Transmitter Series Installation and Safety Guide (languages: English,German, French, Dutch, Spanish, Portuguese, Italian, Hungarian, Czech, Polish, Finnish, Estonian, Swedish, Norwegian, Danish)
M212662EN	Vaisala HMT370EX Multilingual Installation and Safety Guide (languages: English and Japanese)
M212704EN	Vaisala HMT370EX Multilingual Installation and Safety Guide (languages: English and Chinese)
M212717EN	Vaisala HMT370EX Multilingual Installation and Safety Guide (languages: English and Korean)
M212733EN	Vaisala HMT370EX Multilingual Installation and Safety Guide (language: English, for US and CAN FM certification)
M212752EN	Vaisala HMT370EX Multilingual Installation and Safety Guide (language: English, for UK/UKEX certification)

1.3 Documentation conventions



WARNING! Warning alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.



CAUTION! Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.



Note highlights important information on using the product.

1.4 Trademarks

Vaisala® and HUMICAP® are registered trademarks of Vaisala Oyj.

All other product or company names that may be mentioned in this publication are trade names, trademarks, or registered trademarks of their respective owners.

1.5 Regulatory statements

1.5.1 FCC Part 15 compliance statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION! Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.5.2 Canada ICES-3 / NMB-3 compliance statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de la classe B est conforme a la norme NMB-003 du Canada.

2. Product overview

2.1 Introduction to HMT370EX series

Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT370EX is the ideal solution for measuring humidity in hazardous areas. Intrinsically safe and robust, HMT370EX operates safely and reliably even in the most hazardous areas, such as Zone 0. HMT370EX transmitters can be used as a replacement for the long-running HMT360 transmitter series in all HMT360 applications.

HMT370EX can be installed directly in explosive areas. It can withstand continuous exposure to potentially explosive environments that contain flammable gases or dust, and requires no additional protective enclosures for operation in either gas or dust environments.

HMT370EX offers several probe options for different applications. Thanks to the detachable probe module, probes can be easily replaced and removed for calibration outside the hazardous area without removing the entire transmitter.

The transmitter has 2 analog current output channels (4–20 mA) for connection via safety barriers. For easy-to-use access to configuration, diagnostics, and calibration and adjustment functionalities, the probe and transmitter body can be connected to Vaisala Insight PC software for configuration either together as one unit or separately.

2.2 Basic features and options

- Available measurement parameters: relative humidity (RH) and temperature (T)
  - For a list of calculated measurement parameters, see Available measurement parameters (page 22).
- Ex classification: IECEx, ATEX, CML, NEPSI, KCs, FM, and UKEX certified for use in Zone 0 and Zone 20 environments: for full Ex classifications, see the region-specific information in Regional safety certification overview (page 27).
- 2 analog outputs (4–20 mA, scalable, isolated)
- Display options: graphical LCD display or non-display model
- Power supply input: 12–28 V
- Compatible with Vaisala Insight PC software and Vaisala Indigo80 handheld indicator

2.3 Hazardous area safety



CAUTION! Do not install or use HMT370EX in a hazardous area before reviewing the safety information relevant to your region: see Regional safety certification overview (page 27).

2.4 Transmitter parts

The external parts of the transmitter are shown in Figure 1 (page 19), and the internal parts of the transmitter are shown in Figure 2 (page 20).

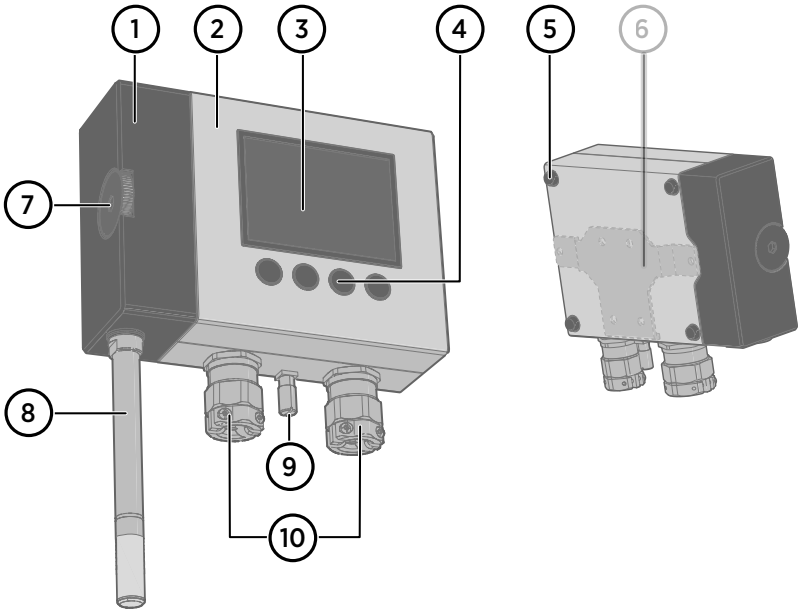


Figure 1 HMT370EX transmitter external parts

1 Detachable probe body
2 Transmitter body (for internal parts, see Figure 2 (page 20))
3 Graphical LCD display (see Display options (page 24))
4 Display interface buttons (see Local display overview (page 99))
5 Wall pads (4 pcs)
6 Retrofit mounting plate for replacing HMT360 installations (optional)
7 Probe body locking wheel
8 Probe head (for information on different probe options, see HMT370EX probe options overview (page 67))
9 Grounding terminal
10 Lead-throughs for wiring (for lead-through accessory options, see Cable gland and conduit options (page 20))

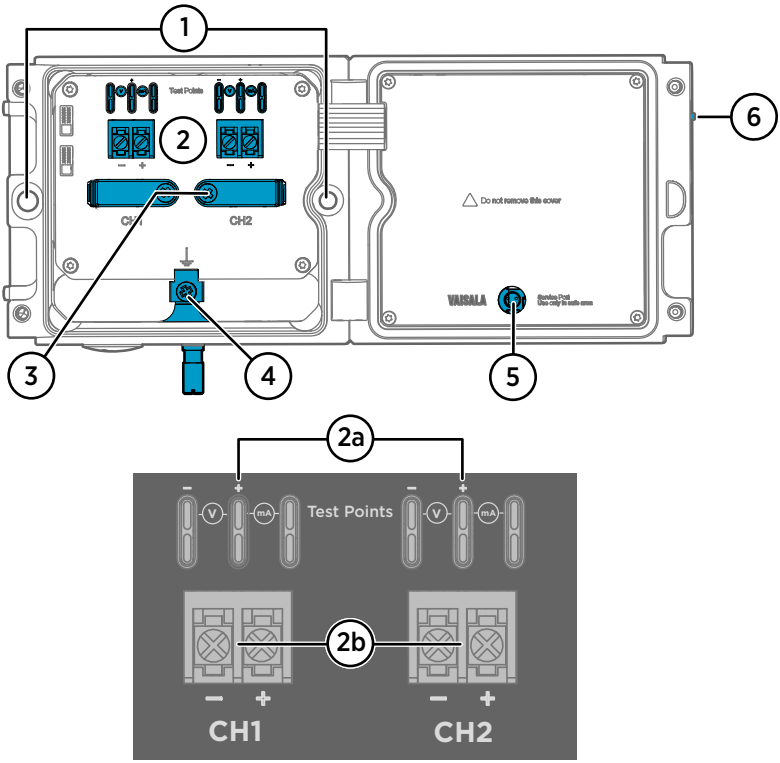


Figure 2 HMT370EX transmitter internal parts

1 Holes for mounting screws
2 Screw terminals and output test points: see **2a** and **2b**
2a Analog output channel 1 and 2 multimeter test points for current and voltage
2b Screw terminals for wiring analog output channels 1 and 2
3 Cable fastening clamps
4 Transmitter grounding terminal
5 Transmitter service port covered with a plug to protect the port (M8, requires Vaisala USB cable accessory)
6 Plug to protect the probe connector when a probe is not connected

2.4.1 Cable gland and conduit options

The HMT370EX transmitter body has two M20x1.5 lead-throughs that can be fitted with cable glands, conduit fittings, and plugs, as required by your application. By default, the transmitter comes delivered with 2 different plug types on the transmitter lead-throughs as shown in Figure 3 (page 21).

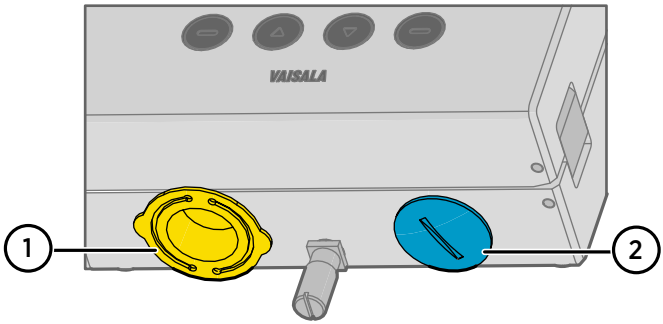


Figure 3 Default plugs in HMT370EX lead-throughs

1 Removable plastic transport cover: must be replaced (fold sides of transport cover together and pull out)
2 Metal sealing plug: can be used in final installation

The plastic transport cover (**1**) must always be replaced with an Ex compliant cable gland, conduit, or seal when wiring HTM370EX. The metal sealing plug (**2**) can be left in place and used in the final installation, if the right-hand lead-through is not used.

Cable glands, conduits, and plugs are available from Vaisala as accessories (listed in Table 3 (page 21)).

Table 3 Cable lead-through accessories

Accessory	Vaisala item code
Cable gland M20 x 1.5 for Ø 5 ... 11 mm cable	265207SP
Cable gland M20 x 1.5 for Ø 10 ... 14 mm cable	265208SP
Conduit fitting M16	265243SP
Conduit fitting NPT1/2"	265240SP
Dummy plug (Ex, 2 pcs)	254931SP

CAUTION! If you use lead-through accessories not ordered from Vaisala, note the following requirements:
- The cable glands and cables used for wiring the device must not impair the Ex protection.
- Unused lead-throughs must be sealed using Ex compliant plugs.
- The glands and plugs must be water and dust tight (minimum IP rating: IP54).

2.5 Available measurement parameters

Table 4 (page 22) lists the available HMT370EX measurement parameter options and their abbreviations and units for the standard probe options HMP371, HMP373, HMP374, HMP375, HMP377, and HMP378.

Table 4 Available measurement parameters for HMP371, HMP373, HMP374, HMP375, HMP377, and HMP378

Parameter	Abbreviation	Unit
Relative humidity	RH	%RH
Temperature	T	°C (°F)
Dew point temperature	T_d	°C (°F)
Dew point / frost point temperature	$T_{d/f}$	°C (°F)
Dew point temperature at 1 atm	T_d (atm)	°C (°F)
Dew/frost point temperature at 1 atm	$T_{d/f}$ (atm)	°C (°F)
Absolute humidity	a	g/m^3 (gr/ft^3)
Mixing ratio	x	g/kg (gr/lb)
Wet-bulb temperature	T_w	°C (°F)
Water concentration	H_2O	ppm_v
Water vapor pressure	pw	hPa (psi)
Water vapor saturation pressure	pws	hPa (psi)
Enthalpy	h	kJ/kg (Btu/lb)
Dew point temperature difference	ΔT	°C (°F)
Absolute humidity at NTP	aNTP	g/m^3 (gr/ft^3)
Water mass fraction	H_2O_w	ppm_w

Table 5 (page 22) lists the measurement parameter options available for the oil and fuel probe variants HMP378F and HMP378H.

Table 5 Available measurement parameters for HMP378F and HMP378H

Parameter	Abbreviation	Unit
Available for both HMP378F and HMP378H		

Parameter	Abbreviation	Unit
Temperature	T	°C (°F)
Relative saturation	RS	%RS
Water activity	a_w	
Only available for HMP378F		
Water content in oil [1)]	H_2O_{oil}	ppm_w
Only available for HMP378H		
Water content in JET A-1 fuel	$H_2O_{Jet\ A\text{-}1}$	ppm_w
Saturation temperature	T_s	°C (°F)

1) *The default calculation coefficients for water content in oil (ppm_w) are valid for mineral transformer oil. For more information on default and oil-specific calculation coefficients, see* *HMP378F calculation model with average oil coefficients (page 129)* and *HMP378F calculation model with oil-specific coefficients (page 130)*.

2.6 Display options

The HMT370EX transmitter can be ordered either with a graphical LCD display, or alternatively without a display. The display options are shown in Figure 4 (page 24).

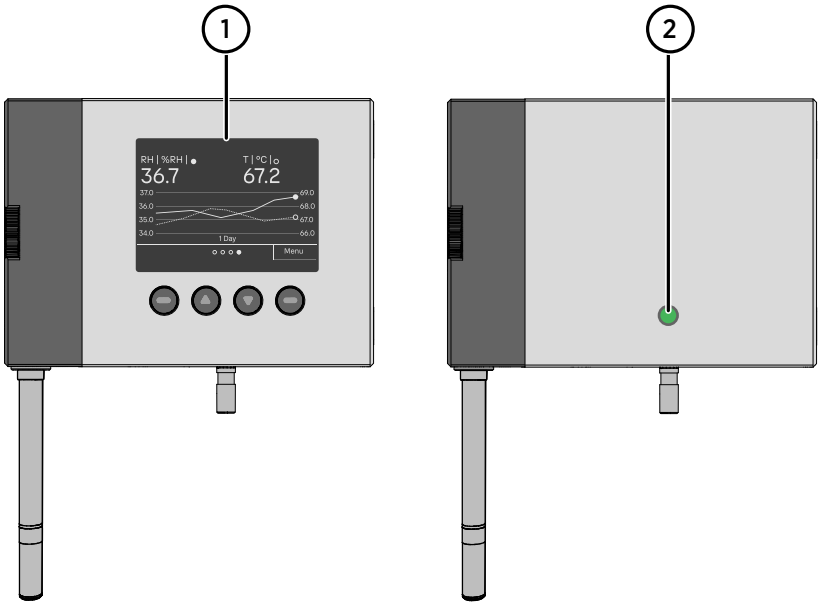


Figure 4 HMT370EX transmitter display options

1 Transmitter with display: LCD display with 4-button interface
2 Transmitter without display: LED status indicator

In the display model, probe and transmitter configuration can be carried out either using the 4-button interface of the display, or by connecting the probe or transmitter to Vaisala Insight PC software or Vaisala Indigo80 handheld indicator. In the model without display, configuration must be carried out with Vaisala Insight PC software or Vaisala Indigo80 indicator.

For information on the display interface, see Local display overview (page 99).

For information on Vaisala Insight PC software, see Vaisala Insight PC software (page 108).

For information on Indigo80, see Connecting HMT370EX transmitter and probes to Indigo80 handheld indicator (page 115).

2.6.1 LED states in transmitter with no display

In the transmitter model with no display, the status LED indicator on the front of the transmitter provides a visual indication of the transmitter's status. If the transmitter LED status indicates that notifications or error messages exist, connect to Vaisala Insight PC software or the Indigo80 indicator to view status information and carry out any required configuration.

For instructions on connecting to Insight, see Connecting to Insight PC software (page 108).

For an overview of the Insight software, see Vaisala Insight PC software (page 108).

For information on Indigo80, see Connecting HMT370EX transmitter and probes to Indigo80 handheld indicator (page 115).

Table 6 LED status indicator states

LED color	Meaning
Not lit	Power off.
Green, fast blinking	Starting up.
Green, not blinking	Power on, normal measurement.
Green, slow blinking	Notification or warning, normal measurement. Connect to Insight to view status information and configure.
Red	Error. Connect to Insight to view status information and configure.
Red and blinking	Critical error. Connect to Insight to view status information and configure.

2.7 Connectivity to Vaisala Insight PC software and Indigo80 handheld indicator

The HMT370EX transmitter and HMT370EX series probes can be connected to Vaisala Insight PC software or the Vaisala Indigo80 handheld indicator, either together as one unit or separately, with Vaisala accessory cables.

When you connect the transmitter or probe to Insight PC software or the Indigo80 indicator, you can:

- Calibrate and adjust the measurement.
- Test and adjust the analog outputs.
- Configure analog output parameter selection, scaling, error, and clipping settings.
- Configure environmental compensations, measurement settings, and local display settings.
- View real-time measurements and device and status information.

The Insight PC software is available for download at www.vaisala.com/insight

Insight PC software connection cable accessories

The following cable accessories are available for connecting the HMT370EX transmitter and probes to Insight PC software:

- M12-USB connection cable for detached probes, Vaisala item code: USB2
- M8-USB connection cable for transmitter service port, Vaisala item code 219690

Indigo80 indicator connection cable accessories

The following cable accessories are available for connecting the HMT370EX transmitter and probes to the Indigo80 indicator:

- M12-M12 connection cable for detached probes, Vaisala item code: 272075SP
- M12-M8 connection cable for transmitter service port, Vaisala item code: 262195SP

More information

- Connecting to Insight PC software (page 108)
- Connecting HMT370EX transmitter and probes to Indigo80 handheld indicator (page 115)

3. HMT370EX regional safety certification information

3.1 Regional safety certification overview

The certification requirements in different regions (for example, ATEX certification in the EU and CML certification in Japan) involve differences in, for example, the specific conditions of use that are applicable to the product in each region. The safety information specific to each region is available in the following chapters:

- ATEX/IECEx safety certification information (page 29)
- Japan safety certification information (page 35)
- China safety certification information (page 41)
- Korea safety certification information (page 47)
- US/CAN (FM) safety certification information (page 52)
- UK (UKEX) safety certification information (page 60)

HMT370EX Series Ex classification by region

The following table shows the Ex classification of HMT370EX in each certification region. For the most up-to-date list of regional certifications, see the HMT370EX product page www.vaisala.com/HMT370EX.

Table 7 Ex classifications by region

Property	Description/value
NOTE: The Ex classifications show the highest level of compliance. Although lower compliance levels are not shown in the classification, they are also included in the classification. For example, compliance with Division 1 also means compliance with Division 2, and compliance with Zone 0 also means compliance with Zone 1 and Zone 2.	
Europe (ATEX)	
Gas classification EU (2014/34/EU)	II 1 G Ex ia IIC T4 Ga
Dust classification	II 1 D Ex ia IIIC T_{200} 85 °C Da
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 12.1 nF, P_i = 700 mW, L_i = 16 µH
Environmental specifications	
T_{amb}	-40 ... +60 °C (-40 ... +140 °F)
P_{amb}	0.8 ... 1.1 bar
International (IECEx)	

Property	Description/value
Gas classification	Ex ia IIC T4 Ga
Dust classification	II 1 D Ex ia IIIC T_{200} 85 °C Da
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 12.1 nF, P_i = 700 mW, L_i = 16 µH
Environmental specifications	
T_{amb}	-40 ... +60 °C (-40 ... +140 °F)
P_{amb}	0.8 ... 1.1 bar
Japan (CML)	
Ex classification	Ex ia IIC T4 Ga Ex ia IIIC T_{200} 85°C Da CML 21JPN2417X
China (NEPSI)	
Ex classification	Ex ia IIC T3-T6 Ga GYJ26.1239X
Korea (KCs)	
Ex classification	Ex ia IIC T4 Ga Ex ia IIIC T200 85 °C Da -40 °C ≤ Tamb ≤ +60 °C IECEx EESF 20.0044.X 21-KA4BO-0891X, 24-KA4BO-0509X
US (FM)	
Ex classification	Class I, Zone 0, AEx ia IIC T4 Ga Zone 20, AEx ia IIIC T85°C Da IS Class I, Division 1, Groups A, B, C, and D T4 IS Class II, III, Division 1, Groups E, F, and G T85°C
CAN (FM)	

Property	Description/value
HMT370EX equipment rating	Intrinsically safe for: Class I, II, III Division 1, Groups A, B, C, D, E, F, and G, T4 Class I, Zone 0, Ex ia IIC T4 Zone 20, Ex ia IIIC Temperature Code T85°C Ta: -40 °C to +60 °C; IP54 (transmitter alone) IP66 (transmitter with the probe body attached)
UK (UKEX)	
Ex classification	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T200 85 °C Da −40 °C ≤ Tamb ≤ +60 °C CML 21UKEX2316X

3.2 ATEX/IECEx safety certification information

This chapter contains the safety certification information (for example, specific conditions of use) related to the ATEX (EU) and IECEx (international) certifications.

A printed version of HMT370EX Installation and Safety Guide (M212306EN) is delivered with the transmitter in ATEX/IECEx deliveries, and the document is also available at docs.vaisala.com.

3.2.1 Using HMT370EX Series transmitters in hazardous locations

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

In hazardous environments, always connect the transmitters via galvanic isolators or Zener barriers. A galvanic isolator or Zener barrier must also be used when the transmitter and probe body are in a safe area, but the probe head is installed in a hazardous environment. For wiring information, see the galvanic isolator and Zener barrier wiring diagrams included in this document.

HMT370EX does not include a galvanic isolator or a Zener barrier. They can be ordered as optional accessories from Vaisala.

WARNING! HMT370EX series transmitters have been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining HMT370EX transmitters are responsible for determining the appropriate protection concept for the specific application HMT370EX is used in, and that the hazardous area classification of the device meets the requirements of the application.

WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.

HMT370EX series transmitters are certified for use in hazardous areas as defined by the following classifications:

Table 8 HMT370EX series hazardous area classifications

Certification	HMT370EX classification
IECEx [1] / ATEX [2]	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C

1) *International certification*
2) *EU certification*

CAUTION! The personnel installing, operating, and maintaining HMT370EX transmitters must have the required competencies for working in the hazardous location, as defined by the applicable standards.

For information on the standards that apply to using HMT370EX based on the classification of the device, see HMT370EX certification documentation and the declarations of conformity related to HMT370EX at www.vaisala.com/declarationofconformity.

3.2.2 Guidelines for safe use in hazardous conditions

HMT370EX Series parts overview

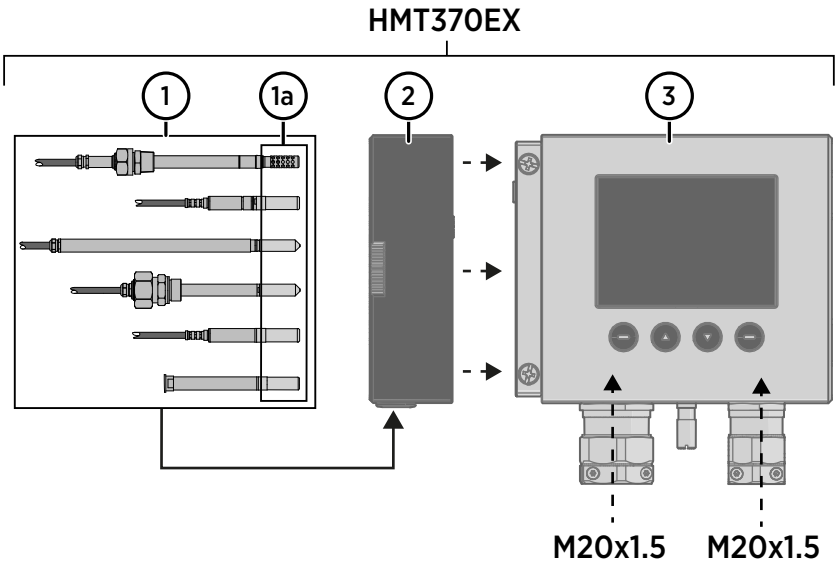


Figure 5 HMT370EX parts overview

HMT370EX Series transmitters consist of 3 main parts: the transmitter body, a detachable probe body, and a probe head attached to the probe body, either directly or using a cable. Figure 5 (page 31) shows the main parts.

1 Probe heads
1a Probe head filters
2 Probe body
3 Transmitter body

CAUTION! Removing or modifying parts is not permitted. Modifications carried out by the user can impair the Ex protection of the device or otherwise damage the device.

The different probe head variants are designed for a range of applications, and have their own specifications. Ensure that the transmitter body, probe body, and probe head are each placed in an environment that matches the specification of the part. For allowed ambient temperature ranges, see Table 9 (page 32).

Table 9 Allowed ambient temperature ranges

Equipment part	Allowed ambient temperature range
Transmitter body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP371	Temperature class T4: -40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP373	**Rubber cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +80 °C (-40 ... +176 °F) **FEP cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +100 °C (-40 ... +212 °F) Temperature class T4: -40 °C ... +120 °C (-40 ... +248 °F)
Probe heads HMP374, HMP375, HMP377, HMP378, HMP378F, and HMP378H	Temperature class T6: -70 °C ... +55 °C (-94 ... +131 °F) Temperature class T5: -70 °C ... +100 °C (-94 ... +212 °F) Temperature class T4: -70 °C ... +135 °C (-94 ... +275 °F) Temperature class T3: -70 °C ... +180 °C (-94 ... +356 °F)

Ingress protection

The IP rating of the transmitter depends on whether the probe body is connected to the transmitter body.

IP rating when the probe body is connected to the transmitter body	IP66
IP rating when the probe body is detached from the transmitter body	IP54

3.2.2.1 Specific conditions of use

CAUTION! With the installation of the equipment in Zone 0 Group II area it has to be ensured that sparks due to impact or friction do not occur.

Wiring requirements

- The cable glands and cables used for wiring the device must not impair the Ex protection.
  - Unused lead-throughs must be sealed using Ex compliant plugs.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).

CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the transmitter body.

Intrinsic safety

The overvoltage category of HMT370EX transmitters is **I** (non-mains equipment), and ambient pollution degree is 4, as specified in IEC 60664-1. For intrinsically safe input parameters, see Table 10 (page 33) .

Table 10 Intrinsically safe input parameters

Parameter	Value	Associated apparatus entity parameters
U_i	28 VDC	$U_o \leq U_i$
I_i	100 mA	$I_o \leq I_i$
P_i	700 mW	$P_o \leq P_i$
C_i	12.1 nF	$C_o \geq C_i + C_{cable}$
L_i	16 µH	$L_o \geq L_i + L_{cable}$

Using analog output test points

There are test points for measuring the voltages and currents of the analog outputs, located above each screw terminal block as shown in Figure 6 (page 34). Accessing the test points on the component board requires opening the transmitter enclosure.

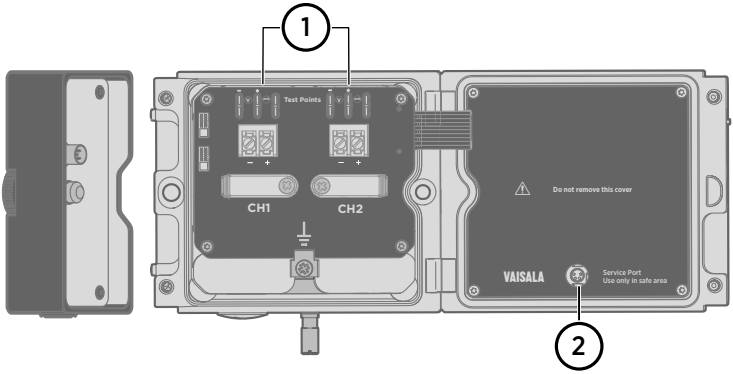


Figure 6 Location of test points and service port

1 Multimeter test points for analog output channels 1 and 2
2 Service port for PC connection

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Use an intrinsically safe multimeter that will not cause the intrinsically safe input parameters listed in Table 10 (page 33) to be exceeded when it is connected in series (current measurement) or parallel (voltage measurement) to the associated apparatus.

Using the service port

The service port (see Figure 6 (page 34)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

Maintenance

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 5 (page 31)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

CAUTION! To maintain the required Ex protection, inspect the equipment for signs of deterioration at an interval of 6 months. If maintenance requirements are found, contact Vaisala.

Installation restrictions

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.

The content in this chapter is maintained in the following separately tracked document:	
Document ID: M212506EN	Revision: E (9 May 2023)

3.3 Japan safety certification information

This chapter contains the safety certification information (for example, specific conditions of use) related to the HMT370EX Series Ex certification in Japan.

A printed version of HMT370EX Multilingual Installation and Safety Guide (M212662EN) is delivered with the transmitter in Japanese certification deliveries, and the document is also available at docs.vaisala.com.

3.3.1 Using HMT370EX Series transmitters in hazardous locations

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

In hazardous environments, always connect the transmitters via galvanic isolators or Zener barriers. A galvanic isolator or Zener barrier must also be used when the transmitter and probe body are in a safe area, but the probe head is installed in a hazardous environment. For wiring information, see the galvanic isolator and Zener barrier wiring diagrams included in this document.

