VAISALA

USER'S GUIDE

Vaisala HUMICAP® Dewpoint and Temperature Transmitter Series HMT360

M210744EN-C

PUBLISHED BY

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CHAPTER 1

GENERAL INFORMATION

This chapter provides general notes for the manual and the product.

About This Manual

This manual provides information for installing, operating, and maintaining the Vaisala HUMICAP® Dewpoint and Temperature Transmitter Series HMT360 for Natural Gas.

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information: This chapter provides general notes for the manual and the product.
- Chapter 2, Product Overview: This chapter introduces the features, advantages, and the product nomenclature.
- Chapter 3, Installation: This chapter provides you with information that is intended to help you install this product.
- Chapter 4, Operation: This chapter contains information that is needed to operate this product.
- Chapter 5, Measuring at Overpressure: This chapter provides you with important information concerning measurement in conditions with pressure higher than the normal atmospheric pressure.

- Chapter 6, Calibration and Adjustment: This chapter contains instructions for checking the calibration and adjusting this product.
- Chapter 7, Maintenance: This chapter provides information that is needed in basic maintenance of the product.
- Chapter 8, Troubleshooting: This chapter describes common problems, their probable causes and remedies, and contact information.
- Chapter 9, Technical Data: This chapter provides technical data of the product.
- Appendix A, Dimensions: This Appendix contains parts drawings of the transmitter housing, probes and some transmitter mounting accessories with metric and nonmetric dimensions specified.
- Appendix B, Wiring for Intrinsically Safe Operation, FM: This appendix contains the wiring diagram for intrinsically safe operation approved by Factory Mutual (FM).
- Appendix C, Wiring for Intrinsically Safe Operation, CSA: This appendix contains the wiring diagram for intrinsically safe operation approved by the Canadian Standards Association (CSA).
- Appendix D, Certificates: This Appendix contains copies of the EXi intrinsically safe certificates issued for the HMT360 series.

Version Information

Table 1 Manual Revisions

Manual Code	Description
M210744EN-C	This manual. April 2010 - Updated Appendix Certificates on page 91.
M210744EN-B	Previous version. September 2007 - New copies of certificates added in Appendix Certificates on page 91. Updated list of options and accessories.

Related Manuals

Table 2 Related Manuals

Manual Code	Manual Name
M210185EN	Humidity Calibrator HMK15 User's Guide

Documentation Conventions

Throughout the manual, important safety considerations are highlighted as follows:

WARNING Warning alerts you to a serious hazard. If you do not read and follow instructions very 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 Note highlights important information on using the product.

Safety

The Series HMT360 Transmitter delivered to you has been tested for safety and approved as shipped from the factory. Note the following precautions:

WARNING	Ground the product, and verify outdoor installation grounding periodically to minimize shock hazard.

CAUTION	Do not modify the unit. Improper modification can damage the product or lead to malfunction.

ESD Protection

Electrostatic Discharge (ESD) can cause immediate or latent damage to electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects inside the equipment housing.

To make sure you are not delivering high static voltages yourself:

- Handle ESD sensitive components on a properly grounded and protected ESD workbench.
- When an ESD workbench is not available, ground yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either of the above precautions, touch a conductive part of the equipment chassis with your other hand before touching ESD sensitive components.
- Always hold component boards by the edges and avoid touching the component contacts.

Recycling

Recycle all applicable material.

Dispose of batteries and the unit according to statutory regulations. Do not dispose of with regular household refuse.

Regulatory Compliances

The certifications that have been granted to the HMT360 Series, and the accompanying safety factors, are listed in section Classification with Current Outputs on page 78.

Copies of the certificates and wiring diagrams are provided in the following appendices:

- Appendix B, Wiring for Intrinsically Safe Operation, FM, on page 87
- Appendix C, Wiring for Intrinsically Safe Operation, CSA, on page 89
- Appendix D, Certificates, on page 91

Trademarks

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License Agreement

All rights to any software are held by Vaisala or third parties. The customer is allowed to use the software only to the extent that is provided by the applicable supply contract or Software License Agreement.

Warranty

For certain products Vaisala normally gives a limited one-year warranty. Visit our Internet pages for more information and our standard warranty terms and conditions: www.vaisala.com/services/warranty.html.

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.

CHAPTER 2

PRODUCT OVERVIEW

This chapter introduces the features, advantages, and the product nomenclature.

Introduction to HMT360

Vaisala HUMICAP® Dewpoint and Temperature Transmitter Series HMT360 for Natural Gas contains reliable, microprosessor-based two-wire instruments for measuring moisture in natural gas in hazardous areas.

Figure 1 HMT360 for Natural Gas

WARNING In hazardous environments, the transmitters must always be connected via galvanic isolators or Zener barriers.

Output Quantities

Vaisala HUMICAP® Dewpoint and Temperature Transmitter Series HMT360 for Natural Gas comes equipped with a local display and with one or two current output channels.

Available output quantities are listed in the table below:

Table 3 Output Quantities for HMT360 for Natural Gas

Character	Quantity	Abbreviation
1	temperature	T
2	dewpoint temperature	Td
6	volume concentration	ppmv
A	water content	w

Probe Options

The HMT360 series has various options for probes and cable lengths (2 m, 5 m and 10 m). The available probe types are presented in the figure below.

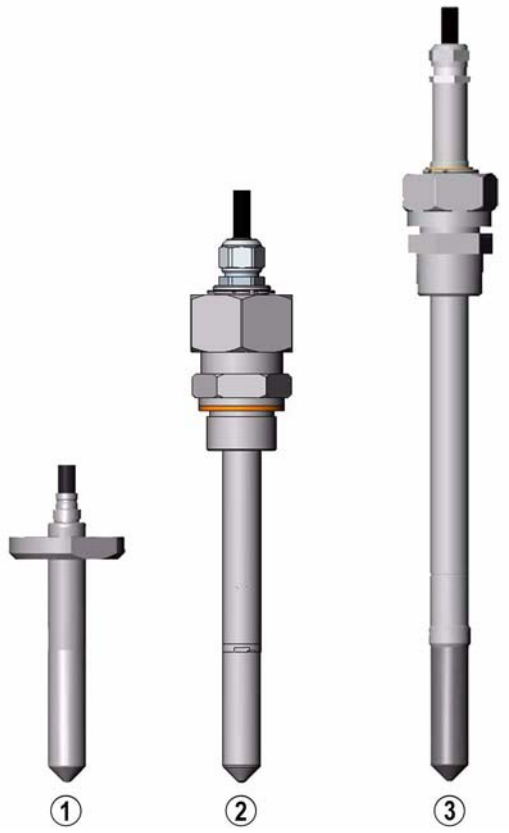


Figure 2 Probe Options for HMT360 for Natural Gas

The following numbers refer to Figure 2 on page 17:

1 = HMP362 probe for pressurized spaces up to 167 bars

2 = HMP364 probe for pressurized spaces up to 100 bars

3 = HMP368 probe for installations in pressurized pipelines up to 40 bars; features a pressure-tight sliding clasp nut

CHAPTER 3

INSTALLATION

This chapter provides you with information that is intended to help you install this product.

General Installation Instructions

Mounting the Probe Cable in Gas Group IIC Spaces

NOTE	The following applies only to installation within the EU! The following instructions shall be followed to fulfil the specifications of the EN50284 for nonconductive layer of the probe cable: - Never mount or handle the probe cable when hazardous gases are present. - For achieving a conductive shield, cover the probe cable with conductive material like metal or conductive tape or mount the probe cable in a metal conduit. - Assure that the conductive shield fulfils requirements of the standard EN50284 (resistance less than 1 GΩ) and make sure that it can not come loose in any operation situation.

WARNING During the installation work of the probes in gas group IIC areas (requiring category I devices), it has to be guaranteed that even in fault cases sparks generated by impacts or friction on the surface of the housing can never occur.

Selecting Location

Select a place with stable conditions for mounting the transmitter. Do not expose the transmitter to direct sunlight or rain. A rain shield is available and it is recommended for direct outdoor installations. When mounting the probe, select a place representing the process conditions.

Checking the Temperature Reading

The actual temperature of the process can be measured with a reference instrument to be compared with the transmitter reading. The heat transfer is less evident if you remove the protective filter of the sensor for a short-term test. However, never use the sensor long periods without the filter as this may cause a faster contamination of the sensor. The transmitter fulfils the specified EMC regulations with the protective filter on the probe.

In humidity measurement and especially in calibration and adjustment it is essential that temperature of the probe and measuring environment is the same. Even a small difference in temperature between the environment and the probe causes an error. As the curve below shows, if the temperature is +20 °C and the relative humidity 100 %RH, a difference of ±1 °C between the environment and the probe causes an error of ±6 %RH.

The graph below illustrates the measurement error at 100 %RH when the difference between the ambient and sensor temperature is 1 °C.

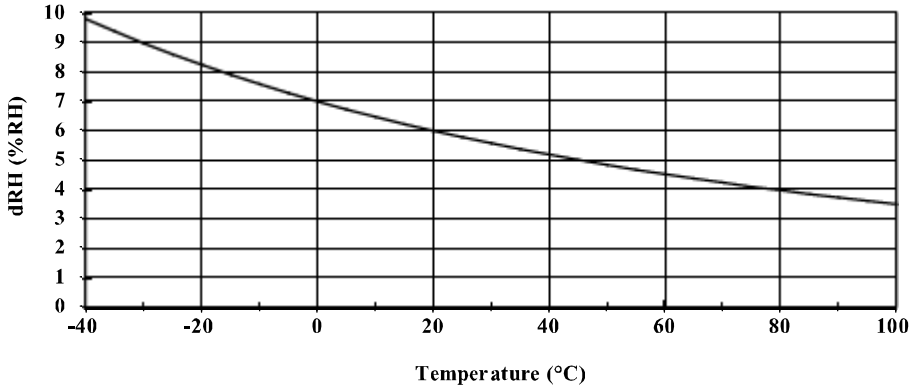


Figure 3 Measurement Error at 100 %RH

Mounting the Transmitter Housing

1. Attach the mounting plate to the wall with 4 screws.
2. Press down the transmitter so that it slides along the rails of the mounting plate.
3. Fasten the transmitter to the mounting plate with the Allen screw (3 mm Allen key provided).

The probe can be detached and replaced when needed by simply unfastening the two Allen screws.

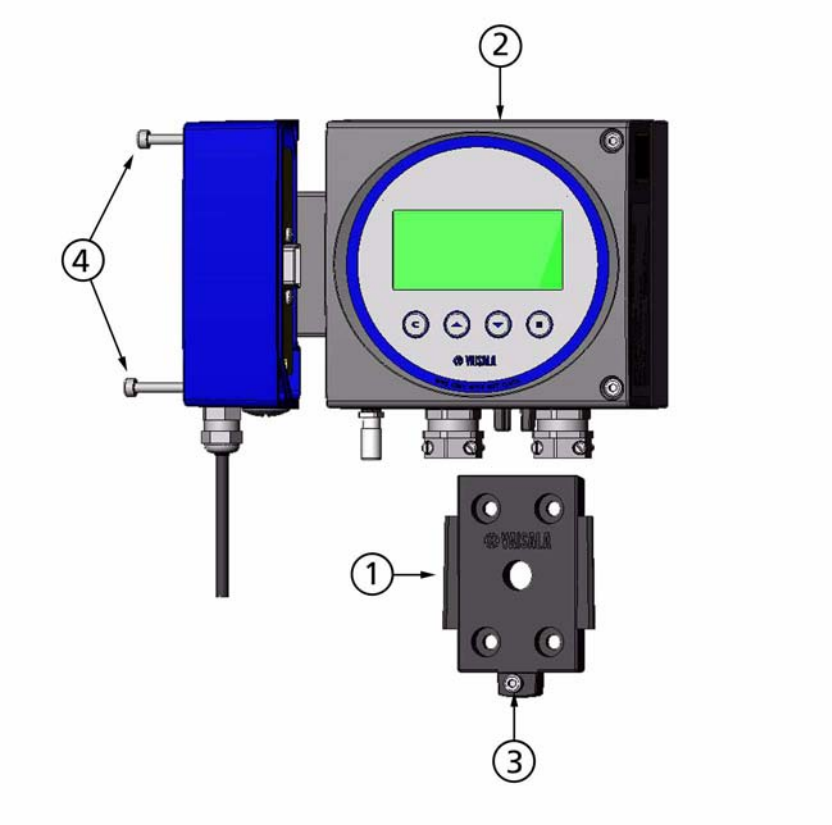


Figure 4 Transmitter Mounting

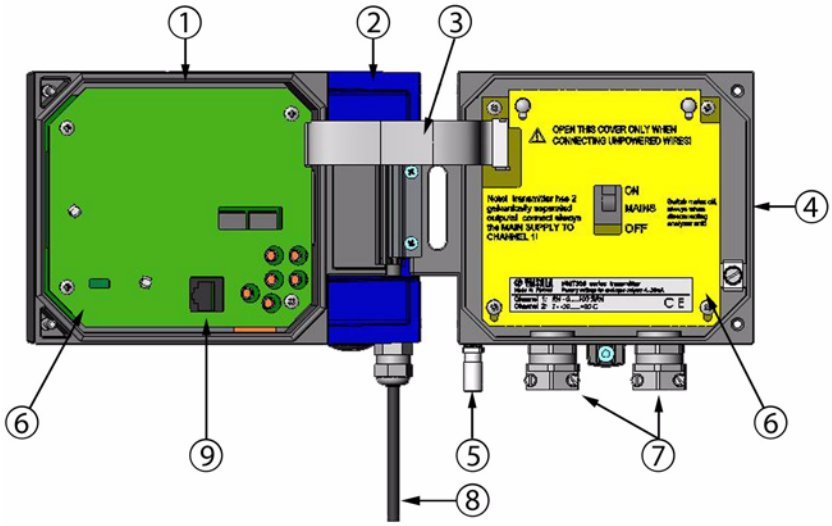


Figure 5 Parts of the Transmitter

The following numbers refer to Figure 5 on page 23:

1 = Electronics unit

2 = Probe; including a part of the measurement electronics (for example, calibration memory)

3 = Flat cable

4 = Transmitter base

5 = Grounding terminal

6 = Protective covers

7 = Cable glands

8 = Sensor cable

9 = RS232C connector

Probe Mounting

CAUTION	Do not unsolder and then resolder the probe cable from and to the printed board during installation. Do not shorten or lengthen the probe cable. These procedures may alter the humidity calibration of the transmitter.

HMP362 Small Pressure-Tight Probe

The HMP362 probe is a small pressure-tight probe equipped with an installation flange. It is suitable for dewpoint measurements in natural gas. When sampling in pressurized processes, the sampling cell HMP302SC is available as an optional accessory.

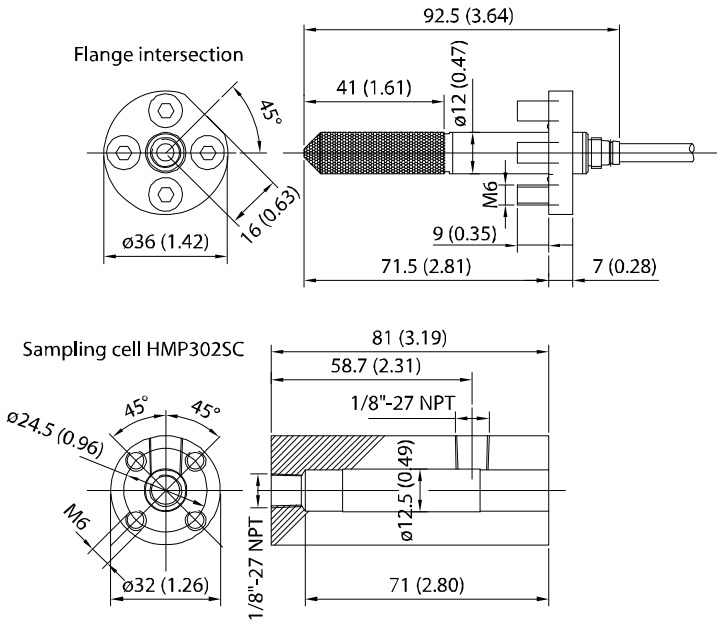


Figure 6 HMP362 Probe and HMP302SC Sampling Cell Dimensions

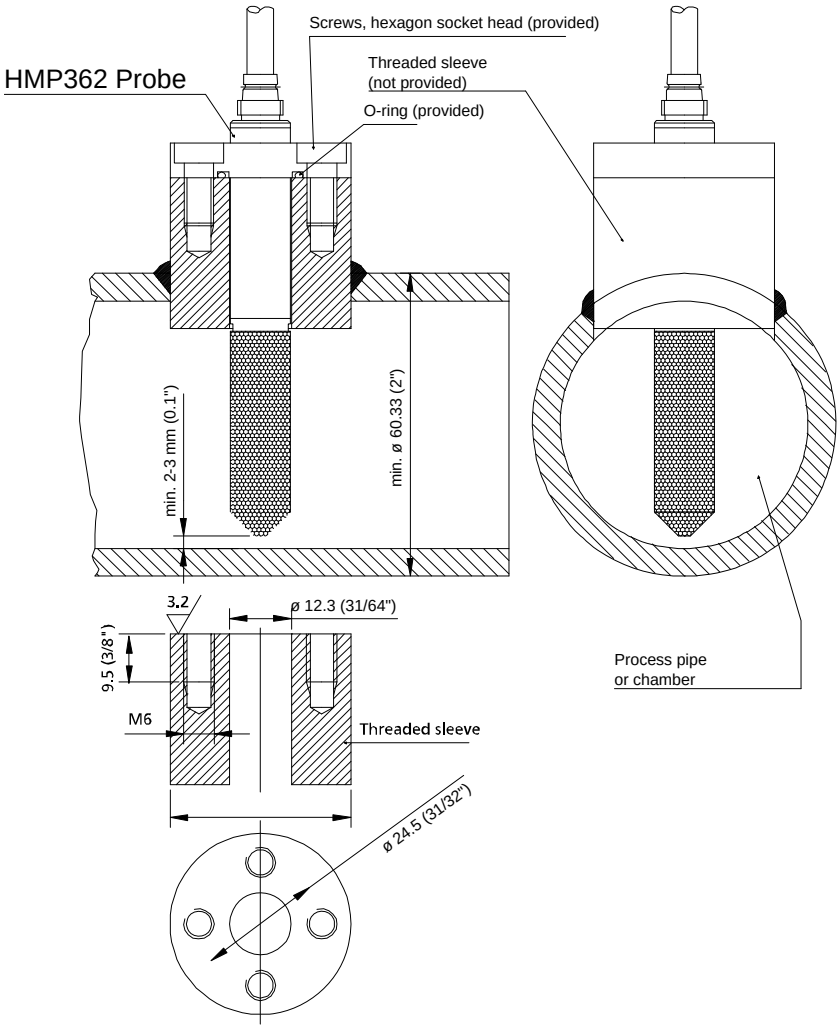


Figure 7 HMP362 Installation (without Sampling Cell)

