USER GUIDE

DMP80

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User Guide

Vaisala Handheld Dew Point and Temperature Probes

DMP80 Series

VAISALA

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1. About this document

1.1 Version information

This document provides instructions for using and maintaining Vaisala DMP80 DRYCAP® Handheld Dew Point and Temperature Probes.

Table 1 Document versions (English)

Document code	Date	Description
M212904EN-A	June 2023	First version.

1.2 Related manuals

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

Table 2 Related manuals

Document code	Name
M212722EN	Vaisala Indigo80 Handheld Indicator User Guide
M212804EN	Vaisala DMP80 Series Handheld Probes Quick Guide
M212903EN	Vaisala HMP80 Series Handheld Probes User Guide
M212803EN	Vaisala HMP80 Series Handheld Probes Quick Guide

1.3 Documentation conventions

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

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

Note highlights important information on using the product.

1.4 Trademarks

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

Microsoft® and Windows® are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.

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2. Product overview

Vaisala DRYCAP® Handheld Dew Point and Temperature Probes DMP80 Series have been designed for portable spot-checking, field calibration, and data logging use with the Indigo80 handheld indicator. For easy access to device analytics and configuration, DMP80 probes can be connected to Vaisala Insight software for Windows.

The DMP80 series probes are available in two product models with different dew point measurement ranges. Connection thread alternatives include ISO G1/2″ and NPT 1/2″ threads.

The IP66-classified probe handle offers protection against moisture and dust with the probe connection cable attached. Also the cable connection is protected against mechanical stress by the robust design of the handle.

For more information on the Indigo product family, see www.vaisala.com/indigo.

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

2.1 Basic features and options

- Portable design optimized for industrial spot-checking and field calibration
- Wide dew point measurement range
- Condensation-tolerant
- Sensor purge improves long-term stability and chemical resistance
- Compatible with Indigo80 handheld indicator and Insight PC software

More information

- Indigo80 handheld indicator (page 21)
- Vaisala Insight PC software (page 28)

2.2 DMP80A and DMP80B probe models

The DMP80A probe model contains the DRYCAP® 180S sensor, making the probe optimal for dew point measurements in humid applications. The DMP80B probe uses the DRYCAP 180M sensor, which has been optimized for measurements in dry environments.

Table 3 DMP80A and DMP80B temperature ranges

Property	DMP80A	DMP80B
Dew point temperature measurement range	−40 ... +60 °C (−40 ... +140 °F) $T_{d/f}$	−70 ... +60 °C (−76 ... +140 °F) $T_{d/f}$
Temperature measurement range	0 ... +60 °C (+32 ... +140 °F)	
Operating temperature range	−10 ... +60 °C (+14 ... +140 °F)	

The identifying letter of each probe model is included in the configuration code of the probe, shown on the side of the device. Example codes: **A**G1A0AS0 for a DMP80A probe, and **B**G1A0AS0 for a DMP80B probe.

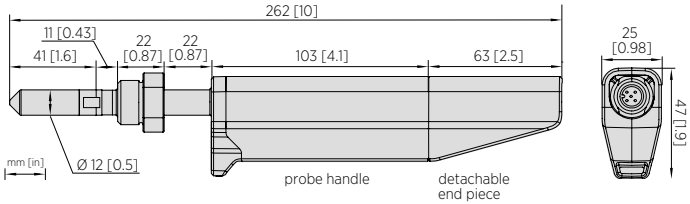


Figure 1 Dimensions of DMP80 series probes with G1/2″ thread, side and bottom view

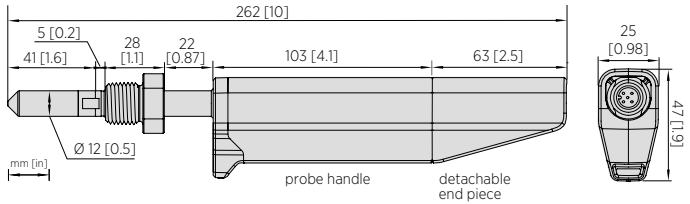


Figure 2 Dimensions of DMP80 series probes with NPT1/2″ thread, side and bottom view

2.3 DMP80 output parameters

Values of all available output parameters are locked (showing the latest valid value) when sensor purge, autocalibration, or condensation prevention functions are active.

