

USER'S GUIDE



Vaisala DRYCAP[®] Dewpoint Transmitter DMT152



PUBLISHED BY

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CHAPTER 1

GENERAL INFORMATION

This chapter provides general notes for the manual and the Dewpoint Transmitter DMT152.

About This Manual

This manual provides information for installing, operating, and maintaining Dewpoint Transmitter DMT152.

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information, provides general notes for the manual and the Dewpoint Transmitter DMT152.
- Chapter 2, Product Overview, introduces the features and advantages of Dewpoint Transmitter DMT152.
- Chapter 3, Functional Description, describes the advanced functionality of Dewpoint Transmitter DMT152, including the auto-calibration, sensor purge and sensor warming functions.
- Chapter 4, Installation, provides you with information that helps you install the Dewpoint Transmitter DMT152.
- Chapter 5, Operation, contains the operating instructions and serial line commands for the Dewpoint Transmitter DMT152.
- Chapter 6, Maintenance, provides information on the maintenance of Dewpoint Transmitter DMT152.
- Chapter 7, Technical Data, provides the technical data of Dewpoint Transmitter DMT152.

Version Information

Table 1 Manual Revisions

Manual Code	Description
M210865EN-A	March 2008 - First version.

Related Manuals

Table 2 Related Manuals

Manual Code	Manual Name
M210866EN-A	Vaisala DRYCAP® Dewpoint Transmitter DMT152 Quick Reference Guide

General Safety Considerations

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.

Feedback

Vaisala Customer Documentation Team welcomes your comments and suggestions on the quality and usefulness of this publication. If you find errors or have other suggestions for improvement, please indicate the chapter, section, and page number. You can send comments to us by e-mail: manuals@vaisala.com

Product Related Safety Precautions

The Dewpoint Transmitter DMT152 delivered to you has been tested for safety and approved as shipped from the factory. Note the following precautions:

CAUTION

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

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

Vaisala DRYCAP® Dewpoint Transmitter DMT152 complies with the following performance and environmental test standards:

Electromagnetic Compatibility

EN 61326-1:1997 + Am1:1998, Electrical equipment for measurement, control and laboratory use - EMC requirements - Industrial environment.

CISPR16/22 Class B, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6

Trademarks

DRYCAP® is a registered trademark of Vaisala.

Warranty

Vaisala hereby represents and warrants all Products manufactured by Vaisala and sold hereunder to be free from defects in workmanship or material during a period of twelve (12) months from the date of delivery save for products for which a special warranty is given. If any Product proves however to be defective in workmanship or material within the period herein provided Vaisala undertakes to the exclusion of any other remedy to repair or at its own option replace the defective Product or part thereof free of charge and otherwise on the same conditions as for the original Product or part without extension to original warranty time. Defective parts replaced in accordance with this clause shall be placed at the disposal of Vaisala.

Vaisala also warrants the quality of all repair and service works performed by its employees to products sold by it. In case the repair or service works should appear inadequate or faulty and should this cause malfunction or nonfunction of the product to which the service was performed Vaisala shall at its free option either repair or have repaired or replace the product in question. The working hours used by employees of Vaisala for such repair or replacement shall be free of charge to the client. This service warranty shall be valid for a period of six (6) months from the date the service measures were completed.

This warranty is however subject to following conditions:

- a) A substantiated written claim as to any alleged defects shall have been received by Vaisala within thirty (30) days after the defect or fault became known or occurred, and
- b) The allegedly defective Product or part shall, should Vaisala so require, be sent to the works of Vaisala or to such other place as Vaisala may indicate in writing, freight and insurance prepaid and properly packed and labelled, unless Vaisala agrees to inspect and repair the Product or replace it on site.

This warranty does not however apply when the defect has been caused through

- a) normal wear and tear or accident;
- b) misuse or other unsuitable or unauthorized use of the Product or negligence or error in storing, maintaining or in handling the Product or any equipment thereof;
- c) wrong installation or assembly or failure to service the Product or otherwise follow Vaisala's service instructions including any repairs or installation or assembly or service made by unauthorized personnel not approved by Vaisala or replacements with parts not manufactured or supplied by Vaisala;
- d) modifications or changes of the Product as well as any adding to it without Vaisala's prior authorization;
- e) other factors depending on the Customer or a third party.

Notwithstanding the aforesaid Vaisala's liability under this clause shall not apply to any defects arising out of materials, designs or instructions provided by the Customer.

This warranty is expressly in lieu of and excludes all other conditions, warranties and liabilities, express or implied, whether under law, statute or otherwise, including without limitation any implied warranties of merchantability or fitness for a particular purpose and all other obligations and liabilities of Vaisala or its representatives with respect to any defect or deficiency applicable to or resulting directly or indirectly from the Products supplied hereunder, which obligations and liabilities are hereby expressly cancelled and waived. Vaisala's liability shall under no circumstances exceed the invoice price of any Product for which a warranty claim is made, nor shall Vaisala in any circumstances be liable for lost profits or other consequential loss whether direct or indirect or for special damages.

CHAPTER 2

PRODUCT OVERVIEW

This chapter introduces the features and advantages of Dewpoint Transmitter DMT152.

Introduction to Dewpoint Transmitter DMT152

The Vaisala DRYCAP[®] dewpoint transmitter DMT152 measures dewpoint temperature accurately in a measurement range from -80 °C to -30 °C (-112 ... -22 °F). The maximum output range of the transmitter is -100 ... +20 °C (-148 ... +68 °F). If the primary dewpoint measurement range of the application is above -30 °C (-22 °F), other Vaisala transmitters may be more suitable.

The DMT152 is designed for a wide range of OEM applications. The transmitter is easy to install, and the mechanics have been designed for harsh environments requiring protection against dust, dirt and splashed water.

The excellent stability and reliability of the transmitter's performance is based on advanced DRYCAP[®] polymer sensor technology. The DRYCAP[®] technology has low maintenance needs due to its excellent long term stability and durability against condensation. For more information on DRYCAP[®] technology, refer to chapter Functional Description on page 13.

Table 3 Quantities Measured by the DMT152

Quantity	Abbreviation	Metric Unit	Non Metric Unit
Dewpoint/frost point temperature	TDF	°C	°F
Parts per million	H2O	ppm _v / ppm _w	ppm _v / ppm _w

Basic Features and Options

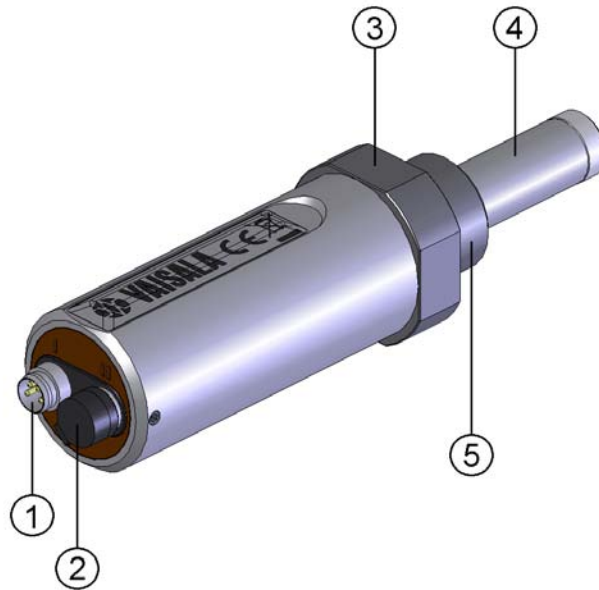
- Calibrated dewpoint measurement range $-80 \dots -30 \text{ }^{\circ}\text{C T}_d$,
output range $-100 \dots +20 \text{ }^{\circ}\text{C T}_d$
- Output in T_d^* and ppm
- DRYCAP[®] polymer sensor with auto-calibration and sensor purge ensures long term stability
- Sensor warming keeps the sensor dry in abnormally high humidity situations
- Small size to fit in tight installations
- Two analog output channels, selectable from $0 \dots 20 \text{ mA} / 4 \dots 20 \text{ mA}$ and $0 \dots 1 \text{ V} / 0 \dots 5 \text{ V} / 0 \dots 10 \text{ V}$
- Configurable alarm modes for analog outputs
- Digital output: RS-485
- Serial line connection also via USB serial interface cable (Vaisala order code 219690)
- Simultaneous use of analog and digital output possible
- Low maintenance requirements due to excellent long term stability
- Field check suitability with DM70 hand-held meter
- Optional sampling cells with different installation options available as DMT152 installation accessories

*When the dewpoint is below $0 \text{ }^{\circ}\text{C}$, the transmitter outputs frostpoint for T_d

Transmitter Structure

The structure of the DMT152 is shown in Figure 1 on page 11. The transmitter body does not have user serviceable parts inside, and is not designed to be opened. Opening the transmitter will void the warranty.

When the transmitter is delivered, the filter is protected by a yellow transport protection cap that keeps the sensor dry. The transport protection cap should be left on the transmitter during storage. Remove the transport protection cap before installing the transmitter.