HMT370EX does not include a galvanic isolator or a Zener barrier. They can be ordered as optional accessories from Vaisala.

WARNING! HMT370EX Series transmitters have been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining HMT370EX transmitters are responsible for determining the appropriate protection concept for the specific application HMT370EX is used in, and that the hazardous area classification of the device meets the requirements of the application.

WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.

HMT370EX Series transmitters are certified for use in hazardous areas as defined by the following classifications:

Table 11 HMT370EX Series hazardous area classifications

Certification	HMT370EX classification
IECEx (international certification)	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C
CML (Japan)	Ex ia IIC T4 Ga Ex ia IIIC T_{200} 85°C Da CML 21JPN2417X

CAUTION! The personnel installing, operating, and maintaining HMT370EX transmitters must have the required competencies for working in the hazardous location, as defined by the applicable standards.

For information on the standards that apply to using HMT370EX based on the classification of the device, see HMT370EX certification documentation and the declarations of conformity related to HMT370EX at www.vaisala.com/declarationofconformity.

3.3.2 Guidelines for safe use in hazardous conditions

HMT370EX Series parts overview

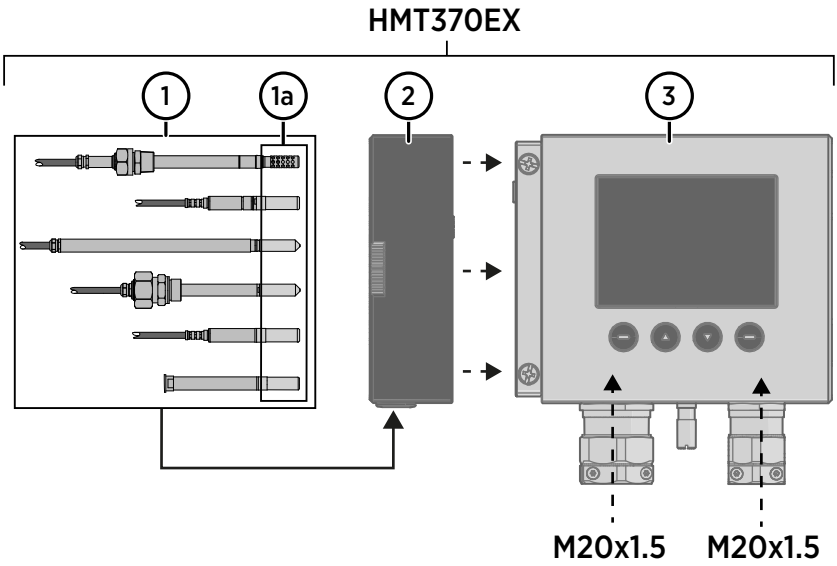


Figure 7 HMT370EX parts overview

HMT370EX Series transmitters consist of 3 main parts: the transmitter body, a detachable probe body, and a probe head attached to the probe body, either directly or using a cable. Figure 7 (page 37) shows the main parts.

1 Probe heads
1a Probe head filters
2 Probe body
3 Transmitter body

CAUTION! Removing or modifying parts is not permitted. Modifications carried out by the user can impair the Ex protection of the device or otherwise damage the device.

The different probe head variants are designed for a range of applications, and have their own specifications. Ensure that the transmitter body, probe body, and probe head are each placed in an environment that matches the specification of the part. For allowed ambient temperature ranges, see Table 12 (page 38).

Table 12 Allowed ambient temperature ranges

Equipment part	Allowed ambient temperature range
Transmitter body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP371	Temperature class T4: -40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP373	**Rubber cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +80 °C (-40 ... +176 °F) **FEP cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +100 °C (-40 ... +212 °F) Temperature class T4: -40 °C ... +120 °C (-40 ... +248 °F)
Probe heads HMP374, HMP375, HMP377, HMP378, HMP378F, and HMP378H	Temperature class T6: -70 °C ... +55 °C (-94 ... +131 °F) Temperature class T5: -70 °C ... +100 °C (-94 ... +212 °F) Temperature class T4: -70 °C ... +135 °C (-94 ... +275 °F) Temperature class T3: -70 °C ... +180 °C (-94 ... +356 °F)

Ingress protection

The IP rating of the transmitter depends on whether the probe body is connected to the transmitter body.

IP rating when the probe body is connected to the transmitter body	IP66
IP rating when the probe body is detached from the transmitter body	IP54

3.3.2.1 Specific conditions of use

CAUTION! With the installation of the equipment in Zone 0 Group II area it has to be ensured that sparks due to impact or friction do not occur.

Wiring requirements

- The cable glands and cables used for wiring the device must not impair the Ex protection.
  - Unused lead-throughs must be sealed using Ex compliant plugs.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).
- **Japan:** Use only cables suitable for +80°C (+176 °F).

CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the transmitter body.

Intrinsic safety

The overvoltage category of HMT370EX transmitters is **I** (non-mains equipment), and ambient pollution degree is 4, as specified in IEC 60664-1. For intrinsically safe input parameters, see Table 13 (page 39).

Table 13 Intrinsically safe input parameters

Parameter	Value	Associated apparatus entity parameters
U_i	28 VDC	$U_o \leq U_i$
I_i	100 mA	$I_o \leq I_i$
P_i	700 mW	$P_o \leq P_i$
C_i	12.1 nF	$C_o \geq C_i + C_{cable}$
L_i	16 µH	$L_o \geq L_i + L_{cable}$

Using analog output test points

There are test points for measuring the voltages and currents of the analog outputs, located above each screw terminal block as shown in Figure 8 (page 40). Accessing the test points on the component board requires opening the transmitter enclosure.

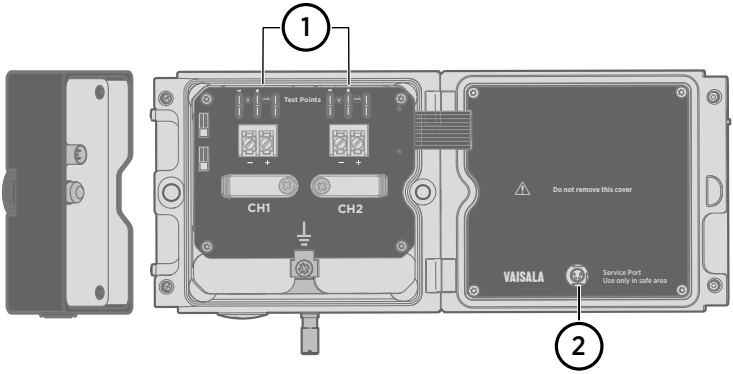


Figure 8 Location of test points and service port

1 Multimeter test points for analog output channels 1 and 2
2 Service port for PC connection

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Use an intrinsically safe multimeter that will not cause the intrinsically safe input parameters listed in Table 13 (page 39) to be exceeded when it is connected in series (current measurement) or parallel (voltage measurement) to the associated apparatus.

Using the service port

The service port (see Figure 8 (page 40)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

Maintenance

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 5 (page 31)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

CAUTION! To maintain the required Ex protection, inspect the equipment for signs of deterioration at an interval of 6 months. If maintenance requirements are found, contact Vaisala.

Installation restrictions

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.

3.4 China safety certification information

This chapter contains the safety certification information (for example, specific conditions of use) related to the HMT370EX Series Ex certification in China.

A printed version of HMT370EX Multilingual Installation and Safety Guide (M212704EN) is delivered with the transmitter in Chinese certification deliveries, and the document is also available at docs.vaisala.com.

3.4.1 Using HMT370EX Series transmitters in hazardous locations

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

In hazardous environments, always connect the transmitters via galvanic isolators or Zener barriers. A galvanic isolator or Zener barrier must also be used when the transmitter and probe body are in a safe area, but the probe head is installed in a hazardous environment. For wiring information, see the galvanic isolator and Zener barrier wiring diagrams included in this document.

HMT370EX does not include a galvanic isolator or a Zener barrier. They can be ordered as optional accessories from Vaisala.

WARNING! HMT370EX series transmitters have been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining HMT370EX transmitters are responsible for determining the appropriate protection concept for the specific application HMT370EX is used in, and that the hazardous area classification of the device meets the requirements of the application.

WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.

HMT370EX series transmitters are certified for use in hazardous areas as defined by the following classifications:

Table 14 HMT370EX series hazardous area classifications

Certification	HMT370EX classification
IECEx (international certification)	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C
NEPSI (China)	Ex ia IIC T3-T6 Ga GYJ26.1239X

CAUTION! The personnel installing, operating, and maintaining HMT370EX transmitters must have the required competencies for working in the hazardous location, as defined by the applicable standards.

For information on the standards that apply to using HMT370EX based on the classification of the device, see HMT370EX certification documentation and the declarations of conformity related to HMT370EX at www.vaisala.com/declarationofconformity.

3.4.2 Guidelines for safe use in hazardous conditions

HMT370EX Series parts overview

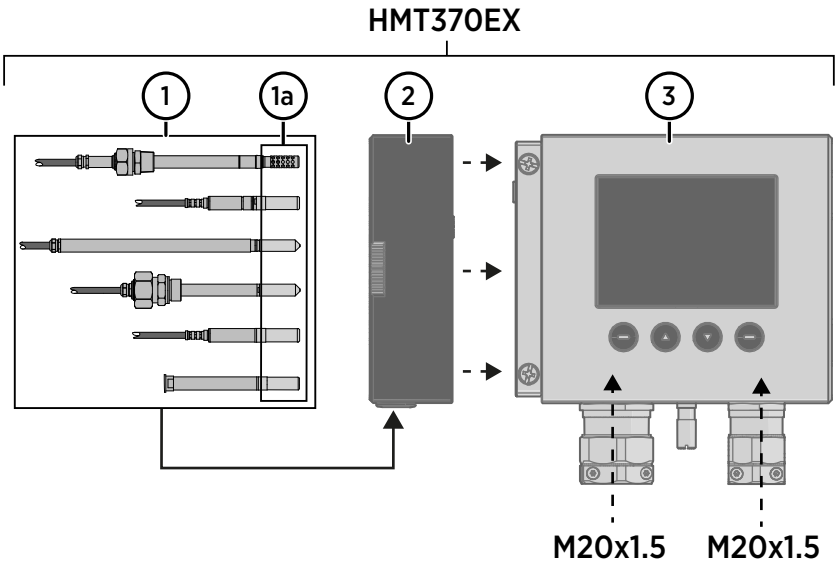


Figure 9 HMT370EX parts overview

HMT370EX Series transmitters consist of 3 main parts: the transmitter body, a detachable probe body, and a probe head attached to the probe body, either directly or using a cable. Figure 9 (page 43) shows the main parts.

1 Probe heads
1a Probe head filters
2 Probe body
3 Transmitter body

The different probe head variants are designed for a range of applications, and have their own specifications. Ensure that the transmitter body, probe body, and probe head are each placed in an environment that matches the specification of the part. For allowed ambient temperature ranges, see Table 15 (page 43).

Table 15 Allowed ambient temperature ranges

Equipment part	Allowed ambient temperature range
Transmitter body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe body	-40 °C ... +60 °C (-40 ... +140 °F)

Equipment part	Allowed ambient temperature range
Probe head HMP371	Temperature class T4: -40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP373	**Rubber cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +80 °C (-40 ... +176 °F) **FEP cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +100 °C (-40 ... +212 °F) Temperature class T4: -40 °C ... +120 °C (-40 ... +248 °F)
Probe heads HMP374, HMP375, HMP377, HMP378, HMP378F, and HMP378H	Temperature class T6: -70 °C ... +55 °C (-94 ... +131 °F) Temperature class T5: -70 °C ... +100 °C (-94 ... +212 °F) Temperature class T4: -70 °C ... +135 °C (-94 ... +275 °F) Temperature class T3: -70 °C ... +180 °C (-94 ... +356 °F)

3.4.2.1 Specific conditions of use

The associated “X” suffix for the HMT370EX certificate number indicates the following specific conditions of use:

- With the installation of the equipment in EPL Ga Group II, when the enclosure is made from aluminum alloy, it has to be ensured that sparks due to impact or friction do not occur.
- The cable glands and blanking elements used with the transmitter must conform to requirements of IEC 60079-0 (GB 3836.1).

Notices for equipment use

1. The transmitter is designed for use in a normal ambient temperature range of -40 °C ... +60 °C (-40 ... +140 °F).
2. The transmitter body has two alternative types: display and 4-button keypad, or LED indicator. The temperature class of both types is T4.

3. Transmitter maximum input parameters:

Max. input voltage Ui (V)	Max. input current Ii (mA)	Max. input power Pi (mW)	Max. input parameters	
28	100	700	Ci(nF)	Li(μH)
			12.1	16

4. When the transmitter is used in mixed explosive gas atmospheres, the transmitter must be used with certified intrinsic safety associated apparatus in intrinsic safety system. The system wiring must comply with the installation manuals of the transmitter and intrinsic safety associated apparatus. The terminals for connection must not be wrong.
5. The enclosure Type of Protection of the transmitter is IP54.
6. To avoid dismissing and damaging the explosion-proof characteristics of the transmitter, it is strictly prohibited for the user to modify the electrical components. The user must contact the product manufacturers to solve any operating problems.
7. Electrical installations design, selection, erection, installations inspection, maintenance, equipment repair, overhaul and reclamation shall comply with relative requirements in the manual, GB 3836.13-2013 "爆炸性环境 第13部分：设备的修理、检修、修复和改造" (note: IEC 60079-19 MOD), GB/T 3836.15-2017 "爆炸性环境 第15部 分：电气装置的设计、选型和安装" (note: IEC 60079-14 MOD), GB/T 3836.16-2017 "爆炸性环境 第16部分：电气 装置的检查与维护" (note: IEC 60079-17 MOD), GB/T 3836.18-2017 "爆炸性环境 第18部分：本质安全电气系统" (note: IEC 60079-25 MOD) 及 GB 50257-2014 "电气装置安装工程爆炸和火灾危险环境电气装置施工及验收规范" (English name: Code for construction and acceptance of electric equipment on fire and explosion hazard electrical equipment installation engineering).

Wiring requirements

- The cable glands and cables used for wiring the device must not impair the Ex protection.
  - Unused lead-throughs must be sealed using Ex compliant plugs.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).

CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the transmitter body.

Intrinsic safety

The overvoltage category of HMT370EX transmitters is **I** (non-mains equipment), and ambient pollution degree is 4, as specified in IEC 60664-1. For intrinsically safe input parameters, see Table 16 (page 45).

Table 16 Intrinsically safe input parameters

Parameter	Value	Associated apparatus entity parameters
U_i	28 VDC	$U_o \leq U_i$

Parameter	Value	Associated apparatus entity parameters
I_i	100 mA	$I_o \leq I_i$
P_i	700 mW	$P_o \leq P_i$
C_i	12.1 nF	$C_o \geq C_i + C_{cable}$
L_i	16 µH	$L_o \geq L_i + L_{cable}$

Using analog output test points

There are test points for measuring the voltages and currents of the analog outputs, located above each screw terminal block as shown in Figure 10 (page 46). Accessing the test points on the component board requires opening the transmitter enclosure.

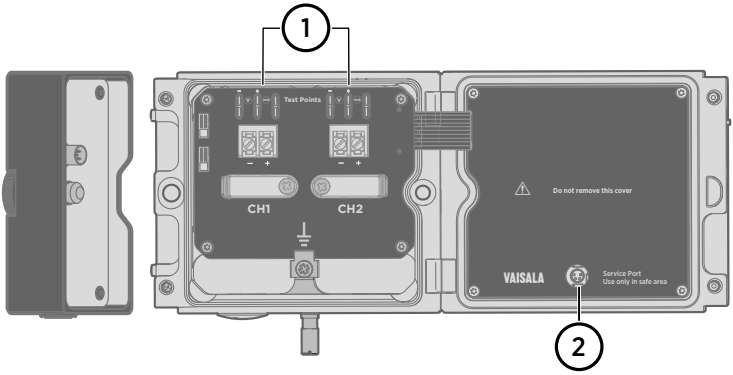


Figure 10 Location of test points and service port

1 Multimeter test points for analog output channels 1 and 2
2 Service port for PC connection

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Use an intrinsically safe multimeter that will not cause the intrinsically safe input parameters listed in Table 16 (page 45) to be exceeded when it is connected in series (current measurement) or parallel (voltage measurement) to the associated apparatus.

Using the service port

The service port (see Figure 10 (page 46)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

Maintenance

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 9 (page 43)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

CAUTION! To maintain the required Ex protection, inspect the equipment for signs of deterioration at an interval of 6 months. If maintenance requirements are found, contact Vaisala.

Installation restrictions

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.

3.5 Korea safety certification information

This chapter contains the safety certification information (for example, specific conditions of use) related to the HMT370EX Series Ex certification in Korea.

A printed version of HMT370EX Multilingual Installation and Safety Guide (M212717EN) is delivered with the transmitter in Korean certification deliveries, and the document is also available at docs.vaisala.com.

3.5.1 Using HMT370EX Series transmitters in hazardous locations

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

In hazardous environments, always connect the transmitters via galvanic isolators or Zener barriers. A galvanic isolator or Zener barrier must also be used when the transmitter and probe body are in a safe area, but the probe head is installed in a hazardous environment. For wiring information, see the galvanic isolator and Zener barrier wiring diagrams included in this document.

HMT370EX does not include a galvanic isolator or a Zener barrier. They can be ordered as optional accessories from Vaisala.

WARNING! HMT370EX series transmitters have been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining HMT370EX transmitters are responsible for determining the appropriate protection concept for the specific application HMT370EX is used in, and that the hazardous area classification of the device meets the requirements of the application.

WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.

HMT370EX series transmitters are certified for use in hazardous areas as defined by the following classifications:

Table 17 HMT370EX series hazardous area classifications

Certification	HMT370EX classification
IECEx (international certification) / ATEX (EU certification)	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C
KCs (Korea) 인증 : 방호장치 안전인증 고시 2021-22 호 인증번호 : 21-KA4BO-0891X, 21-KA4BO-0892X	Ex ia IIC T4 Ga Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C IECEx EESF 20.0044.X 21-KA4BO-0891X, 21-KA4BO-0892X

CAUTION! The personnel installing, operating, and maintaining HMT370EX transmitters must have the required competencies for working in the hazardous location, as defined by the applicable standards.

For information on the standards that apply to using HMT370EX based on the classification of the device, see HMT370EX certification documentation and the declarations of conformity related to HMT370EX at www.vaisala.com/declarationofconformity.

3.5.2 Guidelines for safe use in hazardous conditions

HMT370EX Series parts overview

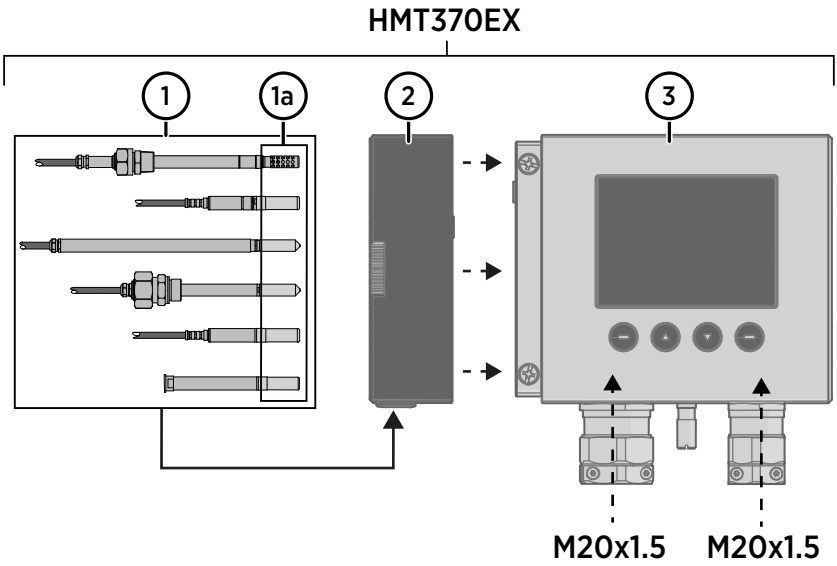


Figure 11 HMT370EX parts overview

HMT370EX Series transmitters consist of 3 main parts: the transmitter body, a detachable probe body, and a probe head attached to the probe body, either directly or using a cable. Figure 11 (page 49) shows the main parts.

1 Probe heads
1a Probe head filters
2 Probe body
3 Transmitter body

The different probe head variants are designed for a range of applications, and have their own specifications. Ensure that the transmitter body, probe body, and probe head are each placed in an environment that matches the specification of the part. For allowed ambient temperature ranges, see Table 18 (page 49).

Table 18 Allowed ambient temperature ranges

Equipment part	Allowed ambient temperature range
Transmitter body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe body	-40 °C ... +60 °C (-40 ... +140 °F)

Equipment part	Allowed ambient temperature range
Probe head HMP371	Temperature class T4: -40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP373	**Rubber cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +80 °C (-40 ... +176 °F) **FEP cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +100 °C (-40 ... +212 °F) Temperature class T4: -40 °C ... +120 °C (-40 ... +248 °F)
Probe heads HMP374, HMP375, HMP377, HMP378, HMP378F, and HMP378H	Temperature class T6: -70 °C ... +55 °C (-94 ... +131 °F) Temperature class T5: -70 °C ... +100 °C (-94 ... +212 °F) Temperature class T4: -70 °C ... +135 °C (-94 ... +275 °F) Temperature class T3: -70 °C ... +180 °C (-94 ... +356 °F)

3.5.2.1 Specific conditions of use

CAUTION! With the installation of the equipment in Zone 0 Group II area it has to be ensured that sparks due to impact or friction do not occur.

Wiring requirements

- The cable glands and cables used for wiring the device must not impair the Ex protection.
  - Unused lead-throughs must be sealed using Ex compliant plugs.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).

CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the transmitter body.

Intrinsic safety

The overvoltage category of HMT370EX transmitters is **I** (non-mains equipment), and ambient pollution degree is 4, as specified in IEC 60664-1. For intrinsically safe input parameters, see Table 19 (page 51).

Table 19 Intrinsically safe input parameters

Parameter	Value	Associated apparatus entity parameters
U_i	28 VDC	$U_o \leq U_i$
I_i	100 mA	$I_o \leq I_i$
P_i	700 mW	$P_o \leq P_i$
C_i	12.1 nF	$C_o \geq C_i + C_{cable}$
L_i	16 µH	$L_o \geq L_i + L_{cable}$

Using analog output test points

There are test points for measuring the voltages and currents of the analog outputs, located above each screw terminal block as shown in Figure 12 (page 51). Accessing the test points on the component board requires opening the transmitter enclosure.

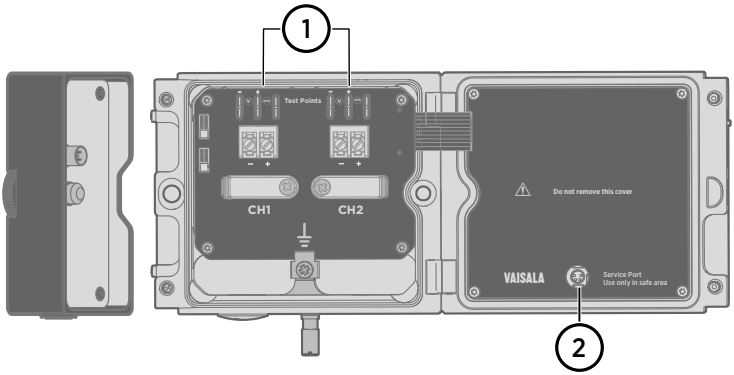


Figure 12 Location of test points and service port

1 Multimeter test points for analog output channels 1 and 2
2 Service port for PC connection

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Use an intrinsically safe multimeter that will not cause the intrinsically safe input parameters listed in Table 19 (page 51) to be exceeded when it is connected in series (current measurement) or parallel (voltage measurement) to the associated apparatus.

Using the service port

The service port (see Figure 12 (page 51)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

Maintenance

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 11 (page 49)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

CAUTION! To maintain the required Ex protection, inspect the equipment for signs of deterioration at an interval of 6 months. If maintenance requirements are found, contact Vaisala.

Installation restrictions

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.

3.6 US/CAN (FM) safety certification information

This chapter contains the safety certification information (for example, specific conditions of use) related to the HMT370EX Series Ex certification in the US and Canada (Factory Mutual (FM) certification).

The Vaisala document code of the US/CAN (FM) certification version of *HMT370EX Installation and Safety Guide* is *M212733EN*.

A printed version of HMT370EX Multilingual Installation and Safety Guide (M212733EN) is delivered with the transmitter in US/CAN (FM) certification deliveries, and the document is also available at docs.vaisala.com.

3.6.1 Using HMT370EX Series transmitters in hazardous locations

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.
Avertissement : Une installation protégée à l'aide d'isolateurs galvaniques ou de barrières Zener est obligatoire dans un environnement dangereux.

WARNING! Review the FM Approvals wiring requirements for intrinsically safe operation in FM Approvals control drawing (page 59) before installation.
Avertissement : Passez en revue les exigences de câblage FM pour un fonctionnement à sécurité intrinsèque dans FM Approvals control drawing (page 59) avant l'installation.

In hazardous environments, always connect the transmitters via galvanic isolators or Zener barriers. A galvanic isolator or Zener barrier must also be used when the transmitter and probe body are in a safe area, but the probe head is installed in a hazardous environment. For wiring information, see the galvanic isolator and Zener barrier wiring diagrams included in this document.

HMT370EX does not include a galvanic isolator or a Zener barrier. They can be ordered as optional accessories from Vaisala.

WARNING! HMT370EX series transmitters have been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining HMT370EX transmitters are responsible for determining the appropriate protection concept for the specific application HMT370EX is used in, and that the hazardous area classification of the device meets the requirements of the application.
Avertissement : Les transmetteurs de la série HMT370EX ont été conçus pour être utilisés dans des emplacements dangereux, conformément à la classification du produit. Il incombe au personnel chargé de l'installation, de l'utilisation ou de la maintenance des transmetteurs HMT370EX de déterminer la protection appropriée en fonction de l'application spécifique dans laquelle le transmetteur est utilisé et de vérifier que la classification de zone dangereuse de l'appareil répond aux exigences de cette application.

WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.
Avertissement : Si l'équipement est utilisé d'une manière non indiquée par Vaisala, la protection assurée par l'équipement peut en être affectée.

HMT370EX series transmitters are certified for use in hazardous areas with the equipment ratings listed in Table 20 (page 54).

Table 20 HMT370EX series hazardous area equipment rating

HMT370EX equipment rating	
IECEx [1] / ATEX [2]	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C
FM (US)	Intrinsically safe for: Class I, II, III Division 1, Groups A, B, C, D, E, F, and G, T4 Class I, Zone 0, AEx ia IIC T4 Zone 20, AEx ia IIIC Temperature Code T85°C Ta: -40 °C to +60 °C;
FM (CAN)	Intrinsically safe for: Class I, II, III Division 1, Groups A, B, C, D, E, F, and G, T4 Class I, Zone 0, Ex ia IIC T4 Zone 20, Ex ia IIIC Temperature Code T85°C Ta: -40 °C to +60 °C;
IP rating	IP54 (transmitter alone) IP66 (transmitter with the probe body attached)

1) *International certification*
2) *EU certification*

CAUTION! The personnel installing, operating, and maintaining HMT370EX transmitters must have the required competencies for working in the hazardous location, as defined by the applicable standards.
Attention : Le personnel chargé de l'installation, de l'exploitation et de la maintenance des transmetteurs de la série HMT370EX doit posséder les compétences requises pour travailler en zones dangereuses, telles que définies par les normes en vigueur.

For information on the standards that apply to using HMT370EX based on the classification of the device, see HMT370EX certification documentation and the declarations of conformity related to HMT370EX at www.vaisala.com/declarationofconformity.