Table 4 DMP80 series output parameters

Output parameter name and unit	
Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew point temperature difference (°C)	Water vapor pressure (hPa)

Output parameter name and unit	
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	

More information

- DMP80 specifications (page 38)

2.4 Probe structure

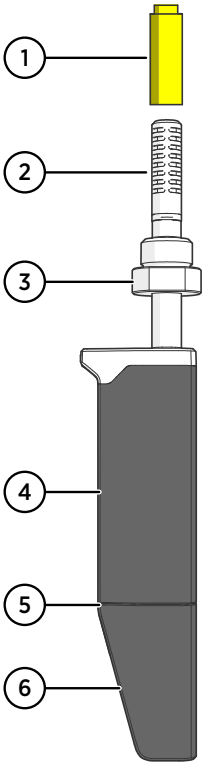


Figure 3 DMP80 probe parts (model with G1/2″ thread shown)

1 Protection cap (remove before use)
2 Location of sensors on the probe head, inside a removable filter [1)]
3 Probe shaft with G1/2″ thread (also model with NPT1/2″ thread available)
4 Probe handle with type label. Contains component board and electronics housing.
5 M12-5M A-coded connector (inside the probe handle)
6 Detachable end piece of the probe handle, protecting the cable connector inside the handle

1) The DRYCAP® 180S and 180M sensors used in DMP80 series probes are not user replaceable. To have the sensor replaced, contact a Vaisala Service Center.

More information

- Recycling instructions (page 44)

2.5 Sampling cell accessories for DMP80 probe models with ISO G1/2″ thread

The following sampling cells are available as accessories for DMP80 series probe models with ISO G1/2″ thread. For information on ordering the items, see store.vaisala.com.

Table 5 Sampling cells for DMP80 probes

Item	Features	Notes
DSC74	• Sampling cell with quick connector and leak screw, thread G3/8″ • Quick coupling, type NIP08, type D • Thread adapter, type G3/8″ - G1/4″ • Thread adapter, type G3/8″ - G1/2″ (for DMT242 fittings)	For sampling from a pressurized process, where the process pressure forces the sample gas into the sample cell.
DSC74B	• Two-pressure sampling cell, thread G3/8″ • Connection part with a needle valve and an integrated leakage screw • Reducing nipple (thread adapter), G3/8″ - G1/2″ • Reducing adapter (thread adapter), G3/8″ - G1/4″	An enhanced version of DSC74. With version DSC74B, harmful gases can be recovered.
DSC74C	• Two-pressure sampling cell with coil, thread G3/8″ • Connection part with a needle valve and an integrated leakage screw • Reducing nipple (thread adapter), G3/8″ - G1/2″ • Reducing adapter (thread adapter), G3/8″ - G1/4″ • Diffusion coil (for measurements in atmospheric pressure)	Designed for measurements at atmospheric pressure. Contains a diffusion coil connected to the sampling cell outlet for protecting the sensor from ambient humidity.

Item	Features	Notes
DMT242SC	• Sampling cell with female connectors, inlet G3/8″, outlet G1/4″	A basic sampling cell consisting of only the main sampling cell body. Suitable for users requiring only a sampling cell to fit the probe into and doing further assembly by themselves.
DMT242SC2	• Sampling cell with Swagelok connectors for 1/4″ tubing	The Swagelok connectors of DMT242SC2 connect easily to a cooling coil or tubing, providing the essential function of cooling the dry air to ambient temperature before it reaches the sensor.

More information

‣ Spare parts and accessories (page 42)

2.6 Safety

WARNING! When returning a product for calibration or repair, make sure it has not been exposed to dangerous contamination, and is safe to handle without special precautions.

CAUTION! Do not attempt to open the solid part of the probe handle. There are no user serviceable parts inside the probe handle.

CAUTION! Do not touch the probe head with your bare hands. Touching will deposit impurities on the probe head.

2.7 ESD protection

Electrostatic discharge (ESD) can damage 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 in the equipment housing.

To avoid delivering high static voltages to the product:

- Handle ESD-sensitive components on a properly grounded and protected ESD workbench or by grounding yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either precaution, touch a conductive part of the equipment chassis with your other hand before touching ESD-sensitive components.
- Hold component boards by the edges and avoid touching component contacts.

3. Functional description

3.1 DRYCAP® technology

Vaisala DRYCAP® dew point measurement technology ensures accurate measurement with excellent long term stability. Its unrivalled performance is based on two innovations: the proven capacitive thin-film polymer sensor and the self-diagnostic functions that the software performs automatically as needed.

The sensor's thin-film polymer absorbs or releases water vapor as the surrounding humidity increases or decreases. The dielectric properties of the polymer change as the humidity around the sensor changes, as does the capacitance of the sensor. Capacitance is converted into a humidity reading. The capacitive polymer sensor is bonded together with a temperature sensor, and dew point is calculated from the humidity and temperature readings.