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Figure 1 Dewpoint Transmitter DMT152

where

- 1 = 4-pin M8 connector I: analog output channels and operating power
- 2 = 4-pin M8 connector II (shown with protective cap): digital output (RS-485) and operating power
- 3 = 30mm nut
- 4 = DRYCAP[®] sensor protected with stainless steel mesh filter (see Figure 16 on page 52)
- 5 = Connection thread: ISO G1/2", UNF 3/4"-16 2A, or NPT 1/2"

When installing a DMT152 transmitter with ISO or UNF thread, use a sealing ring to achieve a tight installation. Three copper sealing rings are provided with the transmitter, and more can be ordered from Vaisala. Note that the sealing rings for ISO and UNF threads are different. See section Spare Parts and Accessories on page 57.

NOTE

Do not use a sealing ring with the NPT thread. Instead, seal the thread using PTFE tape or PTFE paste sealant.

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CHAPTER 3

FUNCTIONAL DESCRIPTION

This chapter describes the advanced functionality of Dewpoint Transmitter DMT152, including the auto-calibration, sensor purge and sensor warming functions.

Advanced DRYCAP[®] Technology

Dewpoint Transmitter DMT152 utilizes an advanced, patented measurement technology to ensure accurate measurement with excellent long term stability. This results in very low maintenance requirements for the transmitter. The lasting performance is achieved with microprocessor technology and software that automatically performs self-diagnostic functions in addition to the normal dewpoint measurement. The self-diagnostic procedures that are conducted are called auto-calibration, sensor purge and sensor warming.

Auto-Calibration

The auto-calibration feature of the DMT152 transmitter is an automatic procedure which greatly reduces the possible drift in the dry end of the dewpoint measurement. The auto-calibration is performed:

- at 45 minute intervals
- when the transmitter is powered up
- when the measured environment changes rapidly

During auto-calibration the sensor is warmed for a short period (< 1 min) and the sensor capacitance values are evaluated at the elevated temperature. The possible dry end drift is then corrected to correspond to the calibrated values. During the auto-calibration the

transmitter outputs the T_d value that was measured prior to the procedure. When the auto-calibration is done, normal measurement and output is resumed.

Auto-calibration is carried out only if several criteria for the measurement environment are fulfilled. This ensures the reliability of the adjustments, and maintains the excellent long term stability that the patented technology offers.

Sensor Purge

Sensor purge is also an automatic procedure that minimizes the drift at the wet end readings of the dewpoint measurement. Sensor purge is performed once a week or when the power is switched on. The sensor is heated for several minutes which will then evaporate all excess molecules out of the sensor polymer. This, together with the auto-calibration, results in a very small drift. Due to the very linear behavior of the polymer technology, corrections made at the dry end and the wet end correct the reading in the whole range.

Sensor Warming

The DRYCAP[®] sensor of the DMT152 transmitter is warmed, which prevents the sensor and filter from becoming wet in high humidities. High humidity may be present when the dewpoint temperature rises close to the gas temperature.

The advantage of sensor warming is the rapid response of dewpoint measurement. A wet sensor and filter would otherwise result in a dewpoint equal to ambient temperature (that is RH = 100 %). If the sensor gets soaked, it will recover fully back to normal operation after it dries out.

CHAPTER 4

INSTALLATION

This chapter provides you with information that helps you install the Dewpoint Transmitter DMT152.

Selecting the Location

It is important that the conditions at the point of installation represent well the gas to be measured. Temperature changes do not affect the dewpoint measurement, but pressure changes will have an effect on the measurement. All leaks in the system must be eliminated to avoid ambient humidity affecting the measurement.

Direct installation to the measured gas is the recommended installation method if the temperature of the gas is suitable for DMT152 and no additional filtering is needed due to very dusty or oily gas. Oil as such is not harmful for the DRYCAP[®] sensor, but response time may be slowed down if there are oil particles in the system, or if oil is collected to the filter over a longer period of time. The maximum measurement pressure is 50 bar_a / 725 psi_a (absolute pressure) for direct measurement.

If the gas temperature is higher than the specified maximum operating temperature of the transmitter, gas sampling and cooling it to ambient temperature (e.g. 10 °C / 18 °F) is recommended. Note that the dewpoint temperature must be clearly lower than the ambient temperature to avoid condensation in the sampling line. Sampling from the process is easy by using Vaisala sampling cell options; see section Sampling from a Process on page 21.

The DMT152 is light in weight which means that it can be installed in a sample pipeline in the sampling cells without the need of any additional mechanical support.

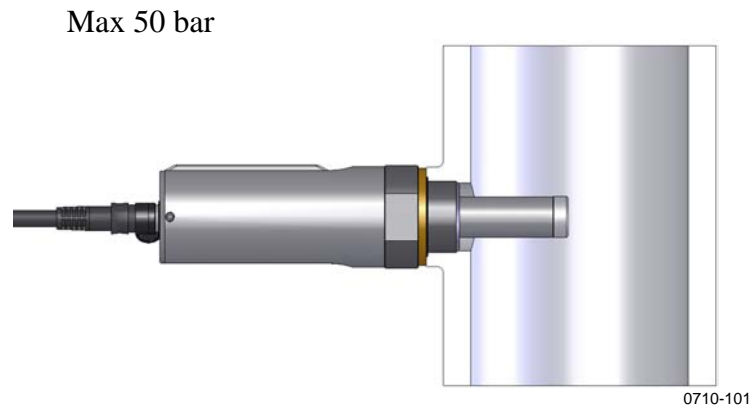


Figure 2 DMT152 Installed Directly to Pipeline

Installing the Transmitter

After selecting a suitable measurement location, follow the procedure below to install the transmitter:

1. Remove the yellow transport protection cap from the transmitter. Do not touch the filter with your hands.

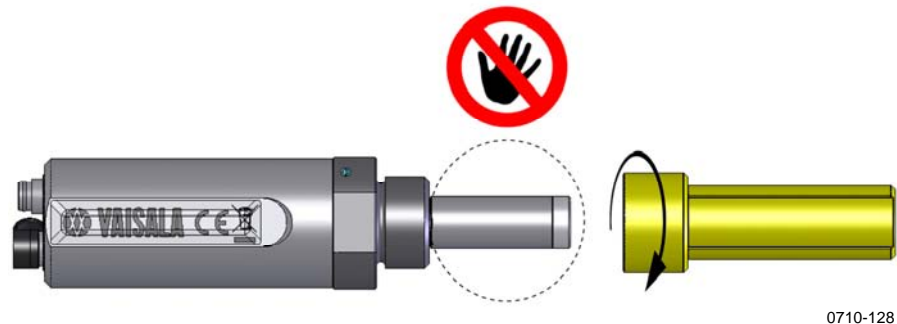
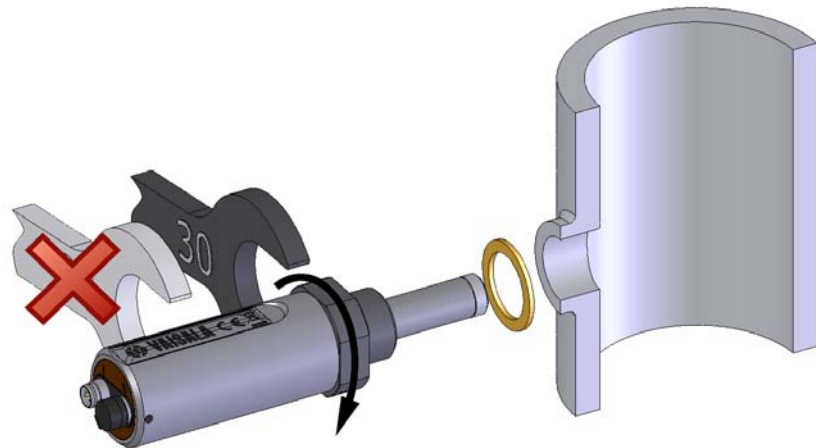


Figure 3 Removing the Transport Protection Cap

2. Prepare the sealing of the connection:
 - If the transmitter has a parallel ISO G1/2" thread or UNF 3/4"-16 thread, place the sealing ring at the base of the thread. Always use a new sealing ring; do not re-use a previously installed one.
 - If the transmitter has an NPT 1/2" thread, do not use the sealing ring. Instead, apply PTFE tape or suitable paste sealant to the thread. Follow the application instructions of the sealant.
3. Make sure that the threads on the mounting point are of the correct type, and fasten the transmitter to the measurement point. Use your hands to turn the probe until it feels tight. Do

not use force at this point, and check that the sealing ring (if used) remains centered.



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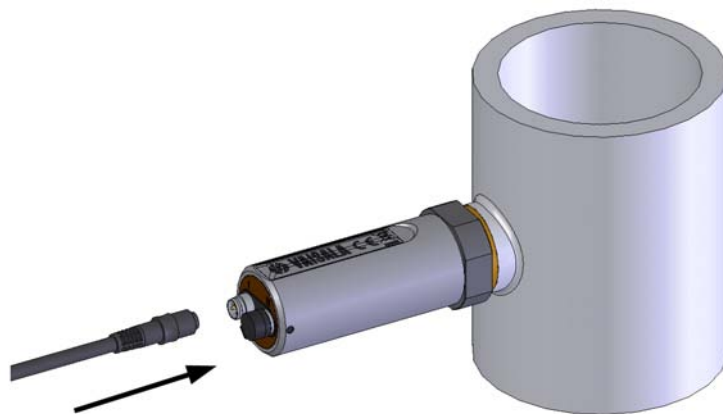
Figure 4 Installing the Transmitter

4. Use a 30mm wrench to tighten the connection to 25 N m, as shown in Figure 4. If you do not have a 30mm wrench, use a 1 3/16" wrench or an adjustable wrench.