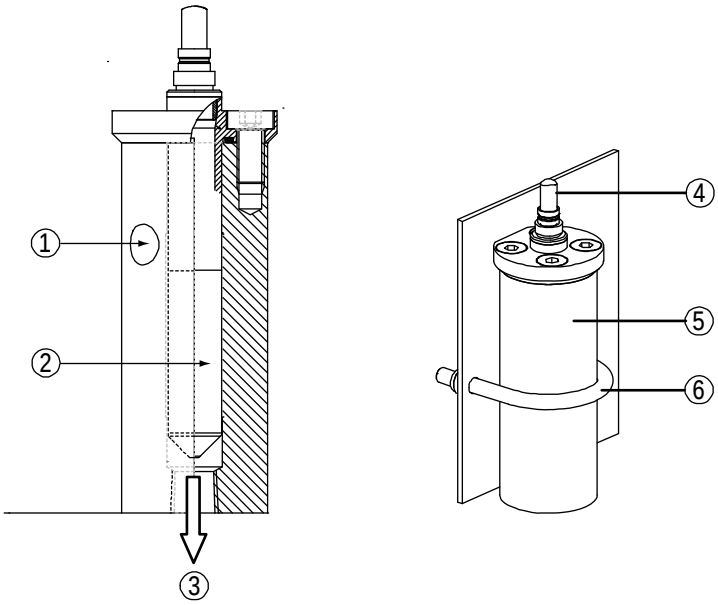


Figure 8 Optional Sampling Cell HMP302SC

The following numbers refer to Figure 8 on page 26:

1 = Gas in

2 = Probe

3 = Gas out

4 = Probe cable

5 = Sampling cell

6 = Clamp

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.

NOTE	When HMP362 is installed in a process with a pressure differing from normal atmospheric pressure, please enter the pressure value of the process (in bar_a) into the transmitter memory, see section Setting the Pressure for Calculations on page 48.

HMP364 for High-Pressure Applications

The probe 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. Follow the instructions below to achieve a leak-tight assembly.

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

1. Remove the fitting screw from the nut and the probe.
2. Fasten the fitting screw to the chamber wall with a sealing washer. Tighten the fitting screw into the threaded sleeve with a torque spanner. The tightening torque is 150 ± 10 Nm (110 ± 7 ft-lbs).
3. Insert the body of the probe into the fitting screw and tighten the nut manually to the fitting screw.
4. Mark both the fitting screw and the nut hex.
5. Tighten the nut a further 30º (1/12) turn or if you have a torque spanner tighten it with a torque of 80 ± 10 Nm (60 ± 7 ft-lbs).
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 a similar grease.

NOTE When retightening the nut after detachment the nut must be tightened without increased effort.

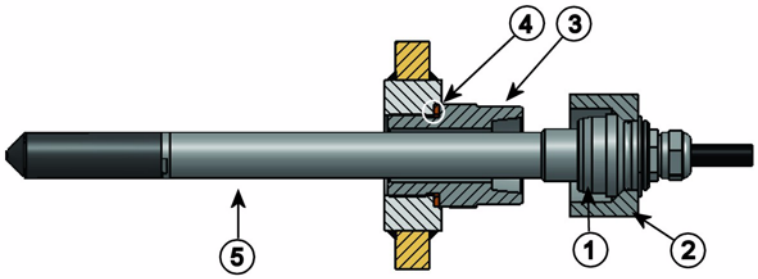


Figure 9 HMP364 Probe Mounting

The following numbers refer to Figure 9 on page 28:

1 = Tightening cone

2 = Nut

3 = Fitting screw, M22×1.5 or NPT 1/2"

4 = Sealing washer

5 = Probe; ø12 mm

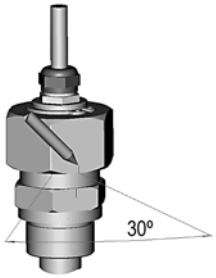


Figure 10 Marking Nut and Fitting Screw

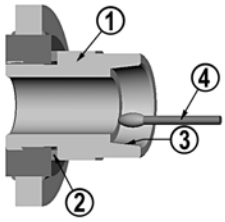


Figure 11 Cleaning the Tightening Cone

The following numbers refer to Figure 11 on page 29:

1 = Fitting screw

2 = Sealing washer

3 = Tightening cone

4 = Clean cotton stick

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.

NOTE When HMP364 is installed in a process with a pressure differing from normal atmospheric pressure, please enter the pressure value of the process (in bar_a) into the transmitter memory, see section Setting the Pressure for Calculations on page 48.

HMP368 for Pressurized Pipelines or Moisture in Liquids

Due to the sliding fit the HMP368 is easy to install into and remove from a pressurized process. The probe is especially suitable for measurements inside pipelines. See section Installing the HMP368 Probe Through a Ball Valve Assembly on page 32.

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.

NOTE When HMP368 is installed in a process with a pressure differing from normal atmospheric pressure, please enter the pressure value of the process (in bar_a) into the transmitter memory, see section Setting the Pressure for Calculations on page 48.

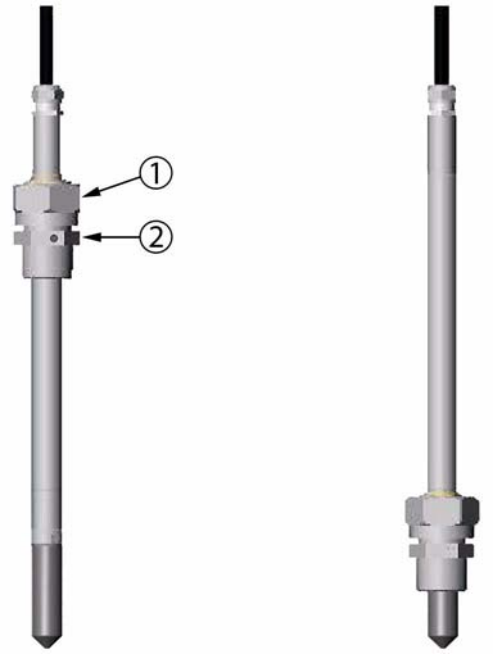


Figure 12 HMP368 Probe

The following numbers refer to Figure 12 on page 30:

1 = Clasp nut, 24 mm hex nut

2 = Fitting body, 27 mm hex nut

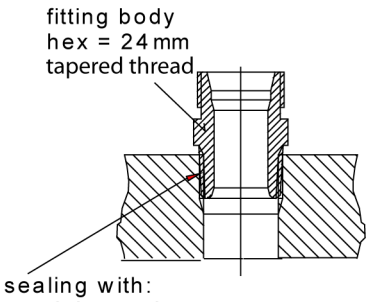
The following two fitting body options are available:

- Fitting Body ISO1/2 solid structure
- Fitting Body NPT1/2 solid structure

Table 4 HMP368 Probe Dimensions

Probe Type	Probe Length	Adjustment Range
Standard	178 mm	120 mm
Optional	400 mm	340 mm

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



sealing with:
1. LOCTITE® No 542 + activ. No 7649 (t=-55...+150 °C)
2. MEGA-PIPE EXTRA No 7188 (t=-55...+170 °C)
3. PTFE tape (t=-60...+210 °C) NOTE: the tape does not lock the parts together. Therefore, use two fork spanners (hex 24 and 27 mm) for tightening and opening the clasp nut of the probe

Figure 13 Sealing of Fitting Body into Process

Tightening the Clasp Nut

1. Adjust the probe to a suitable depth according to the type of installation.
2. Tighten the clasp nut first manually.
3. Mark the fitting screw and the clasp nut.
4. Tighten the nut a further 50 ... 60° (ca. 1/6 turn) with a fork spanner. If you have a suitable torque spanner, tighten the nut to 45 ± 5 Nm (33 ± 4 ft-lbs).

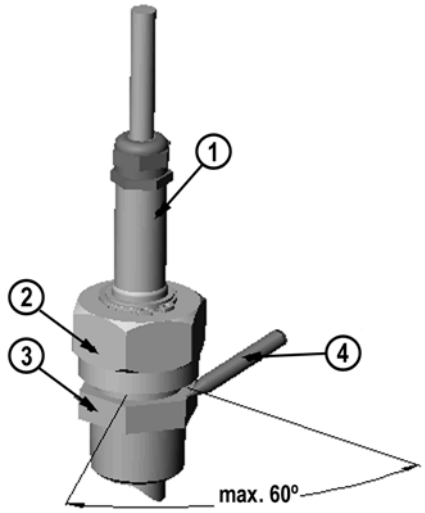


Figure 14 Tightening the Clasp Nut

The following numbers refer to Figure 14 on page 32:

1 = Probe

2 = Clasp nut

3 = Fitting screw

4 = Pen

NOTE	Take care not to tighten the clasp nut more than 60° to avoid difficulties when opening it.

Installing the HMP368 Probe Through a Ball Valve Assembly

The ball valve installation kit (Vaisala order code: BALLVALVE-1) is preferred when connecting the probe to a pressurized process or pipeline. Use the ball valve set or a 1/2" ball valve assembly with a ball hole of ø14 mm or more. If you install the probe (ø12 mm) in a process pipe, please note that the nominal size of the pipe must be at least 1 inch (2.54 cm). Use the manual press handle to press the probe into the pressurized (< 10 bar) process or pipeline.

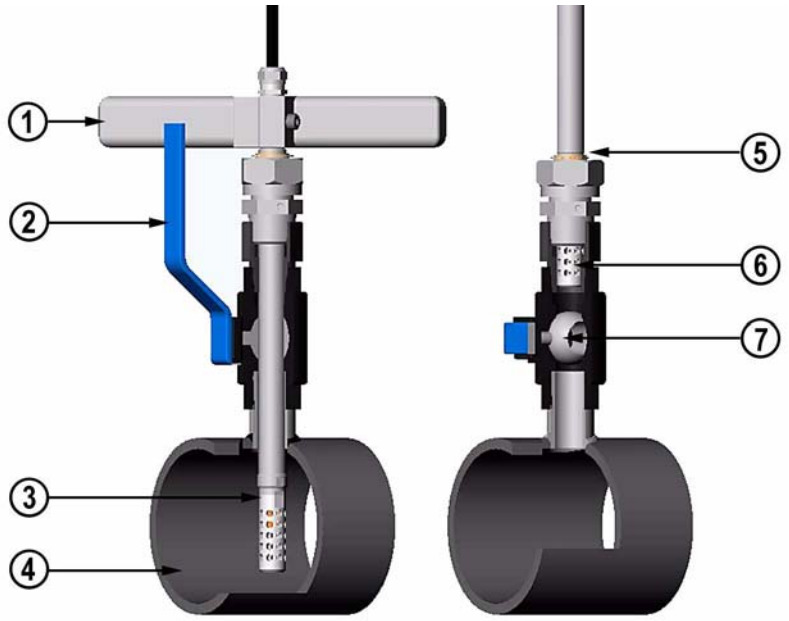


Figure 15 Installing the HMP368 Probe Through a Ball Valve Assembly

The numbers below refer to Figure 15 on page 33:

1 = Manual press tool

2 = Handle of the ball valve

3 = Probe

4 = Process chamber/pipeline

5 = Groove on the probe indicating the upper adjustment limit

6 = Filter

7 = Ball of the ball valve

NOTE The probe can be installed in the process through the ball valve assembly provided that the process pressure is less than 10 bar. This way, the process does not have to be shut down when installing or removing the probe. However, if the process is shut down before removing the probe, the process pressure can be max. 20 bar.

NOTE When measuring temperature dependent quantities make sure that the temperature at the measurement point is equal to that of the process, otherwise the moisture reading may be incorrect.

Follow the steps below to install the HMP368 probe through a ball valve assembly. After the installation, the probe should be sitting in the process chamber or pipeline as shown in Figure 15 on page 33.

1. Shut down the process if the process pressure is more than 10 bars. If the pressure is lower there is no need to shut down the process.
2. Close the ball valve.
3. Seal the threads on the fitting body; refer to Figure 13 on page 31.
4. Attach the fitting body to the ball valve and tighten it.
5. Slide the clasp nut of the probe toward the filter, as far as it will go.
6. Insert the probe to the fitting body, and manually tighten the clasp nut to the fitting body.
7. Open the ball valve.
8. Push the probe through the ball valve assembly into the process. If the pressure is high, use the pressing handle that is provided with the probe. If you push the probe hard without using the handle, you may damage the cable.

   Note that the probe must be pushed so deep that the filter is completely inside the process flow.
9. Mark the fitting screw and the clasp nut.
10. Tighten the clasp nut with a fork spanner a further 50 ... 60º (ca. 1/6 turn). If you have a suitable torque spanner, tighten the nut to max 45 ± 5 Nm (33 ± 4 ft-lbs). Refer to Figure 14 on page 32.

NOTE	Take care not to tighten the clasp nut more than 60° to avoid difficulties when opening it.

If you wish to remove the probe from the process, note that you have to pull the probe out far enough. You cannot close the valve if the groove on the probe body is not visible.

Electrical Connections

Refer to local requirements regarding cabling, grounding and galvanic isolator or barrier connections.

WARNING Connect the transmitter always via galvanic isolators or Zener barriers in hazardous environments.

WARNING Be sure that the main power switch of the transmitter is set off before making any electrical installations in hazardous areas.

1. Open the transmitter cover and remove the protective cover of the transmitter base.
2. Thread the power supply wires through the cable gland, see Figure 5 on page 23.
3. Connect the unpowered power supply wires to the connectors: Ch 1 (humidity) and Ch 2 (temperature). Both channels require an own power supply.
4. Replace the protective cover. Turn the transmitter on **ON** with the **ON/OFF** switch, see Figure 23 on page 64.
5. Close the cover. The transmitter is ready for use.

NOTE As Ch 1 is a main output, the transmitter does not operate if only Ch 2 is connected (Ch 2 is optoisolated from transmitter electronics).

When using the transmitter in hazardous locations, the use of galvanic isolators or barriers is essential. The following barrier & isolator are available in Vaisala: barrier No. 210664 (STAHL 9001/51-280-091-141) and galvanic isolator No. 212483 (STAHL 9160/13-11-11). Examples of connections and more information on installation in hazardous locations is given in section Examples of Connections on page 41.

Installation in Hazardous Locations

US and Canadian Requirements

USA (FM): Wiring for intrinsically safe operation is shown in Appendix B, Wiring for Intrinsically Safe Operation, FM, on page 87.

Canada (CSA): Wiring for intrinsically safe operation is shown in Appendix C, Wiring for Intrinsically Safe Operation, CSA, on page 89.

European Requirements

CATEGORY 1 (Zone 0)

HMT360 has to be connected to Exia-certified associated apparatus with galvanic isolation, gas group IIB or IIC.

NOTE If both analog outputs are in use, the Ch 1 (-) and Ch 2 (-) must be short circuited (see Figure 18 on page 41).

CATEGORY 2 or 3 (Zone 1 or 2)

HMT360 has to be connected either to a Zener barrier or galvanic isolator

NOTE If both analog outputs are in use with a galvanic isolator, the Ch 1 (-) and Ch 2 (-) must be short circuited (see Figure 18 on page 41).

Figure 16 on page 39 and Figure 17 on page 40 present examples of galvanic isolators and Zener barrier connections (only Ch 1 connected).