The automatic sensor functions are called autocalibration, sensor purge, and sensor warming. They are a key element in achieving the stability, rapid response time, and condensation resistance of the DRYCAP® sensors.

3.2 Autocalibration

Autocalibration of the DRYCAP sensor optimizes measurement stability in dry environments. During autocalibration 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 autocalibration the values of all available output parameters are locked (showing the latest valid value).

DMP80 series probes perform autocalibration at 1-hour intervals, and whenever sensor purge is performed. When measuring very dry conditions, the probe performs autocalibration at shorter intervals. A significant change in dew point or temperature may also trigger autocalibration.

Autocalibration 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. These criteria include, for example, a stable enough moisture level in the measured atmosphere. If the conditions are not fulfilled, the autocalibration function is postponed until satisfactory conditions are reached.

Sometimes autocalibration fails to complete successfully due to changes in measurement conditions. This is normal, and is not a problem as autocalibration will be reattempted automatically. However, autocalibration should eventually succeed to maintain the accuracy of the probe.

3.3 Sensor purge

Sensor purge is an automatic procedure that minimizes the drift at the wet end readings of the dew point measurement. The sensor is heated to a high temperature which evaporates all excess molecules out of the sensor polymer. This, together with autocalibration, results in a very small drift of the sensor due to the very linear behavior of the polymer technology.

By default, DMP80 probes perform sensor purge when they are powered on (known as **startup purge**), and at one day intervals (known as **interval purge**). If necessary, the purge settings can be configured with the Insight software or the Indigo80 handheld indicator. However, Vaisala recommends leaving the sensor purge settings at their default values.

As with autocalibration, during sensor purge the values of the measurement parameters are frozen at their last measured values prior to the procedure.

3.4 Condensation prevention functions

The sensor warming feature of the condensation prevention function is intended for improving the condensation tolerance of the probe. It warms the humidity sensor when necessary to keep the sensor's temperature above the dew point of the measurement environment. When sensor warming is activated, all temperature-dependent output parameters become unavailable, unless the temperature compensation setting is set to read the temperature from an external source. The output parameters become available again 4 minutes after the warming is stopped.

The humidity limit where sensor warming activates is:

- 80 %RH for DMP80A probes with S sensors
- 70 %RH for DMP80B probes with M sensors

In addition, the DRYCAP® sensor is kept continuously warmed in freezing conditions to ensure fast response time. Therefore, the temperature and dependent parameters are continuously unavailable if process temperature is below 0 °C / 32 °F.

3.5 Environmental compensation

Environmental compensations improve the measurement accuracy of the probe. You can configure the settings with the Insight software or the Indigo80 handheld indicator.

Pressure compensation

The pressure of the measured environment affects the accuracy of humidity calculations, especially calculations that are dependent on pressure (for example, mixing ratio). To achieve accurate output of all humidity parameters, you are recommended to update the value of the pressure compensation setpoint to match the environmental pressure when installing the probe.

For example, when you install the probe in a process with a pressure differing from normal atmospheric pressure, update the correct pressure into the pressure compensation setpoint parameter or register of the probe using the Insight software or the Indigo80 handheld indicator.

The entered value is persistent and remains unchanged at device restart.

Temperature compensation

You need to set an external source for the temperature compensation setpoint if the sensor warming feature of the condensation prevention function prevents the probe's own temperature measurement, and the output parameters that require temperature information to be known are required.

When warming is active, values of output parameters that depend on temperature measurement (for example, relative humidity) are unavailable, unless temperature information is read from an external source. Output parameters that can be measured or calculated without this external temperature information, such as dew point temperature, are available even without the temperature input.

The external temperature source can be another probe that is connected to the same Indigo80 handheld indicator as your probe.

To get the most accurate measurement values, the external source needs to be able to provide the temperature compensation setpoint value constantly in real time, and the value needs to correspond to the temperature of the probe's measurement environment as accurately as possible. A suitable measurement point is as close to the probe as possible, but yet far enough so that ongoing condensation prevention warming of the probe does not have an effect on the measured value.

At device restart, the value is cleared.

More information

- Configuring environment settings with Indigo80 handheld indicator (page 26)

3.6 Filtering factor

The filtering factor determines how quickly the results of measurement cycles are reflected in values of output parameters. You can use the filtering factor to slow down the response time of the measurement, filtering out rapid changes and measurement noise.

- Maximum value (1) = No filtering, fastest measurement. Output shows 100 % of the most recent measured value.
- Less than maximum value = Filtering is applied and measurement response time is reduced. For example, defining a value that is 90 % of the maximum value means that the filtered output reading = 90 % of the most recent measured value + 10 % of the previous reading.