3.6.2 Guidelines for safe use in hazardous conditions

HMT370EX Series parts overview

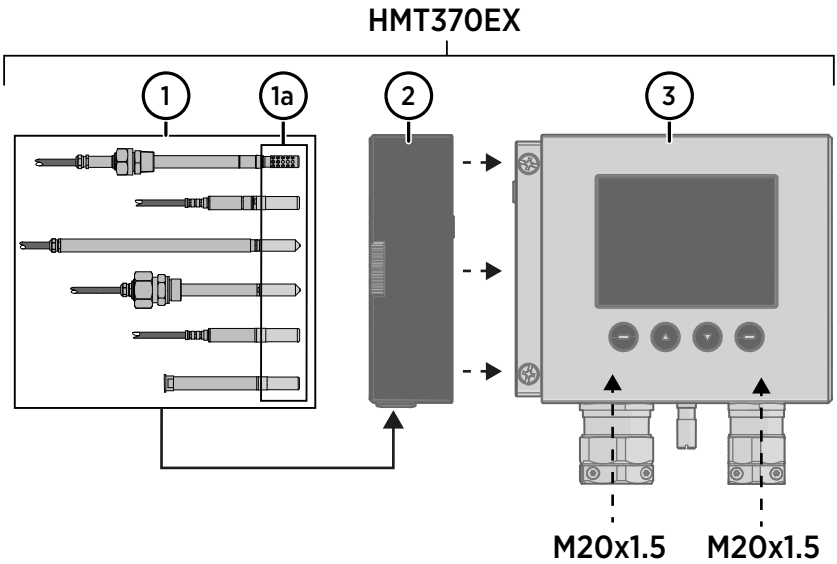


Figure 13 HMT370EX parts overview

HMT370EX Series transmitters consist of 3 main parts: the transmitter body, a detachable probe body, and a probe head attached to the probe body, either directly or using a cable. Figure 13 (page 55) shows the main parts.

1 Probe heads
1a Probe head filters
2 Probe body
3 Transmitter body

The different probe head variants are designed for a range of applications, and have their own specifications. Ensure that the transmitter body, probe body, and probe head are each placed in an environment that matches the specification of the part. For allowed ambient temperature ranges, see Table 21 (page 56).

CAUTION! Removing or modifying parts is not permitted. Modifications carried out by the user can impair the Ex protection of the device or otherwise damage the device.
Attention : Il est interdit de retirer ou de modifier des pièces. Les modifications effectuées par l'utilisateur peuvent compromettre la protection Ex de l'appareil ou endommager l'appareil.

Table 21 Allowed ambient temperature ranges

Equipment part	Allowed ambient temperature range
Transmitter body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP371	Temperature class T4: -40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP373	**Rubber cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +80 °C (-40 ... +176 °F) **FEP cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +100 °C (-40 ... +212 °F) Temperature class T4: -40 °C ... +120 °C (-40 ... +248 °F)
Probe heads HMP374, HMP375, HMP377, HMP378, HMP378F, and HMP378H	Temperature class T6: -70 °C ... +55 °C (-94 ... +131 °F) Temperature class T5: -70 °C ... +100 °C (-94 ... +212 °F) Temperature class T4: -70 °C ... +135 °C (-94 ... +275 °F) Temperature class T3: -70 °C ... +180 °C (-94 ... +356 °F)

3.6.2.1 Specific conditions of use

CAUTION! Potential risk of sparking from aluminum alloy enclosure. The equipment shall be installed in such manner as to prevent the possibility of sparks resulting from friction or impact against the enclosure.
Attention : Risque potentiel d'étincelles provenant du boîtier en alliage d'aluminium. L'équipement doit être installé de manière à empêcher la possibilité d'étincelles résultant du frottement ou de l'impact contre le boîtier.

Wiring requirements

- The cable glands and blanking elements used with the transmitter shall conform to requirements of ANSI/UL 60079-0.
  - Unused lead-throughs must be sealed using Ex compliant blanking elements.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).

CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the transmitter body.
Attention : Ne connectez que des fils hors tension. Ne mettez jamais le système sous tension avant d'avoir terminé le câblage et fermé le corps du transmetteur.

WARNING! Review the FM Approvals wiring requirements for intrinsically safe operation in FM Approvals control drawing (page 59) before installation.
Avertissement : Passez en revue les exigences de câblage FM pour un fonctionnement à sécurité intrinsèque dans FM Approvals control drawing (page 59) avant l'installation.

Intrinsic safety

The overvoltage category of HMT370EX transmitters is **I** (non-mains equipment), and ambient pollution degree is 4, as specified in IEC 60664-1. For intrinsically safe input parameters, see Table 22 (page 57).

Table 22 Intrinsically safe input parameters

Parameter	Value	Associated apparatus entity parameters
U_i	28 VDC	$U_o \leq U_i$
I_i	100 mA	$I_o \leq I_i$
P_i	700 mW	$P_o \leq P_i$
C_i	12.1 nF	$C_o \geq C_i + C_{cable}$
L_i	16 µH	$L_o \geq L_i + L_{cable}$

Using analog output test points

There are test points for measuring the voltages and currents of the analog outputs, located above each screw terminal block as shown in Figure 14 (page 58). Accessing the test points on the component board requires opening the transmitter enclosure.

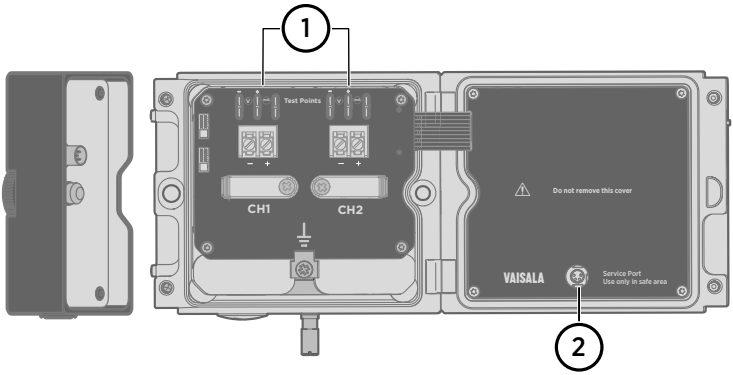


Figure 14 Location of test points and service port

1 Multimeter test points for analog output channels 1 and 2
2 Service port for PC connection

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.
Attention : Le boîtier du corps du transmetteur ne doit pas être ouvert dans une zone explosive, sauf si une autorisation d'exécuter des travaux en toute sécurité a été délivrée conformément à la norme CEI 60079-14. Retirez le transmetteur de la zone dangereuse avant d'ouvrir le boîtier ou assurez-vous qu'une procédure de travail en toute sécurité conforme à la norme CEI 60079-14 a été mise en œuvre dans la zone dangereuse.

Use an intrinsically safe multimeter that will not cause the intrinsically safe input parameters listed in Table 22 (page 57) to be exceeded when it is connected in series (current measurement) or parallel (voltage measurement) to the associated apparatus.

Using the service port

The service port (see Figure 14 (page 58)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

Maintenance

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 13 (page 55)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.
Attention : Il est possible de déposer et de remplacer la sonde lorsque le transmetteur HMT370EX est sous tension. Aucune autre maintenance en direct, y compris le changement du filtre de tête de sonde, n'est autorisée.

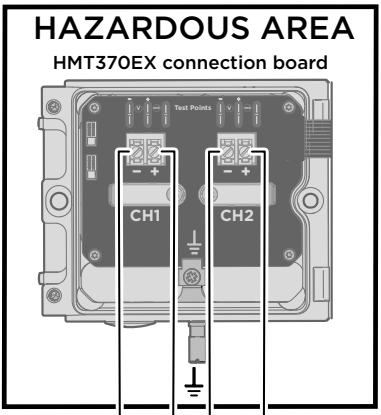
CAUTION! To maintain the required Ex protection, inspect the equipment for signs of deterioration at an interval of 6 months. If maintenance requirements are found, contact Vaisala.
Attention : Pour conserver la protection Ex requise, inspectez l'équipement à la recherche de signes de détérioration tous les 6 mois. En cas d'autres besoins de maintenance, contactez Vaisala.

Installation restrictions

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.
Attention : Pour conserver la protection Ex requise, n'installez pas le modèle de transmetteur avec un écran LCD dans un endroit où il est exposé à la lumière directe du soleil.

3.6.2.2 FM Approvals control drawing

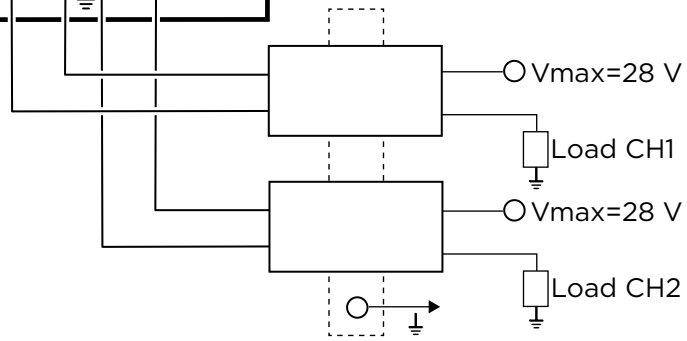
Figure 15 (page 60) describes the FM Approvals requirements for intrinsic safety when wiring HMT370EX series transmitters. The content in this section is maintained in Vaisala document M212732EN.



SAFE AREA

Use FM approved associated apparatus; zener barriers or galvanic separators with entity concept parameters:

$V_{oc} < 28$ V
$I_{sc} < 100$ mA
$C_o > C_i + C_{cable}$
$L_o > L_i + L_{cable}$



The entity parameters for HMT370EX series transmitters are:
Vmax=28 V, Imax=100 mA, Ci=12.1 nF, Li=16 µH, Pi=700 mW

The HMT370EX transmitter series has the following approved probe options: HMP371, HMP373, HMP374, HMP375, HMP377, HMP378, and HMP378F/H

HMT370EX series transmitters are approved for use in:
Class I, Division 1, Groups A, B, C, and D
Class II, III, Division 1, Groups E, F, and G
Class I, Zone 0, AEx/Ex ia IIC T4 Ga
Zone 20, AE/Ex ia IIIC T85°C Da
IP54 (transmitter alone)
IP66 (transmitter with the probe body attached)

NOTE:
1. Barrier installation must be completed in accordance with ANSI/ISA RP 12.6 and the National Electrical Code.
2. Intrinsically safe barrier ground must be less than 1 ohm.
3. Maximum safe area voltage (Um) is 250 V.

Figure 15 FM Approved wiring diagram for intrinsically safe operation

3.7 UK (UKEX) safety certification information

This chapter contains the safety certification information (for example, specific conditions of use) related to the HMT370EX Series Ex certification in the UK (UKEX certification).

A printed version of the HMT370EX Multilingual Installation and Safety Guide (M212752EN) is delivered with the transmitter in UK (UKEX) certification deliveries, and the document is also available at docs.vaisala.com.

3.7.1 Using HMT370EX Series transmitters in hazardous locations

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

In hazardous environments, always connect the transmitters via galvanic isolators or Zener barriers. A galvanic isolator or Zener barrier must also be used when the transmitter and probe body are in a safe area, but the probe head is installed in a hazardous environment. For wiring information, see the galvanic isolator and Zener barrier wiring diagrams included in this document.

HMT370EX does not include a galvanic isolator or a Zener barrier. They can be ordered as optional accessories from Vaisala.

WARNING! HMT370EX series transmitters have been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining HMT370EX transmitters are responsible for determining the appropriate protection concept for the specific application HMT370EX is used in, and that the hazardous area classification of the device meets the requirements of the application.

WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.

HMT370EX series transmitters are certified for use in hazardous areas as defined by the following classifications:

Table 23 HMT370EX series hazardous area classifications

Certification	HMT370EX classification
IECEx [1] / ATEX [2]	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 85 °C Da -40 °C ≤ T_{amb} ≤ +60 °C

Certification	HMT370EX classification
UKEX (UK)	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T200 85 °C Da -40 °C ≤ Tamb ≤ +60 °C CML 21UKEX2316X

1) *International certification*
2) *EU certification*

CAUTION! The personnel installing, operating, and maintaining HMT370EX transmitters must have the required competencies for working in the hazardous location, as defined by the applicable standards.

For information on the standards that apply to using HMT370EX based on the classification of the device, see HMT370EX certification documentation and the declarations of conformity related to HMT370EX at www.vaisala.com/declarationofconformity.

3.7.2 Guidelines for safe use in hazardous conditions

HMT370EX Series parts overview

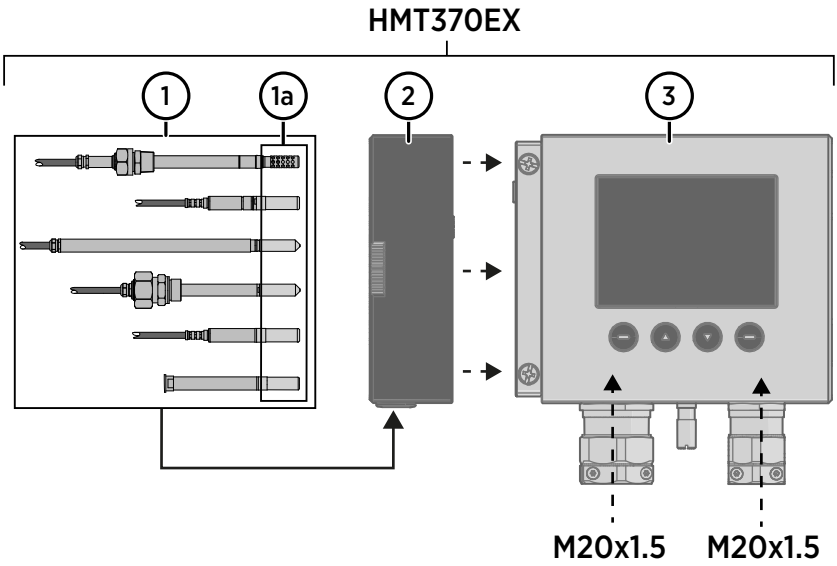


Figure 16 HMT370EX parts overview

HMT370EX Series transmitters consist of 3 main parts: the transmitter body, a detachable probe body, and a probe head attached to the probe body, either directly or using a cable. Figure 16 (page 63) shows the main parts.

1 Probe heads
1a Probe head filters
2 Probe body
3 Transmitter body

The different probe head variants are designed for a range of applications, and have their own specifications. Ensure that the transmitter body, probe body, and probe head are each placed in an environment that matches the specification of the part. For allowed ambient temperature ranges, see Table 24 (page 64).

CAUTION! Removing or modifying parts is not permitted. Modifications carried out by the user can impair the Ex protection of the device or otherwise damage the device.

Table 24 Allowed ambient temperature ranges

Equipment part	Allowed ambient temperature range
Transmitter body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe body	-40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP371	Temperature class T4: -40 °C ... +60 °C (-40 ... +140 °F)
Probe head HMP373	**Rubber cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +80 °C (-40 ... +176 °F) **FEP cable version:** Temperature class T6: -40 °C ... +55 °C (-40 ... +131 °F) Temperature class T5: -40 °C ... +100 °C (-40 ... +212 °F) Temperature class T4: -40 °C ... +120 °C (-40 ... +248 °F)
Probe heads HMP374, HMP375, HMP377, HMP378, HMP378F, and HMP378H	Temperature class T6: -70 °C ... +55 °C (-94 ... +131 °F) Temperature class T5: -70 °C ... +100 °C (-94 ... +212 °F) Temperature class T4: -70 °C ... +135 °C (-94 ... +275 °F) Temperature class T3: -70 °C ... +180 °C (-94 ... +356 °F)

3.7.2.1 Specific conditions of use

CAUTION! With the installation of the equipment in Zone 0 Group II area it has to be ensured that sparks due to impact or friction do not occur.

Wiring requirements

- The cable glands and cables used for wiring the device must not impair the Ex protection.
  - Unused lead-throughs must be sealed using Ex compliant plugs.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).

CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the transmitter body.

Intrinsic safety

The overvoltage category of HMT370EX transmitters is **I** (non-mains equipment), and ambient pollution degree is 4, as specified in IEC 60664-1. For intrinsically safe input parameters, see Table 25 (page 65).

Table 25 Intrinsically safe input parameters

Parameter	Value	Associated apparatus entity parameters
U_i	28 VDC	$U_o \leq U_i$
I_i	100 mA	$I_o \leq I_i$
P_i	700 mW	$P_o \leq P_i$
C_i	12.1 nF	$C_o \geq C_i + C_{cable}$
L_i	16 µH	$L_o \geq L_i + L_{cable}$

Using analog output test points

There are test points for measuring the voltages and currents of the analog outputs, located above each screw terminal block as shown in Figure 17 (page 65). Accessing the test points on the component board requires opening the transmitter enclosure.

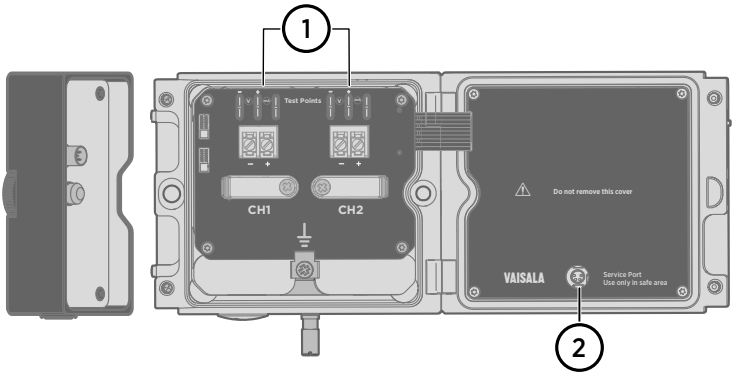


Figure 17 Location of test points and service port

1 Multimeter test points for analog output channels 1 and 2
2 Service port for PC connection

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Use an intrinsically safe multimeter that will not cause the intrinsically safe input parameters listed in Table 25 (page 65) to be exceeded when it is connected in series (current measurement) or parallel (voltage measurement) to the associated apparatus.

Using the service port

The service port (see Figure 17 (page 65)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

Maintenance

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 16 (page 63)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

CAUTION! To maintain the required Ex protection, inspect the equipment for signs of deterioration at an interval of 6 months. If maintenance requirements are found, contact Vaisala.

Installation restrictions

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.

4. Probe options

4.1 HMT370EX probe options overview

Figure 18 (page 67) shows the different probe options available for HMT370EX series transmitters. The HMP371 fixed probe option uses a probe head that attaches directly to the probe body. In the other probe options (HMP373, HMP374, HMP375, HMP377, and HMP378), the probe head is attached to the probe body with a cable.

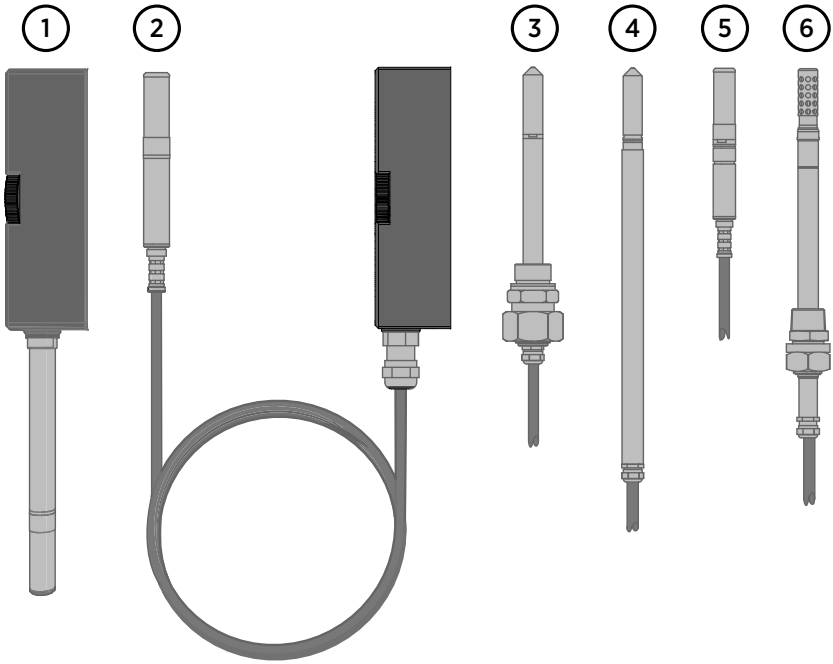


Figure 18 HMT370EX probe options

1 HMP371 fixed probe (page 70)
2 HMP373 probe for confined spaces (page 70)
3 HMP374 probe for high pressure applications (page 72)
4 HMP375 probe for high temperature applications (page 75)
5 HMP377 probe for high humidity applications (page 76)
6 HMP378 probe for pressurized pipelines (page 77)
    - HMP378 variant: HMP378F probe option for measuring oil moisture and temperature (page 80)
    - HMP378 variant: HMP378H probe option for measuring JET A-1 fuel moisture and temperature (page 81)

HMP371 and HMP373 probes can also be ordered as temperature only probes that do not include humidity measurement options. For more information on the T-only HMP371 and HMP373 probe options, see Temperature only probe option (HMP371 and HMP373) (page 69).

More information

- Probe installation overview (page 85)

4.1.1 HMT370EX probe accessories

Table 26 (page 68) lists the available accessories for each probe option.

Table 26 HMT370EX probe accessories

Accessory	Vaisala item code	Models
M12 Indigo USB Adapter cable for connecting HMT370EX probes to Insight PC software	USB2	All models
M12-M12 cable for connecting HMT370EX probes to Indigo80 handheld indicator	272075SP	All models
Thread adapter ISO 1/2″ to NPT 1/2″	210662SP	All models
Duct installation kit	210697	HMP373, HMP377
Mounting flange	210696	HMP375
Cable gland M20 x 1.5 with split seal	HMP247CG	HMP373, HMP375, HMP377
Fitting body M22 x 1.5	17223SP	HMP374
Fitting body NPT1/2	17225SP	HMP374
Fitting body ISO1/2 solid structure	DRW212076SP	HMP378
Fitting body NPT1/2 solid structure	212810SP	HMP378
Swagelok fitting for 12 mm probe, 1/2″ NPT thread	SWG12NPT12	HMP377
Swagelok fitting for 12 mm probe, 3/8″ ISO thread	SWG12ISO38	HMP377
Swagelok fitting for 12 mm probe, 1/2″ ISO thread	SWG12ISO12	HMP377
Ball valve ISO 1/2 with welding joint • Pressure range at +20 °C (+68 °F) 0–20 bar (0–290 psia) (during installation max. 10 bar (145 psia)	BALLVALVE-1	HMP378

Accessory	Vaisala item code	Models
Manual press	HM36854SP	HMP378
Metallized PPS plastic filter grid with stainless steel mesh for general use	DRW010281SP	All models
Metallized PPS plastic filter grid for fast response in clean environments	DRW010276SP	All models
Stainless steel sintered filter for general use	HM47280SP	All models
Stainless steel filter for oil and vacuum environments	HM47453SP	All models
Stainless steel filter with PTFE membrane	214848SP	All models
Stainless steel filter for high oil flow applications (not FM approved)	220752SP	All models
Washer set for pressure-tight installation (3 pcs)	4PROBESETSP	HMP374

4.2 Temperature only probe option (HMP371 and HMP373)

HMP371 and HMP373 probes can be ordered as temperature only probes. In the T-only probe version, humidity measurements cannot be configured into use. The factory default output configuration for the T-only versions of HMP371 and HMP373 is:

1. Channel 1: Temperature output
2. Channel 2: Output disabled

If you need to verify whether the probe in your transmitter is a T-only version, check the configuration code on the product label.



Figure 19 Location of configuration code on product label

1 Configuration code location on product label

If the **3rd** digit of the configuration code is **4**, **5**, **6**, or **7**, the probe is a T-only version.

Example: HMT370EX 1 1 **4** 1 N B 1 A C 1 N N

4.3 HMP371 fixed probe

Dimensions

The HMP371 fixed probe option has a probe head that attaches directly on the probe body, making it suitable for wall mounting applications.

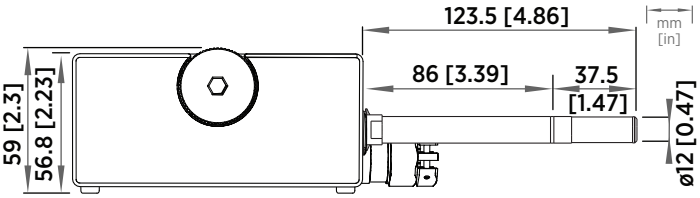


Figure 20 Dimensions in mm (inches)

Specifications

Table 27 HMP371 for wall mounting

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

4.4 HMP373 probe for confined spaces

Dimensions

HMP373 is a small size (ø = 12 mm) general-purpose probe that is suitable for installation into confined spaces such as ducts and channels using the duct installation kit available from Vaisala (item code 210697: see Figure 22 (page 71)).

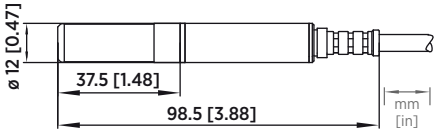


Figure 21 HMP373 dimensions

Specifications

The HMP373 probe option has 2 operating temperature range options depending on the cable selected for the probe. The rubber cable option has a temperature range of -40 ... +80 °C (-40 ... +176 °F). With the Teflon cable option, the temperature range is -40 ... +120 °C (-40 ... +248 °F).

Table 28 HMP373 for confined spaces

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

Duct installation kit 210697

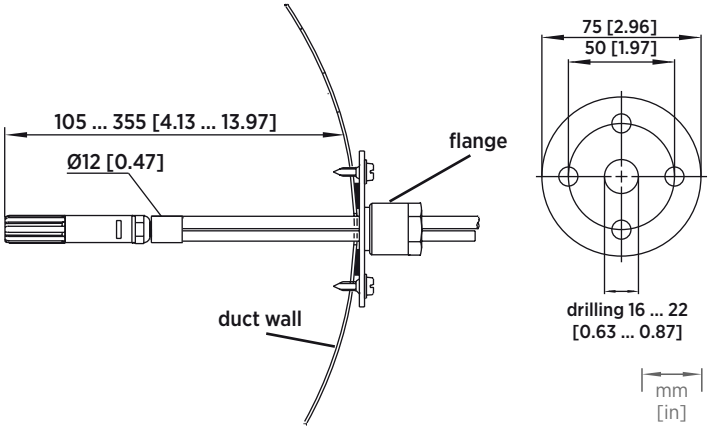


Figure 22 Left: Installation kit for duct mounting dimensions. Right: Installation flange dimensions. Aluminum or stainless steel.

4.5 HMP374 probe for high pressure applications

The HMP374 probe option is designed for measurement in pressurized spaces or vacuum chambers. HMP374 is provided with a nut, a fitting screw, and a sealing washer. Keep the fitting screw and the nut in place on the body of the probe during handling to prevent damage to the highly polished surface of the probe.

For instructions on connecting the probe to a process with the fitting screw, see Attaching HMP374 to process (page 73).