Maximum Cable Resistance Calculation for the Barrier (Vaisala Order Code: 210664)

General specifications of HMT360:

Supply voltage	U_{in} = 24 V (12 ... 35 V)
Maximum current	I_{out} = 20 mA
Minimum operating voltage for HMT360	U_{min} = 12 V (15 V with serial port)

Stahl 9001/51-280-091-141 (values taken from the specifications):

Rated operating voltage	U_N = 20 ... 35 V
Transmitter supply voltage	$U_S = U_N$ - 9.5 V, when $U_N \leq 23.5$ V or U_S = 14 V, when $U_N \geq 23.5$ V
Maximum load	$R_L \leq 350\ \Omega$

Calculation of the maximum cable length from barrier to transmitter:

Cable resistance (as an example)	R_{cable} = 0.085 Ω/m/core (2 × 0.085 Ω/m/pair)

If assuming that the operating voltage would be ≥ 24 V, the maximum acceptable voltage drop U_{drop} in cables is:

$U_{drop} = U_S - U_{min}$

U_{drop} = 14 V - 12 V = 2 V

We also know that:

I_{out} = 20 mA

and that total resistance of the cable $R_{cabletot}$ is cable resistance R_{cable} multiplied with the total maximum length of the cables l_{max}:

$R_{cabletot} = R_{cable} \times l_{max}$

From these facts the following equation can be formed:

$U_{drop} = R_{cabletot} \times I_{out}$

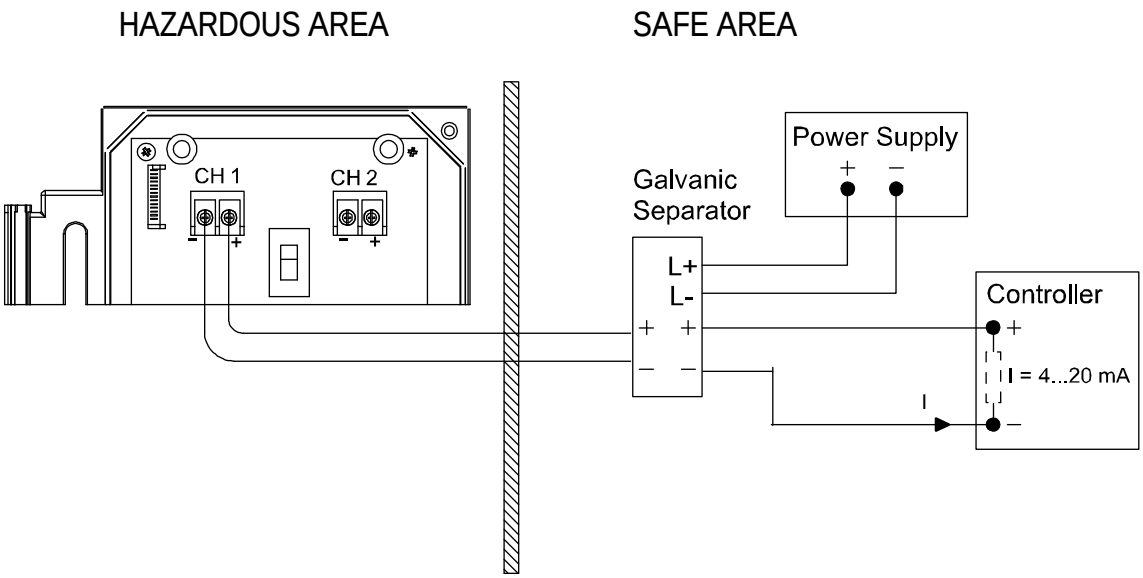
$2 = 2 \times 0.085\ \Omega/m \times l_{max} \times 20\ mA$

$l_{max} = 2\ V / (20\ mA \times 2 \times 0.085\ \Omega/m)$

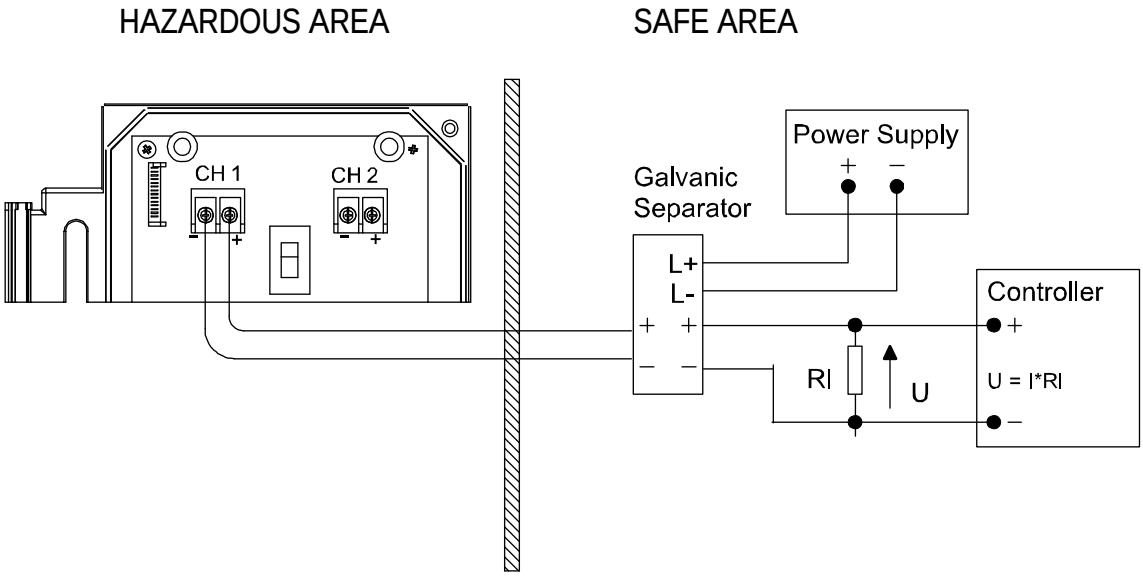
$l_{max} = 588\ m = 1930\ ft$, maximum cable length.

NOTE	If longer cable length is required, use of the galvanic isolators is recommended if possible.

HMT360 Connected to a Galvanic Isolator



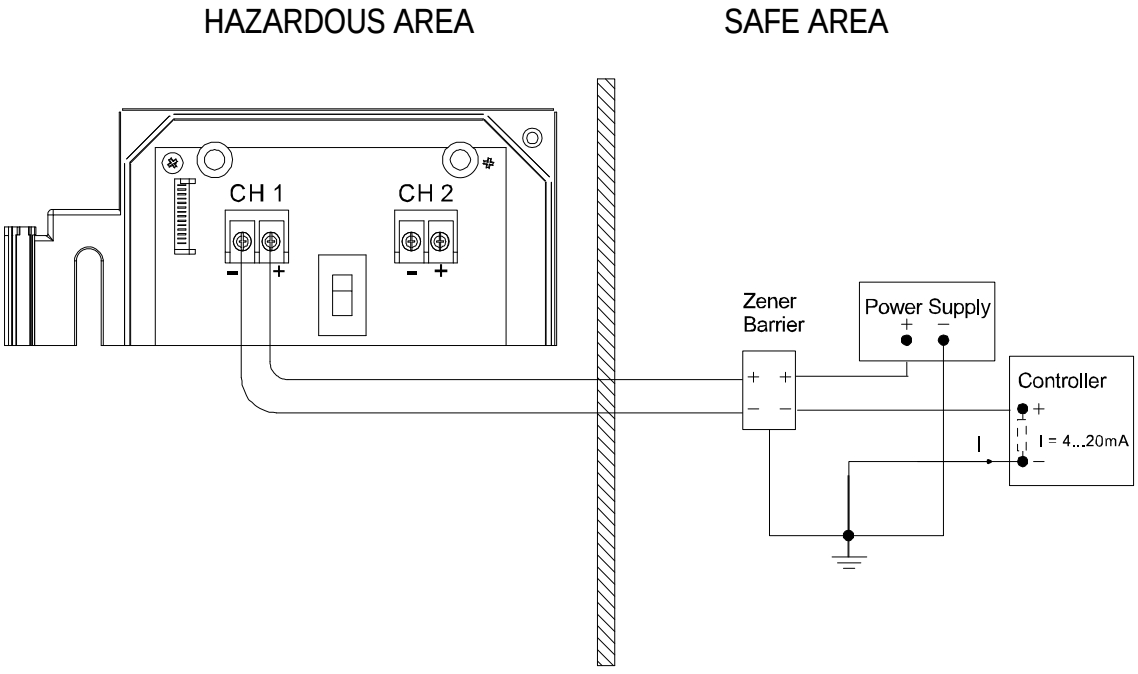
a) current signal controller



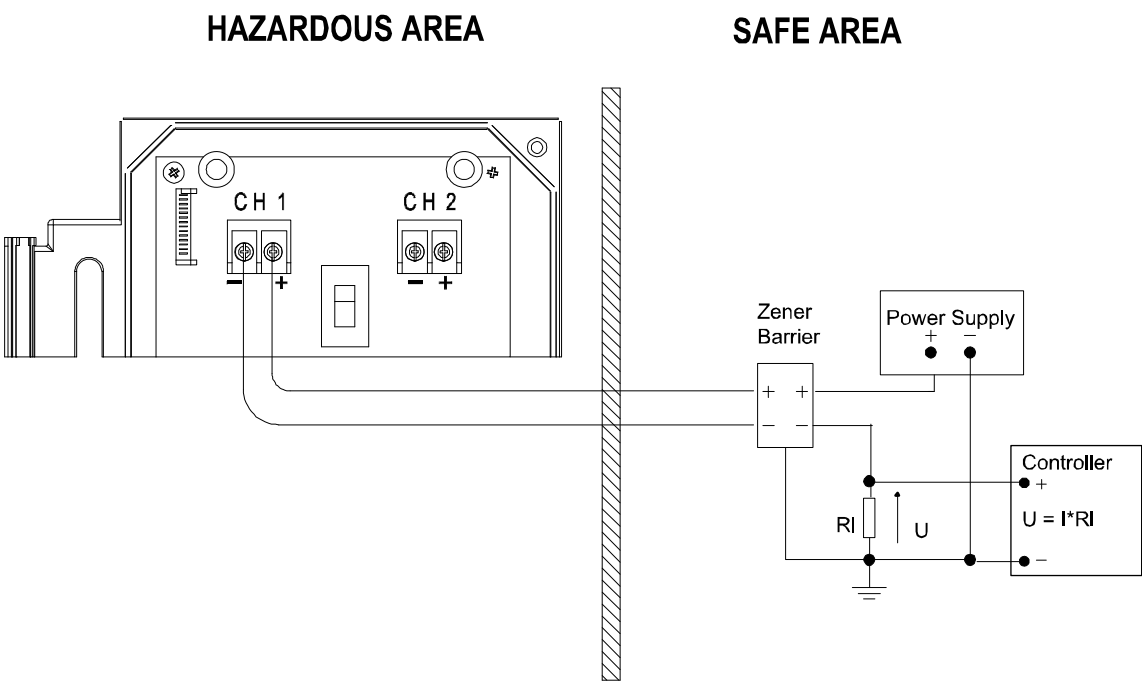
b) voltage signal controller

Figure 16 HMT360 Connected to Galvanic Isolator

HMT360 Connected to a Zener Barrier



a) current signal controller



b) voltage signal controller

Figure 17 HMT360 Connected to a Zener Barrier

Examples of Connections

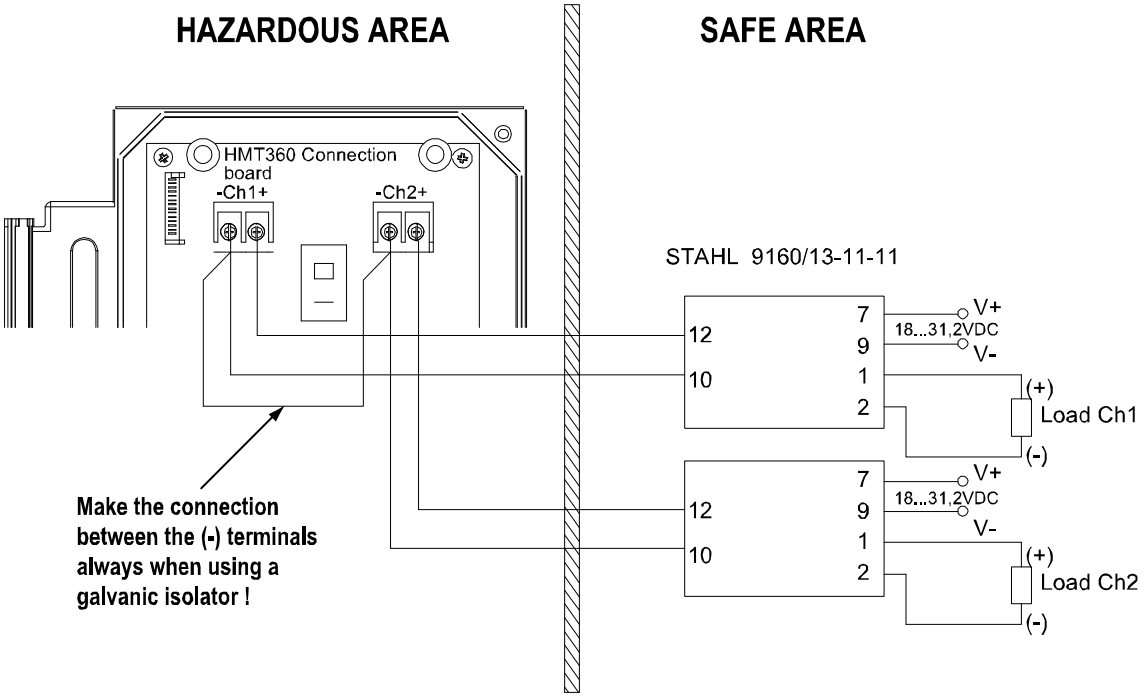


Figure 18 STAHL 9160/13-11-11 (Galvanic Isolator)

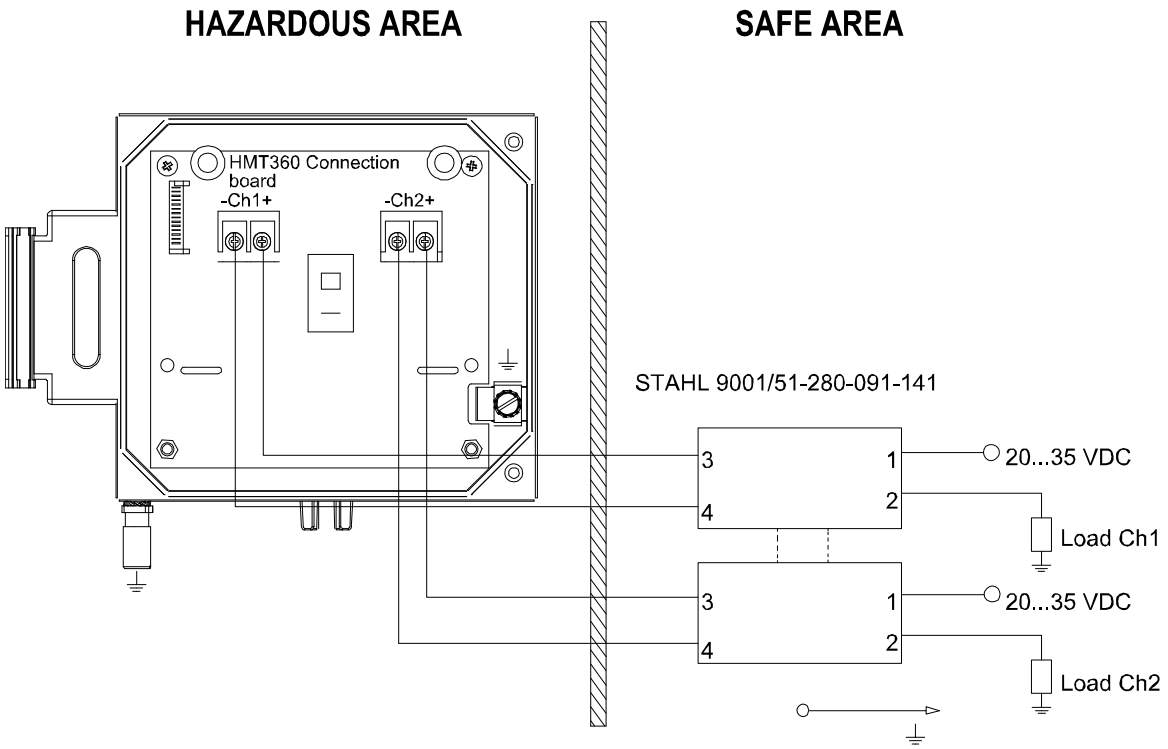


Figure 19 STAHL 9001/51-280-091-141 (Zener Barrier)

Grounding

When grounding the transmitter, follow the local requirements. Use at least 4 mm^2 grounding cable when grounding the transmitter or barrier. Note that the allowed resistance between barrier and system ground must be less than 1 ohm. Use ground terminal located inside or outside of transmitter Figure 20 on page 43:

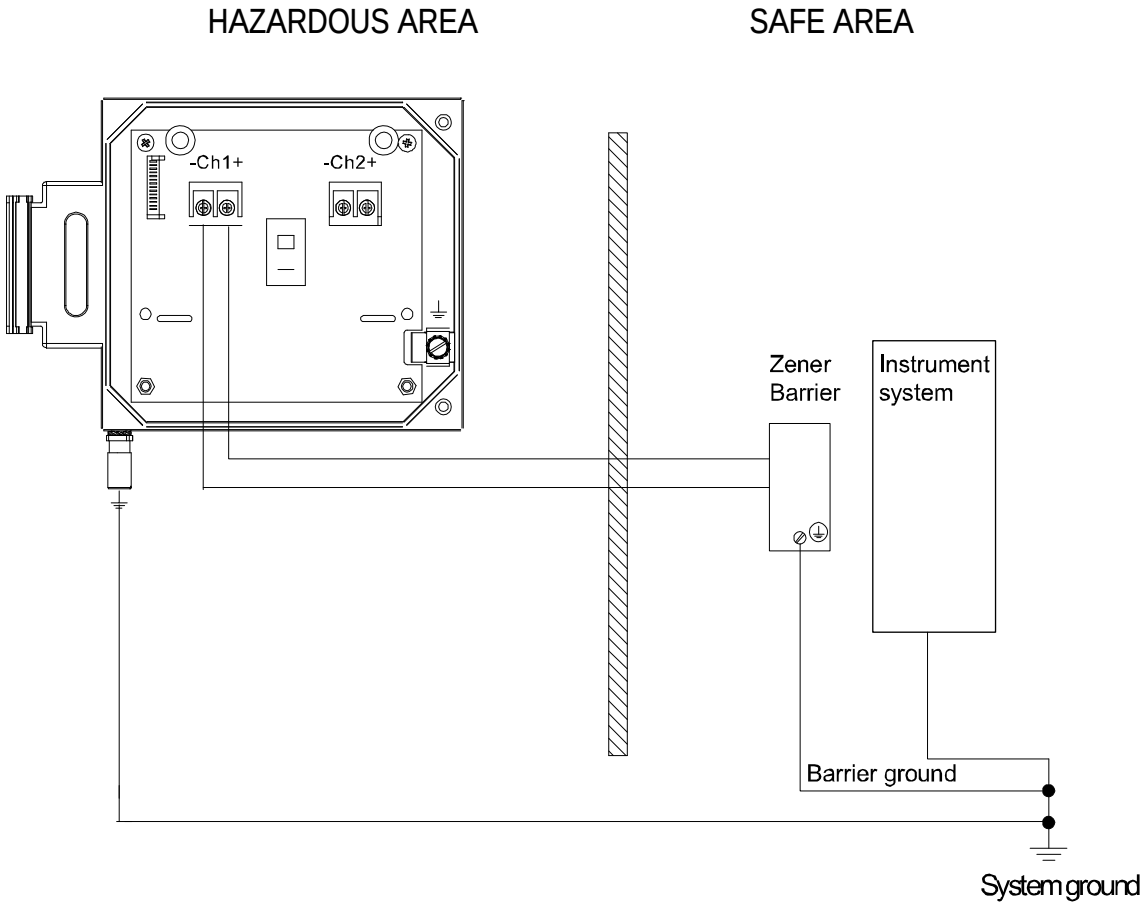


Figure 20 Grounding

CHAPTER 4

OPERATION

This chapter contains information that is needed to operate this product.