CAUTION

Only tighten the probe from the 30mm nut. Do NOT apply force to other points in the probe body.

5. Connect the wires of the connection cable. When using cables provided with DMT152 refer to the wiring section on page 18. See the power supply requirements on page 20.



0710-130

Figure 5 Connecting the Cable

6. Plug in the cable to the transmitter. Be sure to use the correct connector; refer to section Wiring on page 18.

7. Cover the unused connector on the transmitter with the rubber plug that is attached to the transmitter.
8. Turn on the power supply. The DMT152 performs self diagnostics at start-up, and the output is frozen for several minutes. The transmitter will output an approximated reading after one minute, but accurate measurement will only be available after the start-up procedure is complete.

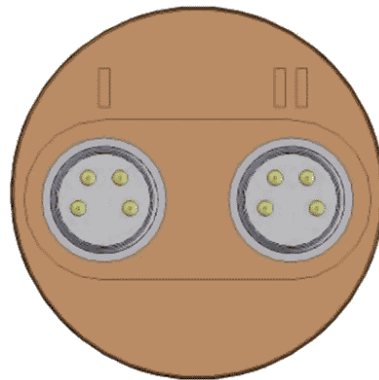
Normal operation is typically achieved in 10 ... 15 minutes. If the measurement environment changes during the startup, the start-up may take up to 15 minutes.

NOTE

The transmitter always performs the self-diagnostic procedure and sensor purge when starting up. Keep the transmitter continuously powered to optimize its measurement performance and availability.

Wiring

Pin	I	II	Wire colour
1	VDC supply+	VDC supply+	Brown
2	Signal Ch 1+	RS-485 - / B	White
3	GND	GND	Blue
4	Signal Ch 2+	RS-485 + / A	Black



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Figure 6 **Connectors I and II**

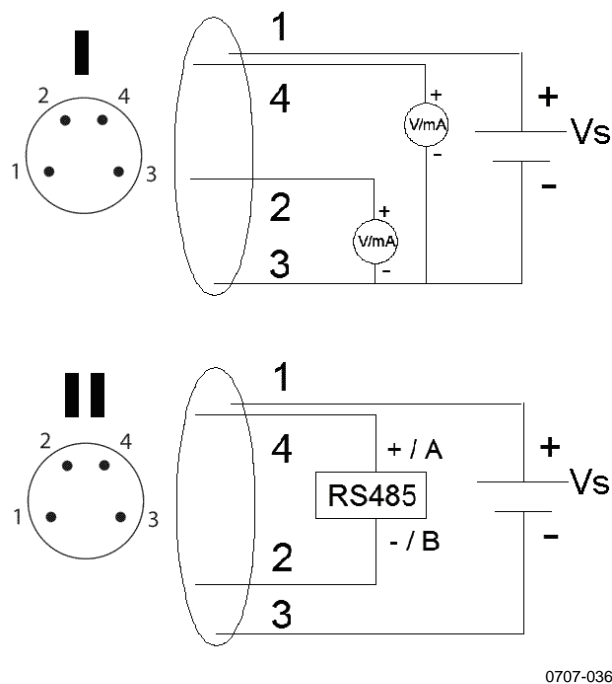


Figure 7 Connector Pinout

CAUTION

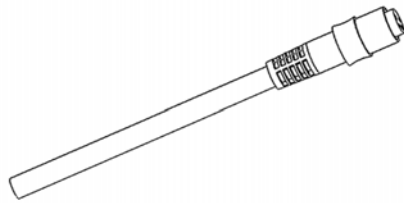
The power supply lines are internally connected. You can use either one of them, but do not connect more than one supply voltage.

Connection Cables

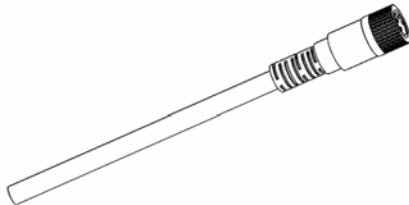
The following connection cable options are available for DMT152:

- Unshielded cable with M8 female straight snap-on connector
- Shielded cables with M8 female straight threaded connector
- USB serial interface cable

For the order codes of the cables, refer to section Spare Parts and Accessories on page 57.



0510-036

Figure 8 Cable with Snap-On Connector

0510-037

Figure 9 Cable with Threaded Connector

Power Supply Requirements

The DMT152 transmitters are designed to operate with a supply voltage of 15 ... 28 VDC (voltage output version) or 21 ... 28 VDC (current output version).

When measuring in pressures 20 ... 50 bar_a (290 ... 725 psi_a) or temperatures -40 ... 0 °C (-40 ... 32 °F), a supply voltage of 24 ... 28 VDC is required.

The power supply should maintain the voltage for all load conditions.

Current consumption during normal operation is 10 mA. The consumption increases during the sensor self-diagnostics (auto-calibration and sensor purge). The maximum current consumption is 220 mA pulsed current.

Sampling from a Process

Sampling is needed when direct measurement of the air or gas is not possible or desirable. This may be related to, for example, a high process temperature, protecting the sensor from water spikes, the need to easily detach the instrument from a pressurized process without running the whole process down, or wanting to make the measurement at a more convenient location. To get a representative sample of the process gas and avoid error sources caused by the sampling system, the following aspects should be considered:

Pressure

It is important to keep in mind that changing the pressure of a gas changes the dewpoint temperature of the gas. If the sensor is at a different pressure than the process itself, an error of several tens of degrees dewpoint may be present.

You can use the Vaisala Humidity Calculator to simulate the effect of pressure change to dewpoint. The Humidity Calculator can be found at:

<http://www.vaisala.com/humiditycalculator>

Leak tightness and materials

Due to the typically very low level of humidity, dewpoint measurements are sensitive to ambient moisture leaks. It is therefore important to have a leak tight sampling system construction.

The system is likewise sensitive to diffusion of water molecules through the materials, as well as the absorption of moisture into the materials. The piping should preferably be made of metal, e.g. stainless steel with a good surface finish. Hygroscopic materials such as plastics are undesirable and should be avoided.

Sample tubing should be as short in length as possible. "Dead ends" should be avoided. Also minimizing the number of connections helps in avoiding leaks. If possible, prepare for measurements by flushing the sampling lines with dry gas.

Flow

Vaisala DRYCAP[®] sensor is not flow dependent as such. For this reason, the flow of the system is not critical to the measurement, although a higher flow makes the response time faster. Typically a flow of 1-2 l/min (0.035-0.7 ft³/min) is enough.

Totally still air or gas should however be avoided, because possible leaks or diffusion through sampling materials are more apparent when there is no or very little flow. Also back diffusion of moisture, i.e. ambient humidity getting to the sensor through the outlet port, may become a problem at a very low flow rate.

Sampling Cell Types

DMT242SC Sampling Cell

The DMT242SC is a basic sampling cell with only the main sampling cell body. The inlet and outlet are female threaded sample connectors (inlet G3/8", outlet G1/4" ISO). Refer to Figure 10 on page 23.

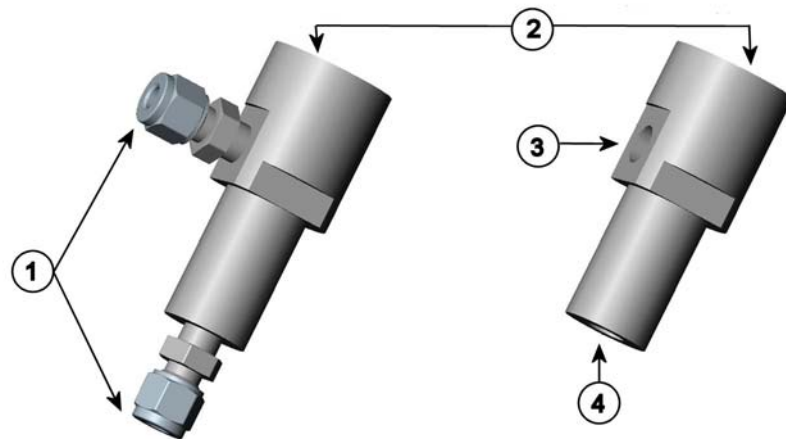
The DMT242SC is suitable for users requiring only a sampling cell to fit the probe into and doing further assembly (piping into inlet & outlet, valves, possible flow meter) by themselves.

DMT242SC2 Sampling Cell with Swagelok Connectors

The DMT242SC2 is similar to DMT242SC, but connections are made easy. The sampling cell includes welded swagelok connectors at both the inlet and outlet that fit directly to 1/4" tubing.

To fit 6 mm tubing to the connectors, an adapter such as Swagelok[®] Reducer SS-6M0-R-4 (not supplied by Vaisala) can be used.