Dimensions

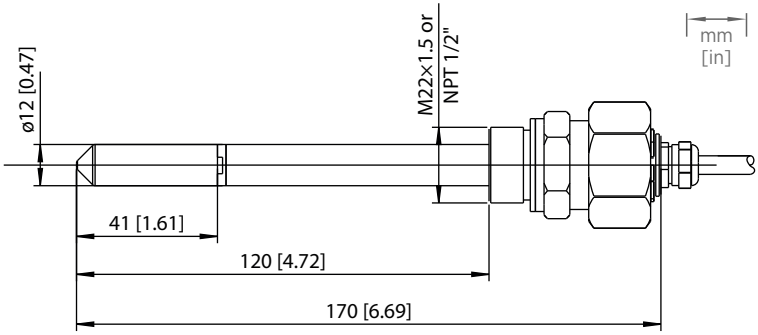


Figure 23 Dimensions in mm (inches)

Specifications

Table 29 HMP374 for high pressure

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

4.5.1 Attaching HMP374 to process

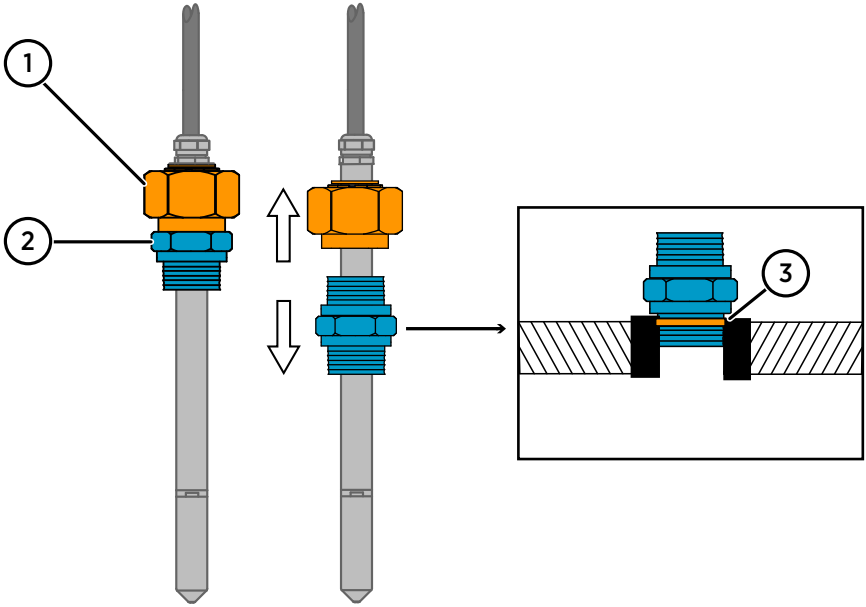


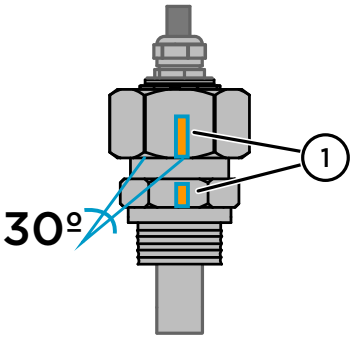
Figure 24 HMP374 fitting body and clasp nut

1 Clasp nut
2 Fitting screw, M22×1.5 or NPT 1/2″
3 Sealing washer

To attach the probe to the process:

1. Detach the fitting screw from the nut and slide it off the probe body.
2. Attach the fitting screw to the chamber wall with a sealing washer. Tighten the fitting screw into the threaded sleeve with a torque wrench. The tightening torque is 150 ± 10 Nm (110 ± 7 ft-lbs).
3. Insert the body of the probe into the fitting screw and attach the nut manually to the fitting screw so that the connection feels tight.
4. Mark both the fitting screw and the nut hex.

5. Tighten the nut a further 30° (1/12) turn, or if you have a torque wrench tighten it with a torque of 80 ± 10 Nm (60 ± 7 ft-lbs).



1 Draw a line on the clasp nut and the fitting screw to mark the 30° (1/12) turn tightening rotation.

When re-tightening the nut after detachment the nut must be tightened without increased effort.

6. Clean and grease the tightening cone of the fitting screw after every tenth detachment. Change the sealing washer every time the fitting screw is detached. Use high-vacuum grease (for example Dow Corning) or similar grease.

CAUTION! In pressurized processes it is essential to tighten the probe very carefully when installing to prevent the loosening of the probe by the action of pressure.

CAUTION! When HMP374 is installed in a process with a pressure differing from normal atmospheric pressure, you must enter the pressure value of the process as an environmental compensation in order to receive accurate measurement results. For information on entering environmental compensations with the transmitter display interface or Vaisala Insight PC software, see Environmental compensation and measurement settings overview (page 126).

Take care not to overtighten the clasp nut to avoid difficulties when opening it.

4.6 HMP375 probe for high temperature applications

The HMP375 probe option is designed for measurement in high temperature environments.

Dimensions

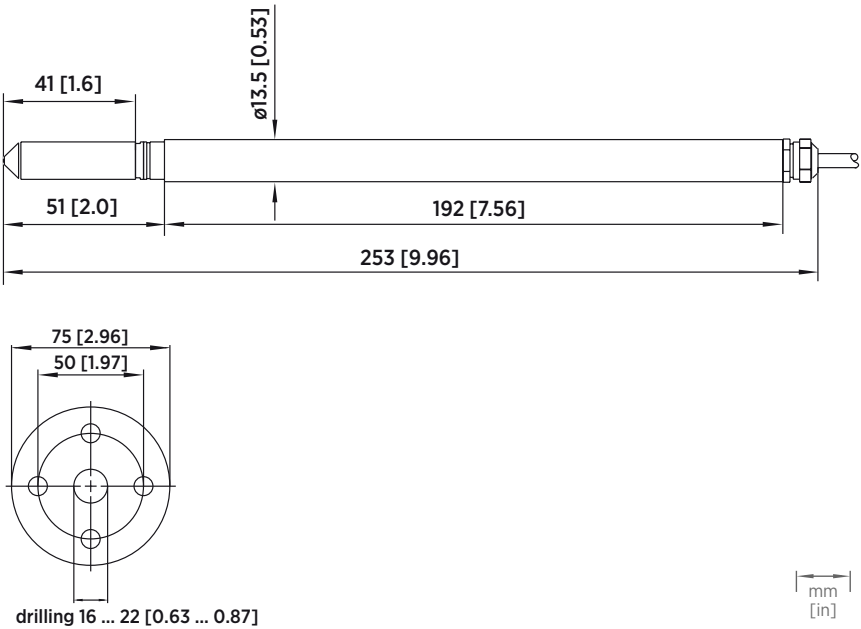


Figure 25 HMP375 probe and stainless steel installation flange dimensions

Specifications

Table 30 HMP375 for high temperature

Property	Description/value
Temperature range	-70 ... +180 °C (-94 ... +356 °F)
Probe cable length	2, 5, or 10 meters (6 ft 7 in, 16 ft 5 in, 32 ft 10 in)
Probe diameter	13.5 mm (0.53 in)
Installation	
Mounting flange	210696

Property	Description/value
Cable gland M20x1.5 with splitting seal	HMP247CG

4.7 HMP377 probe for high humidity applications

The HMP377 probe option is constructed to be installed in environments with high humidities. The same duct installation kit that is used with HMP373 can be used with HMP377: see Figure 22 (page 71).

Dimensions

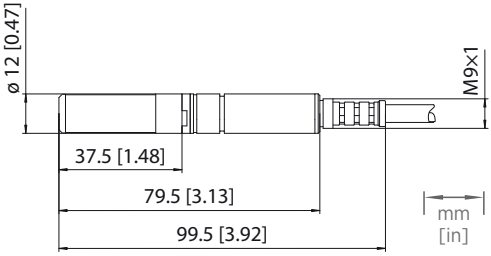


Figure 26 HMP377 dimensions

Specifications

Table 31 HMP377 for high humidities

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

4.8 HMP378 probe for pressurized pipelines

The HMP378 probe option is especially suitable for measurements inside pipelines. Due to its sliding fit (available probe lengths: 262 mm and 448 mm (10.31 in / 17.6 in)), HMP378 is easy to install into and remove from a pressurized process. A ball valve kit (Vaisala item code: BALLVALVE-1) is available for connecting the probe to a pressurized process or pipeline.

Installation options

For instructions on installing HMP378 into a process with the fitting body (R1/2"ISO7/1 or NPT1/2") of the probe, see Attaching HMP378 to process with fitting body (page 79).

For instructions on installation with the optional ball valve kit, see Ball Valve Kit (BALLVALVE-1) Installation Guide (M212837EN).

HMP378F and HMP378H probe variants for measuring oil and JET A-1 fuel moisture

The HMP378F and HMP378H probe options are variants of the standard HMP378, designed for measurements in oil (HMP378F; default calculation coefficients valid for transformer oil) and JET A-1 fuel (HMP378H). They provide a specialized selection of measurement parameters (see Table 5 (page 22)) intended specifically for oil and JET A-1 fuel measurements. With HMP378F, oil-specific calculation coefficients can be configured into use to customize the measurement for a specific oil type: see Configuring calculation coefficients (page 129).

For more information on HMP378F, see HMP378F probe option for measuring oil moisture and temperature (page 80).

For more information on HMP378H, see HMP378H probe option for measuring JET A-1 fuel moisture and temperature (page 81).

Dimensions

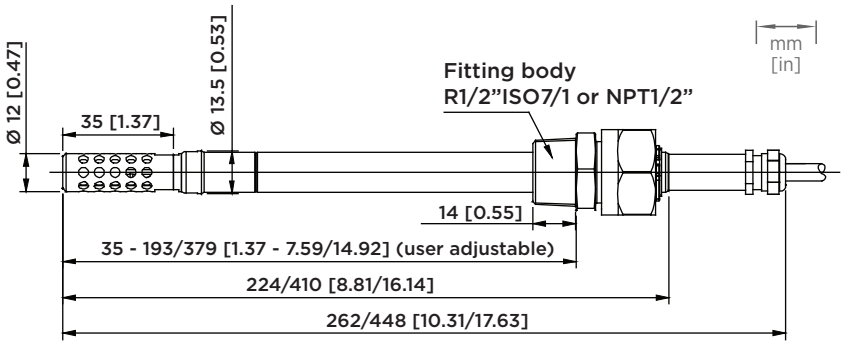


Figure 27 HMP378 dimensions

Specifications

Table 32 HMP378 for pressurized pipelines

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

4.8.1 Attaching HMP378 to process with fitting body

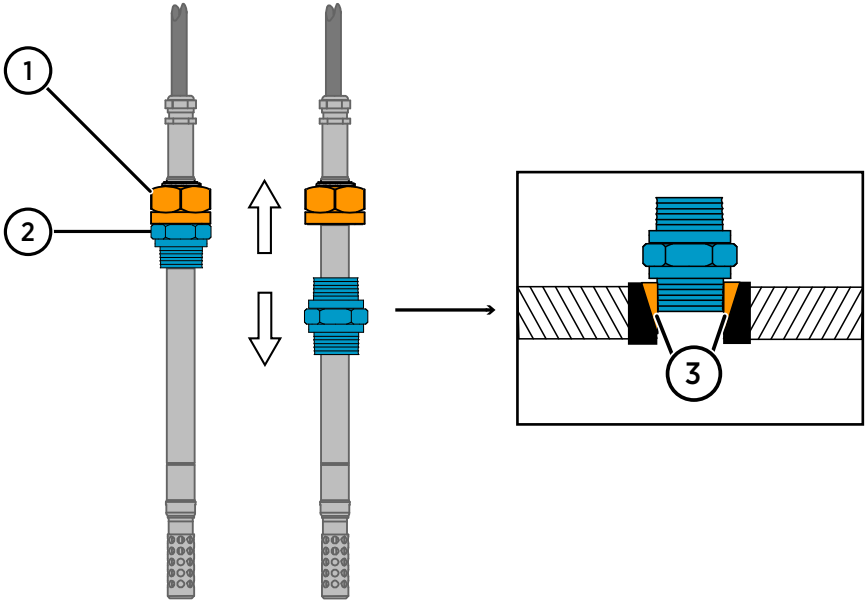


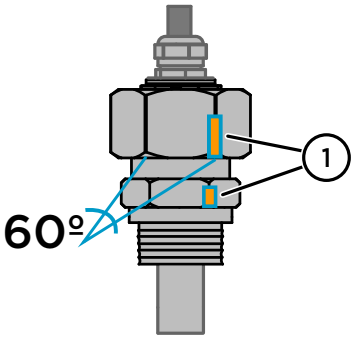
Figure 28 HMP378 fitting body and clasp nut

1 Clasp nut (27 mm hex nut)
2 Fitting body (24 mm hex head): ISO1/2 solid structure or NPT1/2 solid structure
3 Sealing material (use one of the following options):
   1. LOCTITE® No 542 + activ. No 7649 (T=−55 ... +150 °C (-67 ... +302 °F))
   2. MEGA-PIPE EXTRA No 7188 (T=−55 ... +170 °C (-67 ... +338 °F))
   3. PTFE tape (T=−60 ... +210 °C (-76 ... +410 °F))

To attach the probe to the process:

1. Detach the fitting screw from the nut and slide it off the probe body.
2. Attach the fitting screw to the chamber wall with a sealing washer. Tighten the fitting screw into the threaded sleeve with a torque wrench. The tightening torque is 150 ± 10 Nm (110 ± 7 ft-lbs).
3. Insert the body of the probe into the fitting screw and attach the nut manually to the fitting screw so that the connection feels tight.

4. Tighten the nut a further 50-60° (approximately 1/6 turn) with a wrench. If you have suitable torque wrench, tighten the nut to max 45 ± 5 Nm (33 ± 4 ft-lbs).



1 Draw a line on the clasp nut hex and the fitting body hex to mark the 50-60° (1/6) turn tightening rotation.

Take care not to overtighten the clasp nut to avoid difficulties when opening it.

CAUTION! Take care not to damage the probe body. A damaged body makes the probe less tight and may prevent it from going through the clasp nut.

CAUTION! In pressurized processes it is essential to tighten the supporting nuts and screws very carefully to prevent loosening of the probe by the action of pressure.

CAUTION! When HMP378 is installed in a process with a pressure differing from normal atmospheric pressure, you must enter the pressure value of the process as an environmental compensation in order to receive accurate measurement results. For information on entering environmental compensations with the transmitter display interface or Vaisala Insight PC software, see Environmental compensation and measurement settings overview (page 126).

4.8.2 HMP378F probe option for measuring oil moisture and temperature

The HMP378F probe option is a variant of the standard HMP378, designed for measurements in oil. The mechanics of the probe are the same as in the standard HMP378 probe option (see HMP378 probe for pressurized pipelines (page 77)).

The default HMP378F calculation coefficients (see HMP378F calculation model with average oil coefficients (page 129)) are valid for transformer oil. Typically, moisture in transformer oil measurement with HMP378F has a ppm accuracy of ±10 % of the reading. If required, different oil-specific calculation coefficients can be configured into use to customize HMP378F measurements. For instructions, see Configuring calculation coefficients (page 129).

HMP378F uses the HUMICAP® 180L2 sensor designed specifically for oil and fuel measurements. For HUMICAP 180L2 sensor specifications, see Specifications (page 146).

The following measurement parameters are available for HMP378F:

Table 33 HMP378F measurement parameters

Parameter	Abbreviation	Unit
Temperature	T	°C (°F)
Relative saturation	RS	%RS
Water activity	a_w	-
Water content in oil [1)]	H_2O_{oil}	ppm_w

1) *The default calculation coefficients for water content in oil (ppm_w) are valid for mineral transformer oil. For more information on default and oil-specific calculation coefficients, see HMP378F calculation model with average oil coefficients (page 129) and HMP378F calculation model with oil-specific coefficients (page 130).*

4.8.3 HMP378H probe option for measuring JET A-1 fuel moisture and temperature

The HMP378H probe option is a variant of the standard HMP378, designed for measurements in JET A-1 fuel (typical ppm accuracy: ±15 % of the reading). The mechanics of the probe are the same as in the standard HMP378 probe option (see HMP378 probe for pressurized pipelines (page 77)).

HMP378H uses the HUMICAP® 180L2 sensor designed specifically for oil and fuel measurements. For HUMICAP 180L2 sensor specifications, see Specifications (page 146).

The following measurement parameters are available for HMP378H:

Table 34 HMP378H measurement parameters

Parameter	Abbreviation	Unit
Temperature	T	°C (°F)
Relative saturation	RS	%RS
Water activity	a_w	-
Water content in JET A-1 fuel	$H_2O_{Jet\ A\text{-}1}$	ppm_w

Parameter	Abbreviation	Unit
Saturation temperature	T_s	°C (°F)

5. Installation

5.1 HMT370EX installation overview

Figure 29 (page 83) shows an example HMT370EX installation using the HMP373 probe with the probe head mounted with a bracket, and with both lead-throughs fitted with cable glands.

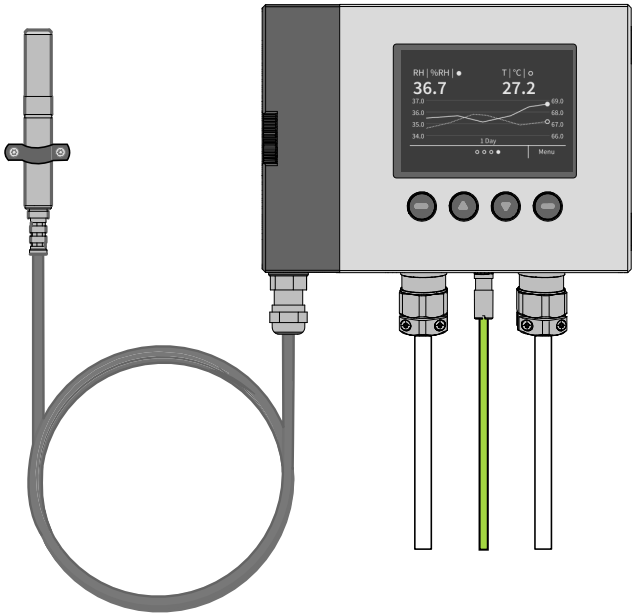


Figure 29 Example wall installation with HMP373 probe

CAUTION! Before starting the installation, review the equipment and safety requirements in this installation overview and the hazardous area safety information relevant to your region: see Regional safety certification overview (page 27).

WARNING! The installation must be carried out in a safe area, or you must ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

WARNING! When HMT370EX is powered, the transmitter enclosure must not be opened in a hazardous area. The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

- Screws for mounting the transmitter:
  - Installation directly through the transmitter body: 2 pcs Ø 5.5 mm screws
  - Installation with optional mounting plate: 4 pcs Ø 5.5 mm screws and 2 pcs M6 Allen screws
- Crosshead screwdriver for transmitter cover captive screws and wiring screw terminals
- Flathead screwdriver for the grounding terminal
- Cable glands, conduits, and plugs as required in your application, and suitable tools for attaching and tightening them
- Wire-cutting pliers

Optional:

- Crimping tool and wire ferrules
- Allen key (5 mm) for probe body locking wheel
- Ex-compliant multimeter for testing analog outputs

5.1.1 Installation preparations

Before starting the installation, check the following:

- Make sure that your installation site suits the Ex classification of the transmitter (for classification information relevant to your region, see Regional safety certification overview (page 27)).
- Review the hazardous area information relevant to your region (see Regional safety certification overview (page 27)) for further information on Ex safety requirements related to HMT370EX and specific conditions of use.
- When selecting the cable glands and plugs for your application, review the information in Cable gland and conduit options (page 20).
- Review the wiring diagrams included in this document for information on wiring using either a galvanic isolator or a Zener barrier.
  - Wiring with galvanic isolators (page 93)
  - Wiring with Zener barriers (page 94)

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

CAUTION! When planning the wiring of your application, note that Channel 1 (CH1) must always be wired. The transmitter receives power through the Channel 1 screw terminals, and does not power on if only Channel 2 (CH2) is wired.

CAUTION! To maintain the required Ex protection, do not install the transmitter model with an LCD display in a location where it is exposed to direct sunlight.

5.1.2 Probe installation overview

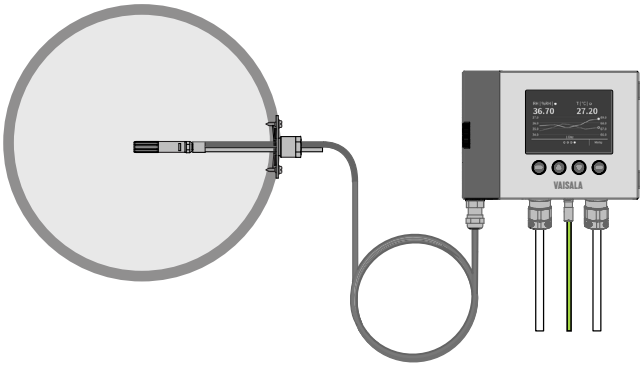


Figure 30 Duct installation example with HMP373 probe and duct installation kit

HMT370EX transmitters can be used with 6 different probe options that are designed for a variety of applications. The installation options vary from wall mounting (fixed HMP371 probe option) to, for example, duct installations (as shown in the HMP373 example in Figure 30 (page 85)) and ball valve installations (HMP378 probe option for pressurized pipelines).

The different probe options have varying operating environment specifications, installation methods, and installation accessories depending on their intended applications. For more information on each option, see HMT370EX probe options overview (page 67). Also review the safety information related to allowed ambient temperature ranges for probes before installation: see the information relevant to your certification region in Regional safety certification overview (page 27).

5.1.3 HMT370EX transmitter dimensions

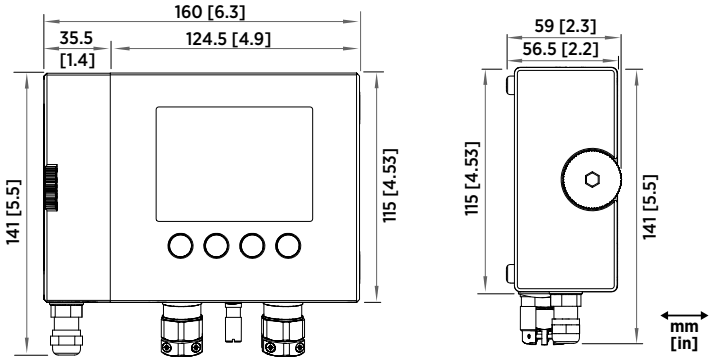
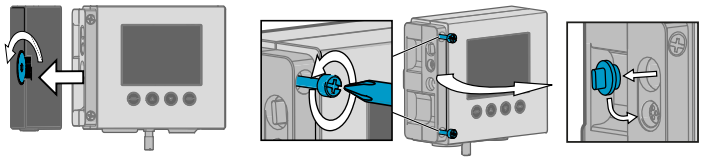


Figure 31 HMT370EX transmitter dimensions

5.2 Mounting

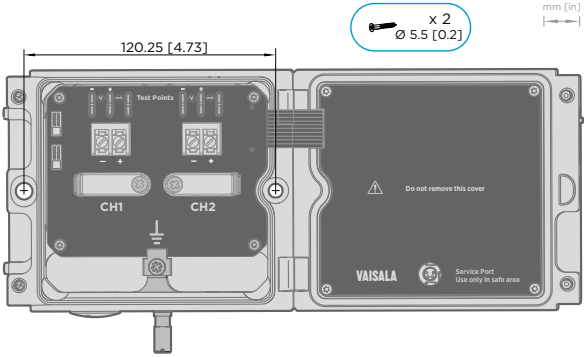
Select a surface (for example, a wall) for installing the transmitter. You can mount the transmitter directly to the installation surface with 2 screws, or use an optional mounting plate that attaches to the back of the transmitter.

1. Detach the probe body from the transmitter body, loosen the captive screws on the transmitter cover, cover the probe connector with the plug, and open the transmitter cover.

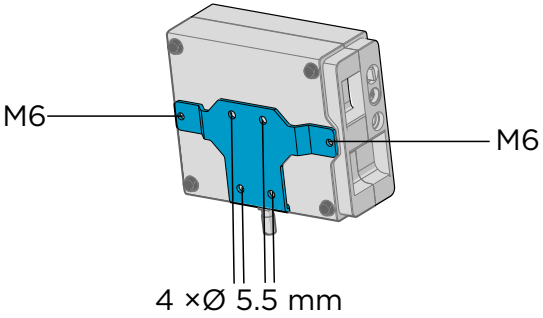


2. Mount the transmitter body on the installation surface either directly through the transmitter body, or using the optional HMT360 retrofit mounting plate:

   a. Installation without mounting plate: attach the transmitter body directly to the installation surface with 2 x Ø 5.5 mm screws. The left-hand screw hole has extra vertical space for adjusting the position of the transmitter after you have attached the right-hand screw.



   b. Installation with mounting plate: attach the mounting plate to the installation surface with 4 x Ø 5.5 mm screws, and then attach the transmitter to the mounting plate with 2 M6 Allen screws.



5.2.1 Pole mounting and attaching weather shield

- Crosshead screwdriver for transmitter cover captive screws
- Allen key (5 mm) for probe body locking wheel
- Screws 14 mm (2 pcs), provided
- Washers (2 pcs), provided
- Installation kit with weather shield (Vaisala item code 215109):
  - Fixing brackets (2 pcs) for 30–102 mm (1.18–4.02 in) poles
  - Mounting nuts for fixing brackets, M8 (4 pcs)
  - Mounting plate (1 pcs)
  - Rain shield (1 pcs)
  - Screws 10 mm (2 pcs)
  - Washers (2 pcs)

Using fixing brackets and a mounting plate, you can install the transmitter to a vertical or horizontal pole. If needed, you can also attach a rain shield.

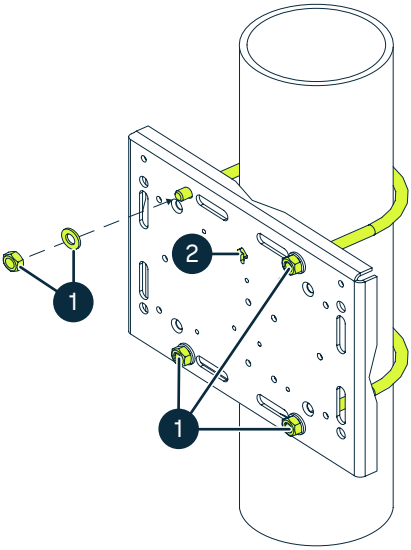


Figure 32 Attaching mounting plate to fixing brackets - vertical pole mounting

1 Mounting nuts for fixing brackets, M8 (4 pcs)
2 Note the position of the arrow when mounting. This side must be face up when mounting.



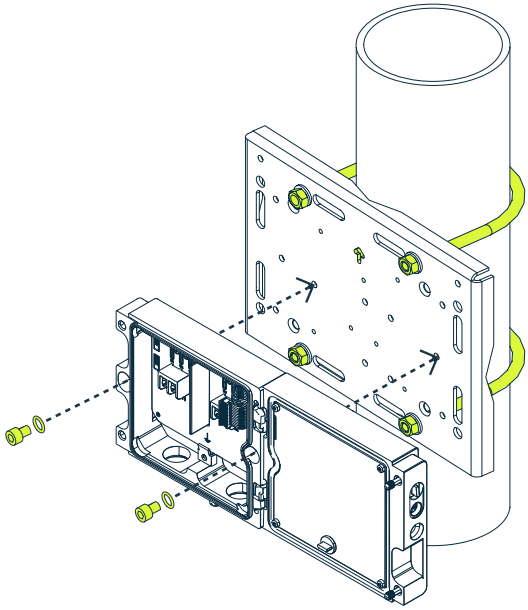


Figure 33 Attaching transmitter to mounting plate - vertical pole mounting

1. Place the fixing brackets around the pole and attach the mounting plate to the brackets using 4 mounting nuts.

   Make sure that the arrow in the mounting plate points upwards.

2. Open the transmitter cover: see Mounting (page 86) for an example.
3. Attach the transmitter to the mounting plate using 14-mm screws (2 pcs) and a 5-mm Allen key. Place nylon washers under the screws to protect the surface of the transmitter.

4. If needed, you can attach a rain shield. Attach the rain shield to the mounting plate using 10-mm screws (2 pcs) and washers (2 pcs).

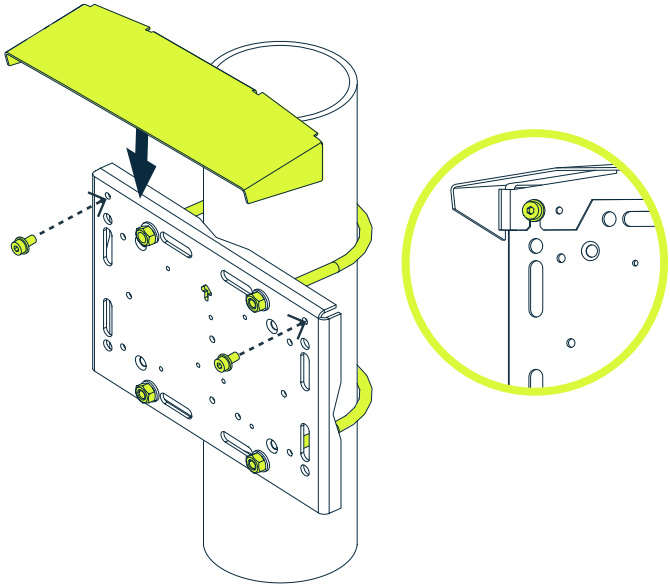


Figure 34 Attaching weather shield to mounting plate - vertical pole mounting

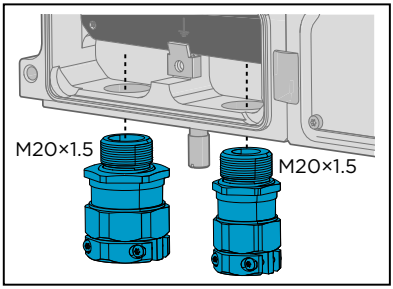
5.3 Attaching cable glands and conduit fittings

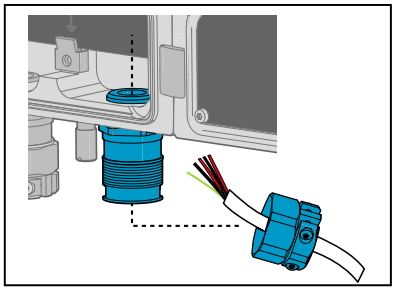
The HMT370EX transmitter body has 2 lead-throughs (M20x1.5) for wiring. The combination of cable glands, conduit fittings, and plugs used in the lead-throughs is application-specific, and must be determined by the customer. For information on lead-through accessories available from Vaisala and lead-through accessory requirements, see Cable gland and conduit options (page 20).