Local Interface

HMT360 transmitter has four pushbuttons located on the housing cover. The display/keypad commands (see Display/Keypad Commands on page 48) can be used to scale the outputs and select output quantities. The measurement results are shown on the display.

The keypad pushbuttons are indicated (from left to right) as **C**, **Up**, **Dn**, and **E** (see Figure 21 on page 46):

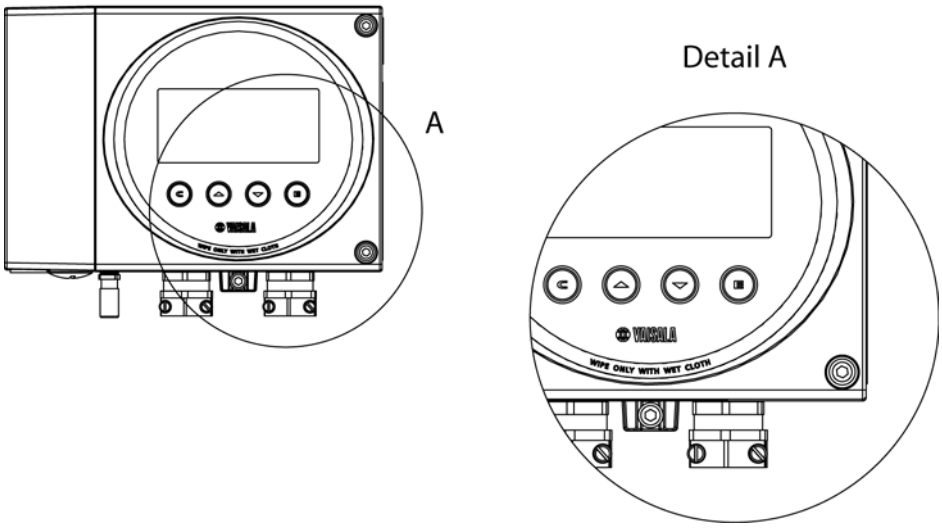


Figure 21 Local Display/Keypad Interface

Power ON/OFF

Open the transmitter cover and flip the internal power switch to position **ON** (up), see Figure 23 on page 64.

When the transmitter is turned on, the existing pressure setting appears on the display; the default setting is 1 bar_a (15 psi_a). After this, measurement readings appear on the display. The analog output signals can be read from the system or load resistor.

WARNING	Avoid static discharge. Always use a wet cloth for wiping the display.

To modify the pressure setting, turn the internal **Calibration Enabled/ Disabled** DIP switch of the transmitter to position **Enabled** (up). Adjust the pressure reading with buttons **Up** and **Dn** on the display cover; the adjustment step is 0.5 bar_a). Acknowledge the value with button **E**. To complete the pressure setting, turn the DIP switch back to position disabled (down). If the pressure setting is not modified, the measurement readings appear automatically on the display after 60 seconds.

DIP Switch Functions

The table below is also printed on the protection board:

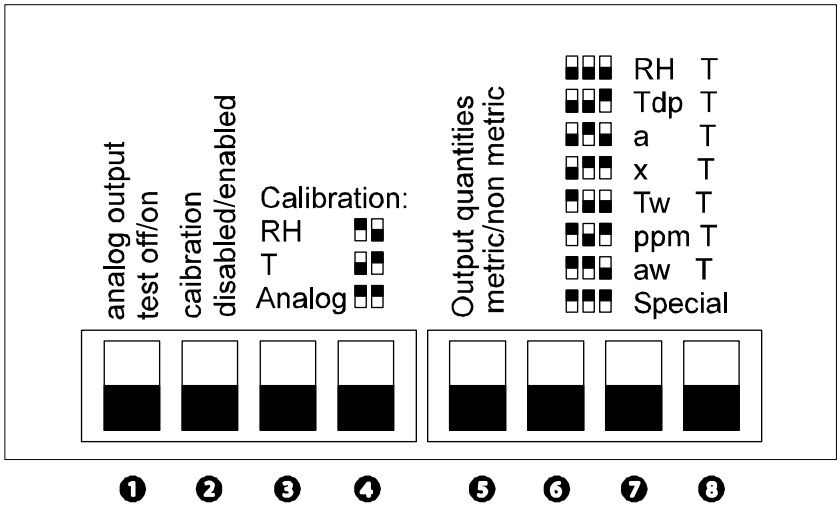


Figure 22 DIP Switch Functions

1: Analog output test on/off

If you turn the switch to on position (up), you can force the outputs to states 4 mA, 12 mA and 20 mA by pressing buttons **Up** and **Dn** on the cover. Outputs return to normal mode when switch is turned down.

2: Calibration Disabled/Enabled

The EEPROMs are write protected. If this switch is in the disabled position (down), it does not allow any calibrations or scalings.

NOTE	Keep this switch always in the disabled position during normal use of the transmitter.

3 and 4: Calibration rh, t, analog

With these combinations you can perform relative humidity, temperature or analog output calibrations with a multimeter or with the transmitter display unit. Turn the DIP switches to the desired position according to the table printed on the protective cover.

5: Output quantities

Determines whether the output units are metric (down) on non-metric.

6, 7 and 8: Select output quantities

With the three DIP switches on the right, you can select the output quantities according to the table printed on the right side of the protective cover. Note that only the ordered quantities can be selected. The special option gives you the choice of setting any ordered quantity to each channel.

NOTE	Always restore the DIP switch settings after having tested the analog outputs or performing the calibration.

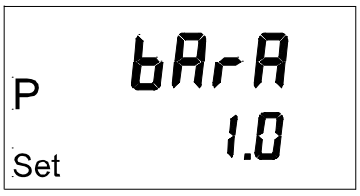
Display/Keypad Commands

NOTE	Chapter 6, Calibration and Adjustment, on page 63 describes separately display/keypad commands for calibration and adjustment.

Setting the Pressure for Calculations

In dewpoint transmitters, the process pressure in the measurement point is required to achieve the specified accuracy.

To modify the pressure settings, turn the internal **Calibration Enabled/ Disabled** DIP switch of the transmitter to position **Enabled** (up). Press button **C** on the display cover: text "SCAL" appears on the display. Then press button **E** until the following display appears (the numeric value is always the existing setting, in this example 1.0):



Adjust the pressure reading with buttons **Up** and **Dn**. Acknowledge the value with button **E**. To complete the pressure setting, turn the dip switch back to position disabled (down).

See the pressure conversion table below:

Table 5 Pressure Conversion Chart

	FROM	hPa (mbar)	psi	bar	MPa
	hPa (mbar)	1	68.95	1000	10000
TO	psi	0.0145	1	14.5	145
	bar	0.001	0.06895	1	10
	MPa	0.0001	0.006895	0.1	1

Example:

200 psi = 200 × 68.95 = 13790 hPa (mbar)

Selecting Output Quantities

Two quantities are shown on the LCD. The upper half of the display shows the moisture, whereas the lower half is reserved for the temperature reading.

Upper Half of Display

To select between metric/non metric output quantities, use the output quantities metric/nonmetric. DIP switch is in the metric (down) position, the available quantities are dewpoint temperature (T_d °C), volume concentration (ppm), and water content in mg/m^3 (w).

When the DIP switch is in the non metric (up) position, the available quantities are dew/frost point temperature (T_d °F), volume concentration (ppm_v), and water content in lb/mmscf (w).

To modify the displayed quantity, turn the **Calibration Enabled/ Disabled** DIP switch of the transmitter to position **Enabled** (up). Select the required quantity with button **Up** on the display cover, and acknowledge the value with button **E**. To complete the selections, turn the DIP switch back to position disabled (down).

Character	Quantity	Abbreviation	Metric Unit	Nonmetric Unit
1	temperature	T	°C	°F
2	dewpoint temperature	Td	°C	°F
6	volume concentration	ppmv	ppm_v	ppm_v

Character	Quantity	Abbreviation	Metric Unit	Nonmetric Unit
A	water content	w	mg/m^3	lb/MMscf

Lower Half of Display

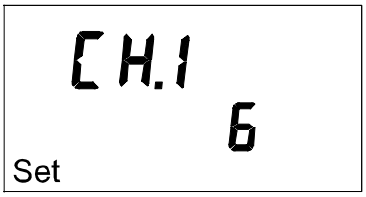
The output quantities metric/non metric DIP switch can be used to select between °C and °F.

It is possible to check the pressure setting of the transmitter by pressing button **Dn**. To return to the temperature reading, press button **Dn** again.

Selecting Analog Outputs

You can select the output quantities for channels 1 and 2 by turning the **Calibration Enabled/Disabled** DIP switch of the transmitter to position **Enabled** (up) and the three output selection DIP switches to position special (all up).

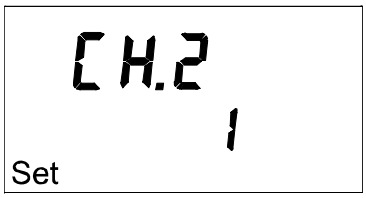
Press button **C** on the display cover: text "SCAL" appears on the display. Then press button **E** until the following display appears:



The characters on the second line of the display in this menu correspond to the quantities according to the table in section Selecting Output Quantities on page 49.

Select the quantity for Ch 1 with buttons **Up** and **Dn** and acknowledge the selection with button **E**.

If the transmitter is equipped with two analog channels, select the quantity for Ch 2 in the same way, for example:

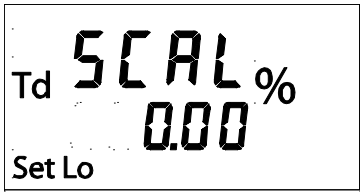


Press button **C** to exit the display command mode or continue by setting the pressure.

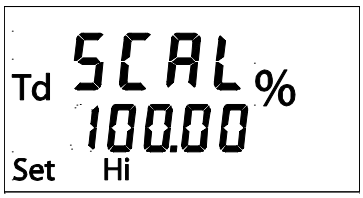
NOTE	Remember to restore the DIP switch settings.

Scaling Analog Outputs

Turn the internal **Calibration Enabled/Disabled** DIP switch of the transmitter to upward position (on). Press button **C** on the display cover and a text similar to the following appears:



Numbers on the second line indicate the low end scaling of Ch 1 currently stored in the transmitter memory. The text "Set Lo" on the lower left corner indicates that you can now change the low end scaling with buttons **Up** and **Dn**. Acknowledge the value with button **E** and a text similar to the following appears:



Numbers on the second line indicate the high end scaling of Ch 1. The text "Set Hi" on the lower left-hand corner indicates that you can now change the high end scaling with buttons **Up** and **Dn**. Acknowledge with button **E**.

If there is another channel available, the display shifts to the scaling menu of Ch 2. You can now scale the analog outputs for the Ch 2 in the same way as described above.

Press button **C** to exit the display command mode or continue by selecting the output quantities. This menu starts automatically after the scaling menu only if the output selection DIP switches are on the position special (all up) from the beginning.

NOTE Remember to restore the DIP switch settings.

Serial Interface

WARNING The serial interface **MUST NOT** be used in hazardous areas.

Use the serial interface for calibration and testing purposes in safe areas only. Always use the serial interface cable (optional accessory, Vaisala order code: 25905ZZ). Connect one end of the cable to the serial port of your computer and the other to the connector marked "RS232C" on the electronics unit of the transmitter (see Figure 5 on page 23).

NOTE With serial communication the current consumption increases approximately to 7 mA and the transmitter is not able to operate with 4 mA. Therefore, it is recommended to use serial communication only temporarily for changing settings or for calibrating the transmitter in a safe area. With serial port, the minimum supply voltage is 15 VDC.

NOTE The transmitter incorporates a serial interface detector. However, not all terminals or PC serial ports (for example, optoisolated or ports not meeting RS232C standards) recognize this standard. If the communication is not possible via a serial interface, use a forced activation by pressing simultaneously buttons **Up** and **E** on the transmitter cover. To deactivate the forced activation, press these buttons again or reset the transmitter. If the transmitter does not receive any commands for half an hour, it automatically closes the serial communication.

Serial Communication Settings

Table 6 Serial Communications Settings

Parameter	Value
bauds	2400
parity	none
data bits	8
stop bits	1

CAUTION When using the serial interface, be sure that power supply and serial interface are not connected to the same ground (use a floating power supply or hand-held serial interface device).

To start issuing commands, make sure that HMT360 is connected to a serial port of your computer and that the terminal session is open. Issue commands by typing them on your computer according to the following instructions. In these commands, <cr> stands for pressing Enter (on your computer keyboard).

Setting the Analog Outputs

ASEL Selecting Analog Outputs

Syntax: **ASEL** [*xxx yyy*]<cr>

where

xxx = Quantity of Ch 1

yyy = Quantity of Ch 2

Turn the internal DIP switch **Calibration Enabled/Disabled** to position **ON** before the selecting the analog outputs and return it to position **OFF** after making the selection. Output quantities and their abbreviations are listed in the table below:

Quantity	Abbreviation
temperature	T
dewpoint temperature	Td
volume concentration	ppmv
water content	w (when scaling water content, the abbreviation is "ng1", see note below)

NOTE When scaling water content w (mg/m^3 or lb/mmscf) with the natural gas transmitter, issue command **SNG1**.

Example:

```
>asel td t<cr>
Ch1 Td lo: -40.00 'C
Ch1 Td hi: 100.00 'C
Ch2 T lo: -40.00 'C
Ch2 T hi: 100.00 'C
>
```

S Scaling Analog Outputs

Syntax: **S***zz aa.a bb.b*<cr>

where

zz = Quantity (T, Td, ppm, w)

aa.a = Lower limit of the quantity

bb.b= Upper limit of the quantity

Turn the internal DIP switch **Calibration Enabled/Disabled** to position **ON** before the scaling the analog outputs and return it to position **OFF** after scaling.

Example:

```
>std -50 50<cr>
Td lo: -50.00 %RH
Td hi: 50.00 %RH
>
```

Adjustment Commands

Turn the internal DIP switch **Calibration Enabled/Disabled** to position **ON** before the adjustment and return it to position **OFF** after the adjustment.

CT Temperature Adjustment

Syntax: **CT**<cr>

The transmitter asks and measures temperature readings and calculates the calibration coefficients.

Example:

```
>ct<cr>
T  :  0.811   1. ref ? 0.5<cr>
 Press any key when ready ...<cr>
T  :  99.122  2. ref ? 99.5<cr>
OK
>
```

The OK indicates that the adjustment was succesful. When performing one-point adjustment press only Enter for the second reference.

Output Commands

ITEST Testing Analog Outputs

NOTE	Before giving command **ITEST**, reset the transmitter with command **RESET**, see section RESET Transmitter Reset on page 59.

Syntax: **ITEST** *aa.aaa bb.bbb*<cr>

where

aa.aaa = Current value to be set for Ch 1 (mA)

bb.bbb = Current value to be set for Ch 2 (mA)

This command outputs the current value of each channel and the corresponding control signal of the digital-to-analog converter.

Example:

```
>itest 8 12<cr>
 8.00000   403   12.00000   7DF
>itest<cr>
 7.00150   30A   11.35429   73E
>
```

The set current values remain valid until you issue the command **ITEST** without readings or reset the transmitter. With this command the desired outputs of the transmitter are shown.

NOTE	When outputting low currents from Ch 1, remember to remove RS232C-cable while reading the current output, because of the increased current consumption for using RS port.

SEND Outputting Measurement Values

Syntax: **SEND**<cr>

This command outputs the measured values in one point.

R Activating Continuous Output

Syntax: **R**<cr>

With the command **R** the transmitter outputs measured values continuously.

S Stopping Continuous Output

Syntax: **S**<cr>

The continuous outputting is stopped with the command **S**. If outputting is active, this command is not echoed.

INTV Setting Output Interval

Syntax: **INTV** *n xxx*<cr>

where

n = 1 ... 255

xxx = S, MIN or H

Sets the output interval when the transmitter outputs measurement readings. The time interval is used when the continuous output is active.