DMT242SC2 is the suitable choice in e.g. plastics drying systems, where the measurement is made by tapping off the dryer system and bringing a small air stream to the sensor. The swagelok connectors of DMT242SC2 easily connect to a cooling coil or tubing providing the essential function of cooling the dry air to ambient temperature before it reaches the sensor.



0801-069

Figure 10 Sampling Cells DMT242SC2 (left) and DMT242SC (right)

where

- 1 = Male pipe welded connector Swagelok 1/4"
- 2 = G1/2"
- 3 = G1/4"
- 4 = G3/8"

DSC74 Sampling Cell with Quick Connector and Leak Screw

The DSC74 has been designed especially for compressed air lines. The sampling cell contains an adjustable leak screw that allows keeping up the pipeline pressure at the sensor. The leak screw is opened and closed with a screwdriver. The leak screw should be 1/2 turn open. This can be verified by first closing the leak screw, then turning 1/2 turn to open it. Then the air coming out will make a barely audible little hiss and it can be lightly felt when putting a hand in front of the air stream.

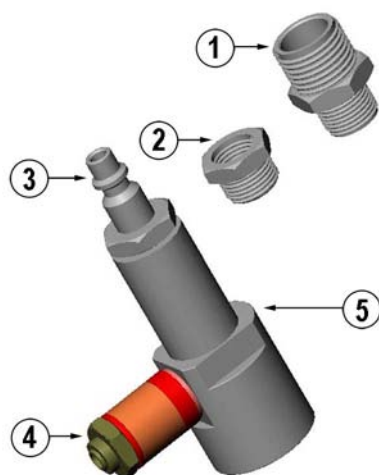
NOTE

Do not open the leak screw more than 1/2 turn to avoid reducing the pressure in the sampling cell.

The DSC74 comes with a quick connector that fits to industry standard compressed air line connectors (suitable for type D, Quick08, NIP08). This allows for easy installation and detachment of the dewpoint transmitter without having to shut down the process. Alternative ways to connect are through the two different thread

adapters (G3/8" to G1/2" and G3/8" to G1/4" ISO) that are supplied with each DSC74 unit.

When using the DSC74, seal the threads of the quick connector or thread adapter carefully with PTFE thread seal tape. Tighten with a fork spanner.



0507-105

Figure 11 DSC74 Sampling Cell with Accessories

where

- 1 = Thread adapter type G3/8" - G1/2"
- 2 = Thread adapter type G3/8" - G1/4"
- 3 = Quick connector
- 4 = Leak screw
- 5 = Sampling cell body (DMT242SC)

DSC74B Two Pressure Sampling Cell

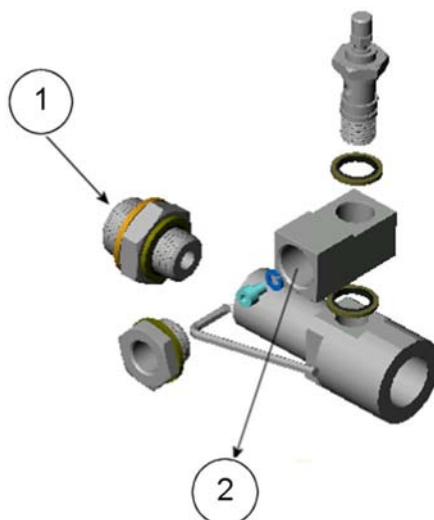
The DSC74B and DSC74C sampling cells are enhanced versions of the DSC74. The body is designed in a way that it is possible to measure at both system pressure and atmospheric pressure.

The DSC74B limits the flow rate with a fixed leak screw. The flow is optimized for pressures 3 ... 10 barg. The fixed leak screw eliminates the risk of opening the leak screw fully by accident and this way emptying a gas vessel. The maximum flow can be increased, if needed, by removing the leak screw and adjusting the flow manually with the valve. Harmful gases can be recovered by connecting a collection system at the outlet (not available from Vaisala).

In the basic operation of the DSC74B, the gas flows to the sensor from the front and the outlet is on the side. To have the measurement done at atmospheric pressure, the inlet and outlet are reversed. Then the reducing parts supplied (G3/8" -G1/2" or G3/8" - G1/4") on the outlet side help to protect the sensor from ambient humidity coming in.

DSC74B parts are:

- Sampling cell, thread 3/8"G
- Connection part with a needle valve and an integrated leak screw
- Reducing Nipple (thread adapter), G3/8" - G1/2"
- Reducing Adapter (thread adapter), G3/8" - G1/4"



0510-032

Figure 12 DSC74B

where

- 1 = Gas goes in
- 2 = Gas comes out



0510-033

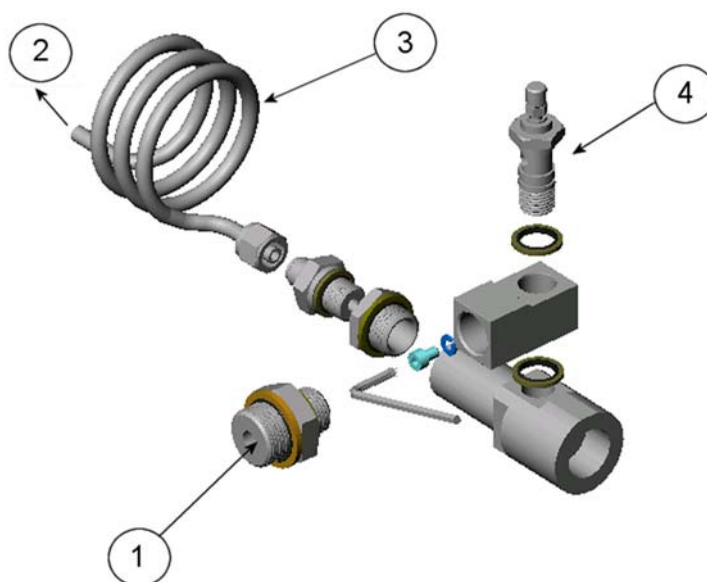
Figure 13 Removing the Leak Screw

DSC74C Two-Pressure Sampling Cell with Coil

The DSC74C with an outlet coil is designed for the most critical measurements at atmospheric pressure. In the DSC74C the coil is connected to the sampling cell outlet to protect the sensor from ambient humidity disturbing the measurement. The coil can also be used as a cooling coil for sampling from high temperature processes.

DSC74C parts are:

- Sampling cell, thread G3/8"
- Connection part with a needle valve and an integrated leak screw
- Reducing Nipple (thread adapter), G3/8" - G1/2"
- Reducing Adapter (thread adapter), G3/8" - G1/4"
- Diffusion coil (for measurements in atmospheric pressure)

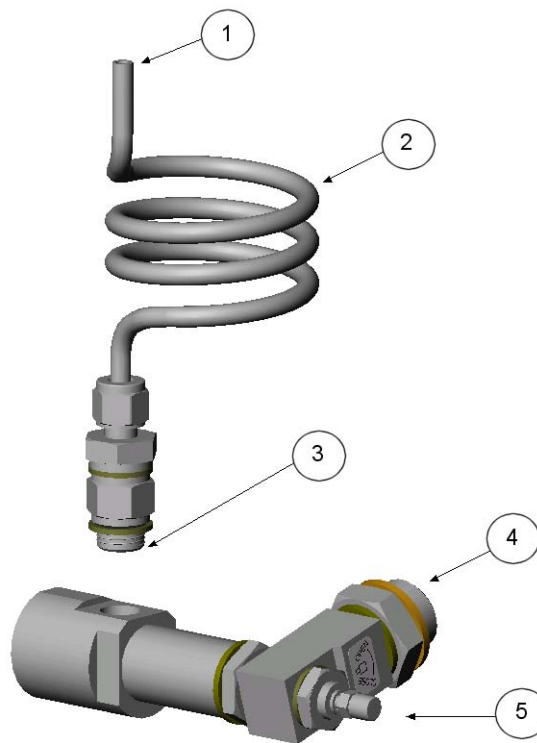


0510-034

Figure 14 Default Assembly of DSC74C

where

- 1 = Gas goes in. The coil can also be used here.
- 2 = Gas comes out
- 3 = Coil
- 4 = Valve



0403-113

Figure 15 Alternative Assembly of DSC74C (for Tight Spaces)

where

- 1 = Gas comes out
- 2 = Coil
- 3 = Thread, max. size 7 mm
- 4 = Gas goes in
- 5 = Valve

The thread size cannot exceed 7 mm. Use the provided adapter to avoid damage to the probe.

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CHAPTER 5

OPERATION

This chapter contains the operating instructions and serial line commands for the Dewpoint Transmitter DMT152.

Analog Output Operation Modes

The DMT152 has two analog output channels. These channels can function in three different modes, which can be set individually for both channels:

1. Normal operation mode
2. Limit alarm mode
3. Self-diagnostic alarm mode

When the transmitter is ordered from Vaisala, the modes are configured as specified in the order form. You can change the operation settings after delivery using serial commands and the USB cable accessory.

Normal Operation Mode and Malfunction Alarm

In the normal operation mode, a channel outputs voltage or current that corresponds to the reading of the selected quantity.

If the transmitter is malfunctioning, the channel output is set to a pre-defined level. This level can be changed using the **AERR** command; see page 41.