CAUTION! If you use lead-through accessories not ordered from Vaisala, note the following requirements:

- The cable glands and cables used for wiring the device must not impair the Ex protection.
- Unused lead-throughs must be sealed using Ex compliant plugs.
- The glands and plugs must be water and dust tight.

1. Install the application-specific lead-through accessories and lead the wiring cables through them into the transmitter body: an example is shown below.





5.4 Wiring

WARNING! Protected installation using galvanic isolators or Zener barriers is mandatory in a hazardous environment.

Galvanic isolators and Zener barriers are available from Vaisala as accessories. See Spare parts and accessories (page 157).

CAUTION! Ensure that the transmitter is powered correctly. 12 V DC is the minimum voltage in all conditions, measured at the transmitter screw terminals. If the supply voltage is less than 12 V DC, the analog output current can be erroneous.

It is recommended to use ferrules on the stripped wires to help ensure a secure connection with the screw terminals.

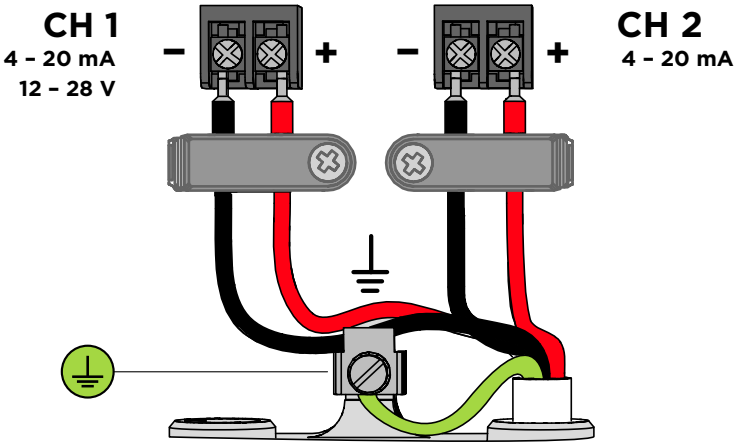


Figure 35 Wiring example using one cable

1. Prepare the cabling wires as required in your application (cabling either through 1 or 2 lead-throughs).
   a. Strip the cable wires: it is recommended to attach ferrules to the contact ends of the wires.
   b. Open the cable gland and insert a suitable length of the cable inside the transmitter through the cable gland.
   c. Tighten the cable gland: refer to the instructions of the glands used in your application for maximum tightness.
   d. If your installation does not require using both lead-throughs, plug the unused lead-through with an Ex compliant seal.
2. Connect the screw terminal wiring as required in your application. For protected installation wiring diagrams, see Wiring with galvanic isolators (page 93) and Wiring with Zener barriers (page 94).
   a. Open the cable fastening clamps below the screw terminals and lead the cables to the terminals through the clamps.
   b. Connect the wires to the screw terminals: for an example, see Figure 35 (page 92).

      Note that Channel 1 (CH1) must always be wired. The transmitter receives power through the CH1 screw terminals, and does not power on if only Channel 2 (CH2) is wired.

   c. Adjust the length of the wires and close the cable fastening clamps so that they hold the cables in place.

5.4.1 Wiring with galvanic isolators

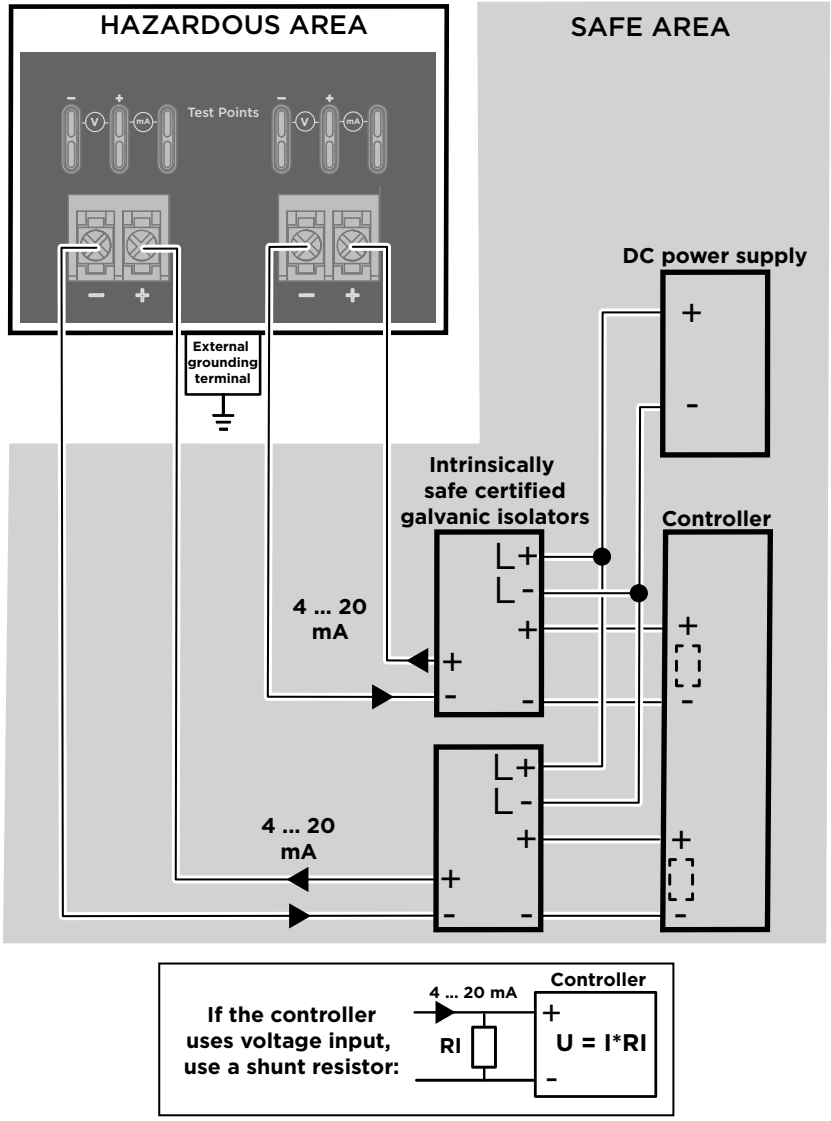


Figure 36 Wiring diagram with galvanic isolators

5.4.2 Wiring with Zener barriers

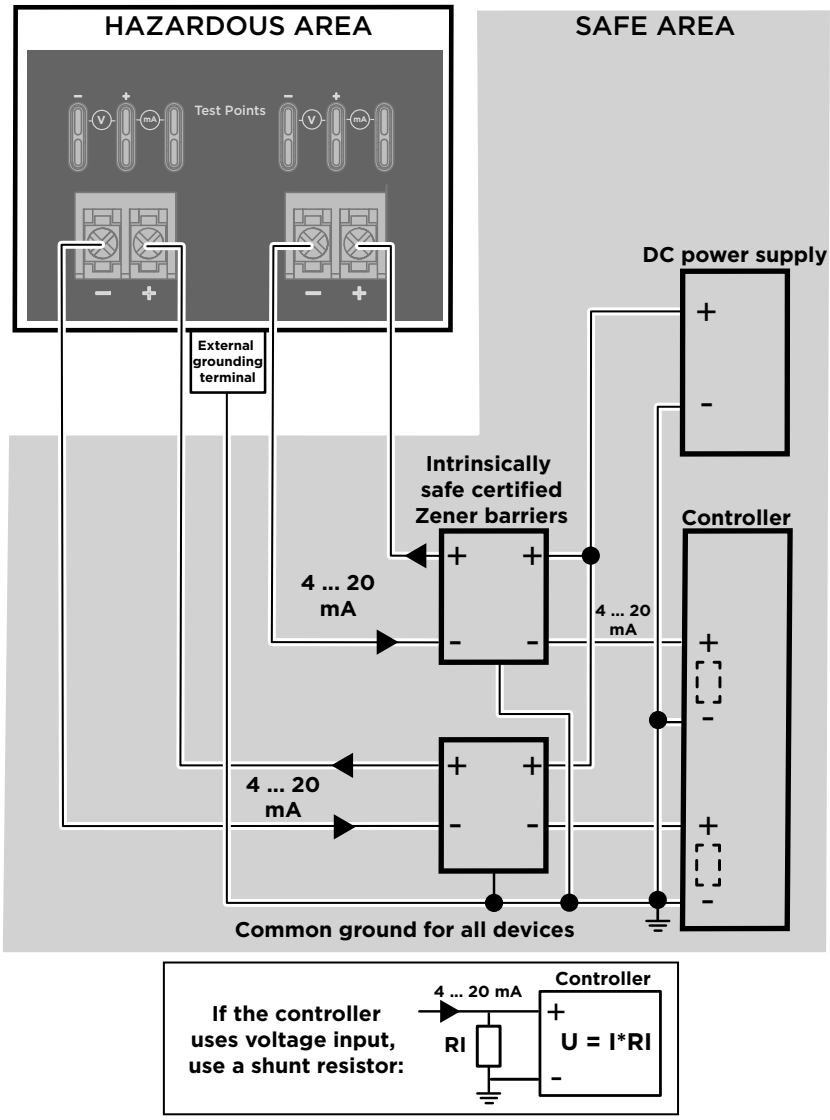
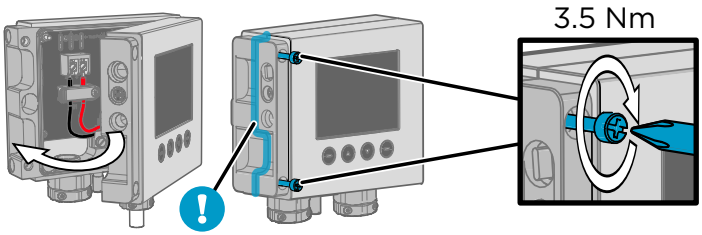


Figure 37 Wiring diagram with Zener barriers

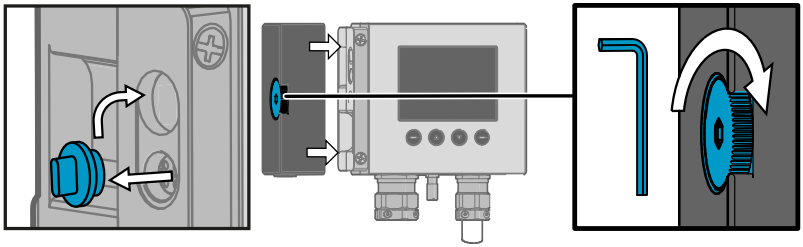
5.5 Finalizing installation: closing transmitter and attaching grounding

1. Close the transmitter body cover and tighten the captive screws. Tighten the screws to approximately 3.5 Nm: ensure that there is no gap between the covers.



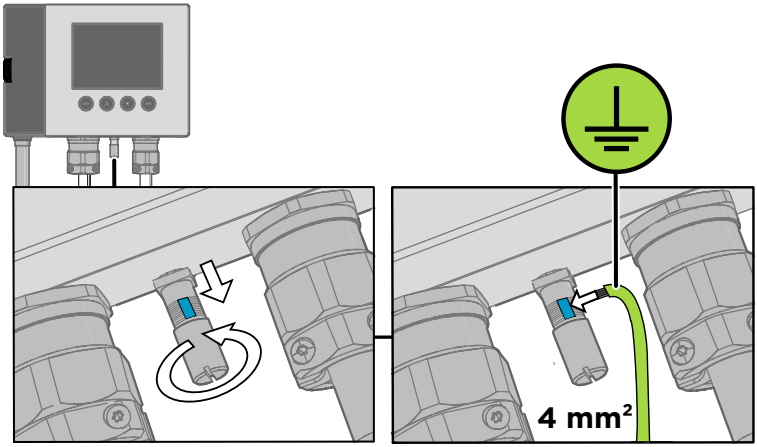
Ensure that the cover has been tightened sufficiently so that there is no gap between the covers in the area highlighted in the illustration.

2. Remove the plug, place it in its storage space, and attach the probe body to the transmitter.



It is sufficient to tighten the probe body to finger tightness with the locking wheel. To prevent detaching the probe body without tools, you can tighten the locking wheel further with an Allen key (5 mm).

3. Connect the grounding terminal on the bottom of the transmitter to the grounding element of the installation site with a 4 mm^2 grounding wire.



4. After grounding the transmitter, switch on the power supply input.

5.6 Optional: testing analog output level with a multimeter

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Always use an Ex compliant multimeter. The output parameters of the multimeter must be compatible with the input parameters of the transmitter.

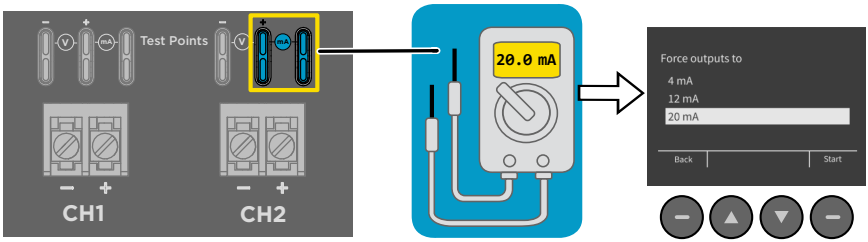
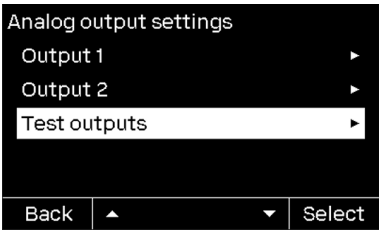


Figure 38 Multimeter test point overview

If you want to verify the output level of the analog output channels, test the connection as follows:

1. Detach the probe body and open the transmitter cover.
2. Connect a multimeter to the mA testing points located above the output screw terminals on the transmitter component board.
3. Start the output test mode either by using the transmitter display interface, or, if using a transmitter without a display, by connecting the transmitter to Insight PC software.
    a. For instructions on using the output test mode with Insight PC software, see Testing analog output level with Insight (page 123).
    b. To start the output test mode with the display interface, open the **Settings > Analog outputs > Test outputs** menu.





    c. Select an output level to force the output to (4, 12, or 20 mA) and select **Start**. Verify the output with the multimeter.
4. After verifying the output, remove the multimeter, close the transmitter cover, and reattach the probe body.

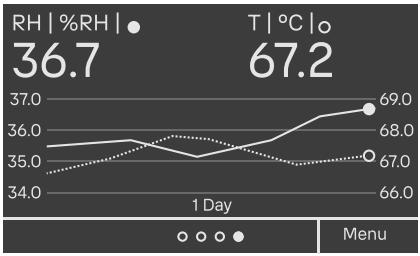
5. If the output is incorrect and requires adjustment, see Analog output adjustment overview (page 136).



CAUTION! The service port (see Figure 2 (page 20)) must only be used in a safe area. Either remove the transmitter from the hazardous area or ensure that a safe work procedure has been implemented in the hazardous area. Only use the Vaisala accessory PC connection cable with the service port.

6. HMT370EX local display interface

6.1 Local display overview



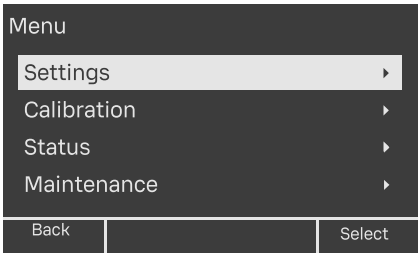


Figure 39 HMT370EX local display examples: measurement graph view and main menu screen

The display version of the HMT370EX transmitter has graphical LCD display with a 4-button interface. The local display can be used to view measurement information, configure settings, and calibrate and adjust measurements and outputs.

Using local display interface buttons

The display interface has 4 buttons for operating the display menus.

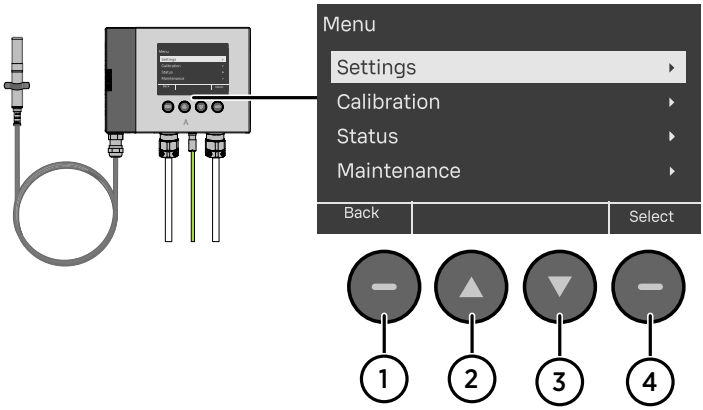


Figure 40 HMT370EX display interface buttons

1 **Back**: press to move back in the menu tree or cancel a selection.
2 **Up**: move up in the menu tree or increase a value.
3 **Down**: move down in the menu tree or decrease a value.
4 **Select**: press to open a menu or confirm a selection.

Press and hold **Back** to return directly to the main menu.

Press and hold the **Up** or **Down** button to increase or decrease a value faster.

Measurement information views

The home view of the display has several options for showing the measurement information of the connected probe. You can switch between the different views (for example, numerical parameters or graph view) using the **Up** and **Down** buttons. The parameter display settings can be configured in the **Settings > Display** menu.



Figure 41 2 parameter view example

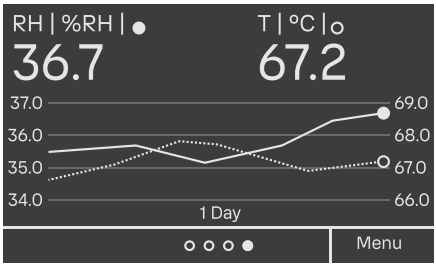


Figure 42 Graph view example

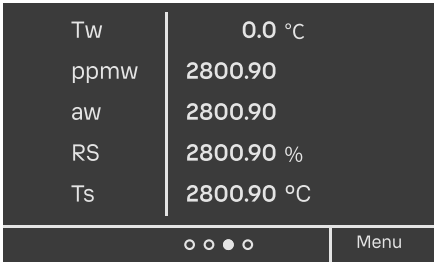


Figure 43 Parameter list view example

Configuration options

You can configure the following settings with the local display:

- Analog output settings (parameters, scaling, fault indication, output test and adjustment)
- Measurement settings (environmental compensation and filtering factor)
- Display settings (displayed parameters, units, graph visualization options, general display settings such as theme and PIN code)

In addition to configuration, you can also calibrate and adjust the measurement of the connected probe with different references (1-point or 2-point adjustment), view device and measurement status information, and reset the transmitter back to factory settings.

6.1.1 Local display PIN code

You can enable a (non-configurable) PIN code in the **Settings > Display** menu to prevent using the display menus without entering the code.

The PIN code is the following 4 button presses: **Up > Select > Back > Back**

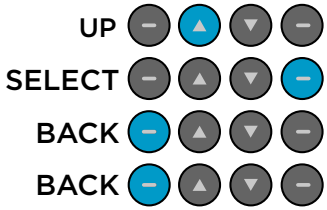


Figure 44 Display PIN code button presses

6.1.2 Light and dark display themes

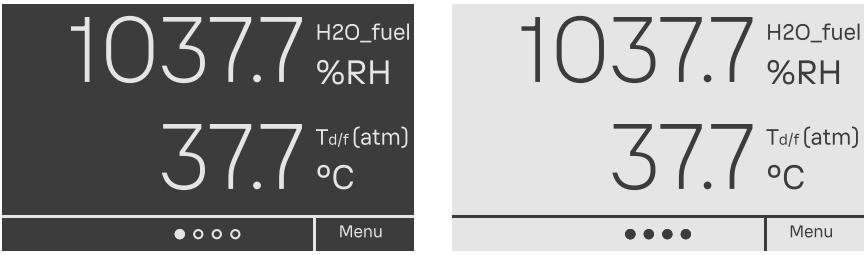


Figure 45 Dark (left) and light (right) display theme examples

You can select either a **Light** or **Dark** display theme to match the lighting conditions of your environment.

The **Light** theme has a light background and dark text and graphics, and the **Dark** theme has a dark background and light text and graphics.

6.2 HMT370EX display main menu

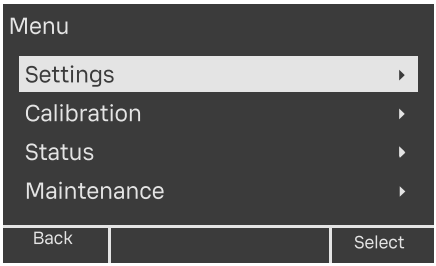


Figure 46 HMT370EX display interface main menu

The first view of the display interface menu contains 4 submenus for different configuration options. See the following sections for more information on each submenu:

- Settings menu (page 103)
- Calibration menu (page 106)
- Status menu (page 106)
- Maintenance menu (page 107)

6.3 Settings menu

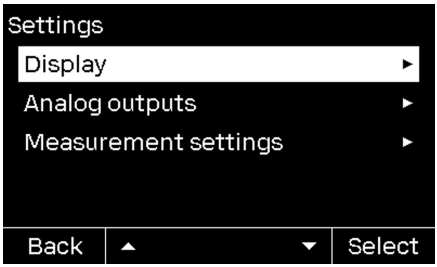


Figure 47 Settings menu

The **Settings** menu contains the following configuration options:

Display	Selections for which parameters are displayed, display interface language, graph settings, display PIN code protection, and theme.
Analog outputs	Analog output 1 and 2 parameter selection, scaling, error output selection, and output test mode.
Measurement settings	Environmental compensation and filtering factor configuration.

6.3.1 Display menu

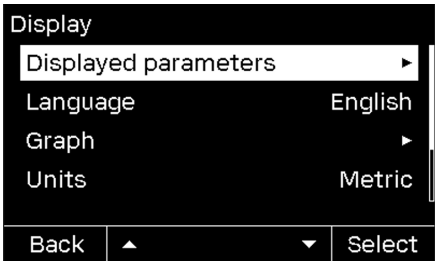


Figure 48 Display menu

In the **Display** menu, you can select which parameters are shown on the display, change the local display interface language, and configure graph, unit, menu access PIN code, and color theme options.

Displayed parameters	Select which measurement parameters are shown on the display. Up to 4 parameters can be shown simultaneously.
Language	Set the local display interface language. The available options are **English**, **German**, **French**, **Japanese**, and **Chinese**.
Graph	Set the measurement parameters shown as graphs and the time period visualized in the graph.
Units	Set the display interface to show units either as metric or non-metric.
Menu PIN code	Enable or disable using the fixed PIN code to restrict access to configuration menus.
Theme	Set the display interface to use either a **Light** or **Dark** color theme.

If you have selected a wrong language and need to change the display language, see the instructions in Problems and their possible solutions (page 142). You can also change the display language by connecting the transmitter to the Insight PC software.

6.3.2 Analog outputs menu

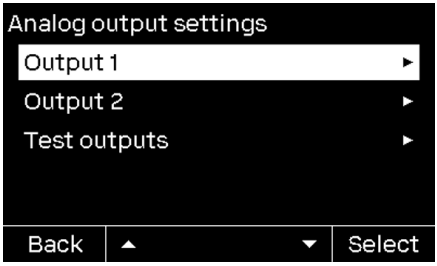


Figure 49 Analog output settings

In the **Analog outputs** menu, you can select the measurement parameters that are sent on analog output channels 1 and 2, select the output scaling and error indication level, and test the accuracy of the outputs.

Output 1	Select which measurement is sent on analog output channel 1 and how the measurement value is scaled on the 4 – 20 mA output range. You can also set the current level that is output to indicate an error state (either 3.6 mA or 21 mA).
Output 2	The same configuration options as for **Output 1**.
Test outputs	You can force the analog output to a fixed value (options: 4, 12, and 20 mA) and read the fixed output to verify that the transmitter outputs are working correctly.

For more information on analog output configuration using the local display or Vaisala Insight PC software, see Analog output configuration overview (page 120).

6.3.3 Measurement settings menu

In the **Measurement settings** menu, you can set environmental compensations and configure the filtering factor.



CAUTION! You must enter the pressure compensation value in order to accurately measure calculated parameters that require pressure data. By default, the pressure compensation value is set as 1013.25 hPa.

Pressure	Enter the pressure of the current measurement environment (in hPa).
Filtering on/off	Enable or disable measurement output filtering using the default filtering factor.
Extended filtering on/off	Enable or disable measurement output filtering using a custom filtering factor value (entered in the **Filtering factor** selection).
Filtering factor	Enter a custom filtering factor value (requires enabling the **Extended filtering factor** selection).
Molar mass of gas	Enter the molar mass of the ambient gas (default value: 28.965 g/mol). Note that the molar mass of the ambient gas must be defined when calculating gas dependent humidity parameters.
Oil A	Oil-specific calculation coefficient: only used in the HMP378F probe option for measuring oil moisture and temperature.
Oil B	Oil-specific calculation coefficient: only used in the HMP378F probe option for measuring oil moisture and temperature.

6.4 Calibration menu

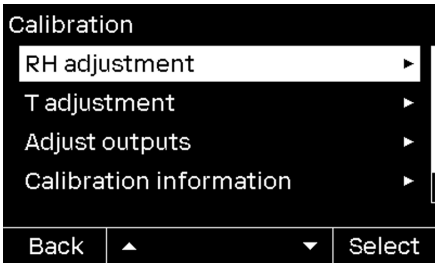


Figure 50 Calibration menu

In the calibration menu, you can adjust the RH or T measurement of the connected probe using 1 or 2 reference points. You can also view information about the currently existing adjustments and reset the adjustment of the connected probe back to default.

RH adjustment	Relative humidity calibration and adjustment using 1 or 2 reference points.
T adjustment	Temperature calibration and adjustment using 1 or 2 reference points.
Calibration information	Shows information on the adjustments made to the measurement.
Reset probe	Selections for resetting probe measurement adjustments to factory default settings.

6.5 Status menu

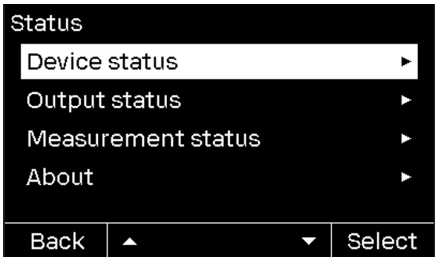


Figure 51 Status menu

The **Status** menu contains options for viewing information about the operation of the device: transmitter and probe status messages, output and measurement status, and general information on the device.

Device status	Device operation information such as notifications and errors.
Output status	Shows the current statuses of analog output 1 and 2 (output level and measurement).
Measurement status	Shows the current status or statuses of each measurement parameter (for example, **OK** or **Measurement not ready**).
About	Device information (software version and manufacturing date).

6.6 Maintenance menu



Figure 52 Maintenance menu

In the maintenance menu, you can restart the transmitter and restore transmitter settings back to factory defaults.

Adjustments made to probe measurement will remain in place also after a transmitter factory reset, as probe adjustments are stored in probe memory.

7. Operating with Insight PC software

7.1 Vaisala Insight PC software

Vaisala Insight PC software is a configuration software for Indigo compatible devices. The supported operating systems are Windows 7 (64-bit), Windows 8.1 (64-bit), and Windows 10 (64-bit).

With the Insight software, you can:

- See device information and status.
- See real-time measurement data.
- Calibrate and adjust device measurement.
- Configure analog output settings such as parameters, scaling and error level, and test and adjust analog output level.
- Configure environmental compensations and measurement settings such as filtering factor and calculation coefficients.

Download Vaisala Insight software at www.vaisala.com/insight.