Example, the output interval is set to 10 minutes:

```
>intv 10 min<cr>
Output interval:   10 MIN
>
```

PRES Setting Ambient Pressure for Calculations

Syntax: **PRES** *aaaa.a*<cr>

where

aaaa.a = Pressure (bar_a)

Turn the internal DIP switch **Calibration Enabled/Disabled** to position **ON** before setting the pressure and return it to position **OFF** after making the setting.

Example:

```
>pres 12<cr>
Pressure       :     12.0 bara
>
```

Table 7 Pressure Conversion Chart

	FROM	hPa/mbar	mmHg/Torr	inHg	atm	bar	psi
	hPa/ mbar	1	1.333224	33.86388	1013.25	1000	68.94757
TO	mmHg/ Torr	0.7500617	1	25.40000	760	750.0617	51.71493
	inHg	0.02952999	0.03937008	1	29.921	29.52999	2.036021
	atm	0.00098692	0.00131597	0.033422	1	0.98692	0.068046
	bar	0.001	0.001333224	0.03386388	1.01325	1	0.06894757
	psi	0.01450377	0.01933678	0.4911541	14.6962	14.50377	1

Example:

29.9213 inHg = 29.9213 × 33.86388 = 1013.25 hPa / mbar

NOTE Conversions from mmHg and inHg are defined at 0 °C.

FILT Output Filtering

Syntax: **FILT** *a.aaa*<cr>

where

a.aaa = 0.1 ... 1

1 = No filtering

0.5 = Average of last two measurements

0.1 = Average of ca. 16 measurements

This commands sets the measurement result filtering.

Example:

```
>filt 1<cr>
Filter          :  1.0000
>filt 0.5<cr>
Filter          :  0.5000
>filt 0.1<cr>
Filter          :  0.1000
>
```

Resetting the Transmitter

RESET Transmitter Reset

Syntax: **RESET**<cr>

This command resets the device.

CHAPTER 5
MEASURING AT OVERPRESSURE

This chapter provides you with important information concerning measurement in conditions with pressure higher than the normal atmospheric pressure.

The probes HMP362, HMP364 and HMP368 are designed for dewpoint measurement at overpressure. The maximum measurement pressures depend on the probe as follows:

HMP362: 0 ... 167 bar (16,7 MPa), for natural gas, sample cell HMP302SC available

HMP364: 0 ... 100 bar (10 MPa), for pressurized rooms and processes, probe is provided with a nut, fitting screw and sealing washer

HMP368: 0 ... 40 bar (4 MPa), for pressurized pipelines, ball valve set available

The accuracy of the dewpoint measurement is affected by pressure in the measurement chamber. The actual pressure in the sampling cell is required to be set to the transmitter, see section Setting the Pressure for Calculations on page 48).

Pressure Regulator Recommended

When sampling pressurized processes exceeding the maximum measurement pressure of the probe, the pressure in the measurement chamber must be regulated to the acceptable level or below. It is recommended to use pressure regulator before the measurement chamber to prevent remarkable pressure variations.

CHAPTER 6

CALIBRATION AND ADJUSTMENT

This chapter contains instructions for checking the calibration and adjusting this product.

In this User's Guide the term "calibration" refers to comparing the device's reading against a reference concentration. "Adjustment" refers to changing the device's reading to correspond to the reference concentration.

Calibration Interval

HMT360 is calibrated as shipped from the factory. Typical calibration interval is one year. In demanding applications it may be advisable to make the first calibration check earlier.

Factory Calibration and Adjustment

NOTE	HMT360 for natural gas must always be adjusted in a Vaisala Service Center.

The device (or the probe only) can be sent to Vaisala Service Centers for calibration and adjustment. See section Technical Support on page 74 for contact information.

Removing the Electronics Unit

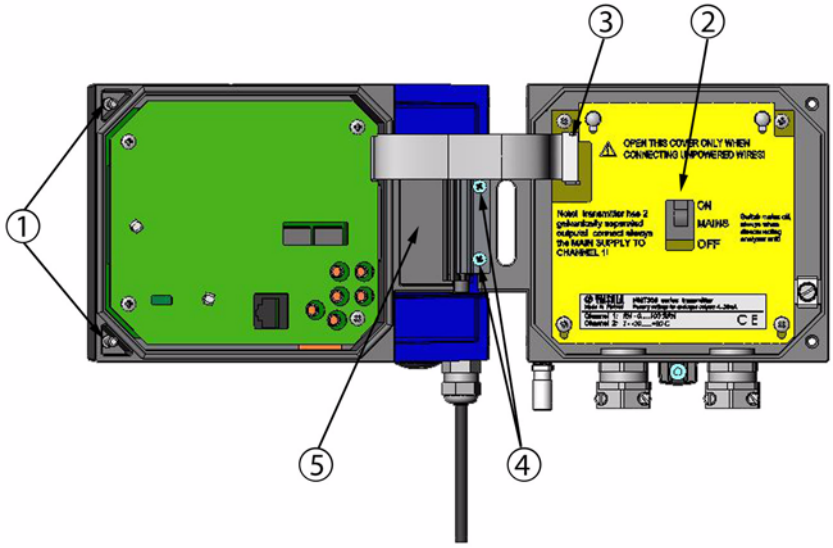


Figure 23 Detaching the Electronics Unit with Probe for Calibration and Adjustment

1. Unfasten the screws and open the cover.
2. Switch the transmitter off with the **ON/OFF** switch.
3. Disconnect the flat cable by lifting it carefully, for example with a screwdriver.
4. Remove the two screws holding the hinge support. Remove the hinge support.
5. Turn the electronics unit slightly upwards to release it from the hinges. Leave the transmitter base with the cable connections on place. When putting the electronics unit back to place, attach the upper hinge first. Remember to attach the hinge support.

Connections

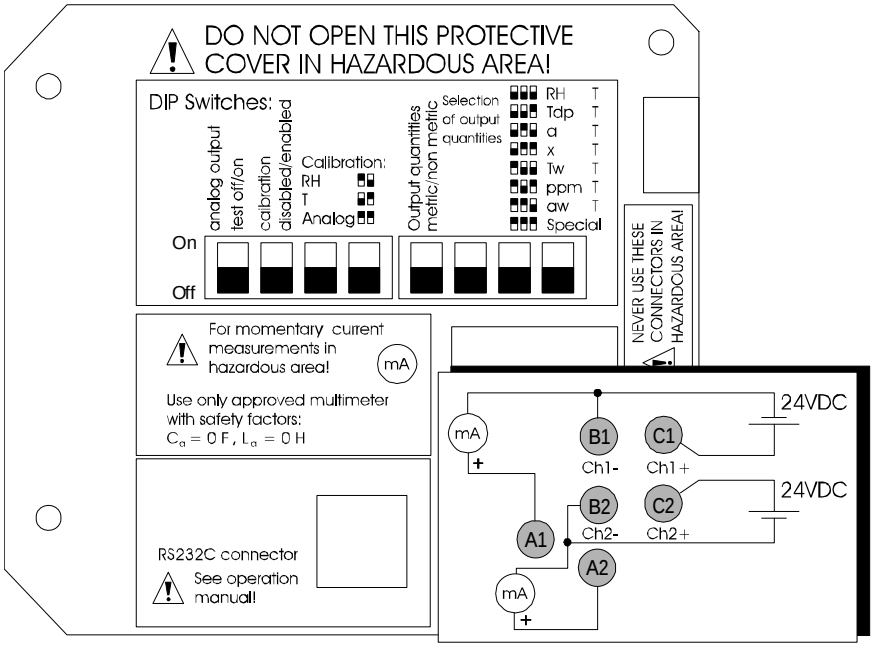


Figure 24 Connecting Power Supply and Multimeter for Calibration

1. Connect a power supply (12 ... 24 VDC, with a serial port the minimum supply voltage is 15 VDC) to the terminals B1 (-) and C1 (+) (Ch 1) with banana plugs, see Figure 24 on page 65.
2. Connect the multimeter in series with the supply, B1 (-) and A1 (+).
3. Follow the same procedure with Ch 2 using the terminals B2 (-) and C2 (+). When calibrating both channels at the same time, use two galvanically separated power supplies.

You can now calibrate or check the dewpoint and temperature or the analog outputs according to the instructions given in this chapter.

If the current measurement is needed in a hazardous area, the multimeter is connected to the terminals A1/A2 (+) and B1/B2 (-). Use only an approved multimeter.

WARNING	The power supply connectors (C1 and C2) **MUST NOT** be used in hazardous areas. For calibration and adjustment in a hazardous area use only an approved multimeter, which fulfills the safety factors printed on the protective cover.

Calculating Correspondence of Current Values and Output Quantities

When using HMT360 without a display, calibration and adjustment is carried out by using a multimeter. Use the following equations to calculate the current values corresponding to the reference output quantities.

$$I = 4\ \text{mA} + 16\ \text{mA} \cdot \frac{Q_{\text{ref}} - Q_{\text{min}}}{Q_{\text{max}} - Q_{\text{min}}}$$

where

Q_{ref} = Reference value of the calibrated quantity

Q_{min} = Reference value of the calibrated quantity

Q_{max} = Value corresponding to 20 mA

Example:

Temperature scaling -40 ... +120 °C, reference 22.3 °C:

$$I = 4\ \text{mA} + 16\ \text{mA} \cdot \frac{22.3^\circ\text{C} - 40^\circ\text{C}}{120^\circ\text{C} - 40^\circ\text{C}} = 10.230\ \text{mA}$$

One-Point Temperature Adjustment

NOTE	Always use a high quality standard for adjusting the temperature.

NOTE	If you use serial commands, please refer to section Adjustment Commands on page 55.

1. Set the internal DIP switch **Calibration Enabled/Disabled** to position **ON** and select T calibration by using switches 3 and 4 (see section DIP Switch Functions on page 47).
2. The temperature value measured by the transmitter appears on the display as well as the text "Set Lo" on the lower left corner. If the transmitter has no display, the LED indicator starts to blink.
3. Let the sensor stabilize; use a multimeter or the transmitter display to monitor the stabilization.
4. Press buttons **Up** and **Dn** to adjust the display or multimeter reading to correspond to the reference value (when using a multimeter calculate the current value corresponding to the reference humidity by using the equations presented in Calculating Correspondence of Current Values and Output Quantities on page 66).
5. Conclude the one-point adjustment by pressing button **E** twice.

ACAL Analog Output Calibration

Syntax: **ACAL**<cr>

Connect HMT360 to a multimeter. Issue the **ACAL** command:

1. Disconnect the serial cable from the transmitter while reading the multimeter value for the Ch 1 (I1).
2. Reconnect the serial cable. Type the multimeter reading and press Enter.
3. Type the higher current multimeter reading and press Enter.

Example:

```
>acal<cr>
 Ch1 I1 ( mA  )  ? 4.846<cr>
 Ch1 I2 ( mA  )  ? 19.987<cr>
>
```

CHAPTER 7

MAINTENANCE

This chapter provides information that is needed in basic maintenance of the product.

Periodical Checking and Cleaning

Transmitter Housing and Probe

WARNING	Avoid static discharge. Always use a wet cloth for wiping the display.

The electronics unit of the transmitter, as well as the probe, can be removed and replaced in the field. See section Removing the Electronics Unit on page 64 for detailed information.

All other maintenance must be performed by qualified Vaisala personnel. If a transmitter is damaged, contact your nearest Vaisala Service Center. See section Technical Support on page 74 for contact information.

Sintered Steel Filter

Check the sintered filter of the probe regularly. A dirty or corroded filter needs to be replaced, as it may increase the response time and decrease the lifetime of the sensor. Make also sure the filter remains tighly fit.

If you need to replace the filter:

1. Make sure you have the spare part available, or order one from your nearest Vaisala Service Center. See section Technical Support on page 74 for contact information.
2. Carefully remove the old filter from the probe.
3. Install the new filter to the probe. Make sure to tighten it.

CAUTION	Avoid touching the sensor element, as this may lead to physical damage to the component, or measurement inaccuracy due to sensor contamination.

Sensor Element

Check the Vaisala HUMICAP® sensor in your transmitter regularly. A corroded or otherwise damaged sensor has to be replaced, which needs to be done by your nearest Vaisala Service Center. See section Technical Support on page 74 for contact information.

Figure 25 Sensor Element is Located under the Filter

The sensor element is located under the sintered steel filter. A dirty sensor element can be cleaned by soaking the sensor in de-ionized water or IPA (isopropanol, propan-2-ol), as follows:

1. Carefully remove the sintered steel filter from the probe.
2. Rinse the sensor with de-ionized water or IPA for no more than one minute.
3. Gently dehydrate the sensor with dry gas (nitrogen) if available.
4. When the sensor and probe are both dry, install the filter back to the probe.

CAUTION

Do not touch the sensor surface.

Only de-ionized water or IPA is allowed, other agents such as ethanol cannot be used.

Do not immerse the sensor in water or IPA for more than one minute.

Water or IPA temperature must be below 30 °C (86 °F)

Do not use a cotton stick or any other mechanical means for cleaning and/or drying the sensor.

CHAPTER 8
TROUBLESHOOTING

This chapter describes common problems, their probable causes and remedies, and contact information.

Diagnostics

Operation Errors

The following symptoms indicate an operation error of the HMT360:

- The analog output(s) current drops below 4 mA.
- Display shows the word "ERROR".

In the case of error:

- Check that the sensor is connected properly. Clean the sensor according to instructions in section Periodical Checking and Cleaning on page 69.
- Check if there is condensed water in the probe. If yes, let the probe dry.

In case of constant error, contact the Vaisala Helpdesk. See section Technical Support on page 74 for contact information.

Analog Output Test

Analog outputs can be tested with dip switch 1, see DIP Switch Functions on page 47 for details.

Technical Support

For technical questions, contact the Vaisala technical support by e-mail at helpdesk@vaisala.com.

For contact information of Vaisala Service Centers, see www.vaisala.com/services/servicecenters.html.

CHAPTER 9

TECHNICAL DATA

This chapter provides technical data of the product.

Performance

Temperature (+ Operating Pressure Ranges)

Table 8 Temperature Specifications

Property	Description / Value
Measurement range	-40 ... +100 °C
Typical accuracy of electronics at +20 °C	± 0.1 °C
Typical temperature dependence of electronics	0.005 °C/°C
Sensor	Pt 1000 RTD Class B IEC 751

Moisture in Natural Gas

Dewpoint Measurement

Table 9 Dewpoint Measurement Specifications

Property	Description / Value
Measurement range	-50 ... +50 °C (-58 ... +122 °F) Td
Accuracy	± 2 °C (± 3.6 °F) (see graph in Figure 26 on page 76)
Response time 63 % [90 %] -20 +10 ° C (-4 +50 ° F) +10 -20 ° C (+50 -4 ° F)	 6 s [32 s] 120 s [370 s]
Sensor	Vaisala HUMICAP®180M

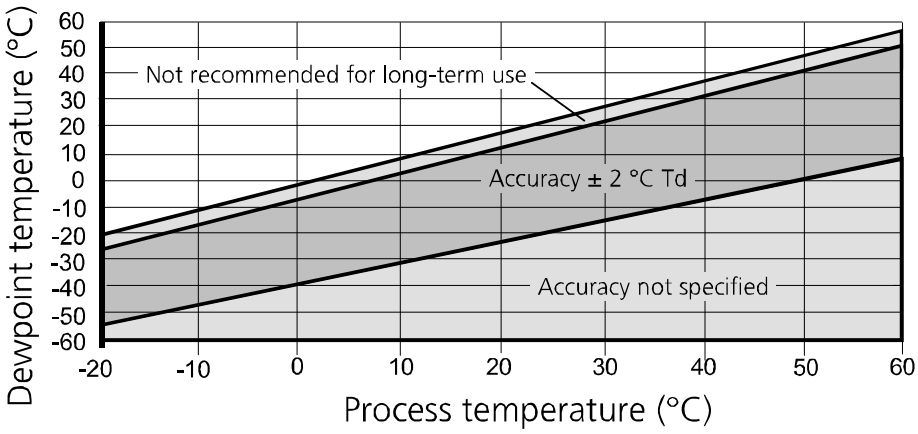


Figure 26 Effect of Process Temperature on Dewpoint Measurement Accuracy

Calculated Variables Available (Typical Ranges)

Table 10 Calculated Variables Specifications

Property	Description / Value
Water content	0 ... 20 lb/MMscf, 0 ... 320 mg/m^3
Parts per million by volume	0 ... 500 ppm_v

Outputs

Table 11 Output Specifications

Property	Description / Value
Two analog outputs (one standard, one optional)	two wire 4 ... 20 mA
Typical accuracy of analog outputs at +20 °C	± 0.05 %/°C full scale
Typical temperature dependence of analog outputs	± 0.005 %/°C full scale
RS232C serial output **for service use only in safe area**	connector type RJ45

WARNING Output connections are made via safety barriers.