NOTE

The malfunction alarm overrides the limit alarm and self-diagnostic alarm modes. If the transmitter is malfunctioning, the analog outputs are always set to the levels specified with the **AERR** command.

Limit Alarm

The limit alarm is activated when the measured quantity goes below the low limit, or above the high limit. The alarm levels and limits are configurable using the **ALARM** command (see page 42). By default, the alarm levels are set as follows:

- For **current output**, an active alarm is indicated by the current being at the maximum of the scale (20 mA).
- For **voltage output**, an active alarm is indicated by the voltage being at the maximum of the selected scale. For example, if the voltage output scale is 0 ... 5 V, an output of 5 V indicates the alarm is active.

You can also set a hysteresis value to prevent the repeated triggering of the alarm when the measurement fluctuates around a limit value.

Self-Diagnostic Alarm

The self-diagnostic alarm is activated by the sensor purge and auto-calibration functions of the DMT152. When the transmitter is performing a sensor purge or auto-calibration, the measurement output is frozen (unchanging) until the procedure is complete. The self-diagnostic alarm indicates this state by being at the maximum of the selected range, in the same way as the limit alarm (see page 29). The alarm level can also be configured using the **STATUS** command; see page 35.

Serial Communication

Connecting to the Serial Interface

The DMT152 can be connected to a PC using the RS-485 line, for example using the USB serial connection cable (Vaisala order code 219690). The cable also provides operation power to the transmitter from the USB port. It is OK to connect the USB serial

connection cable even if the transmitter is already supplied with operation power from another cable.

NOTE

It is recommended to only connect one USB serial connection cable and DMT152 to a PC. Depending on the USB implementation, your PC may not be able to power more than one DMT152 at a time.

1. If you have not used the DMT152 USB serial connection cable before, install the driver that came with the cable. Refer to section Installing the Driver for the USB Cable on page 32 for detailed instructions.
2. Connect the USB serial connection cable between your PC and the RS-485 port of the DMT152 (port II).
3. Open the terminal program (e.g. Hyperterminal in Microsoft Windows®).
4. Set the serial settings of the terminal program, and open the connection. See the following table.

Table 4 Default Serial Interface Settings

Property	Description / Value
Baud rate	4800
Parity	none
Data bits	7
Stop bits	1
Flow control	X _{on} /X _{off} (none)

Alternate Serial Interface Settings

The operating power provided by the USB port may not be enough for all DMT152 features (for example, current output for analog channels). In that case the serial interface may temporarily switch to an alternate serial interface mode, regardless of the currently set serial interface mode. The serial settings for this mode are listed in Table 5.

Table 5 Alternate Serial Interface Settings

Property	Description / Value
Baud rate	19200
Parity	none
Data bits	8
Stop bits	1
Flow control	X _{on} /X _{off} (none)

If you have problems connecting via the serial interface when using the USB serial connection cable, set your terminal program to these alternate settings.

Installing the Driver for the USB Cable

Before taking the USB cable into use, you must install the provided USB driver on your PC. When installing the driver, you must acknowledge any security prompts that may appear. The driver is compatible with Windows 2000, Windows XP, Windows Server 2003, and Windows Vista.

1. Check that the USB cable is not connected. Disconnect the cable if you have already connected it.
2. Insert the media that came with the cable, or download the driver from www.vaisala.com.
3. Execute the USB driver installation program (setup.exe), and accept the installation defaults. The installation of the driver may take several minutes.
4. After the driver has been installed, connect the USB cable to a USB port on your PC. Windows will detect the new device, and use the driver automatically.
5. The installation has reserved a COM port for the cable. Verify the port number, and the status of the cable, using the **Vaisala USB Instrument Finder** program that has been installed in the Windows Start menu.

Windows will recognize each individual cable as a different device, and reserve a new COM port. Remember to use the correct port in the settings of your terminal program.

There is no reason to uninstall the driver for normal use. However, if you wish to remove the driver files and all Vaisala USB cable devices, you can do so by uninstalling the entry for **Vaisala USB Instrument Driver** from the **Add or Remove Programs (Programs and Features)** in Windows Vista) in the Windows Control Panel.

List of Serial Commands

The commands function as described when the serial interface is in full duplex mode. All commands can be issued either in uppercase or lowercase. The notation <cr> refers to pressing the carriage return (**Enter**) key on your computer keyboard. Enter a <cr> to clear the command buffer before starting to enter commands.

Table 6 DMT152 Serial Commands

Command	Description
?	Show device information
??	Show device information (overrides poll mode)
ACAL [1/2]	Calibrate analog channel
ADDR [0 ... 99]	Set the transmitter address for POLL mode
AERR	Set analog output device malfunction error mode
ALARM	Set analog output limit alarm modes
AMODE	Set analog output mode
AOVER [ON/OFF]	Allow analog outputs to exceed their range 10%
ASEL	Configure analog output quantities and scaling
ATEST	Test analog outputs
CLOSE	Close the temporary connection and return the device to POLL mode
ERRS	Display the currently active errors
FORM	Change the format of the measurement output
FRESTORE	Restore factory settings
HELP	Display the command list
INTV [0 ... 255 S/MIN/H]	Set the continuous output interval (for RUN mode and R command)
MOL	Set the molar mass of the process gas (used in ppm _w calculation)
OPEN [0 ... 99]	Open temporary connection to a device that is in POLL mode
PRES	Set value for pressure compensation
R	Start the continuous outputting
RESET	Reset the transmitter
S	Stop the continuous outputting
SDELAY [0 ... 255]	Set response sending delay in milliseconds
SEND [0 ... 99]	Output the reading once
SERI	Set the serial interface settings
SMODE [RUN/POLL/STOP]	Set the serial interface mode
STAT	Display transmitter status
STATUS	Set analog output self-diagnostic alarm
TIME	Set time for transmitter clock
UNIT	Select metric or non-metric units
VERS	Display transmitter software version
XPRES	Set value for pressure compensation (temporarily, is cleared at reset)
XPUR [ON/OFF]	Enable or disable sensor purge (temporarily, is enabled at reset)

Device Information and Status

Show Device Information

The `?` command outputs a listing of device information.

```
?<cr>
```

If the transmitter is in poll mode, but a connection has not been opened using the `OPEN` command, issue the `??` command. For a description of the serial interface modes, see section Set Serial Interface Mode on page 39.

```
??<cr>
```

Show Transmitter Status

The `STAT` command displays the status of the transmitter in four characters.

```
STAT<cr>
```

The status codes are as follows:

```
0000 Normal measurement
1000 Sensor purge
1010 Settling period after sensor purge
1100 Auto-calibration after sensor purge
1110 Settling period after purge + auto-calibration
0100 Auto-calibration (e.g. after interval has elapsed)
0110 Settling period after auto-calibration
0001 Error state (use the ERRS command to view the error message)
```

Example:

```
>stat
0000
>
```

Set Analog Output Self-diagnostic Alarm

Use the **STATUS** command to view and set the self-diagnostic alarm for the analog outputs. For an explanation of the self-diagnostic alarm, see section Self-Diagnostic Alarm on page 30.

STATUS<cr>

Example:

```
>status
Channel 1:
Status      :      ON      ?
Level Lo    :      0.00    ?
Level Hi    :      5.00    ?
Channel 2:
Status      :      OFF     ?
Level Lo    :      0.00    ?
Level Hi    :      0.00    ?
>
```

Show Firmware Version

VERS<cr>

Example:

```
>vers
DMT152 / 1.00
>
```

Configuring Serial Line Operation

Set Serial Line Settings

Use the **SERI** command to set the serial line settings. Note that the transmitter has fixed settings that it will use if the operating power is insufficient; see section Alternate Serial Interface Settings on page 31.

SERI [*b p d s*]
<cr>

where

B = baud rate (300, 600, 1200, 2400, 4800, 9600, or 19200)
P = parity (n = none, e = even, o = odd)
D = data bits (7 or 8)
S = stop bits (1 or 2)

Example:

```
>seri 9600 e 7 1
Baud P D S      :      9600 E 7 1
>
```

Set Serial Line Response Time

With the **SDELAY** command you can set delay (response time) of the serial line, or view the currently set delay value. Increasing the value by one increases the delay by 4 milliseconds. For example, value of 5 equals ~20 ms answer delay.

SDELAY [*x*]
<cr>

Where

x = Serial line delay (0 ... 255)

Example:

```
>sdelay 1
Serial delay    :      1
>
```

Set Transmitter Address

To operate in the POLL mode, the transmitter must have an address. If multiple transmitters share the same serial line, each transmitter must have a different address.

For a description of the serial interface modes, see section Set Serial Interface Mode on page 39.

ADDR [*nn*]
<cr>

where

nn = address (0 ... 99)

Example:

```
>addr 1
Address      :      1
>
```

Format the Measurement Output

Use the serial line command **FORM** to change the format or select the quantities for the output commands **SEND** and **R**.

You can return to the default format using the '**FORM /**' command.

FORM [*x*]

where

x = Formatter string

Formatter string consists of quantities and modifiers. The maximum length of the form string is 74 characters.