The probe body can be detached from the transmitter and connected to Insight separately using the probe body service port. You can also connect the transmitter and probe body to Insight together as one unit by using the transmitter service port.

Connecting the probe body separately to Insight software requires the M12 Indigo USB Adapter accessory (Vaisala item USB2). Connecting the transmitter service port to Vaisala Insight software requires the M8-4F USB cable accessory (Vaisala item 219690).

7.1.1 Basic and Advanced user modes

You can switch between the **Basic mode** and **Advanced mode** user modes in the **Settings** menu.

Depending on the connected device, switching to **Advanced mode** may provide access to additional configuration options. Use these options only as described in the product documentation or as instructed by Vaisala support.

7.2 Connecting to Insight PC software



- Computer with Vaisala Insight PC software installed
- M12-USB connection cable for detached probes, Vaisala item code: USB2
- M8-USB connection cable for transmitter service port, Vaisala item code: 219690

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

CAUTION! When connecting several devices at the same time, note that your computer may not be able to supply enough power through its USB ports. Use an externally powered USB hub that can supply >2 W for each port.

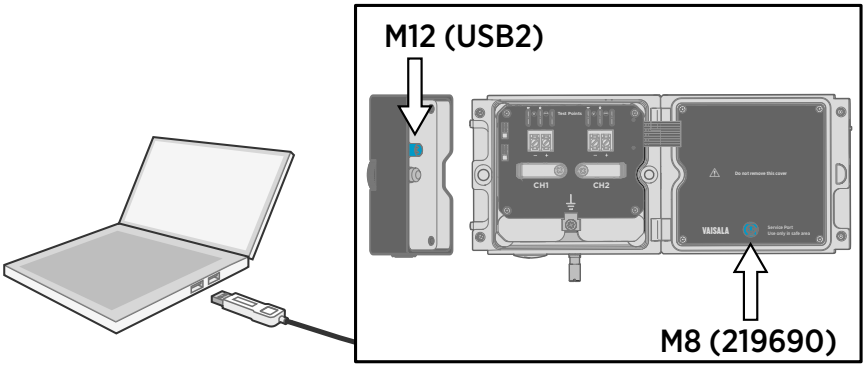


Figure 53 Connecting to Insight: probe body and transmitter service port locations

1. If you want to configure the probe by itself:
   a. Open the Insight PC software.
   b. Connect the M12 USB cable (Vaisala item USB2) to a free USB port on the PC.
   c. Detach the probe body from the transmitter: see Mounting (page 86) for an example.

      CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

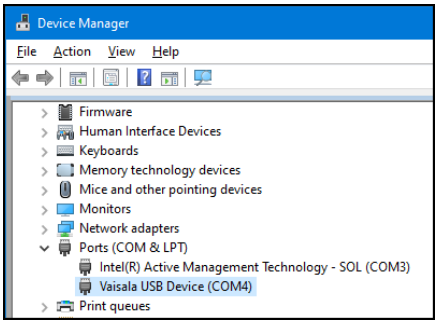
   d. Move the probe body to the space you are using to connect the probe to a computer.
   e. Connect the M12 USB cable (Vaisala item USB2) to the service port of the probe.
   f. Wait for Insight to detect the probe.

2. If you want to configure the transmitter and probe together as one unit:
   a. Open the Insight PC software.
   b. Connect the M8 USB cable (Vaisala item 219690) to a free USB port on the PC.
   c. Open the transmitter cover: see Mounting (page 86) for an example.
   d. Reconnect the probe body to the transmitter cover.
   e. Connect the M8 USB cable (Vaisala item 219690) to the service port on inside of the transmitter cover.
   f. Wait for Insight to detect the probe.

7.2.1 Installing driver for the USB service cable

Only Windows® operating systems are supported by the driver of the USB service cable.

1. Connect the USB service cable to a USB port on your computer. Windows® detects the new device and installs the appropriate driver.
2. Open **Device Manager** from the Windows® Start menu. Use search to find it if necessary (search for "device").
3. Locate the cable in the list of devices:
   - If the device is listed as **Vaisala USB Device** with a COM port number in brackets, the cable is ready for use.
   - If the device is listed as **Vaisala USB Instrument Cable** without a COM port number listed, you must install the driver manually.



4. To install the driver manually:
   a. Disconnect the USB service cable from the computer.
   b. Download the Vaisala USB driver at vaisala.com/software (select the appropriate USB Instrument Driver Setup for your cable).
   c. Extract the driver zip file and run the USB driver installation program ***`Vaisala USB Device Driver Setup.exe`***. Accept the installation defaults.
   d. Go back to step 1 and verify that the driver installation works as expected.

7.3 Insight main view with transmitter

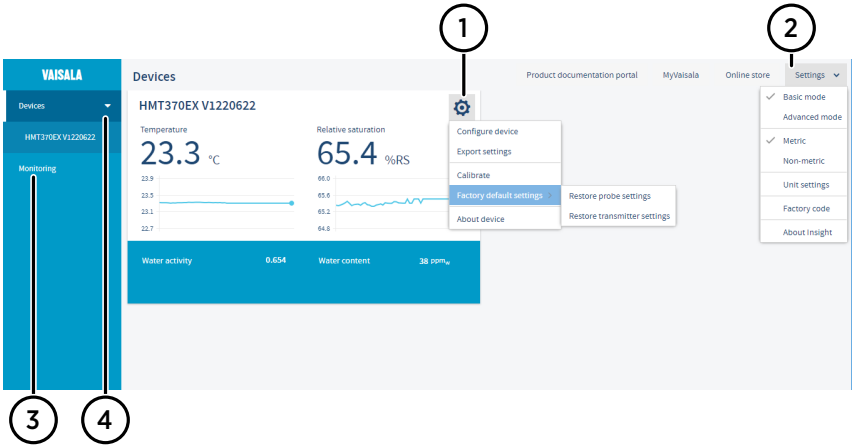


Figure 54 Insight main menu and settings: transmitter view

1 Select ⚙ to access Insight main menu.
   - **Configure Device**: environmental compensation settings, analog output settings, display and graph settings, measurement coefficients, filtering factor, and general settings.
   - **Export Settings**: creates a text file export of the device settings.
   - **Calibrate**: options for calibrating and adjusting RH and T measurement, adjusting analog outputs, viewing adjustment data, and restoring factory adjustments.
   - **Factory default settings**: options for restoring transmitter and probe factory settings.
   - **About Device**: general device information such as serial number and software version.
2 Select **Settings** to switch between the **Basic Mode** and **Advanced Mode** user modes, change the units of parameters (metric/non-metric), enter a factory code to access restricted functionalities, or view information about the Insight software.
3 **Monitoring** provides options for monitoring and recording selected parameters, and exporting the monitoring data as a CSV (comma-separated values) file.
4 Device information menu for devices connected to Insight. Select HMT370EX from the device list to view the following tabs:
   - **Measurements**: measurement graph view with parameter drop-down selection.
   - **Calibration information**: read-only information about the latest stored calibration.
   - **Diagnostics**: troubleshooting and administrative information about the device status. You can also test the transmitter's analog output level in the **Diagnostics** view. This view includes options for exporting the device error log and other diagnostics information as files (CSV/ZIP). When contacting Vaisala support, it is recommended to include an up-to-date export of the error log with the support request. Note that certain diagnostics options are only available when using Insight in the **Advanced Mode** user mode.

7.4 Insight main view with probe

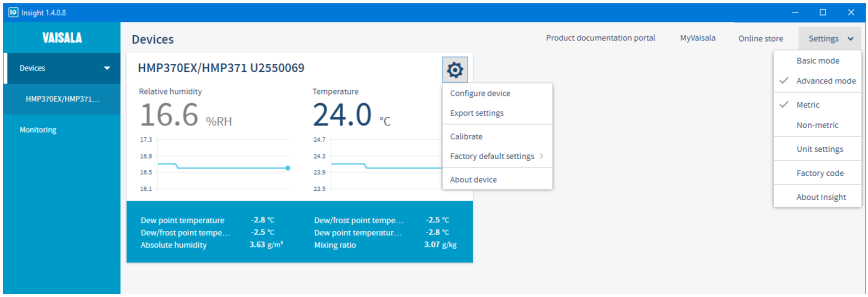


Figure 55 Insight main menu and settings: probe view

When you detach a probe from the transmitter and connect it separately to Insight, the configuration view is otherwise similar as when connecting a transmitter and a probe together (see Insight main view with transmitter (page 112)), but the configuration options are limited to probe functionalities.

8. Operating with Indigo80 handheld indicator

8.1 Indigo80 handheld indicator

Connecting the HMT370EX transmitter to Indigo80 is possible from HMT370EX transmitter software version 1.2.0 onward. HMT370EX probes are compatible with Indigo80 from probe software version 1.1.0 onward.

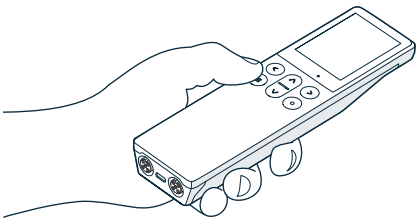


Figure 56 Indigo80 handheld indicator

Vaisala Indigo80 Handheld Indicator is a portable diagnostics tool that accommodates up to two compatible Vaisala devices for measuring a wide range of parameters.

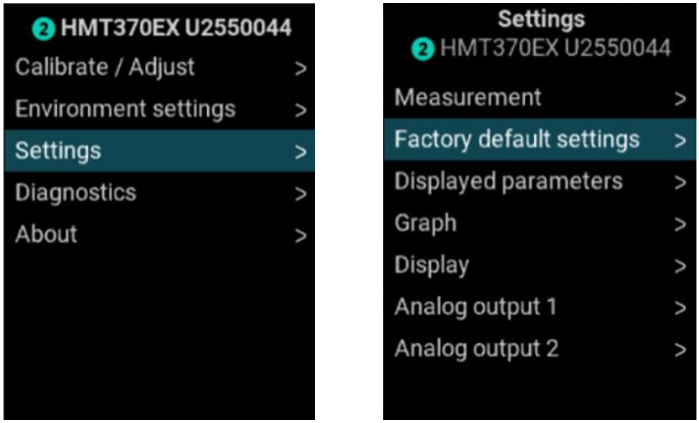


Figure 57 HMT370EX main menu and Settings menu example views

With the indicator, you can:

- See real-time measurements and device and status information
- Log measurement data from the probes connected to the transmitter

- Calibrate and adjust the connected probes
- Configure, test and adjust the analog output channels of the transmitter
- Configure transmitter and probe settings

The help tours in the indicator's user interface guide you through the key features of the indicator. You can access the tours in the **Help** menu by pressing the ☰ button.

For more information on using the indicator, for example, editing the measurement views and performing data logging, see Indigo80 User Guide (M212722EN).

8.2 Connecting HMT370EX transmitter and probes to Indigo80 handheld indicator

CAUTION! Note that the Indigo80 indicator is not classified for use in hazardous areas. Do not use the indicator in a hazardous area, or alternatively ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

- HMT370EX transmitter software version 1.2.0 or higher and probe software version 1.1.0 or higher.
- Cable for transmitters (M12-M8), 1.5 m (4 ft 11 in). Vaisala item code: 262195SP.
- Cable for probes (M12-M12), 1.5 m (4 ft 11 in). Vaisala item code: 272075SP.
- Crosshead screwdriver for transmitter cover captive screws.
- Allen key (5 mm) for probe body locking wheel.

CAUTION! Use only cables provided by Vaisala to connect devices to the transmitter. Attempting to connect incompatible devices or cables can damage the equipment.

Upon connecting, the transmitter receives date and time settings from Indigo80.

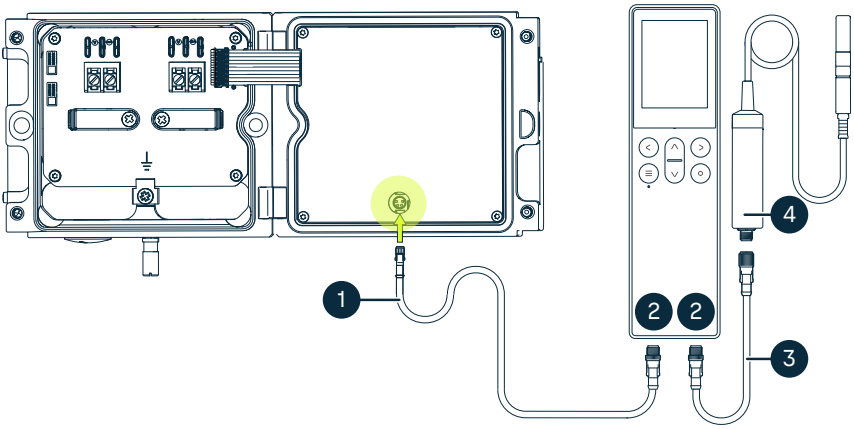


Figure 58 Example of connecting HMT370EX transmitter to Indigo80 indicator

1 M12-M8 Indigo80 transmitter connection cable accessory 262195SP
2 M12-5F ports on the bottom of Indigo80 for connecting compatible Vaisala devices. Ports are labeled ❶ (left) and ❷ (right) on Indigo80.
3 Probe connection cable
4 Probe connected to Indigo80

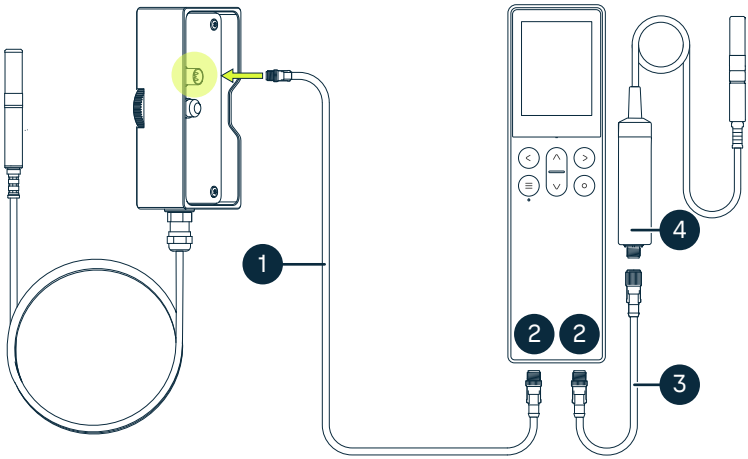


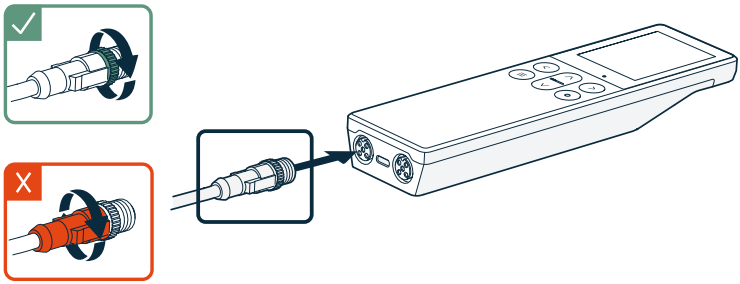
Figure 59 Example of connecting detached HMT370EX probe to Indigo80 indicator

1 M12-M12 Indigo80 probe connection cable accessory 272075SP
2 M12-5F ports on the bottom of Indigo80 for connecting compatible Vaisala devices. Ports are labeled ❶ (left) and ❷ (right) on Indigo80.
3 Probe connection cable
4 Probe connected to Indigo80

1. If you want to configure a detached probe by itself:
   a. Detach the probe body from the transmitter: see Mounting (page 86) for an example.

> **CAUTION!** The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

   b. Move the probe body to the safe area where you carry out the configuration with the Indigo80 indicator.
   c. Connect the M12-M12 probe connection cable (Vaisala item code: 272075SP) to the service port of the probe.
   d. Connect the other end of the probe connection cable to the desired port on the bottom of the Indigo80 indicator. You can select the port freely based on your set of connected devices.
      - **Note the orientation of the cable connector when inserting it**
      - **Hold the connector in place while turning its locking ring clockwise – never twist the connector body!**



   e. Power on the Indigo80 indicator. The indicator provides power also for the connected probe.

      When the indicator recognizes the connected probe, it shows a notification on the display. A probe connected to the leftmost port in the indicator is labeled ❶ on the indicator's display, while the probe in the rightmost port is labeled ❷.
   f. To change probes, simply detach the cable from the probe and connect a new probe.

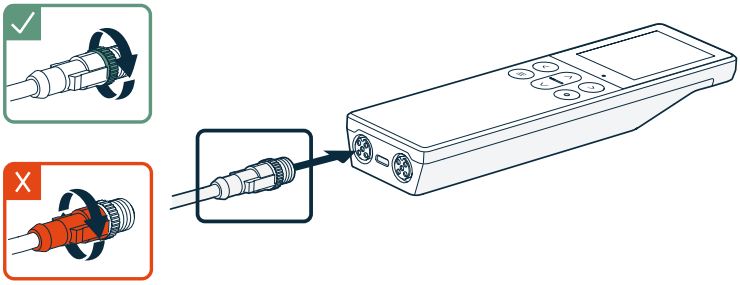
2. If you want to configure the transmitter and probe together as one unit:
   a. Open the transmitter cover: see Mounting (page 86) for an example.

> **CAUTION!** The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

   b. Reconnect the probe body to the transmitter cover.
   c. Connect the M8 end of the M12-M8 service cable (Vaisala item code: 262195SP) to the transmitter service port.

      Avoid touching any other part of the PCB by hand or with the service cable M8 connector.
   d. Connect the other end of the transmitter connection cable to the desired port on the bottom of the Indigo80 indicator. You can select the port freely based on your set of connected devices.

      - **Note the orientation of the cable connector when inserting it**
      - **Hold the connector in place while turning its locking ring clockwise – never twist the connector body!**



   e. Power on the Indigo80 indicator. The indicator provides power also for the connected transmitter and probe.
   f. Wait for the indicator to detect the transmitter.

      When the indicator recognizes the connected transmitter, it shows a notification on the display. On the transmitter display, the active connection symbol ⇄ appears.

9. Analog output configuration

9.1 Analog output configuration overview

HMT370EX has 2 scalable 4–20 mA analog output channels. Each output has the following configuration options:

- Output parameter selection
- Output scale low end and high end
- Error output level and clipping limits
- Output testing (force output to a specified level for multimeter testing)
- Output adjustment (comparing the output level shown by the transmitter to a multimeter reading and changing the output level as needed)

The configuration of the outputs can be changed with the transmitter display interface, by connecting the transmitter to Vaisala Insight PC software, or with the Indigo80 handheld indicator.

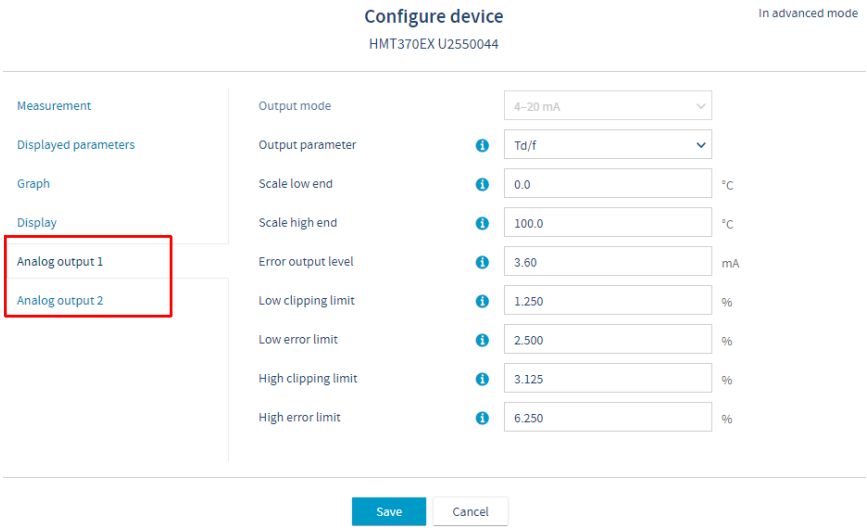


Figure 60 Analog output configuration options in Insight PC software

9.1.1 Analog output overrange behavior

The analog output of the transmitter has a defined behavior when the measured values are outside the scaled analog output range. At first, the output is clipped when the measurement exceeds a set limit (clipping limit): the measurement continues, but the output does not change from the clipped value.

When the measurement exceeds the second limit (error limit), the analog output switches to the error state defined for the output.

The clipping and error limits are configured separately for the low and the high ends of the measurement scale.

You can change or disable the clipping and error limits using Vaisala Insight PC software. Changing the limits does not affect the scaling of the outputs. The definable range for the low clipping limit and low error limit is 0.0–2.5 % (4.00–3.9 mA) , and 0.0–12.5 % (20.00–22.5 mA) for the high clipping limit and high error limit.

The same clipping and error limits are applied when the measured value drops back to the scaled range: at first the output returns to the clipped value from the error state, and then to normal output.

Note that the clipping and error limit configuration can only be carried out with Insight PC software or the Indigo80 handheld indicator.

9.2 Configuring analog outputs with Insight

Using the Insight PC software, you can configure the measurement parameter sent on each analog output, the scaling of the parameter, clipping and error limits, and the error output level. In addition to configuration, you can also carry out an output test where the output is forced to a fixed level so it can be verified with a multimeter. Both output channels have the same configuration options.

The analog output configuration view in Insight also shows the status and output mode of the analog output channel: see Figure 60 (page 120).

1. Connect to Insight (see Connecting to Insight PC software (page 108)).
2. Select > **Configure device**, and then one of the 2 analog outputs.
3. Select the measurement parameter that is sent on the output channel you are configuring, set the scaling for the output, and define the output level that indicates an error.
4. Define the clipping and error limits.
5. Store the selections with **Save** and exit with **Close**.
6. Repeat the configuration for each output as required.
7. If you want to test the output, see the instructions in Analog output level test (page 122). If the analog output requires adjustment, see Analog output adjustment overview (page 136).

9.3 Configuring analog outputs with local display interface

Using the local display interface of the transmitter, you can configure the measurement parameter sent on each analog output, the scaling of the parameter, and the error output level. In addition to configuration, you can also carry out an output test where the output is forced to a fixed level so it can be verified with a multimeter. Both output channels have the same configuration options.

To view the status of the outputs, select **Menu > Status > Output status**.

Note that clipping and error limit configuration for the analog outputs can only be carried out with Insight PC software or the Indigo80 handheld indicator.

1. Select **Menu > Settings > Analog outputs**.
2. Select the measurement parameter that is sent on the output channel you are configuring, set the scaling for the output, and define the output level that indicates an error.
3. Repeat the configuration for each output as required.
4. If you want to test the output, see the instructions in Analog output level test (page 122). If the analog output requires adjustment, see Analog output adjustment overview (page 136).

9.4 Analog output level test

If you need to verify that the signal from the HMT370EX transmitter's analog output channel is correct, you can force the output of the channel to a specific value and measure the output level with a multimeter.

The analog output level tested can be carried out either with the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator.

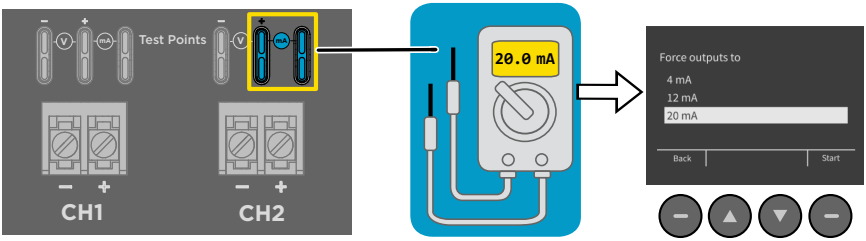


Figure 61 Multimeter test point overview

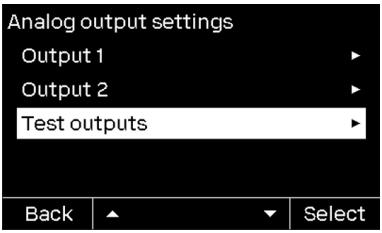
CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

Always use an Ex compliant multimeter. The output parameters of the multimeter must be compatible with the input parameters of the transmitter.

9.4.1 Testing analog output level with local display interface

If you want to verify the output level of an analog output channel, test the connection as follows:

1. Detach the probe body and open the transmitter cover.
2. Connect a multimeter to the mA testing points located above the output screw terminals on the transmitter component board (see Figure 61 (page 122)).
3. To start the output test mode with the local display interface, open the **Settings > Analog outputs > Test outputs** menu.

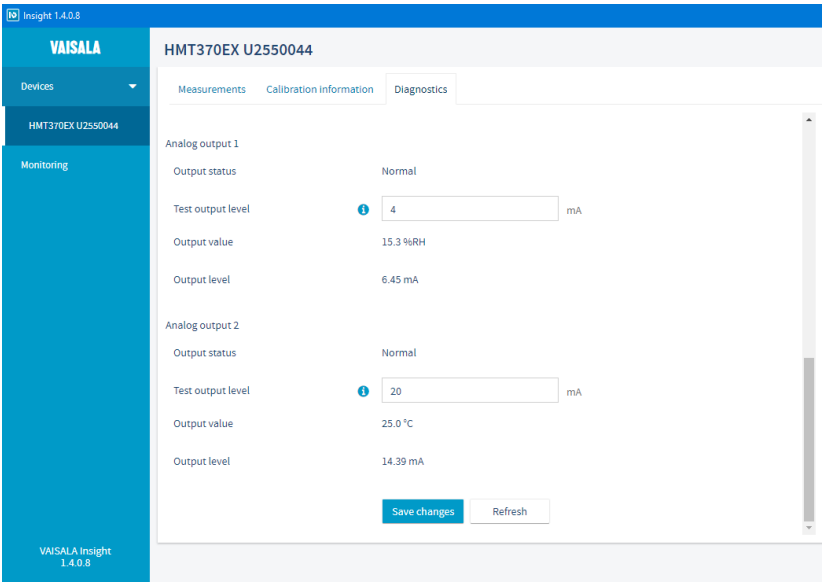


4. Select an output level to force the output to (4, 12, or 20 mA) and select **Start**. Verify the output with the multimeter and select **Finish** when done.
5. If the output is incorrect and requires adjustment, see Analog output adjustment overview (page 136).
6. Remove the multimeter, close the transmitter cover, and reattach the probe body.

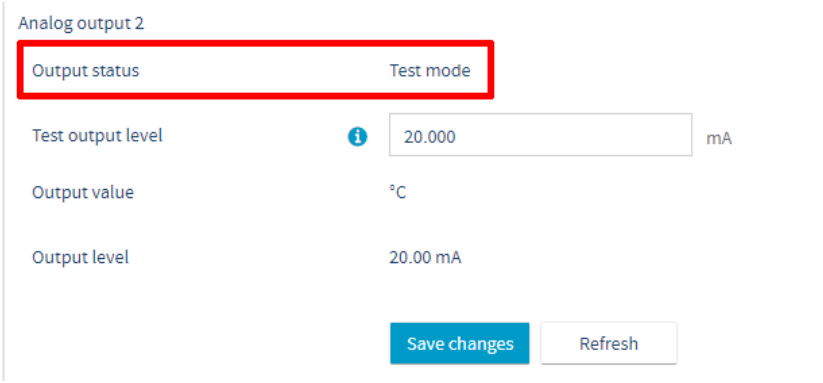
9.4.2 Testing analog output level with Insight

1. Detach the probe body and open the transmitter cover.
2. Connect a multimeter to the mA testing points located above the output screw terminals on the transmitter component board (see Figure 61 (page 122)).
3. Connect to Insight (see Connecting to Insight PC software (page 108)).

4. Expand the **Devices** selection, select your device, and open the **Diagnostics** tab.



5. Enter a test output value in the **Test output level** of the output you want to test and select **Save changes**.
6. The **Output status** field will show that the **Test mode** is now active.



7. Verify that the multimeter reading matches the **Test output level** value.
8. If the output is incorrect and requires adjustment, see Analog output adjustment overview (page 136).

9. After verifying the output, clear the value from the **Test output level** field and select **Save changes**. This switches the **Test mode** off.



CAUTION! The **Test mode** must always be switched off after verifying the output level to return to normal measurement mode.