Classification with Current Outputs

Europe (VTT)

EU (94/9/EC, ATEX100a)	II 1 G Ex ia IIC T4 Ga VTT 09 ATEX 028 X issue No: 1
Safety factors	U_i = 28 V, I_i = 100 mA, P_i = 700 mW C_i = 1 nF, L_i negligibly low
Environmental specifications	T_{amb} = -40 ... +60 °C (-40 ... +140 °F) P_{amb} = 0.8 ... 1.1 bar
Dust classification (with protection cover)	II 1 D (IP65 T = 70 °C) VTT 04 ATEX 023X
USA (FM)	Classes I, II, III Division 1, Groups A - G Division 2, Groups A - D, F and G FM Project ID: 3010615
Safety factors	V_{max} = 28 VDC, I_{max} = 100 mA C_i = 1 nF, L_i = 0, P_i = 0.7 W T_{amb} = 60 °C (140 °F), T5
Japan (TIIS)	Ex ia IIC T4 Code number: TC17897
Safety factors	U_i = 28 VDC, I_i = 100 mA, C_i = 1 nF P_i = 0.7 W, L_i = 0, T_{amb} = 60 °C (140 °F)

Canada (CSA)

Class I	Division 1 and Division 2 Groups A, B, C, D
Class II	Division 1 and Division 2 Groups G and Coal Dust
Class III	CSA File No: 213862 0 000 CSA report: 1300863
Safety factors	T_{amb} = 60 °C, T4, Intrinsically safe when connected as per Installation Drawing DRW213478
China (PCEC)	Ex ia II CT4 Certificate No. CE092145 Standard GB3836.1-2000 and GB3836.4-2000

IECEx (VTT) Ex ia IIC T4 Ga
IECEx VTT 09.0002x issue No:1

Safety factors U_i = 28 V, I_i = 100 mA, P_i = 700 mW
C_i = 1 nF, L_i negligibly low

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

General

Table 12 General Specifications

Property	Description / Value
Operating voltage with serial port (service mode)	12 ... 28 V 15 ... 28 V
Connections	screw terminals, 0.33 ... 2.0 mm^2 wires (AWG 14-22)
Cable bushings	M20×1.5 (7.5 ... 12 mm) M20×1.5 (10.5 ... 15 mm)
Conduit fitting	M20×1.5 / NPT 1/2"
Operating temperature range for electronics with display Storage temperature range	-20 ... +60 °C -40 ... +70 °C
Housing material	G-AlSi 10 Mg (DIN 1725)
Housing classification	IP 66 (NEMA 4X)
Housing dimensions	164 × 115 × 62 mm
Housing weight	950 g
Fully electromagnetically compatible according to standards	EN 61326-1: Electrical equipment for measurement, control and laboratory use - EMC requirements; Industrial environment

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

Probes

Table 13 Probe Specifications

Property	Description / Value
Probe material	Stainless steel (AISI 316L)
Probe cable length	2 m, 5 m or 10 m
Probe cable diameter	5.5 mm
Sensor protection options	sintered stainless steel filter
HMP362 Probe - small pressure-tight	
Temperature range	-40 ... +110 °C
Pressure range	0 ... 16.7 MPa (0 ... 167 bar)
HMP364 Probe - high pressures	
Temperature range	-40 ... +180 °C
Pressure range	0 ... 10 MPa (0 ... 100 bar)
HMP368 Probe - pressurized pipelines	
Temperature range	-40 ... +180 °C
Pressure range	0 ... 4 MPa (0 ... 40 bar)

Options and Accessories

Table 14 Options and Accessories

Item	Description / Order Code
MODULES	
Analog Output Module	HM360AOUTSP
FILTERS	
Sintered Stainless Steel Filter	HM47280SP
TRANSMITTER MOUNTING ACCESSORIES	
Wall Mounting Kit	HM37108SP
Rain shield	215109
Protection cover (for use in the presence of combustible dust, ATEX)	214101
PROBE MOUNTING ACCESSORIES	
HMT362/HMP362	
Sampling Cell for Probe with Flange	HMP302SC
5 pcs. O-ring Set Size 14.1×1.6	216026
HMT364/HMP364	
Fitting Body M22×1.5	17223SP
Fitting Body NPT1/2	17225SP

Table 14 Options and Accessories

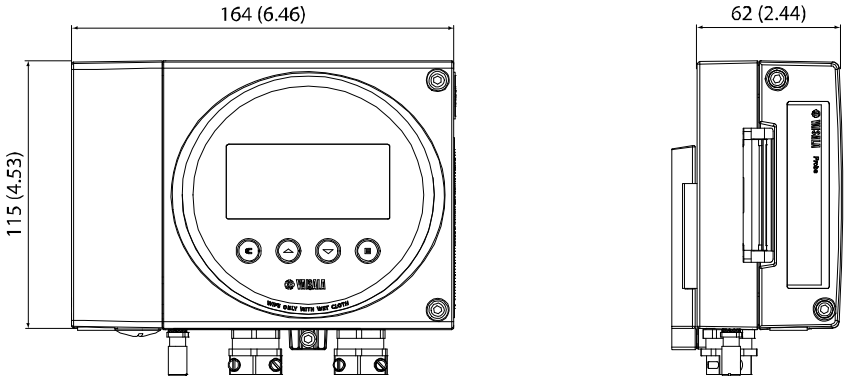
Item	Description / Order Code
HMT368/HMP368	
Fitting Body ISO1/2 Solid Structure	DRW212076SP
Fitting Body NPT1/2 Solid Structure	NPTFITBODASP
Fitting Body Set ISO 1/2	ISOFITBODASP
Fitting Body Set (ISO 1/2 + NPT 1/2)	THREADSETASP
Leaking Screw with Allen Key	216027
Thread Adapter ISO1/2 to NPT1/2	210662SP
Sampling Cell with Female Connectors	DMT242SC
Sampling Cell with Swagelok Connectors	DMT242SC2
Ball Valve ISO1/2 with Welding Joint	BALLVALVE-1
Installation Flange ISO1/2	DM240FA
Manual Press	HM36854SP
CONNECTION CABLES	
Serial Interface Cable	25905ZZ
CABLE BUSHINGS	
Cable Gland M20×1.5 for 7.5...12mm Cable	216587SP
Cable Gland M20×1.5 for 10...15mm Cable	216588SP
Conduit Fitting M20×1.5 for NPT1/2 Conduit	214780SP
Dummy Plug M20×1.5 for transmitter body	214672SP
OTHER	
Calibration Adapter for HMK15	211302SP
Galvanic isolator	212483
Barrier	210664

APPENDIX A

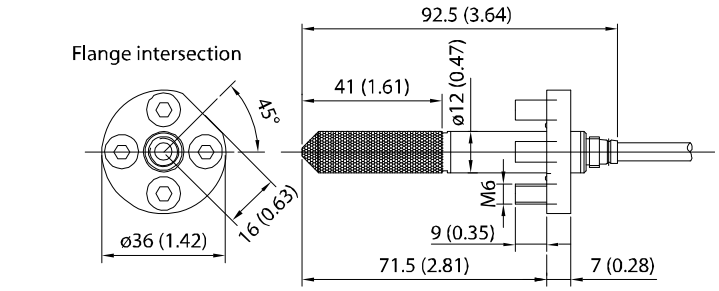
DIMENSIONS

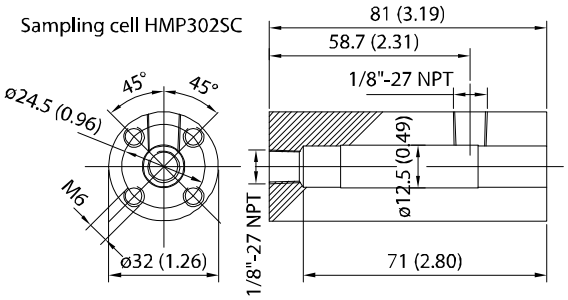
This Appendix contains parts drawings of the transmitter housing, probes and some transmitter mounting accessories with metric and nonmetric dimensions specified.

Transmitter Housing

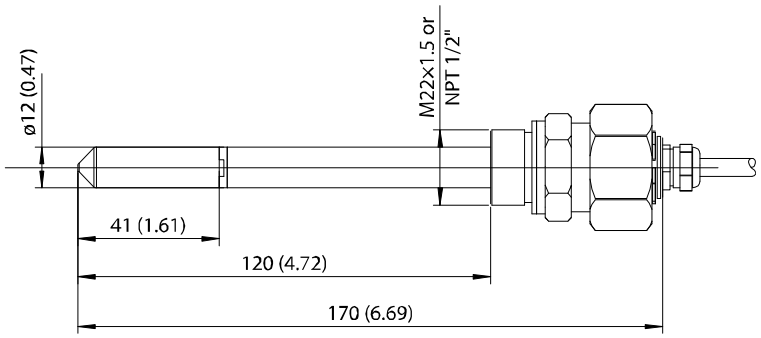


HMP362

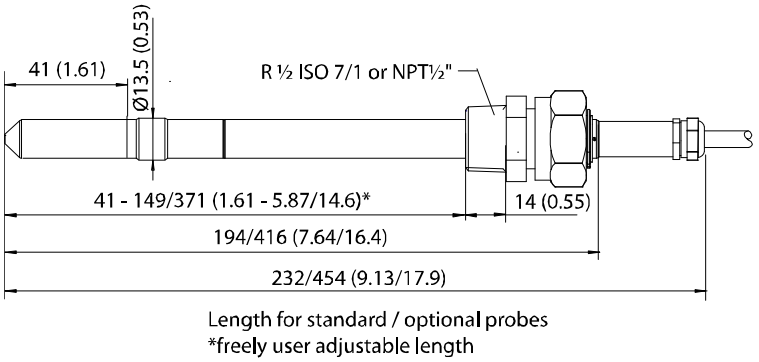




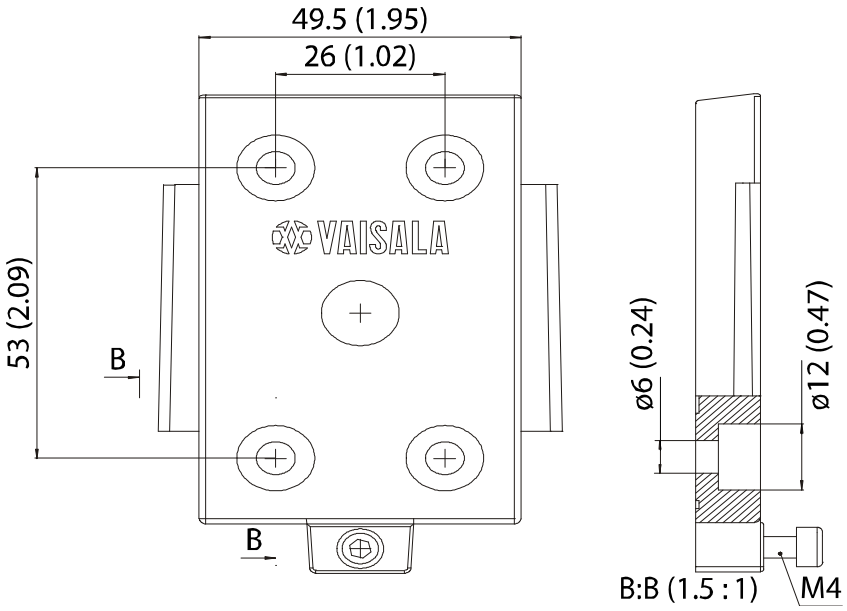
HMP364



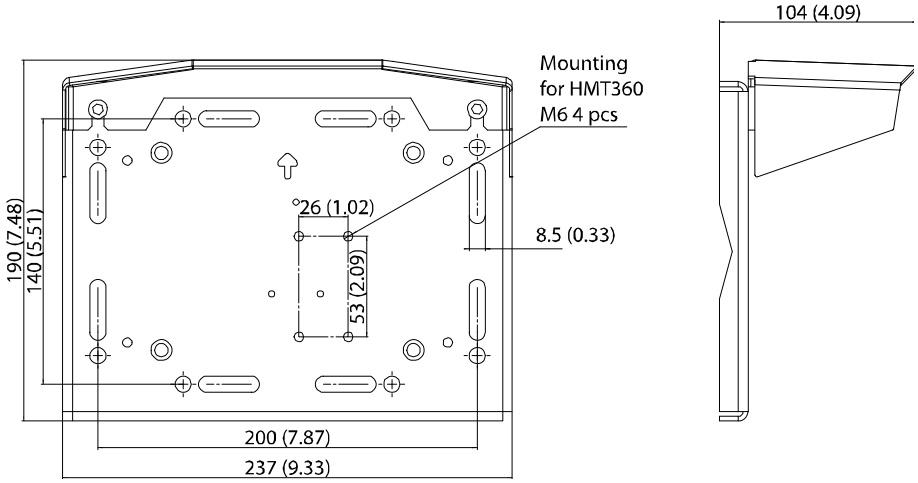
HMP368



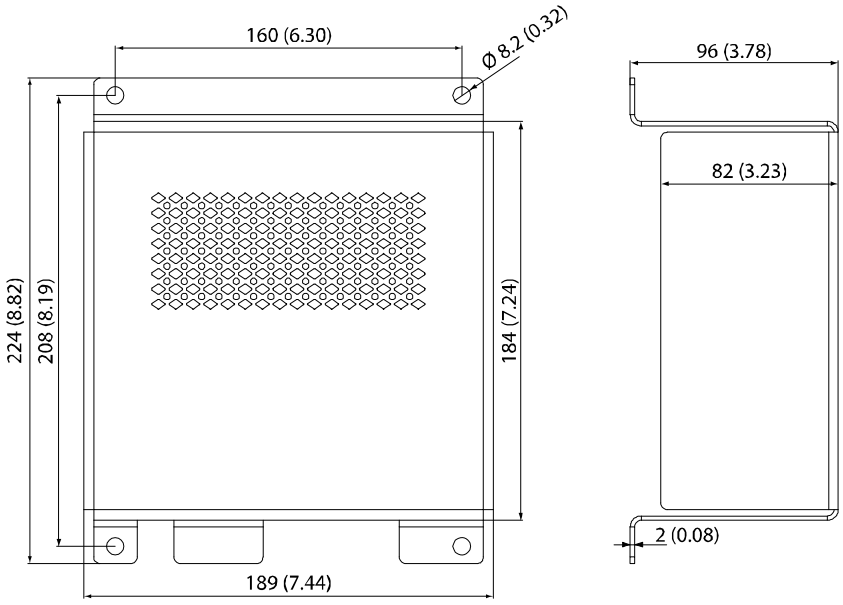
Mounting Plate



Rain Shield



Protection Cover



APPENDIX B

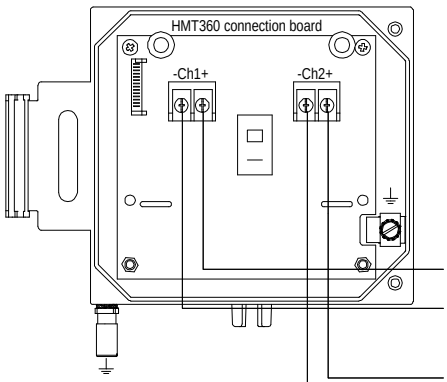
WIRING FOR INTRINSICALLY SAFE OPERATION, FM

This appendix contains the wiring diagram for intrinsically safe operation approved by Factory Mutual (FM).

REV	QTY	DESCRIPTION / INFO / ECO No.	DESIGN	CHECKED / Reviewed	ACCEPTED / Approved
B		List of approved probe types added ECO212870	RHA	RHA 06-04-24	HJJ 06-05-04

Wiring diagram for intrinsically safe operation of the HMT360-series humidity and temperature transmitter.

HAZARDOUS AREA

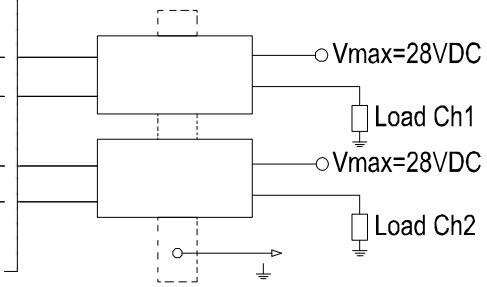


HMT360 transmitter series has following approved probe options:

HMP361, HMP362, HMP363, HMP364, HMP365, HMP367 & HMP368

SAFE AREA

Use FM approved associated apparatus; zener barriers or galvanic separators with entity concept parameters:
Voc < 28V
Isc < 100mA
Ca > Ci + Ccable
La > Li + Lcable



HMT360-series transmitters are approved for use in Classes I, II and III, Division 1, Groups A - G and Division 2, Groups A - D, F and G.

Safety factors for HMT360-series transmitters are: Vmax=28V, Imax=100mA, Ci=1nF, Li=0, Pi=0.7W

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 is 250V.

General tolerance ISO 2768-m	Design	VAISALA	
Material / Weight	Supplier code	Title: Assembly Instruction HMP360 and HMT360 VIN/HM	
Finish	DOCUMENT CREATION DATA (YYYY-MM-DD / INITIALS)		
	Creator 01-07-18 ARH		
	Review 01-11-19 ARH		
FIRST ANGLE PROJECTION	Approved 05-04-11 RHA	Size	Code DRW211603 Rev B
DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SPECIFIED	Archive ID ACAD	Scale	Sheet of

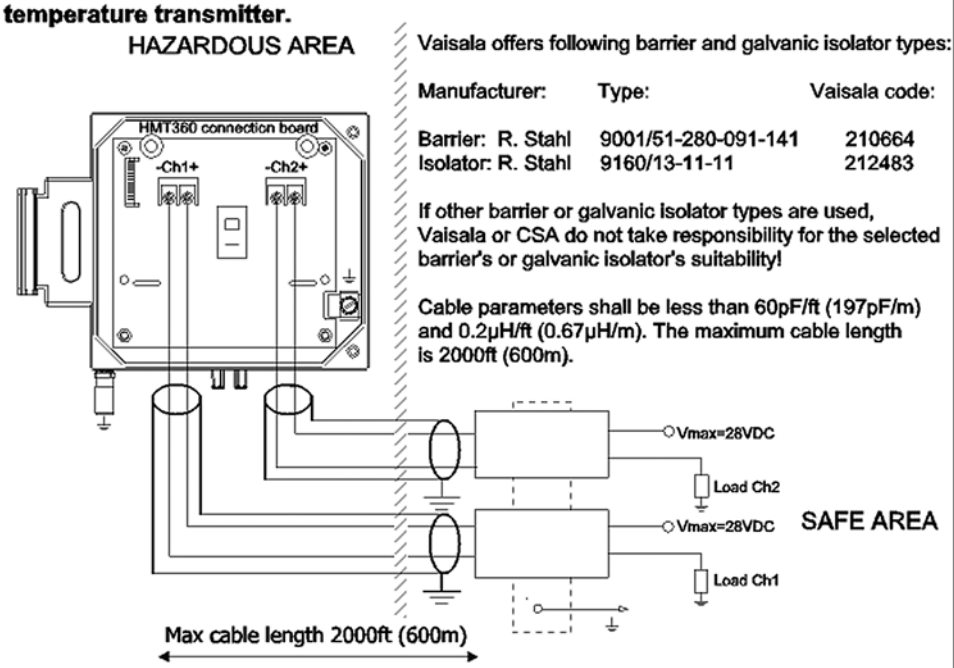
APPENDIX C

WIRING FOR INTRINSICALLY SAFE OPERATION, CSA

This appendix contains the wiring diagram for intrinsically safe operation approved by the Canadian Standards Association (CSA).