When entering the command, use the abbreviations of the quantities. The quantities are presented in Table 7, and modifiers in Table 8.

Table 7 FORM Command Quantities

Quantity	Description
TDF	Dewpoint/frost point temperature
PPM	Water content in parts per million
PPB	Water content in parts per billion
PPMW	Water content in parts per million by weight
	Note: For accurate ppm, ppb or ppmw reading, you must compensate for the pressure and molar mass of the process gas.

Table 8 FORM Command Modifiers

Modifier	Description
x.y	Length modifier (number of digits and decimal places)
#t	Tabulator
#r	Carriage-return
#n	Line feed
""	String constant
#xxx	ASCII code value (decimal) of a special character; for example, #027 for ESC
ADDR	Transmitter address with two characters [00...99]
ERR	Currently active transmitter errors in a five bit field: bit0bit1bit2bit3bit4 bit0 T MEAS error bit1 F meas error bit2 Voltage too low error bit3 Voltage too low for mA output error bit4 Ambient temperature error
STAT	Transmitter status in 4 characters. The status codes are the same as for the STAT command; see section Show Transmitter Status on page 34.
SN	Transmitter serial number
TIME	Current time; see the description of the TIME command on page 49.
Ux	Shows the name of the measurement unit using "x" number of characters. For example, U3 shows the name of the measurement unit with three characters.

Examples:

```
>form 4.2 TDF #r #n
OK
>
```

```
>form 3.1 "H2O= " ppm " " U3 #r #n
OK
>
```


Select Unit

The DMT152 Transmitter outputs dewpoint temperature T_d in either Celsius or Fahrenheit degrees depending on the unit selection. The unit selection also affects the unit (bar_a or psi_a) for the pressure compensation.

UNIT [x]<cr>

where

x = Selects the unit type to output:
m = metric units, e.g. celcius
n = nonmetric units, e.g. fahrenheit

Set Serial Interface Mode

SMODE [xxx]<cr>

where

xxx = STOP, RUN, or POLL

In STOP mode: outputting only when command is issued, any command can be used.

In RUN mode: outputting automatically, only command S can be used. In POLL mode: outputting only when command is issued, any command can be used after the line has been opened using the **OPEN** command.

The polling mode can be used when more than one transmitter is connected to one serial bus. When set to POLL state, the transmitters communicate one at a time when the specific transmitter address is called on the serial line. See descriptions of the commands **ADDR** on page 37 and **OPEN** on page 48.

Examples:

```
>smode stop
Output mode      : STOP
>
```

```
>smode run
Output mode      : RUN
>
```

```
>smode poll
Output mode      : POLL
>
```

Configuring Measurement Parameters

Select Analog Output Quantity and Scaling

Use the **ASEL** command to select the quantities output by the analog channels. Refer to Table 7 on page 38 for the selectable quantities. After entering the command, you will be prompted to enter the scaling of the quantities for both channels. Press enter to accept the suggested scaling values.

ASEL [xxx yyy]<cr>

where

xxx = Analog channel 1 output quantity

yyy = Analog channel 2 output quantity

Example:

```
>asel tdf ppm
Ch1 Tdf lo : -80.00 'C ?
Ch1 Tdf hi : 20.00 'C ?
Ch2 ppm lo : 0.00 ppm ?
Ch2 ppm hi : 1000000.00 ppm ?
>
```

Set Analog Output Mode (mA/V)

The **AMODE** command can be used to change the analog output mode of channels 1 and 2.

AMODE [c1 c2]<cr>

where

c1 = Channel 1 analog output mode. Available options are:

1 = 0 ... 20 mA

2 = 4 ... 20 mA

3 = 0 ... 1 V

4 = 0 ... 5 V

5 = 0 ... 10 V

6 = Limit alarm (current)

7 = Limit alarm (voltage)

c2 = Channel 2 analog output mode. Available options are the same as for channel 1.

Example:

```
>amode 2 1
Ch1 output      : 4 ... 20 mA
Ch2 output      : 0 ... 20 mA
>
```

Calibrate Analog Output

Use the **ACAL** command to force the analog outputs to the following values:

- Current output: 2 mA and 18 mA
- Voltage output: 10 % and 90 % of the range

After entering the ACAL command, use a calibrated current/voltage meter to measure the output, and enter the values. Note that the calibration is only valid for the currently selected analog output modes.

ACAL [*channel*]

where

Channel = Analog output channel: 1 or 2

Example:

```
>acal 1
Ch1:
I1 ( mA ) ? 0.166
I2 ( mA ) ? 18.1
3.61058569E+02 1.40927863E+03
```

Set Malfunction Alarm Output for Analog Channels

Use the **AERR** command to set the analog output levels that are output in case of a device malfunction.

AERR<cr>

Example:

```
>aerr
Ch1 error out   : 0.000V ? 5.0
Ch2 error out   : 0.000V ? 5.0
>
```

NOTE

The error output value must be within a valid range for the output type.

NOTE

The error output value is displayed only when there are minor electrical faults such as a humidity sensor damage. When there is a severe device malfunction, the error output value is not necessarily shown.

Set Alarm Limits for Analog Outputs

Use the **ALARM** command to set the analog output alarm limits, levels, and quantities. For an explanation of the alarm limits, see section Limit Alarm on page 30.

ALARM<cr>

Before setting the alarm limits, verify the currently set analog output modes using the **AMODE** command.

```
>amode
Ch1 output      : 0 ... 5 V
Ch2 output      : 0 ... 5 V
>
```

The following example shows that a high limit alarm has been enabled for channel 1. If the measured value rises above the $-40.00\text{ }^{\circ}\text{C}$ T_d limit, analog channel 1 is set to 5 V (Limit Hi = -40.00 , Level Hi = 5.00):

```
>alarm ?
Channel 1:
Low Limit      :      OFF
High Limit     :      ON
Aerr           :      OFF
Quantity       :      Tdf
Limit Lo       :      0.00
Limit Hi       :     -40.00
Hysteresis     :      0.00
Level Lo       :      0.00
Level Hi       :      5.00
Channel 2:
Low Limit      :      OFF
High Limit     :      OFF
Aerr           :      OFF
Quantity       :      ppm
Limit Lo       :      0.00
Limit Hi       :      0.00
Hysteresis     :      0.00
```

```
Level Lo      :      0.00
Level Hi      :      0.00
>
```

Extend Analog Output Range

Use the **AOVER** command to allow the analog output channels to exceed their specified range by 10%. The scaling of the quantity remains as before; the extra range is used for additional measurement range in the wet end.

AOVER [*ON/OFF*]
<cr>

The following example illustrates how the analog output is affected. Channel 1 outputs T_d with voltage output 0 ... 5 V (-80 °C ... -30 °C). After giving the **AOVER ON** command, the range is 0 ... 5.5 V (-80 °C ... -25 °C). Note that the -30 °C T_d point is still at 5 V.

Example:

```
>aover on
      : ON
>
```

Enable or Disable Sensor Purge

You can temporarily disable the sensor purge function using the **XPUR** command. Note that disabling the sensor purge will affect the measurement performance of the transmitter.

XPUR [*ON/OFF*]
<cr>

Example:

```
>xpur off
Purge      :      OFF
>
```

After giving the **XPUR OFF** command, the transmitter will not perform sensor purge until one of the following events takes place:

- Transmitter is reset or powered up
- Sensor purge is enabled using the **XPUR ON** command

Set Pressure Value for ppm Calculation

The DRYCAP[®] 180U sensor in the DMT152 is not pressure dependent. When measuring dewpoint, pressure compensation is not needed. However, in the calculation of ppm volume concentration, the pressure of the system must be known. If you did not specify pressure compensation when ordering the product, use the commands below to enable the pressure compensation and set the pressure value.

PRES [pp.pppp]<cr>

XPRES [pp.pppp]<cr>

where

pp.pppp = Absolute pressure in the measuring point. The unit is bar_a if metric units have been selected, and psi_a if non-metric units are used.

Command **XPRES** should be used if the value is changed frequently. The value set using the **XPRES** command overrides the **PRES** value, but it is not retained at reset. When the **XPRES** is set to 0, the last value set with **PRES** is used instead.

Example:

```
>pres 1.01325
Pressure      : 1.01325 bar
>
```

The pressure conversion coefficients from other pressure units to bars is given in the Table 9.

NOTE

Conversions from mmHg and inHg are defined at 0 °C and from mmH₂O and inH₂O at 4 °C.

Table 9 Pressure Conversion Coefficients

From	To bar _a
PaN/m ²	0.00001
mmHg torr	0.001333224
inHg	0.03386388
mmH ₂ O	0.00009806650
inH ₂ O	0.002490889
atm	1.01325
at	0.980665
psi _a	0.06894757

Example:

$$29.9213 \text{ inHg} = 29.9213 \times 0.03386388 = 1.01325 \text{ bar}_a$$

Set Molar Mass for ppmw Calculation

Use the **MOL** command to view and set the molar mass of the gas in the measurement environment. The molar mass parameter is used in calculating H₂O ppm_w. Some typical molar masses are:

- Air 28.96 g/mol
- N₂ 28.0134 g/mol
- O₂ 32.00 g/mol
- SF₆ 146.06 g/mol

MOL [n]<cr>

where

n = Molar mass (in g/mol) of the gas in the measurement environment

Examples:

```
>mol 146.06
Mol          : 146.0600
>
```

```
>mol
Mol          : 146.0600    ?
>
```

Serial Line Output Commands

Start Measurement Output

Use the **R** command to start the continuous outputting of measurement values as an ASCII text string to the serial line. The format of the measurement message is set with the **FORM** command.