10. Remove the multimeter, close the transmitter cover, and reattach the probe body.

10. Environmental compensation and measurement settings

10.1 Environmental compensation and measurement settings overview

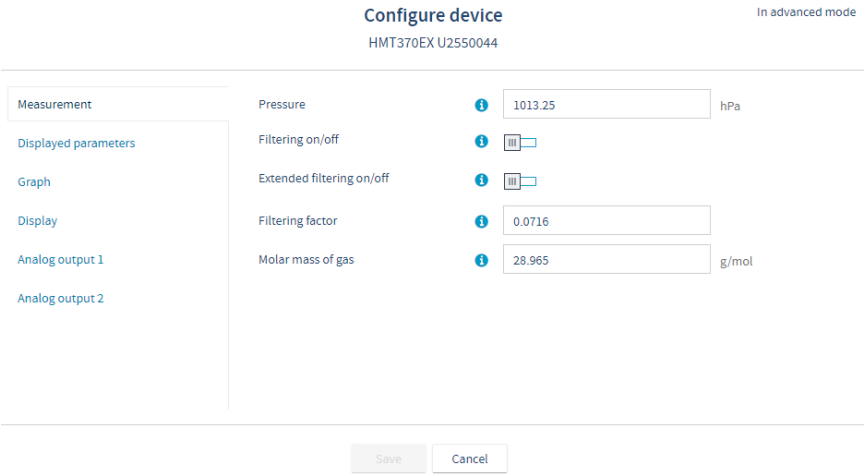


Figure 62 Insight PC software Measurements configuration view when connected to transmitter

Pressure compensation

You can configure a pressure compensation value to HMT370EX using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator.

CAUTION! You must enter the pressure compensation value in order to accurately measure calculated parameters that require pressure data. By default, the pressure compensation value is set as 1013.25 hPa.

Note that pressure compensation is not used in the HMP378F and HMP378H oil and fuel measurement probe models.

Filtering factor

If the measuring environment produces occasional exceptionally high or low readings that need to be averaged out in the output, you can apply a filtering factor to the measurement output. The filtering factor defines the speed at which the latest measurement is integrated into the transmitter's output. For example, setting the filtering factor to 0.500 means that the displayed output is a 50%+50% combination of the previous measurement and the most recent measurement. To show the latest measurement directly in the output, set the filtering factor to 1.000 (no filtering).

HMT370EX has 2 alternative filtering factor options: either a default filtering factor that uses a 13 second moving average (T90), or a custom filtering factor defined by the user.

The filtering factor can be configured using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator.

Calculation coefficients

When required, you can define the molar mass of the ambient gas (default value: 28.965 g/mol) and oil-specific calculation coefficients. The oil-specific calculation coefficients (selections **Oil A** and **Oil B**) are applicable only for the HMP378F oil probe model.

CAUTION! The molar mass of the ambient gas must be defined when calculating gas dependent humidity parameters.

Note that the molar mass of gas coefficient is not used in the HMP378F and HMP378H oil and fuel measurement probe models.

Calculation coefficients (molar mass of the ambient gas and oil-specific calculation coefficients) can be configured using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator.

For more information on the oil calculation coefficients for HMP378F, see HMP378F calculation model with average oil coefficients (page 129) and HMP378F calculation model with oil-specific coefficients (page 130).

10.2 Configuring pressure compensation

You can configure a pressure compensation value to HMT370EX using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator.

To set a pressure compensation value:

1. If you are using the local display interface:
   a. Select **Menu > Settings > Measurement settings > Pressure**.
   b. Use the **Up** and **Down** buttons to enter a value for each digit of the pressure value. Move to the next digit with **Select**.
   c. After the final digit, pressing **Select** saves the pressure value.
2. If you are using Insight PC software:
   a. Connect to Insight PC software: see Connecting to Insight PC software (page 108).
   b. Select **> Configure Device > Measurement**.
   c. Enter the pressure compensation value into the **Pressure** field and select **Save**.

10.3 Configuring filtering factor

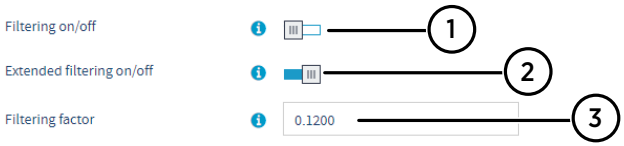


Figure 63 Filtering factor configuration in Insight PC software

1 Enable **Filtering on/off** to use the default filtering factor.
2 Enable **Extended filtering on/off** if you want to enter a custom filtering factor value.
3 After enabling the **Extended filtering on/off** selection, enter the custom value into the **Filtering factor** field.

You can apply a filtering factor to the measurement output to average out measurement output over time (for more information, see Environmental compensation and measurement settings overview (page 126)). A default or custom filtering factor can be set using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator.

To set a filtering factor:

1. If you are using the local display interface:
   a. Select **Menu > Settings > Measurement settings > Filtering**.
   b. To enable the default filtering factor (13 second moving average (T90)), set the **Filtering on/off** selection to **ON**.
   c. If you want to enter a custom filtering factor, set the **Extended filtering on/off** selection to **ON**, select **Filtering factor** and enter the custom value with the **Up** and **Down** buttons.
   d. After the final digit, pressing **Select** saves the pressure value.

2. If you are using Insight PC software:
   a. Connect to Insight PC software: see Connecting to Insight PC software (page 108).
   b. Select **> Configure Device > Measurement**.
   c. To enable the default filtering factor (13 second moving average (T90)), set the **Filtering on/off** selection to **ON** and select **Save**.
   d. If you want to enter a custom filtering factor, set the **Extended filtering on/off** selection to **ON**, enter the custom value into the **Filtering factor** field, and select **Save**.

10.4 Configuring calculation coefficients

You can configure a compensation value for the molar mass of the ambient gas and oil-specific coefficients to HMT370EX using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator. The oil-specific coefficients (**Oil A** and **Oil B**) are only applicable for the HMP378F oil measurement probe option.

Note that the default calculation coefficients (see HMP378F calculation model with average oil coefficients (page 129)) are valid for mineral transformer oil.

To enter calculation coefficients:

1. If you are using the local display interface:
   a. Select **Menu > Settings > Measurement settings**.
   b. Select the calculation coefficient (**Molar mass of gas**, **Oil A**, or **Oil B**) as applicable.
   c. Enter the custom value with the **Up** and **Down** buttons.
   d. After the final digit, pressing **Select** saves the entered value.
2. If you are using Insight PC software:
3. Connect to Insight PC software: see Connecting to Insight PC software (page 108).
4. Select **> Configure Device > Measurement**.
5. Enter the calculation coefficients (**Molar mass of gas**, **Oil A**, or **Oil B**) as applicable in their respective fields and select **Save**.

10.4.1 HMP378F calculation model with average oil coefficients

The oil moisture calculation model in HMP378F probes is based on average water solubility behavior of transformer oils. The ppm_w output is calculated as follows:

$ppm_w = a_w \times 10^{(A/(T+273.15)+B)}$

a_w water activity
A, B coefficients (average or oil specific)
T temperature (°C)

Typically, moisture in transformer oil measurement with HMP378F has a ppm accuracy of ±10 % of the reading. If additional accuracy is needed, see HMP378F calculation model with oil-specific coefficients (page 130).

10.4.2 HMP378F calculation model with oil-specific coefficients

For additional accuracy, an oil-specific calculation model can be used in HMP378F for mineral transformer oils. A specific model is always needed for other transformer oil/fluid types. Note that the calculation is only supported for stable dielectric fluids.

For oil-specific coefficients, an oil sample has to be sent to Vaisala for modeling. As a result, the specific coefficients (A and B: see formula in HMP378F calculation model with average oil coefficients (page 129)) for the oil are determined by Vaisala. Using these coefficients increases measurement accuracy.

You can configure the determined coefficients of the oil into use with Insight PC software, or contact Vaisala about setting the coefficients. For configuration instructions, see Configuring calculation coefficients (page 129).

10.5 Temporary environmental settings with detached probe

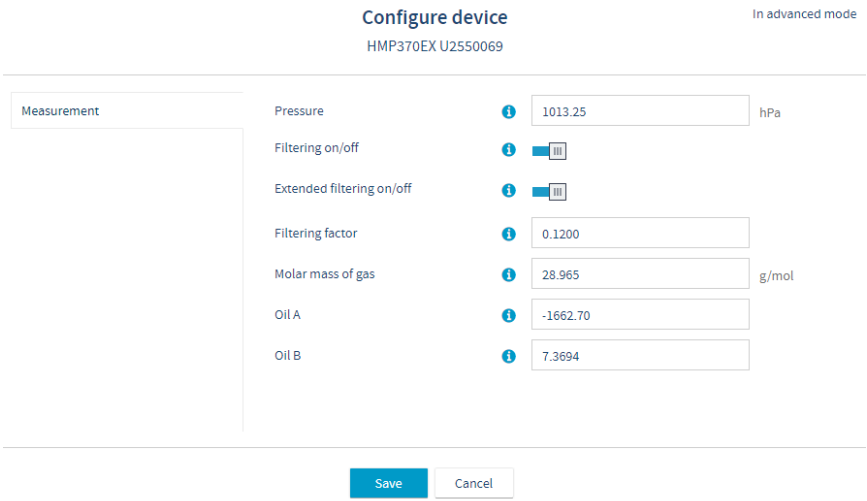


Figure 64 Measurements menu options for detached probe in Insight PC software

When you detach an HMP370EX probe from the HMT370EX transmitter, you can connect the probe to Insight PC software to configure the same environmental, filtering, and coefficient settings that are available when configuring through the transmitter.

However, note that the configuration you enter for the detached probe is for **temporary use only**, and will be replaced with the configuration stored in the transmitter when you connect the probe to the transmitter.

11. Calibration and adjustment

11.1 Calibration and adjustment overview

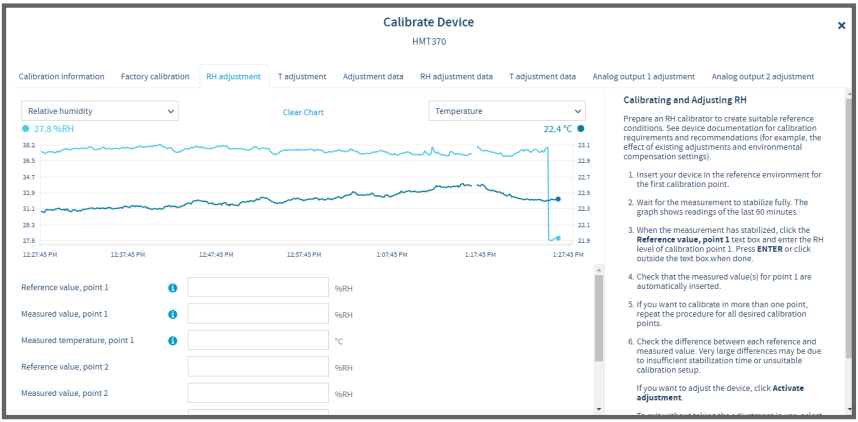


Figure 65 Insight PC software calibration view example

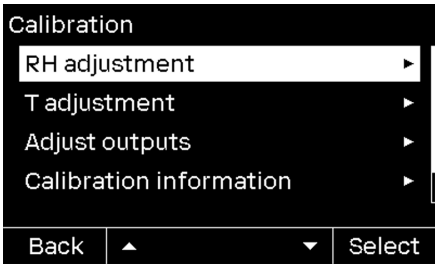


Figure 66 Local display calibration menu

The RH and T measurement of the probe used in the HMT370EX transmitter can be calibrated and adjusted (1-point or 2-point adjustments) using one of the following alternative configuration options:

- Detaching the probe body from the transmitter and connecting the probe to Insight PC software (requires M12 Indigo USB Adapter cable accessory (Vaisala item USB2)).
- Calibrating and adjusting the probe with Insight PC software when the probe is attached to the transmitter (requires M8 USB cable accessory 219690).
- Calibrating and adjusting the probe with the local display interface of the transmitter when the probe is attached to the transmitter.
- Detaching the probe body from the transmitter and connecting the probe to the Indigo80 indicator (requires M12-M12 Indigo80 probe connection cable accessory 262195SP).

- Calibrating and adjusting the probe with the Indigo80 indicator when the probe is attached to the transmitter (requires M12-M8 Indigo80 transmitter connection cable accessory 272075SP).

11.1.1 Calibration and adjustment with Indigo80 and reference probe

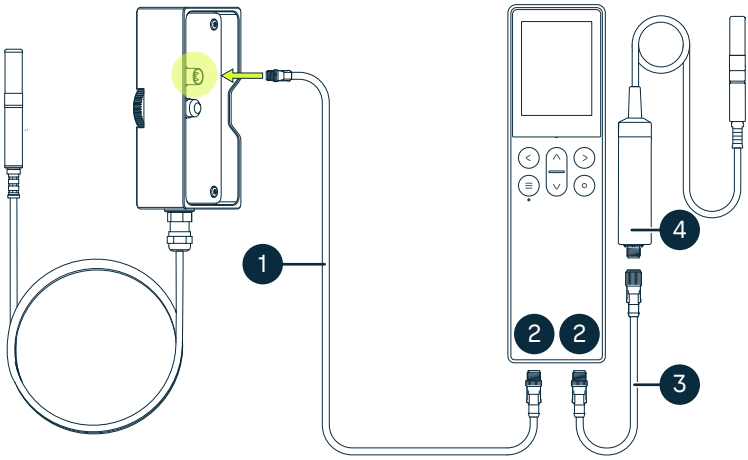


Figure 67 Example of connecting detached HMT370EX probe to Indigo80 indicator

1 M12-M12 Indigo80 probe connection cable accessory 272075SP
2 M12-5F ports on the bottom of Indigo80 for connecting compatible Vaisala devices. Ports are labeled ❶ (left) and ❷ (right) on Indigo80.
3 Probe connection cable
4 Probe connected to Indigo80

The Indigo80 handheld indicator allows connecting HMT370EX (either transmitter and probe together, or a detached probe) and a reference probe to the indicator at the same time, and carrying out calibration and adjustment on HMT370EX using the measurements provided by the connected reference probe. Both guided and manual calibration and adjustment options are available in Indigo80.

For instructions on connecting to Indigo80 and information on Indigo80 features, see Connecting HMT370EX transmitter and probes to Indigo80 handheld indicator (page 115) and Indigo80 User Guide (M212722EN).

11.2 Adjusting measurements with Insight

You can carry out RH and T adjustments with Insight PC software in 2 ways:

- Detach the probe body from the transmitter and connect the probe body to Insight.

- Connect the probe body and transmitter to Insight together as one unit using the transmitter service port.

For instructions on connecting to Insight using either option, see Connecting to Insight PC software (page 108).

CAUTION! Using the transmitter service port requires opening the transmitter enclosure. Do not open the transmitter enclosure without reviewing the information in Connecting to Insight PC software (page 108).

1. Connect the probe body or transmitter to Insight (see Connecting to Insight PC software (page 108)).
2. Select > **Calibrate > Yes**.
3. Select either **RH adjustment** or **T adjustment**
4. Follow the instructions in the Insight interface.
5. After completing the adjustment:
   a. If you configured the probe body separately, reattach the probe body to the transmitter.
   b. If you connected to the transmitter service port, remove the cable and see the instructions in Finalizing installation: closing transmitter and attaching grounding (page 95).

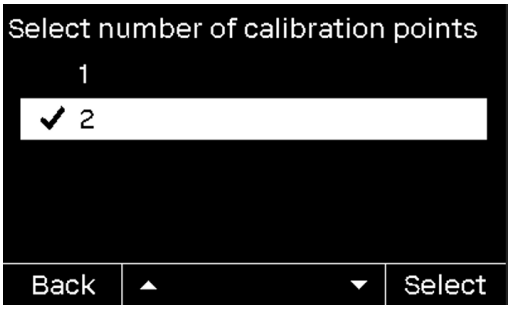
11.3 Adjusting measurements with HMT370EX local display interface

The probe connected to HMT370EX can be calibrated and adjusted using the local display interface and a reference device or a calibrator with a known reference concentration. Both RH and T adjustments can be carried out either as 1-point or 2-point adjustments.

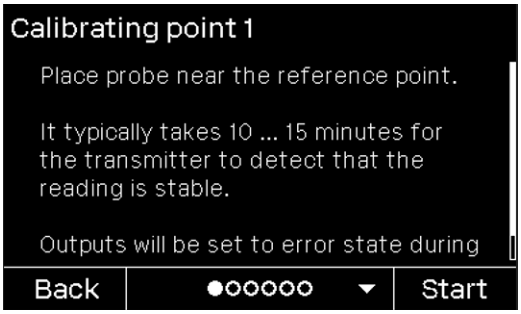
To carry out a 1-point or 2-point adjustment with the local display interface:

1. Prepare a reference source that you can compare to the measurement of the probe.
2. Select **Menu > Calibration** and either **RH adjustment** or **T adjustment**.

3. Select the number of points you want to adjust and press **Select**.



4. When you select either 1 or 2 points, the transmitter shows a notification about starting the adjustment and information about the task. Place the probe near the reference point.



5. When you are ready to begin the adjustment, select **Start**. To cancel the adjustment and return to the previous menu, select **Back**.

> The analog outputs are set to error state during calibration and adjustment.

6. After you start the adjustment, the stabilization view is shown. Wait until the display shows a notification about the stabilization being complete.



> You can also select **Next** to continue before the notification about stabilization being complete is shown. If the stabilization is not yet ready, a message is shown.

7. After the stabilization has completed, continue with **Next**.
8. The display shows the value measured by the probe. Enter the known value of your reference using the **Up** and **Down** buttons, and then select **Next**.

> Press and hold the **Up** or **Down** button to change the value faster.

9. If you are calibrating multiple points, repeat the steps for the next point.
10. After the last point has been adjusted, an information view shows the adjustments that were made. Confirm the adjustments by selecting **Apply**.

    If you do not want to use the adjustments, select **Discard** to return back without taking the adjustments into use.
11. After applying the adjustment, you can view information about the calibration from the **Calibration information** selection in the **Calibration** menu.
12. If you need to restore factory adjustments, select **Reset probe** in the **Calibration** menu.

11.4 Analog output adjustment overview

If the output level of the HMT370EX transmitter's analog channels appears to be incorrect, you can test and adjust the output level using the local display interface, Vaisala Insight PC software, or the Indigo80 handheld indicator..

Note that testing and adjusting the analog output requires opening the transmitter enclosure and connecting a multimeter to the test points on the transmitter component board.

CAUTION! The transmitter body enclosure must not be opened in an explosion hazardous area, unless a safe work permit has been issued in accordance with the standard IEC 60079-14. Either remove the transmitter from the hazardous area before opening the enclosure, or ensure that an IEC 60079-14 compliant safe work procedure has been implemented in the hazardous area.

The output parameters of the multimeter must be compatible with the input parameters of the transmitter.

For instructions on connecting the multimeter to the test points and testing the analog output level, see Analog output level test (page 122).

11.4.1 Adjusting analog output level with Insight



Figure 68 Analog output level adjustment in Insight PC software

1 Enable the adjustment mode with this selection.
2 Start sending a low level test output (4 mA) with this selection. Enter the value measured with the multimeter in the **Measured value, low point** field.
3 Start sending a high level test output (20 mA) with this selection. Enter the value measured with the multimeter in the **Measured value, high point** field.
4 After adjusting both low and high points, activate the adjustment with this selection.
5 The corrections made to the output level are shown here. Enter information about the calibration and the calibration date.

1. Detach the probe body and open the transmitter cover.
2. Connect a multimeter to the mA testing points located above the output screw terminals on the transmitter component board (see Figure 61 (page 122)).
3. Connect to Insight (see Connecting to Insight PC software (page 108)).

4. Select **> Calibrate > Yes** and then either **Analog output 1 adjustment** or **Analog output 2 adjustment**.
5. Follow the instructions in the Insight interface to carry out the adjustment.
6. Remove the multimeter, close the transmitter cover, and reattach the probe body.

11.4.2 Adjusting analog output level with local display interface

To adjust the output level of analog output channel 1 or 2 with the local display interface:

1. Detach the probe body and open the transmitter cover.
2. Connect a multimeter to the mA testing points located above the output screw terminals on the transmitter component board (see Figure 61 (page 122)).
3. Select **Menu > Calibration > Adjust outputs**, and then select either **Analog output 1** or **Analog output 2**.
4. The display shows information about the analog output level adjustment. Select **Next** to start sending the low level (4 mA) test output from the transmitter analog channel.
5. Verify that the output reading of the multimeter matches 4 mA. If the multimeter reading differs from 4 mA, enter the required change to the transmitter output level with the **Up** and **Down** buttons. Select **Next** after the correction.
6. The transmitter starts to send the high level (20 mA) test output. Verify that the output reading of the multimeter matches 20 mA. If the multimeter reading differs from 20 mA, enter the required change to the transmitter output level. Select **Next** after the correction.
7. In the next view, select **Apply** to take the adjustment into use. If you do not want to save the adjustment, select **Back**.
8. Remove the multimeter, close the transmitter cover, and reattach the probe body.

12. Maintenance

12.1 Maintenance overview

Inspect the condition of the transmitter, probe body, and probe head periodically, at least once a year.

Inspect transmitters with display that are installed outdoors or exposed to direct UV light, more frequently. Stop using the device if you notice signs of deterioration (such as discoloration or color changes in the display border, or visible separation of backing ink from display glass). Transmitters with signs of deterioration need to be serviced or replaced.

The probe (includes probe body and head) can be detached and replaced by the user. The probe head filter (see Figure 5 (page 31)) is also user-replaceable. For other maintenance requirements, contact Vaisala.

CAUTION! The probe can be detached and changed when HMT370EX is powered. Any other live maintenance, including changing the probe head filter, is not allowed.

12.1.1 Technical support

Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see vaisala.com/support.

12.2 Cleaning

You can clean the transmitter, probe, and probe body by wiping with a moist cloth. Standard cleaning agents can be used.

Avoid exposing the transmitter, probe body, or probe to chemicals for unnecessarily long periods of time. Do not immerse them in liquid when cleaning, and wipe chemicals off the surfaces after cleaning.

12.3 Changing probe filter

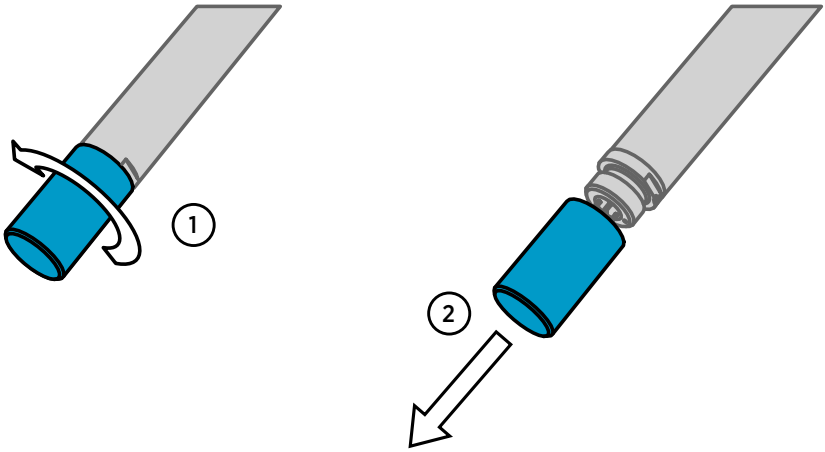
Replace the probe filter if it is contaminated. New filters are available from Vaisala.

CAUTION! Be careful when changing the filter, since it is easy to break the sensor when the filter is removed.

When replacing the filter, wear clean gloves to avoid depositing dirt or oil on the filter.

Replace the filter as follows:

1. Turn the filter counterclockwise until it is loose.
2. Pull the filter straight out carefully.



CAUTION! Do not damage the sensor.

3. Take the new filter, and insert it to the filter thread.
4. Tighten the new filter firmly by turning it clockwise (recommended force 5 Nm).

13. Troubleshooting

13.1 Problems and their possible solutions

If you have a problem with using HMT370EX, check the following tables before contacting Vaisala. If the problem you have is not listed in the tables, or if the proposed solution does not fix the problem, contact Vaisala technical support.

Problem: Analog output level appears incorrect	
Possible cause:	**Solution:**
Insufficient supply voltage	Ensure that the transmitter is powered correctly. 12 V DC is the minimum voltage in all conditions, measured at the transmitter screw terminals. If the supply voltage is less than 12 V DC, the analog output current can be erroneous. For information on testing and adjusting analog output level, see Analog output level test (page 122) and Analog output adjustment overview (page 136)

Problem: Transmitter does not power on when power supply is switched on	
Possible cause:	**Solution:**
Analog output channel 1 (CH1) not wired	Analog output channel 1 (CH1) must always be wired. The transmitter receives power through the Channel 1 screw terminals, and does not power on if only Channel 2 (CH2) is wired. For wiring instructions, see Wiring (page 91).
Incorrect supply voltage	Ensure that the transmitter is powered correctly using a supply voltage range of 12 – 28 V DC. 12 V DC is the minimum voltage in all conditions, measured at the transmitter screw terminals.
Incorrect polarity	Check that the screw terminal connections have been made correctly. For wiring instructions, see Wiring (page 91).

Problem: Humidity measurement options are not available	
Possible cause:	**Solution:**
Temperature only probe in use (HMP371 or HMP373)	HMP371 and HMP373 probes can be ordered as temperature only versions that do not have humidity measurement available for use. If you do not know if the HMP371 or HMP373 probe you are using is a T-only version, see instructions on checking the version from the configuration code on the product label: Temperature only probe option (HMP371 and HMP373) (page 69).

Problem: PIN code prevents opening transmitter local display menus	
Possible cause:	**Solution:**
PIN code required	Access to transmitter local display menus can be restricted by taking a PIN code into use. For instructions on unlocking the display menus with the PIN code, see Local display PIN code (page 102).

Problem: Transmitter local display interface has wrong language selected	
Possible cause:	**Solution:**
Local display configuration mistake	If the transmitter local display interface has been set to a wrong language, you can access the language selection menu with the following button presses: 1. Press and hold **Back** to return to the home view. 2. Press **Select** 3 times to open the **Display** menu. 3. Press **Down** once to move to the language selection menu item. 4. Press **Select** to open the language selections. 5. Move to the correct language with the **Up** and **Down** buttons, and start using the language by pressing **Select**.

Problem: Cannot locate Insight PC software configuration options	
Possible cause:	**Solution:**

Problem: Cannot locate Insight PC software configuration options	
Wrong user mode	Certain functionalities are only available in **Advanced Mode**. Change between the **Basic Mode** and **Advanced Mode** in the **Settings** menu. See Figure 54 (page 112) for the location of the **Settings** menu.

13.2 Error messages

HMT370EX can display error messages either in Vaisala Insight PC software or in the transmitter's local display.

The messages are categorized according to the severity of the status:

- **Critical errors** are fatal to the operation of the device. It may not be able to respond to communication at all, and will not measure correctly.
- **Errors** prevent normal operation of the device. Depending on the problem, errors may resolve themselves. For example, a completely wet humidity sensor may cause a humidity measurement error.
- **Warnings** do not prevent normal operation but may indicate possible problems.
- **Status** indicates a known state of the device.

Error message	Description	Recommended action
Critical errors		
Firmware checksum mismatch	Firmware is corrupted.	Contact Vaisala technical support.
Factory default settings corrupted	Parameter memory is corrupted.	
Device settings corrupted		Contact Vaisala technical support. Restore factory default settings.
Errors		
Temperature sensor failure	Readings from sensors missing or out of range.	Inspect probe head and sensors visually. If the probe is completely wet, allow it to dry out. If the sensors are damaged or missing and the error message(s) stay active, contact Vaisala to have the probe repaired.
Humidity sensor failure		
Supply voltage out of range	Supply voltage too high or low.	Check supply voltage.

Warnings		
Calibration has expired	Shown by calibration reminder functionality.	Calibrate the probe and update the calibration date information.
Unexpected device restart	Device has automatically restarted itself.	Check that supply voltage is stable and operating environment is within specification.
Status messages		
Calibration is about to expire	Shown by calibration reminder functionality.	Calibrate the probe and update the calibration date information.

13.3 Restoring factory default settings

You can restore the transmitter and the connected probe back to their factory default settings using Insight software or the local display interface. Doing this will also clear any user adjustment and restore the latest adjustment performed by Vaisala.