Ltr	Qty	Change	Reason/ MOD no	Design	Date Review	Date Appr
C		Probe types and barrier/isolator info updated	ECO212844	KKe	2006-06-20 RHA	2006-06-20 HJJ

Wiring diagram for intrinsically safe operation of the HMT360-series humidity and temperature transmitter.



Vaisala offers following barrier and galvanic isolator types:

Manufacturer:	Type:	Vaisala code:
Barrier: R. Stahl	9001/51-280-091-141	210664
Isolator: R. Stahl	9160/13-11-11	212483

If other barrier or galvanic isolator types are used, Vaisala or CSA do not take responsibility for the selected barrier's or galvanic isolator's suitability!

Cable parameters shall be less than 60pF/ft (197pF/m) and 0.2µH/ft (0.67µH/m). The maximum cable length is 2000ft (600m).

HMT360-series transmitters are approved for use in Division 1 and 2, Class I, Groups A, B, C, and D. Division 1, and 2, Class II, Group G and coal dust. Division 1, and 2, Class III.

NOTE:
1. Each channel must be supplied through separate shielded cables.
2. When using galvanic separators CH1- and CH2- must be short circuited with an external wire.
3. When using transmitter in Class I, Division 2 the main switch shall not be operated or the unit shall not be disconnected unless power has been switched off, or area is known to be non hazardous.
4. Use only conduit connection in Division 2.
5. Substitution on components may impair intrinsic safety or suitability for Division 2.
6. Only intrinsically safe installation is allowed in Class II and Class III environments.
7. Intrinsically safe barrier ground must be less than 1 ohm.
8. Maximum safe area voltage is 250V.

HMT360-series transmitters shall be used with following probes:
Probe HMP361 with 127mm long pipe.
Probe HMP362 with 2, 5 or 10 m length cable
Probe HMP363 with 2, 5 or 10 m length cable
Probe HMP364 with 2, 5 or 10 m length cable
Probe HMP365 with 2, 5 or 10 m length cable
Probe HMP367 with 2, 5 or 10 m length cable
Probe HMP368 with 2, 5 or 10 m length cable

The material for associated cable is FEP (Tetrafluoropropylene) or for HMP363 also PUR (Polyurethane) available.

To avoid static discharge shall the cable cover with conductive material.

Drawn KKe 2002-08-21	Arch id	Serial no	Sheet	Cooperation's doc no
Review IML 2002-10-06	Title: **Installation Drawing**	Vaisala Oyj Vanhanurmijärventie 21 Vantaa Finland	VAISALA	
Appr KKe 2002-10-06			Dwg no DRW213478	Rev C
Design	Scale			
Replaces DRW213478B				
Replaced by				

APPENDIX D
CERTIFICATES

This Appendix contains copies of the EXi intrinsically safe certificates issued for the HMT360 series.

- VTT IECEx Certificate
- VTT ATEX Certificates
- FM Certificate of Compliance
- CSA Certificate of Compliance
- TIIS Certificate of Compliance
- PCEC Conformity Certificate

Certificate of Conformity: IECEx VTT 09.0002X http://iecex.iec.ch/iecex/iecexweb.nsf/UID/B753C6ABE86405BF...

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx VTT 09.0002X issue No.:1

Certificate history:
Issue No. 1 (2009-8-26)
Issue No. 0 (2009-6-10)

Status: **Current**

Date of Issue: **2009-08-26** Page 1 of 4

Applicant: **Vaisala Oyj**
Vanha Nurmijärventie 21
FI-01670 Vantaa
Finland

Electrical Apparatus: **Humidity and temperature transmitter type HMT360**
Optional accessory:

Type of Protection: **Intrinsic safety**

Marking: **Ex ia IIC T4 Ga**

Approved for issue on behalf of the IECEx Certification Body: Risto Sulonen

Position: Team Leader

Signature:
(for printed version)

Date: 26.8.2009

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:
VTT Technical Research Centre of Finland
Otakaari 7 B, Espoo
P.O.Box 1000
FI-02044 VTT
Finland

1 / 4 26.8.2009 14:48

Figure 27 VTT IECEx Certificate Page 1/4

Certificate of Conformity: IECEx VTT 09.0002X http://iecex.iec.ch/iecex/iecexweb.nsf/UID/B753C6ABE86405BF...

IECEx Certificate of Conformity

Certificate No.: IECEx VTT 09.0002X

Date of Issue: **2009-08-26** Issue No.: **1**

Page 2 of 4

Manufacturer: **Vaisala Oyj**
Vanha Nurmijärventie 21
FI-01670 Vantaa
Finland

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-26 : 2006 Edition: 2	Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

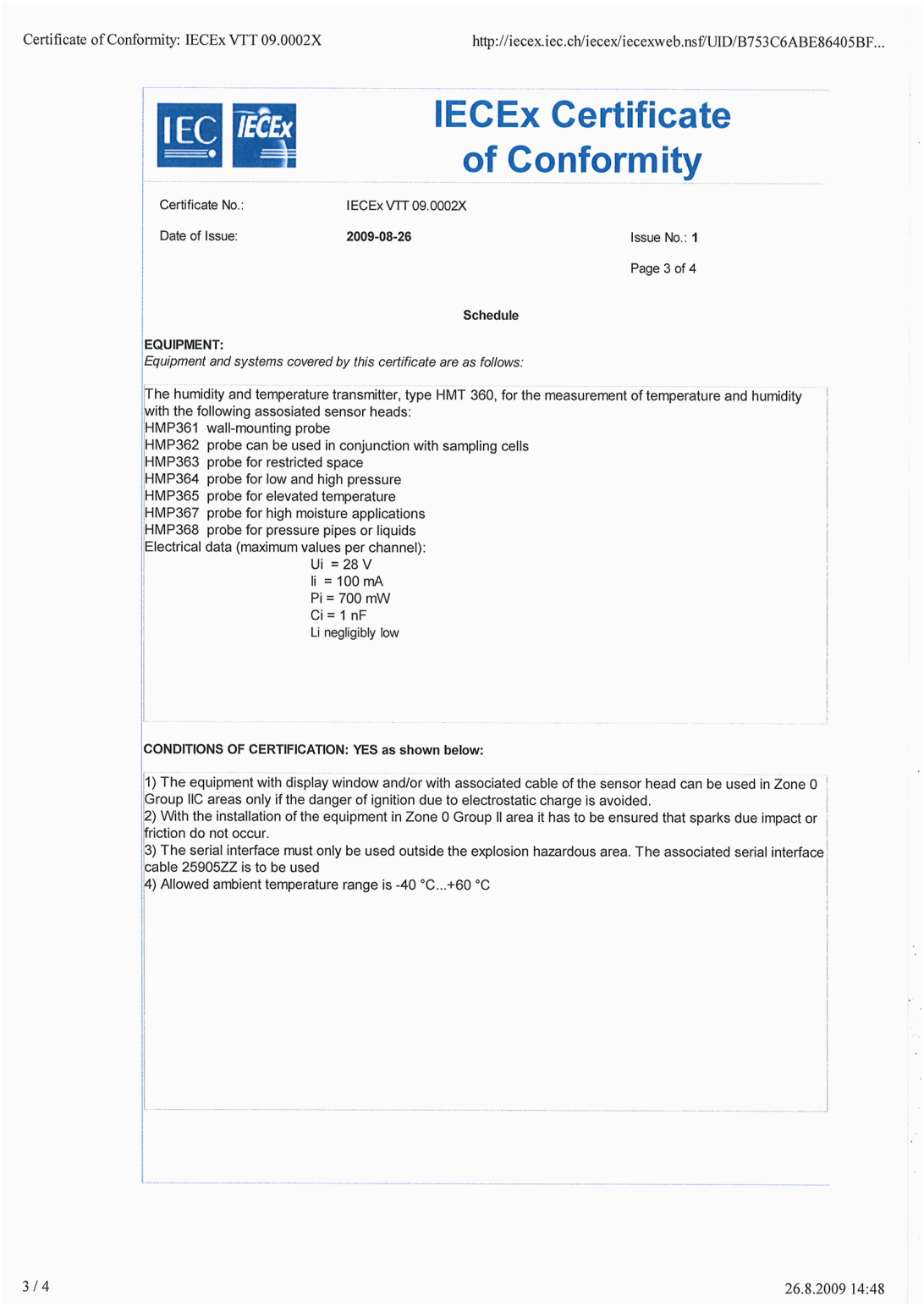
Test Report:

FI/VTT/ExTR09.0002/00

Quality Assessment Report:
FI/VTT/QAR09.0001/00

2 / 4 26.8.2009 14:48

Figure 28 VTT IECEx Certificate Page 2/4



Certificate of Conformity: IECEx VTT 09.0002X http://iecex.iec.ch/iecex/iecexweb.nsf/UID/B753C6ABE86405BF...

IECEx Certificate of Conformity

Certificate No.: IECEx VTT 09.0002X

Date of Issue: **2009-08-26** Issue No.: **1**

Page 3 of 4

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

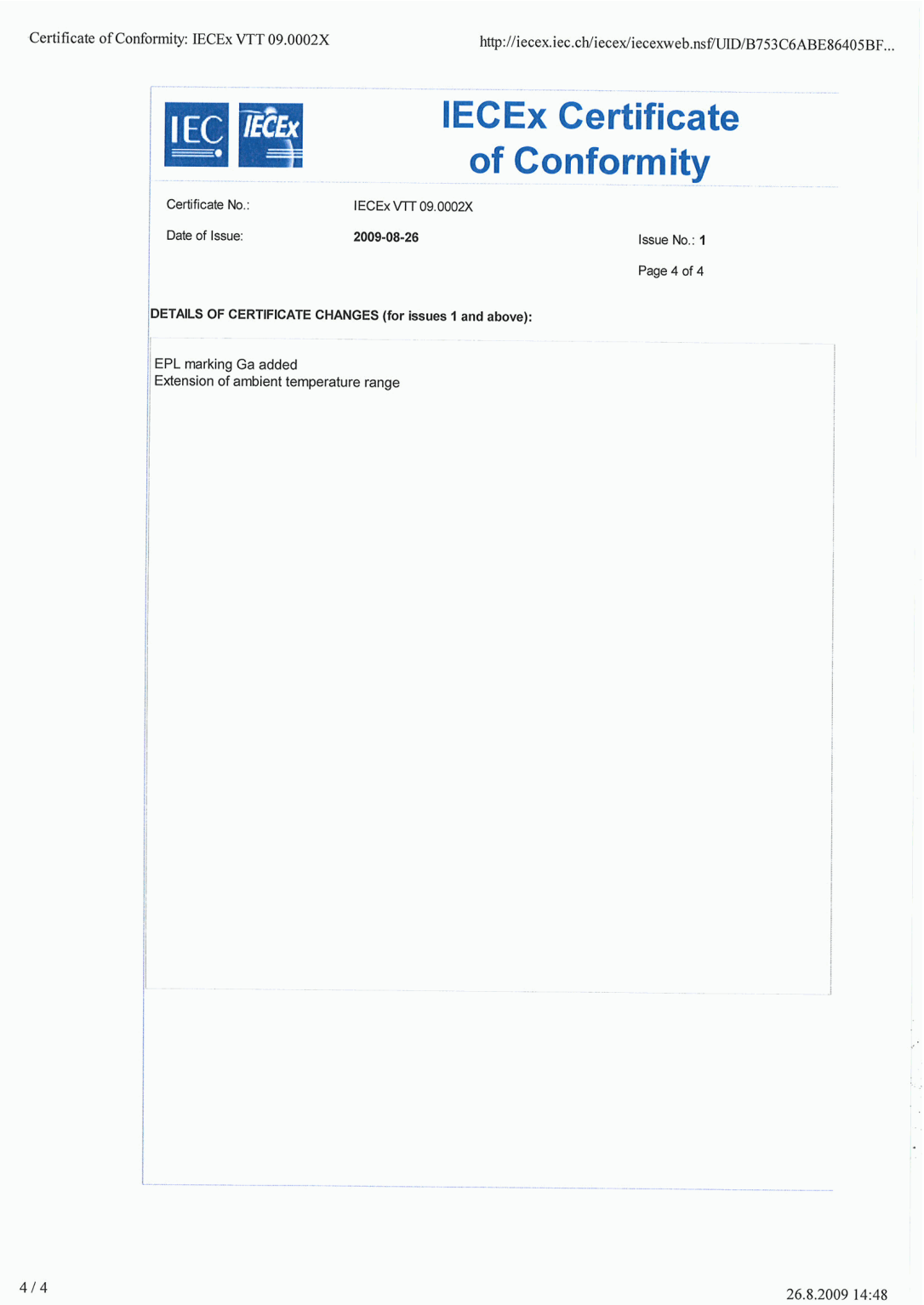
The humidity and temperature transmitter, type HMT 360, for the measurement of temperature and humidity with the following assosiated sensor heads:
HMP361 wall-mounting probe
HMP362 probe can be used in conjunction with sampling cells
HMP363 probe for restricted space
HMP364 probe for low and high pressure
HMP365 probe for elevated temperature
HMP367 probe for high moisture applications
HMP368 probe for pressure pipes or liquids
Electrical data (maximum values per channel):
Ui = 28 V
Ii = 100 mA
Pi = 700 mW
Ci = 1 nF
Li negligibly low

CONDITIONS OF CERTIFICATION: YES as shown below:

1) The equipment with display window and/or with associated cable of the sensor head can be used in Zone 0 Group IIC areas only if the danger of ignition due to electrostatic charge is avoided.
2) With the installation of the equipment in Zone 0 Group II area it has to be ensured that sparks due impact or friction do not occur.
3) The serial interface must only be used outside the explosion hazardous area. The associated serial interface cable 25905ZZ is to be used
4) Allowed ambient temperature range is -40 °C...+60 °C

3 / 4 26.8.2009 14:48

Figure 29 VTT IECEx Certificate Page 3/4



Certificate of Conformity: IECEx VTT 09.0002X http://iecex.iec.ch/iecex/iecexweb.nsf/UID/B753C6ABE86405BF...

IECEx Certificate of Conformity

Certificate No.: IECEx VTT 09.0002X

Date of Issue: **2009-08-26** Issue No.: **1**

Page 4 of 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

EPL marking Ga added
Extension of ambient temperature range

4 / 4 26.8.2009 14:48

Figure 30 VTT IECEx Certificate Page 4/4

EC-TYPE EXAMINATION CERTIFICATE
VTT 09 ATEX 028X issue No :1

1. **EC-TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective Systems Intended for use in Potentially explosive atmospheres Directive 94/9/EC**

3. Reference: VTT 09 ATEX 028X issue No:1

4. Equipment: **Humidity and temperature transmitter**

Certified types: **HMT360**

5. Manufactured by: **Vaisala Oyj**

6. Address: **Vanha Nurmijärventie 21**
FI-01670 Vantaa
Finland

7. This equipment and any acceptable variations thereto are specified in the schedule and possible supplement(s) to this certificate and the documents therein referred to.