R<cr>

Example (measurement message in default format):

```
>r
Tdf= -2.5 'C H2O= 4919 ppm
Tdf= -2.5 'C H2O= 4918 ppm
Tdf= -2.5 'C H2O= 4917 ppm
...
```

Outputting the results continues in intervals issued with the command **INTV**. You can stop the output with the command **S**.

Stop Measurement Output

You can stop the measurement output by pressing **ESC**, or with the **S** command:

S<cr>

Set Output Interval

INTV [*n xxx*]<cr>

where

n = time interval = 0 ... 255
xxx = time unit = "S", "MIN", or "H"

Example:

```
>intv 1 min
Output interval: 1 MIN
>
```

The shortest output interval (with *n* = 0) is approximately one second due to the internal measurement cycle.

Output a Reading Once

SEND [*aa*]<cr>

where

aa = Transmitter address (0 ... 99). Must be specified if the transmitter is in POLL mode, and a line has not been opened using the **OPEN** command.

Example:

```
>send
Tdf= -2.0 'C H2O= 5152 ppm
>
```

Troubleshooting commands

Display the Currently Active Errors

Use the **ERRS** command to display the currently active transmitter error states. Possible errors and their causes are listed in Table 10 on page 53.

ERRS<cr>

Example:

```
>errs
Voltage too low error
>
```

Test Analog Outputs

The operation of the analog outputs can be tested with the **ATEST** command by forcing the output to a given value which can then be measured with calibrated multimeter. The command uses the currently selected analog output types for the channels (voltage or current) so you do not have to specify the unit.

Before testing, you can verify the currently set analog output modes using the **AMODE** command. After testing the output, give the **ATEST** command again to exit the test mode.

ATEST [xxx yyy]<cr>

Where

xxx = Channel 1 output value (V or mA)
yyy = Channel 2 output value (V or mA)

The output shows the test values of the analog channels, and diagnostic information that may be useful to Vaisala Service if there is a problem with the analog outputs.

Example:

```
>atest 1 15
   1.00      2660
  15.00     19425
>

>atest
   0.00      79
   0.00     20110
>
```

Other commands

Opening the Transmitter in POLL Mode

Use the OPEN command to connect to a transmitter that is in POLL mode.

OPEN [aa]<cr>

where

aa = address (0 ... 99)

Resulting (only in POLL-state):

```
>open 1
DMT152  1 line opened for operator commands
>
```

Closing the Connection to a Transmitter in POLL Mode

The **CLOSE** command closes the connection to a transmitter.

CLOSE<cr>

Example:

```
>close
line closed
>
```

Display Command List

HELP<cr>

Set Time

Use the **TIME** command to view and set the transmitter clock. The clock does not have a battery backup – it is reset to 00:00:00 when the transmitter is powered up or reset.

TIME [*hh mm ss*]<cr>

where

hh	=	Hours (24-hour clock)
mm	=	Minutes
ss	=	Seconds

Example:

```
>time 12 30 00
12:30:00
>
```

```
>time
12:30:05
>
```

Reset Transmitter

When the **RESET** command is given, the transmitter will restart as if it had just been powered on. All transmitter settings are retained. The serial line mode of the transmitter will be set to the mode that was set using the **S.MODE** command.

As the transmitter starts up, it performs the startup sensor purge and auto-calibration before resuming measurement.

RESET<cr>

Restore Factory Settings

Use the **FRESTORE** command to restore the factory settings to the transmitter. All user settings will be lost.

FRESTORE<cr>

CHAPTER 6

MAINTENANCE

This chapter provides information on the maintenance of Dewpoint Transmitter DMT152.

Cleaning the Transmitter

The body of the transmitter can be cleaned by wiping with a moistened lint-free cloth. Do not immerse the transmitter in liquid, and do not use cleaning agents or solvents.

Do not attempt to clean the filter or the sensor element. If the filter is contaminated, replace it with a new one.

Changing the Filter

If the filter is contaminated, it should be replaced. New filters can be ordered from Vaisala, with the order code 220957. Be careful when changing the filter, since it is easy to break the sensor when the filter is removed.

When replacing the filter, note the following:

- The pores of the steel mesh may become blocked if touched. Do not touch the filtering surface with your hands or any tools. Always handle the filter from the top of the filter body.
- Touching the filter with your fingers will also deposit oil and dirt on the filter, which may affect the measurement. Always handle the filter with gloved hands.
- When installing the transmitter after a filter change, always use a new sealing ring (ISO and UNF threads only).

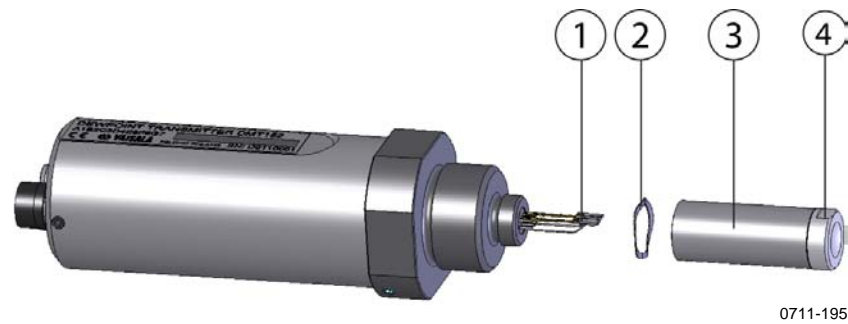


Figure 16 Filter Structure

where

- 1 = Vaisala DRYCAP[®] sensor
- 2 = Spring washer
- 3 = Stainless steel mesh filter (do not touch)
- 4 = Top of the filter

Replace the filter as follows:

1. Grip the old filter from the top of the filter body using an 11 mm socket wrench. Turn the filter counterclockwise until it is loose.
2. Pull the filter straight out carefully; do not damage the sensor, and do not lose the spring washer.
3. Take the new filter, and insert it to the filter threads. The spring washer should be under the filter.
4. Tighten the new filter by turning it clockwise with the 11 mm socket wrench. Tighten to 5 N m.

Calibration and Adjustment

The DMT152 is fully calibrated as shipped from factory. The recommended calibration interval is 2 years. If the transmitter is used in the wet end of the measurement range, calibration should be done every year. Calibration should also be done if there is a reason to believe that device is not within the accuracy specifications.

You can perform a simple field-checking operation by comparing the readings of the DMT152 and the DM70 hand-held dewpoint meter with a calibrated reference probe (for example, another DMT152). For connecting the DMT152 to the MI70, you need a connection cable (Vaisala order code 219980).

If there is need for calibration or adjustment, contact a Vaisala Service Center or your local Vaisala representative. See contact information on page 54.

Error States

DMT152 has the following states that indicate a problem with the transmitter:

- Analog current output at 0 mA or 4 mA (according to selected range)
- Analog voltage output at 0V
- Serial line outputs asterisk characters (***)

The analog output levels for the error state are configurable using the AERR command; see page 41. The asterisk characters on the serial line may also appear during the start-up procedure.

Additionally, the transmitter has error codes that can be displayed on the serial line using the ERRS command. See section Display the Currently Active Errors on page 47.

Table 10 Error codes

Error Code	Cause
T meas error	Internal error, can be caused by damage to the sensor.
F meas error	Internal error, can be caused by damage to the sensor.
Voltage too low error	Supplied operating voltage is too low for reliable operation. May cause transmitter to use alternate serial interface settings; see page 31.
Voltage too low for mA output error	Supplied operating voltage is too low for reliable operation of the analog current output. May cause transmitter to use alternate serial interface settings; see page 31.
Ambient temperature error	Ambient temperature out of operating range (probably too hot).
Flash check sum error	Internal error
Param check sum error	Internal error
INFOA check sum error	Internal error
SCOEFS check sum error	Internal error
CURRENT check sum error	Internal error

In the case of an error, reset the transmitter by disconnecting the power or issuing the RESET command on the serial line. If the source of error is not found and the transmitter does not return to the normal state with the reset, please contact a Vaisala Service Center or your local Vaisala representative.

Technical Support

For technical questions, contact the Vaisala technical support:

E-mail helpdesk@vaisala.com

Fax +358 9 8949 2790

Vaisala Service Centers

Send the device to Vaisala Instruments Service Centre for calibration and adjustment, see contact information below. Remember to attach the yellow transport protection cap to the transmitter to protect it (and keep it dry) during transit.

If the product needs repair, please contact Vaisala Instruments Service Center in your region before shipping the instrument. Follow the instructions given to you to speed up the process and to avoid extra costs.

NORTH AMERICAN SERVICE CENTER

Vaisala Inc., 10-D Gill Street, Woburn, MA 01801-1068, USA.