Note that restoring the factory default settings of the probe can only be done using Vaisala Insight PC software. Transmitter factory default settings can be restored also with the local display interface.

1. To restore **transmitter** factory default settings with the local display interface:
   a. Select **Menu > Maintenance > Restore factory settings** and confirm with **Restore**.
2. To restore **transmitter** factory default settings with Vaisala Insight PC software:
   a. Connect the transmitter to Insight. See Connecting to Insight PC software (page 108).
   b. Select ⚙ **> Restore Factory Settings > Yes**.
3. To restore **probe** factory default settings with Vaisala Insight PC software:
   a. Connect the probe body, or transmitter and probe body together as one unit, to Insight. See Connecting to Insight PC software (page 108).
   b. When the probe body is connected to Insight without the transmitter: select ⚙ **> Restore Factory Settings > Yes**.
   c. When the probe body is connected to the transmitter: select ⚙ **> Probe > Restore Factory Settings > Yes**.

14. Technical data

14.1 Specifications

Table 35 Measurement performance

Property	Description/value
Relative humidity	
Measurement range	0–100 %RH, at max. +95 °C (203 °F) T_d
Accuracy at +23 °C (+73.4 °F) [1]	±0.8 %RH (0–90 %RH)
Factory calibration uncertainty [2]	±0.5 %RH (0–40 %RH) ±0.8 %RH (40–95 %RH)
T_{63} response time	15 s
Sensor options	HUMICAP® R2 HUMICAP® L2
Temperature	
Measurement range	−70 ... +180 °C (−94 ... +356 °F)
Accuracy at +23 °C (+73.4 °F) [1]	±0.1 °C (±0.18 °F)
Factory calibration uncertainty [2]	±0.1 °C (±0.18 °F) at +23 °C (+73.4 °F)
Sensor	Pt1000 RTD Class F0.1 IEC 60751
Other available measurement parameters	
Dew point temperature, dew point / frost point temperature, absolute humidity, mixing ratio, wet-bulb temperature, water concentration, water vapor pressure, water vapor saturation pressure, enthalpy, dew point temperature difference, absolute humidity at NTP, water mass fraction, relative saturation, water activity, water content in mineral transformer oil, water content in JET A-1 fuel, saturation temperature	

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

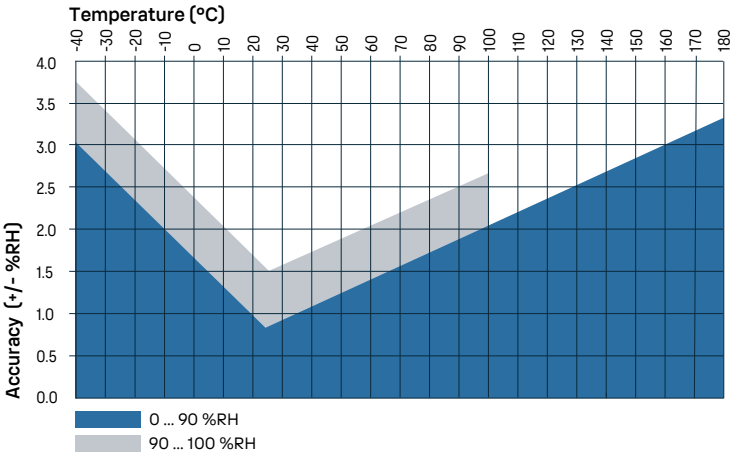


Figure 69 Humidity measurement accuracy as function of temperature

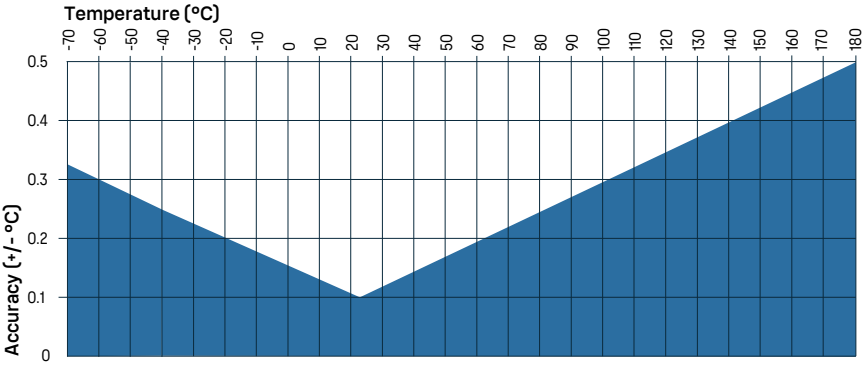


Figure 70 Temperature measurement accuracy over full range

HUMICAP® 180L2 sensor option

The HUMICAP® 180L2 sensor is used in the HMP378F and HMP378H probe variants that are intended for oil and JET A-1 fuel measurements.

Table 36 HUMICAP® 180L2 measurement performance

Property	Description/value
Water activity	

Property	Description/value
Measurement range	0–1 a_w 1
T_{90} response time 2	10 min
Sensor	HUMICAP® 180L2
Accuracy 3	±0.01 a_w (±1 %RS)
Factory calibration uncertainty	±0.6 %RH (0–40 %RH) ±1.0 %RH (40–95 %RH)
Temperature	
Measurement range	−40 ... +180 °C (−40 ... +356 °F)
Accuracy at +20 °C (+68 °F)	±0.2 °C (0.36 °F)

1) *0–1 a_w corresponds to 0–100 %RH*
2) *At +20 °C (+68 °F) in still oil.*
3) *In range 0–0.5 a_w, including non-linearity, hysteresis, and repeatability. See accuracy graph below.*

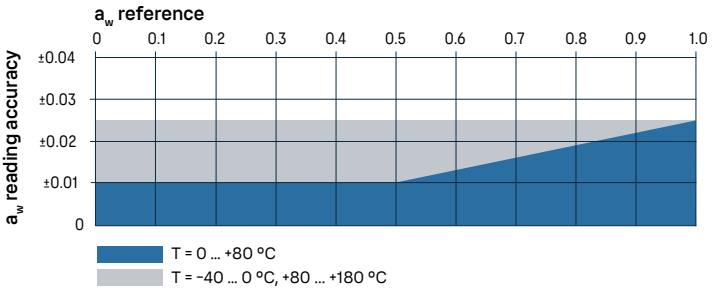


Figure 71 A_w measurement accuracy

Table 37 Operating environment

Property	Description/value
Operating temperature for electronics	-40 ... +60 °C (-40 ... +140 °F)
Operating temperature with display	-20 ... +60 °C (-4 ... +140 °F)
Operating humidity of probe head	Max. +100 °C (212 °F) T_d
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Pressure range	See probe specifications

Property	Description/value
Note: Do not install the LCD display model in a location where the transmitter is exposed to direct sunlight.	

Table 38 Compliance

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

Table 39 Inputs and outputs

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

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

Table 40 Mechanical specifications

Property	Description/value
Connections	Screw terminals, 0.33–2.0 mm^2 wires (AWG 14-22)
Cable glands	M20×1.5
Conduit fitting	NPT 1/2″ and M16
Housing material	EN AW-6082
Housing weight	LCD transmitter: 1500 g (3.3 lb) LED transmitter: 1520 g (3.35 lb) HMP371 fixed probe: 320 g (0.7 lb)

Property	Description/value
IP rating	With probe connected to the transmitter: **IP66**
	With probe detached from the transmitter: **IP54**

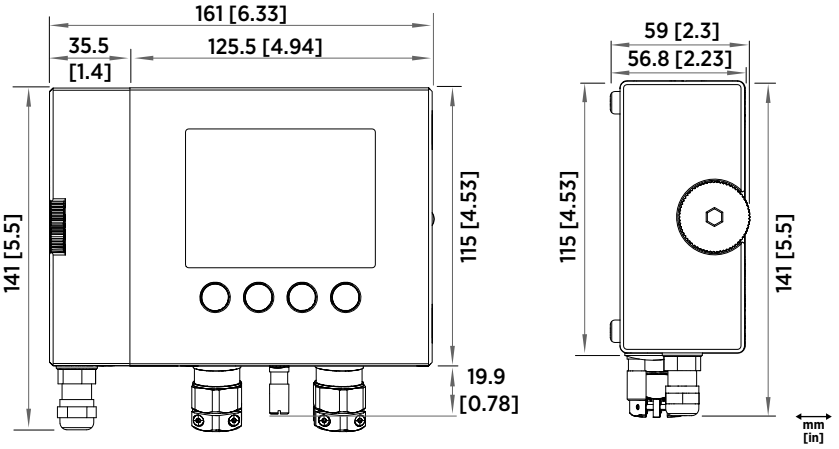


Figure 72 HMT370EX transmitter dimensions

Table 41 Ex classifications by region

Property	Description/value
NOTE: The Ex classifications show the highest level of compliance. Although lower compliance levels are not shown in the classification, they are also included in the classification. For example, compliance with Division 1 also means compliance with Division 2, and compliance with Zone 0 also means compliance with Zone 1 and Zone 2.	
Europe (ATEX)	
Gas classification EU (2014/34/EU)	II 1 G Ex ia IIC T4 Ga
Dust classification	II 1 D Ex ia IIIC T_{200} 85 °C Da
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 12.1 nF, P_i = 700 mW, L_i = 16 µH
Environmental specifications	
T_{amb}	-40 ... +60 °C (-40 ... +140 °F)
P_{amb}	0.8 ... 1.1 bar
International (IECEx)	

Property	Description/value
Gas classification	Ex ia IIC T4 Ga
Dust classification	II 1 D Ex ia IIIC T_{200} 85 °C Da
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 12.1 nF, P_i = 700 mW, L_i = 16 µH
Environmental specifications	
T_{amb}	-40 ... +60 °C (-40 ... +140 °F)
P_{amb}	0.8 ... 1.1 bar
Japan (CML)	
Ex classification	Ex ia IIC T4 Ga Ex ia IIIC T_{200} 85°C Da CML 21JPN2417X
China (NEPSI)	
Ex classification	Ex ia IIC T3-T6 Ga GYJ26.1239X
Korea (KCs)	
Ex classification	Ex ia IIC T4 Ga Ex ia IIIC T200 85 °C Da -40 °C ≤ Tamb ≤ +60 °C IECEx EESF 20.0044.X 21-KA4BO-0891X, 24-KA4BO-0509X
US (FM)	
Ex classification	Class I, Zone 0, AEx ia IIC T4 Ga Zone 20, AEx ia IIIC T85°C Da IS Class I, Division 1, Groups A, B, C, and D T4 IS Class II, III, Division 1, Groups E, F, and G T85°C
CAN (FM)	

Property	Description/value
HMT370EX equipment rating	Intrinsically safe for: Class I, II, III Division 1, Groups A, B, C, D, E, F, and G, T4 Class I, Zone 0, Ex ia IIC T4 Zone 20, Ex ia IIIC Temperature Code T85°C Ta: -40 °C to +60 °C; IP54 (transmitter alone) IP66 (transmitter with the probe body attached)
UK (UKEX)	
Ex classification	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T200 85 °C Da −40 °C ≤ Tamb ≤ +60 °C CML 21UKEX2316X

14.2 HMP371 specifications

Table 42 HMP371 for wall mounting

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

The HMP371 fixed probe option has a probe head that attaches directly on the probe body, making it suitable for wall mounting applications.

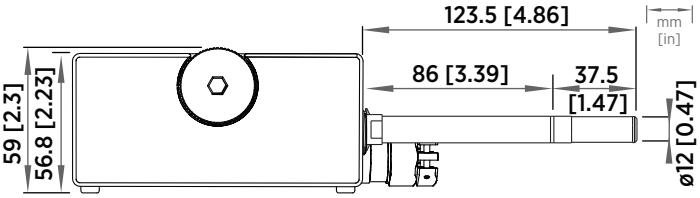


Figure 73 Dimensions in mm (inches)

14.3 HMP373 specifications

Table 43 HMP373 for confined spaces

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

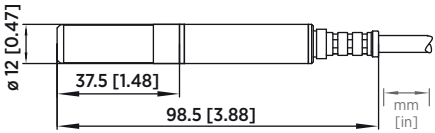


Figure 74 HMP373 dimensions

14.4 HMP374 specifications

Table 44 HMP374 for high pressure

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

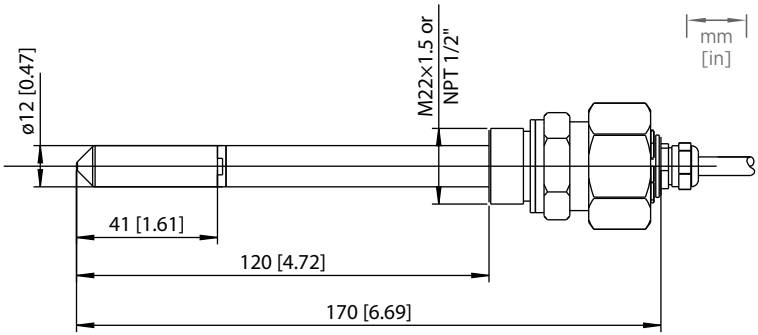


Figure 75 Dimensions in mm (inches)

14.5 HMP375 specifications

Table 45 HMP375 for high temperature

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

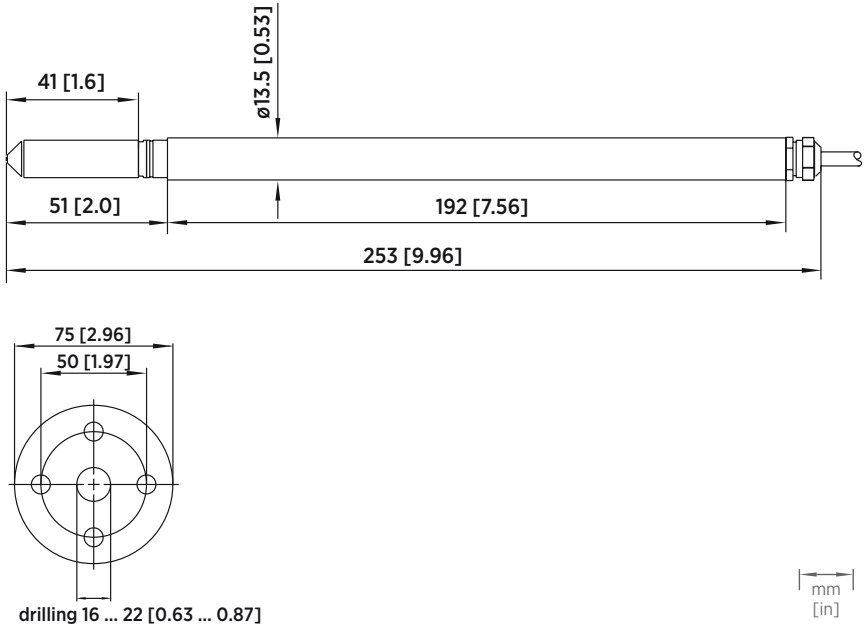


Figure 76 HMP375 probe and stainless steel installation flange dimensions

14.6 HMP377 specifications

Table 46 HMP377 for high humidities

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

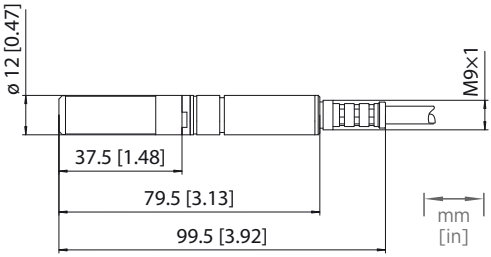


Figure 77 HMP377 dimensions

14.7 HMP378 specifications

Table 47 HMP378 for pressurized pipelines

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

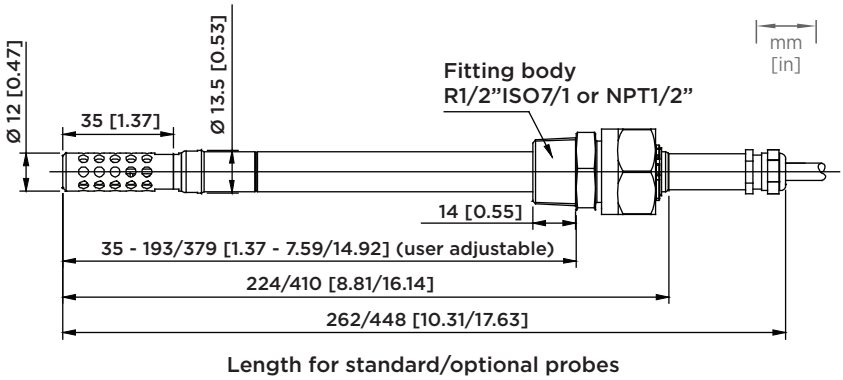


Figure 78 Dimensions in mm (inches)

14.8 Spare parts and accessories

Information on spare parts, accessories, and calibration products is available online at vaisala.com and store.vaisala.com.

Table 48 Accessory availability

Accessory	Part number	Models
Probe accessories		
M12 Indigo USB Adapter cable for connecting HMT370EX probes to Insight PC software	USB2	All models
M12-M12 cable for connecting HMT370EX probes to Indigo80 handheld indicator	272075SP	All models
Ball valve ISO 1/2 with welding joint • Pressure range at +20 °C (+68 °F) 0–20 bar (0–290 psia) (during installation max. 10 bar (145 psia)	BALLVALVE-1	HMP378
Duct installation kit	210697	HMP373, HMP377
Mounting flange	210696	HMP375
Cable gland M20 x 1.5 with split seal	HMP247CG	HMP373, HMP375, HMP377
Fitting body M22 x 1.5	17223SP	HMP374
Fitting body NPT1/2	17225SP	HMP374

Accessory	Part number	Models
Fitting body ISO1/2 solid structure	DRW212076SP	HMP378
Fitting body NPT1/2 solid structure	212810SP	HMP378
Swagelok fitting for 12 mm probe, 1/2″ NPT thread	SWG12NPT12	HMP377
Swagelok fitting for 12 mm probe, 3/8″ ISO thread	SWG12ISO38	HMP377
Swagelok fitting for 12 mm probe, 1/2″ ISO thread	SWG12ISO12	HMP377
Thread adapter ISO 1/2″ to NPT 1/2″	210662SP	All models
Manual press	HM36854SP	HMP378/F/H
Washer set for pressure-tight installation (3 pcs)	4PROBESETSP	HMP374
Metallized PPS plastic filter grid with stainless steel mesh, for general use (pore size 15 µm)	DRW010281SP	All models
Stainless steel sintered filter for general use (pore size 38 µm)	HM47280SP	All models
Metallized PPS plastic filter grid, for fast response in clean environments (6.5 mm gaps)	DRW010276SP	All models
Stainless steel filter for high oil flow applications	220752SP	HMP378/F/H
Stainless steel filter with PTFE membrane	214848SP	All models
Stainless steel filter for oil and vacuum environments	HM47453SP	All models
Cable lead-through accessories		
Cable gland M20 x 1.5 for Ø 5–11 mm cable	265207SP	All models
Cable gland M20 x 1.5 for Ø 10–14 mm cable	265208SP	All models
Conduit fitting M16	265243SP	All models
Conduit fitting NPT1/2″	265240SP	All models
Dummy plug (Ex, 2 pcs)	254931SP	All models
Transmitter accessories		
HMT360 retrofit mounting plate	DRW253246SP	All models

Accessory	Part number	Models
Turbine mounting kit	HMT300TMK	All models
Outdoor installation kit (weather shield)	215109	All models
USB service cable for transmitter	219690	All models
M12-M8 cable for connecting HMT370EX transmitter to Indigo80 indicator	262195SP	All models
Zener barrier for 1 channel (for 2 channels, order 2 pcs)	210664	All models
Galvanic isolator for 1 channel	212483	All models
Calibration adapter for HMK15	211302	HMP371, HMP373, HMP374, HMP377
Galvanic isolator for 1 channel	272886SP	All models
Galvanic isolator for 2 channels	272887SP	All models

14.9 Recycling instructions

These recycling instructions guide you on the end-of-life treatment of this Vaisala product. As waste regulations and infrastructure vary in each country, these instructions only indicate the different components to be separated and common ways to handle them. Always follow local requirements when disposing of the product. Vaisala encourages to use the best available recycling practices to minimize related environmental impacts.



Vaisala is committed to meeting the requirements of the EU Waste Electrical and Electronic Equipment (WEEE) Directive. This directive aims to minimize the impact of electrical and electronic goods on the environment, by increasing reuse and recycling, and reducing the amount of WEEE going to landfill. This symbol indicates that the product should be collected separately from other waste streams and treated appropriately.

HMT370EX series transmitters and probes have metal and plastic parts that can be removed for recycling. The gasket of the transmitter body is made of silicone. With the transmitter model with no display, the transmitter body can be recycled as metal after removing the detachable electronics. With the LCD display model, the transmitter body must be disposed of as electrical and electronic waste.

Recycling instructions for transmitters with no display

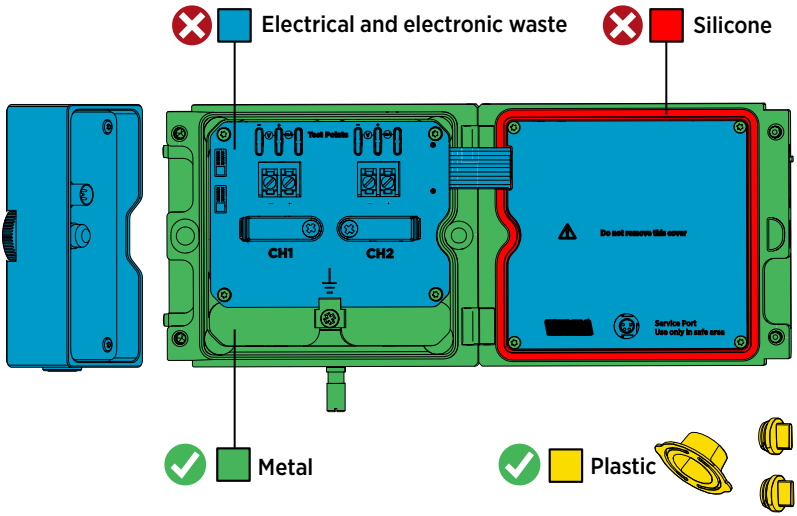


Figure 79 Recyclable and non-recyclable parts in transmitters with no display

- Probe body and probe head: dispose of as electrical and electronic waste.
- Transmitter component board, flat cable, and inside cover: remove metal screws and dispose of as electrical and electronic waste.
- Transmitter body and screws: recycle as metal.
- Service port and lead-through plugs: recycle as plastic.
- Transmitter cover gasket: dispose of or recycle as silicone according to local regulations.

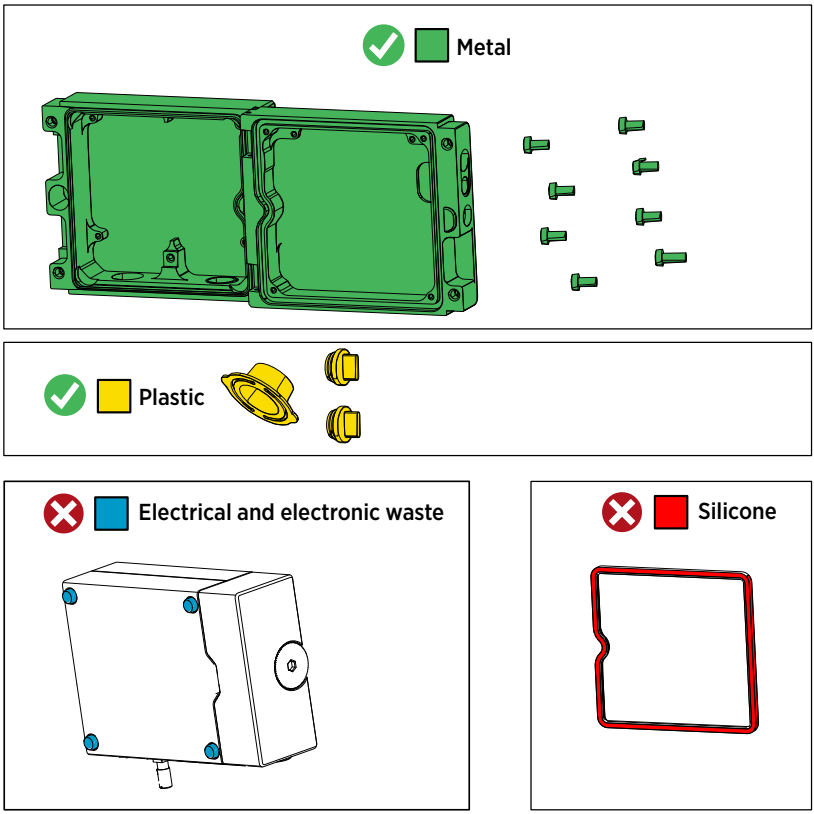


Figure 80 Recyclable and non-recyclable parts in transmitters with no display after disposing of electronics and probe

The transmitter body and screws can be recycled as metal after the electronics have been removed. Remove the wall pads on the bottom of the transmitter before recycling.

Recycling instructions for transmitters with display

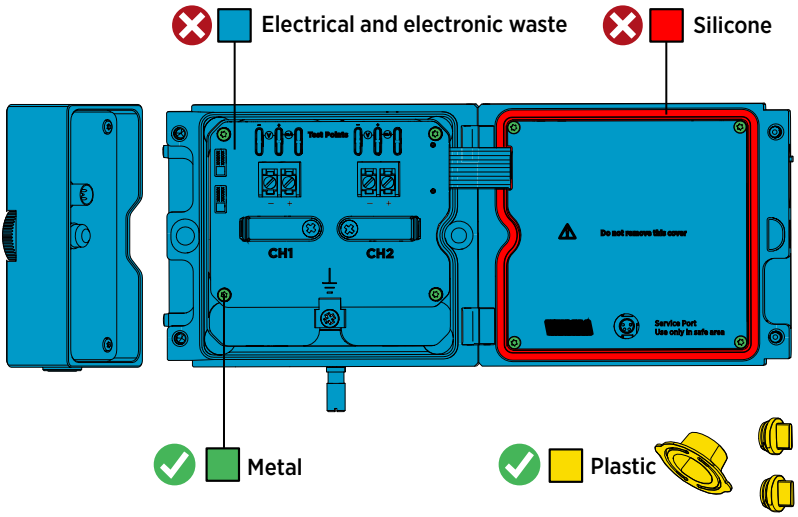


Figure 81 Recyclable and non-recyclable parts in transmitters with display

- Probe body and probe head: dispose of as electrical and electronic waste.
- Transmitter body, component board, flat cable, and inside cover: remove metal screws and dispose of as electrical and electronic waste.
- Service port and lead-through plugs: recycle as plastic.
- Transmitter cover gasket: dispose of or recycle as silicone according to local regulations.

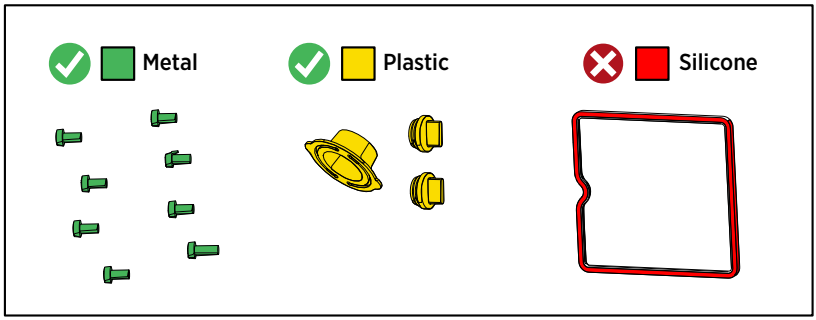


Figure 82 Recyclable and non-recyclable parts in transmitters with display after disposing of electrical and electronic waste

Maintenance and calibration services



Vaisala offers comprehensive customer care throughout the life cycle of our measurement instruments and systems. Our factory services are provided worldwide with fast deliveries. For more information, see vaisala.com/calibration.

- Vaisala Online Store at store.vaisala.com is available for most countries. You can browse the offering by product model and order the right accessories, spare parts, or maintenance and calibration services.
- To contact your local maintenance and calibration expert, see vaisala.com/contactus.

Warranty

For standard warranty terms and conditions, see vaisala.com/warranty.
Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Technical support



Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see vaisala.com/support.

Recycling



Recycle all applicable material according to local regulations.

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