8. VTT, Technical Research Cenre of Finland, notified body number 0537, in accordance with Article 9 of the Council Directive 94/9/EC of March 1994, certifies that the assembly has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

9 The examination and test results are recorded in confidential Report no VTT-S-03434-09.

10. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 (2006)
EN 60079-11 (2007)
EN 60079-26 (2007)

VTT; Epert Services
Electrical Ex-apparatus
Otakaari 7B, Espoo
P.O.Box 1000, FI-02044 VTT, Finland

Tel +358 20 7222 111
Fax +358 20 722 7042

FINAS
Finnish Accreditation Service
1018 (EN ISO/IEC 17020)
(Tyyppi A / Type A)

Figure 31 VTT ATEX 028X Certificate Page 1/2

11. If the sign "X" is placed after the certificate number, it indicates that these equipment is subject to special conditions for safe use specified in the schedule to this Certificate

12. This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the directive 94/9/EC.

Further requirements of the Directive may apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

13. The marking of the equipment shall include the following:

II 1 G Ex ia IIC T4 Ga

Espoo, 26.8.2009

VTT , Technical Research Centre of Finland

Martti Siirola
Research scientist

Risto Sulonen
Senior research scientist

Figure 32 VTT ATEX 028X Certificate Page 2/2

SCHEDULE TO EC-TYPE EXAMINATION CERTIFICATE
VTT 09 ATEX 028X issue No:1

14. **Schedule**

15. **EC-TYPE EXAMINATION CERTIFICATE**
VTT 09 ATEX 028X issue No:1

16. Description of equipment

The humidity and temperature transmitter, type HMT 360, for the measurement of temperature and humidity with the following associated sensor heads:

HMP361 wall-mounting probe
HMP362 probe can be used in conjunction with sampling cells
HMP363 probe for restricted space
HMP364 probe for low and high pressure
HMP365 probe for elevated temperature
HMP367 probe for high moisture applications
HMP368 probe for pressure pipes or liquids

Electrical data (maximum values per channel):

U_i = 28 V, I_i = 100 mA, P_i = 700 mW, C_i = 1 nF, L_i negligibly low

17. Report No. VTT-S-03434-09

18. Special conditions for safe use

1) The equipment with display window and/or with associated cable of the sensor head can be used in Zone 0 Group IIC areas only if the danger of ignition due to electrostatic charge is avoided.
2) With the installation of the equipment in Zone 0 Group II area it has to be ensured that sparks due impact or friction do not occur.
3) The serial interface must only be used outside the explosion hazardous area. The associated serial interface cable 25905ZZ is to be used
4) Allowed ambient temperature range is -40 °C...+60 °C

19. Essential Health and Safety Requirements

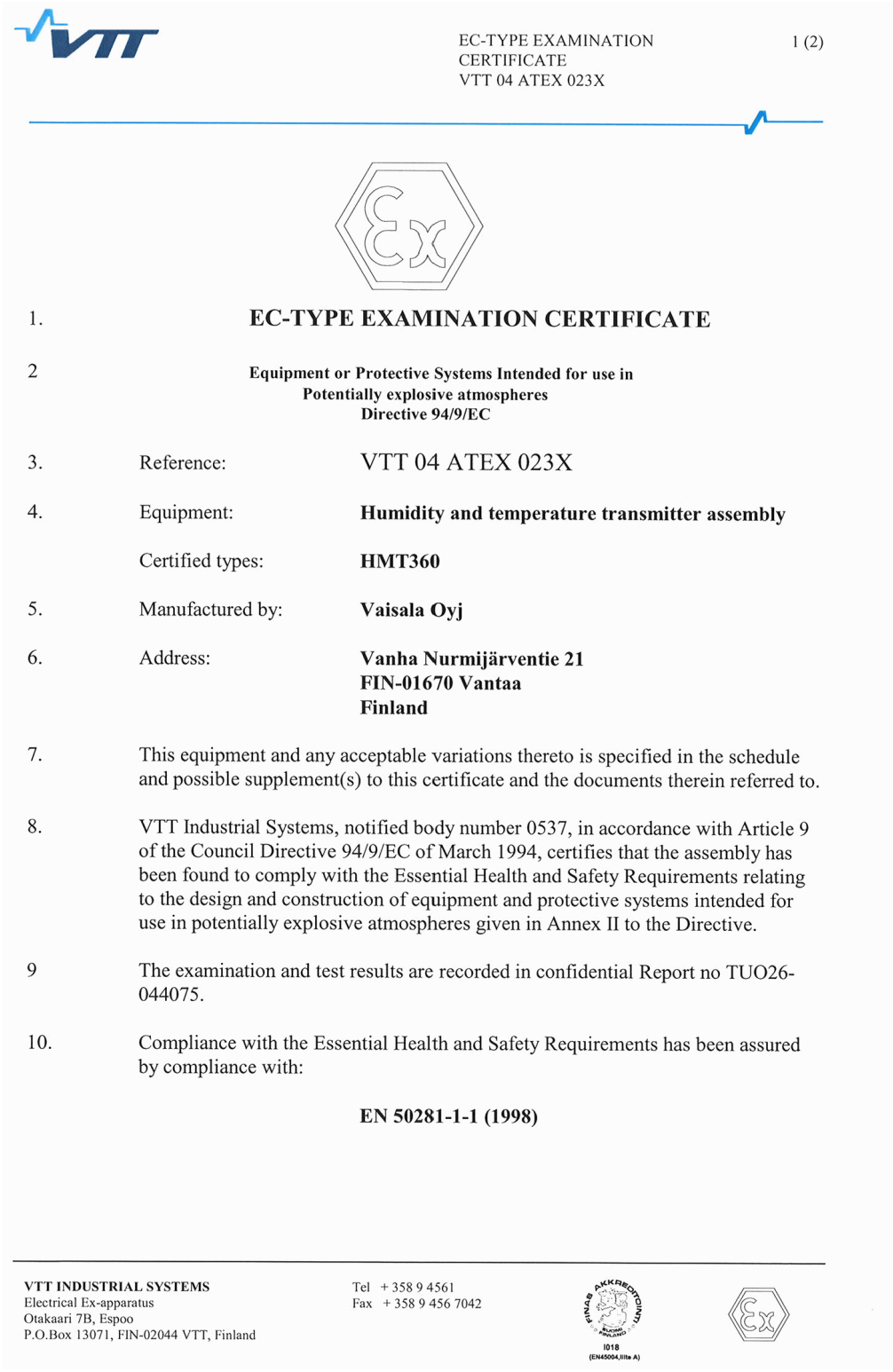
Met by compliance with the standards listed on the front page.

Espoo, 26.8.2009
VTT, Technical Research Centre of Finland

Martti Siirola
Research scientist

Risto Sulonen
Senior research scientist

Figure 33 VTT ATEX 028X Certificate Schedule



EC-TYPE EXAMINATION CERTIFICATE
VTT 04 ATEX 023X

1 (2)

1. **EC-TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective Systems Intended for use in Potentially explosive atmospheres Directive 94/9/EC**

3. Reference: VTT 04 ATEX 023X

4. Equipment: **Humidity and temperature transmitter assembly**

Certified types: **HMT360**

5. Manufactured by: **Vaisala Oyj**

6. Address: **Vanha Nurmijärventie 21**
FIN-01670 Vantaa
Finland

7. This equipment and any acceptable variations thereto is specified in the schedule and possible supplement(s) to this certificate and the documents therein referred to.

8. VTT Industrial Systems, notified body number 0537, in accordance with Article 9 of the Council Directive 94/9/EC of March 1994, certifies that the assembly has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

9 The examination and test results are recorded in confidential Report no TUO26-044075.

10. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50281-1-1 (1998)

VTT INDUSTRIAL SYSTEMS
Electrical Ex-apparatus
Otakaari 7B, Espoo
P.O.Box 13071, FIN-02044 VTT, Finland

Tel + 358 9 4561
Fax + 358 9 456 7042

1018
(EN45004,liite A)

Figure 34 VTT ATEX 023X Certificate Page 1/2

EC-TYPE EXAMINATION CERTIFICATE
VTT 04 ATEX 023X

2 (2)

11. If the sign "X" is placed after the certificate number, it indicates that these equipment is subject to special conditions for safe use specified in the schedule to this Certificate

12. This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the directive 94/9/EC.

Further requirements of the Directive may apply to the manufacturing process and supply of these equipment. These are not covered by this certificate.

13. The marking of the equipment shall include the following:

II 1 D IP 65 T = 70 °C

Espoo, 7.4.2004

VTT INDUSTRIAL SYSTEMS
Electrical Ex-apparatus

FINAS AKKREDITOINTI SUOMI FINLAND
I018
(EN45004,liite A)

Martti Siirola
Research scientist

Risto Sulonen
Senior research scientist

Certificate without signatures shall not be valid.
This certificate, including the schedule, may only be reproduced in its entirety and without any change.

Figure 35 VTT ATEX 023X Certificate Page 2/2

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

HMT360abcdefghi4jklAmn. Transmitter and Probe or Transmitter only.
IS / I,II,III / 1 / ABCDEFG / T5 Ta = 60°C - DRW211603, Entity;
NI / I, / 2 / ABCD / T5 Ta = 60°C; S / II,III / 2 / FG / T5 Ta = 60°C
Entity Parameters:

Terminals	V_{Max} *(V)*	I_{Max} *(mA)*	P_{Max} *(W)*	C_i *(nF)*	L_i *(µH)*
Ch 1: + and -	28	100	0.7	1	0
Ch 2: + and -	28	100	0.7	1	0

a = Probe type: 0, 1, 2, 3, 4, 5, 7 or 8.
b = Transmitter type: any single letter A-Z.
c = Display: 1 or 2.
d = Output channels: 1 or 2.
e = Analog output signal (Ch1): any single letter A-Z.
f = Analog output signal (Ch 2): any single letter A-Z.
g = Output range: any single letter A-Z.
h = Units: 1 or 2.
i = Cable bushings: A, B, C or 4.
j = Manual: Any single letter A-Z.
k = Cable length: (any single letter) A-Z or 0, 1, 2 or 3.
l = Humidity sensor: 0, 1, 2, 3, 4, 5, 6, 7, 8 or A.
m = Sensor protection: 0, 1, 2, 3, 4, 6 or 7.
n = Installation kit: A-Z or 0.

Figure 36 FM Certificate of Compliance page 1/3

Equipment Ratings:

Intrinsically Safe Class I, II, III, Division 1, Groups A, B, C, D, E, F, & G; also as Class I, Zone 0, AEx ia IIC; in accordance with Entity requirements when installed per installation drawing DRW211603; and Nonincendive Class I, Division 2, Groups A, B, C, & D; Suitable for Class II & III, Division 2, Groups F & G, for use in an indoor hazardous (classified) locations with a temperature rating of T5, Ta = 60°C.

FM Approved for:

Vaisala Oyj
Helsinki, Finland

6/07

3010615
Page 2 of 3

Figure 37 FM Certificate of Compliance page 2/3

FM Approvals
Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3610	1999
Class 3611	1999
Class 3810	1989
Including Supplement #1	1995

Original Project ID: 3010615 Approval Granted: January 9, 2002

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
3016167	March 14, 2003		
3017701	August 7, 2003		
030916	November 3, 2003		
051221	May 24, 2006		
091102	November 5, 2009		

FM Approvals LLC

J.E. Marquedant
Group Manager, Electrical

5 November 2009
Date

6/07

3010615
Page 3 of 3

Figure 38 FM Certificate of Compliance page 3/3

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 1300863 **Master Contract:** 213862

Project: 1813104 **Date Issued:** 2006/07/24

Issued to: **Vaisala Oyj**
P.O. Box 26
Helsinki, 00421
Finland
Attention: Mr. Riku Hakala

The products listed below are eligible to bear the CSA Mark shown

Issued by: Dorin Stochitoiu, P.Eng

Authorized by: Patricia Pasemko, Operations Manager

PRODUCTS

CLASS 2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non - Incendive Systems - For Hazardous Locations

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

HMT 360 series, humidity and temperature transmitters, rated 28V, 4-20 mA, and provides intrinsically safe outputs to HMP36* series probe when connected as per installation drawing DRW213478. Maximum ambient temperature 60°C, Temperature Code T4.

APPLICABLE REQUIREMENTS

CSA Std C22.2 No. 142-M1987 - Process Control Equipment

DQD 507 Rev. 2004-06-30

Figure 39 CSA Certificate of Compliance

防爆構造電気機械器具型式検定合格証

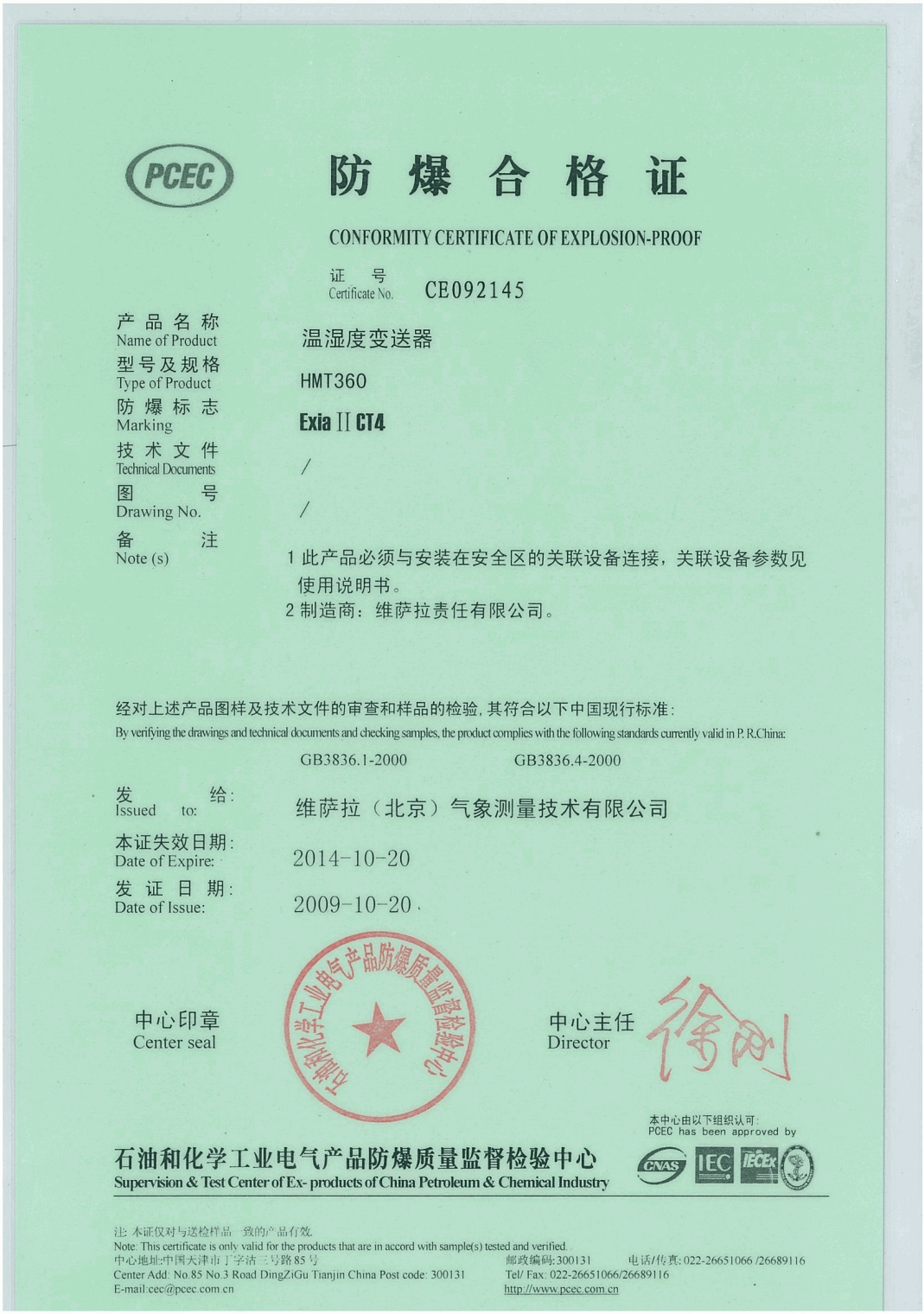
申請者	東京都新宿区神楽坂六丁目４２番地 ヴァイサラ株式会社
製造者	Vanha Nurmijärventie 21, FIN-01670 Vantaa, FINLAND Vaisala Oyj
品名	湿・温度変換器
型式の名称	ＨＭＴ３６０　７Ｄ２２ＨＫＤ２Ｂ７ＢＸ１Ａ１Ａ （同一型式は別表のとおり）
防爆構造の種類	本質安全防爆構造（ｉａ）
対象ガス又は蒸気の爆発等級及び発火度	ⅡＣＴ４
定格	チャンネル１回路 許容電圧　２８Ｖ 許容電流　１００ｍＡ 許容電力　７００ｍＷ 内部インダクタンス　無視できる値 内部キャパシタンス　１ｎＦ チャンネル２回路 許容電圧　２８Ｖ 許容電流　１００ｍＡ 許容電力　７００ｍＷ 内部インダクタンス　無視できる値 内部キャパシタンス　１ｎＦ 周囲温度　６０℃
使用条件	
型式検定合格番号	第　ＴＣ１７８９７　号
有効期間	平成１９年　４月　４日から平成２２年　４月　３日まで
	平成　年　月　日から平成　年　月　日まで
	平成　年　月　日から平成　年　月　日まで
	平成　年　月　日から平成　年　月　日まで

機械等検定規則による型式検定に合格したことを証明する。

平成１９年　４月　４日

型式検定実施者　社団法人　産業安全技術協会長

Figure 40 TIIS Certificate of Compliance



PCEC

防 爆 合 格 证

CONFORMITY CERTIFICATE OF EXPLOSION-PROOF

证 号
Certificate No. CE092145

产 品 名 称 Name of Product	温湿度变送器
型号及规格 Type of Product	HMT360
防 爆 标 志 Marking	Exia II CT4
技 术 文 件 Technical Documents	/
图 号 Drawing No.	/
备 注 Note (s)	1 此产品必须与安装在安全区的关联设备连接，关联设备参数见使用说明书。 2 制造商：维萨拉责任有限公司。

经对上述产品图样及技术文件的审查和样品的检验，其符合以下中国现行标准：
By verifying the drawings and technical documents and checking samples, the product complies with the following standards currently valid in P. R.China:

GB3836.1-2000 GB3836.4-2000

发 给：
Issued to: 维萨拉（北京）气象测量技术有限公司

本证失效日期：
Date of Expire: 2014-10-20

发 证 日 期：
Date of Issue: 2009-10-20

中心印章
Center seal

中心主任
Director

本中心由以下组织认可：
PCEC has been approved by

石油和化学工业电气产品防爆质量监督检验中心
Supervision & Test Center of Ex- products of China Petroleum & Chemical Industry

注：本证仅对与送检样品一致的产品有效。
Note: This certificate is only valid for the products that are in accord with sample(s) tested and verified.
中心地址：中国天津市丁字沽三号路85号 邮政编码：300131 电话/传真：022-26651066 /26689116
Center Add: No.85 No.3 Road DingZiGu Tianjin China Post code: 300131 Tel/ Fax: 022-26651066/26689116
E-mail:cec@pcec.com.cn http://www.pcec.com.cn

Figure 41 PCEC Conformity Certificate

www.vaisala.com

M210744EN