Phone: +1 781 933 4500, Fax: +1 781 933 8029

E-mail: us-customersupport@vaisala.com

EUROPEAN SERVICE CENTER

Vaisala Instruments Service, Vanha Nurmiäventie 21 FIN-01670 Vantaa, FINLAND.

Phone: +358 9 8949 2658, Fax: +358 9 8949 2295

E-mail: instruments.service@vaisala.com

TOKYO SERVICE CENTER

Vaisala KK, 42 Kagurazaka 6-Chome, Shinjuku-Ku, Tokyo 162-0825, JAPAN.

Phone: +81 3 3266 9617, Fax: +81 3 3266 9655

E-mail: aftersales.asia@vaisala.com

BEIJING SERVICE CENTER

Vaisala China Ltd., Floor 2 EAS Building, No. 21 Xiao Yun Road, Dongsanhuan Beilu, Chaoyang District, Beijing, P.R. CHINA 100027.

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E-mail: china.service@vaisala.com

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CHAPTER 7

TECHNICAL DATA

This chapter provides the technical data of Dewpoint Transmitter DMT152.

Measured Variables

Dewpoint temperature

Measurement range -80 ... -30 °C (-112 ... -22 °F) T_d

Accuracy ± 2 °C (3.6 °F) T_d

Non-calibrated range -100 ... +20 °C (-148 ... +68 °F) T_d

Response time 63% [90%] at +20 °C (+68 °F)

gas temperature and 1 bar pressure

-80 -> -30 °C (-112 ... -22 °F) T_d 10 s [20 s]

-30 -> -80 °C (-22 ... -112 °F) T_d 2 min [30 min]

Analog output scalings

option 1 -80 ... +20 °C (-112 ... +68 °F) T_d

option 2 -100 ... 0 °C (-148 ... +32 °F) T_d

option 3 free scaling

ppm volume concentration

Measurement range 0 ... 500 ppm

Accuracy at +20 °C (+68 °F),
1013 mbar ± (0.2 ppm + 20 % of reading)

Operating Environment

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

Relative humidity 0 ... 100 %RH (up to +20 °C / +68 °F)

Pressure 0 ... 50 bar (725 psia)

Measured gases non-corrosive gases

Sample flow rate no effect on measurement accuracy

Outputs

Two analog outputs (scalable)	0 ... 20 mA 4 ... 20 mA 0 ... 1 V 0 ... 5 V 0 ... 10 V
Accuracy	
voltage output	± 0.01 V
current output	± 0.01 mA
Typical temperature dependence	
voltage output	± 0.001 % of span / °C
current output	± 0.005 % of span / °C
Digital output	RS485 (2-wire)
ON/OFF output available instead of the 2 nd analog output	
purge or auto-calibration inactive	0 V or 4 mA
purge or auto-calibration active	1 V, 5 V, 10 V or 20 mA
OR exceeded T _d or ppm limit	user selectable

General

Sensor	Vaisala DRYCAP [®] 180U Thin-film capacitive polymer sensor
Startup time	10 .. 15 minutes
Recommended calibration interval	2 years
Operating voltage with	
RS485 output	11* ... 28 VDC
voltage output	15* ... 28 VDC
current output	21 ... 28 VDC
* For extended temperature down to -40 °C (-40 °F) or pressure up to 50 bar (725 psia) the supply voltage must be 21 ... 28 VDC.	
Supply current	
normal measurement	20 mA + load current
during self-diagnostics	max. 220 mA pulsed
Load for	
voltage output	min. 10 kOhm
current output	max. 500 Ohm
Housing material	AISI316L and PPS
Stainless steel mesh filter	AISI303, filter grade 18 µm
Mechanical connections	
option 1	ISO G1/2"
option 2	NPT 1/2"
option 3	UNF 3/4"-16
Housing classification	IP65 (NEMA 4)

Storage temperature range	-40 ... +80 °C (-40 ... +176 °F)
Weight (with ISO thread)	190 g (6.70 oz)

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

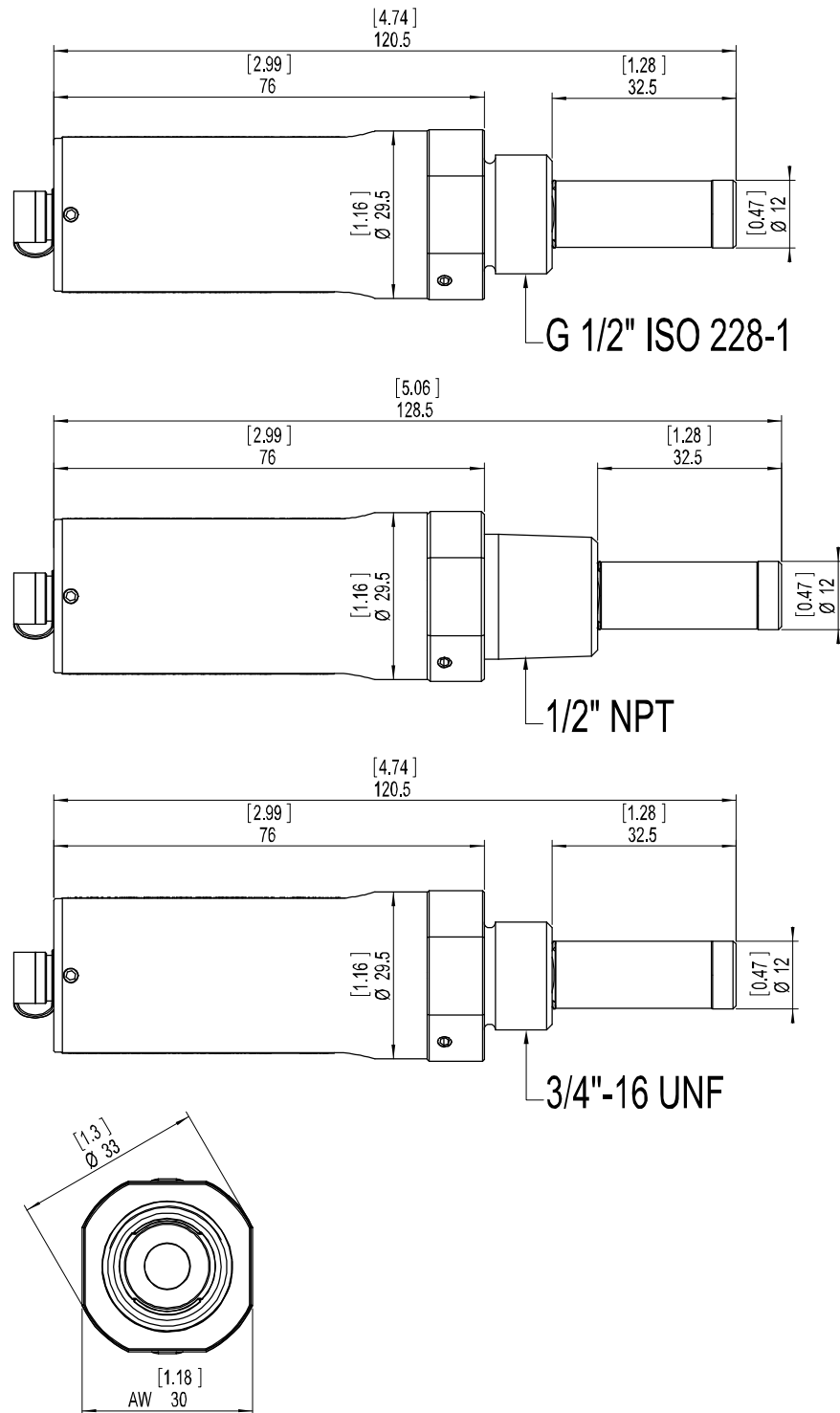
Output Cable Specifications

Connector	Straight, moulded M8 female (IEC 60947-5-2)
Color	Black
Number of contacts	4
Conductors	0.25 mm ² (× 4) / 0.00039 inch ² (× 4)
Insulation	PVC
Cable diameter	5.0 mm / 0.2 inch
Protection class	IP67 / NEMA 4
Wire color code	EN50044

Spare Parts and Accessories

Description	Order Code
Connection cable for DM70	219980
USB serial interface cable	219690
Sealing ring set ISO (copper, 3 pcs)	221524
Sealing ring set UNF (copper, 3 pcs)	221563
Stainless steel mesh filter (18 µm)	220957SP
110 ... 240 VAC external power supply	POWER-1
Analog/RS-485 output cables	
2 m (6,5 ft) cable, M8 snap-on connector	211598
0.32 m (1 ft) shielded cable, M8 threaded connector	HMP50Z032
3 m (9.8 ft) shielded cable, M8 threaded connector	HMP50Z300
5 m (16.4 ft) shielded cable, M8 threaded connector	HMP50Z500
10 m (32.8 ft) shielded cable, M8 threaded connector	HMP50Z1000
Sampling cells (available only for ISO G1/2")	
Sampling cell	DMT242SC
Sampling cell with 1/4" male Swagelok connectors	DMT242SC2
Sampling cell with quick connector and leak screw	DSC74
Two-pressure sampling cell	DSC74B
Separate cooling/venting coil for sampling cells	DMCOIL

Dimensions in mm (inches)



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Figure 17 DMT152 Dimensions



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