Filtering factor settings can be configured with the Insight software or the Indigo80 handheld indicator.

More information

- Example of configuring filtering factor with Indigo80 handheld indicator (page 25)

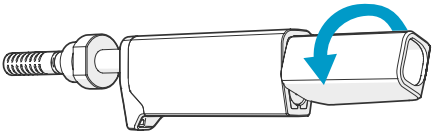
4. Attaching cable to probe

- Probe connection cable (Vaisala item code 272075SP)

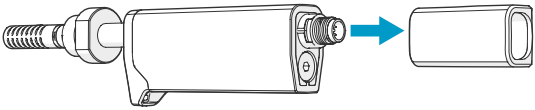
The handle of DMP80 probes has a detachable end piece that protects the probe's cable connector from mechanical stress, such as physical shocks.

To detach the end piece of the handle and expose the cable connector:

1. Hold the probe firmly in your hands.
2. Grip the end piece of the handle and twist it counterclockwise to detach it.



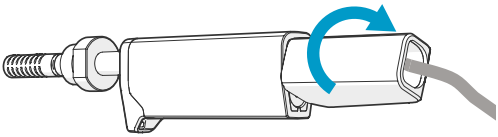
3. Pull out the end piece.



4. You can now attach a probe connection cable in the DMP80 probe's cable connector.

Before attaching the cable, make sure to insert the cable through the end piece first.

5. Position the end piece against the probe and twist it clockwise to secure it into place.



The probe is delivered with a yellow cap protecting the filter. Leave the protection cap on during storage, but remove it before taking the probe into use.

5. Using probe with Indigo80 handheld indicator

5.1 Indigo80 handheld indicator

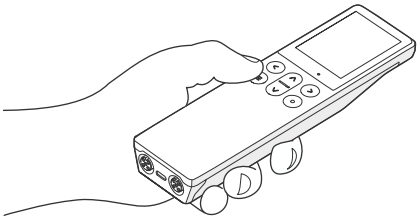


Figure 4 Indigo80 handheld indicator

Vaisala Indigo80 Handheld Indicator is a portable diagnostics tool that accommodates up to two Vaisala Indigo-compatible probes or transmitters for measuring a wide range of parameters.

With the indicator, you can:

- See real-time measurements and device and status information
- Log measurement data
- Update probe calibration information
- Configure probe features and settings such as condensation prevention, compensation setpoints, sensor purge, and filtering factor. The available features and settings depend on the probe model and firmware version.

Accessing certain configuration options for your probe requires using the free Insight PC software, downloadable at www.vaisala.com/insight.

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

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

5.1.1 Indigo80 keypad

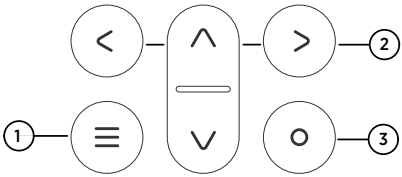


Figure 5 Indigo80 keypad

1 Power on/off and main menu button
2 Arrow buttons for navigating menus and scrolling views
3 Select button for selecting items in the user interface

5.1.2 Indigo80 main menu

Pressing the button while navigating the Indigo80 menus and views opens the main menu.

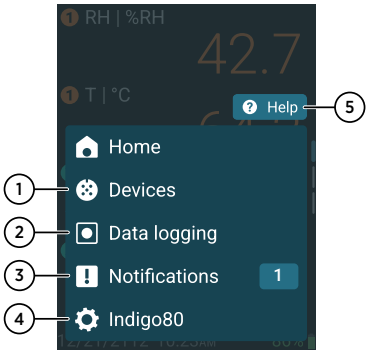


Figure 6 Indigo80 main menu

1 **Devices** menu contains, for example, options related to sensor purge, calibration, and environment settings (depending on the connected device).
2 **Data logging** menu for setting logging interval and duration, and browsing data files.
3 **Notifications** menu displays notifications related to Indigo80 and the connected devices.
4 **Indigo80** menu for changing the settings of Indigo80 (for example, date, time, and language) and viewing device information.
5 **Help** menu contains a **Getting started** tour showing the key features of Indigo80, as well as instructions for sending devices to Vaisala for calibration and maintenance.

5.2 Connecting probes to Indigo80

- Probe connection cable

Up to two Vaisala Indigo-compatible probes or transmitters can be connected to the ports located on the bottom of Indigo80. You can connect and disconnect devices both when the indicator is powered on and when it is off.

Vaisala recommends using cables provided by Vaisala when connecting devices to the indicator. Cables and other accessories are available to order at store.vaisala.com.

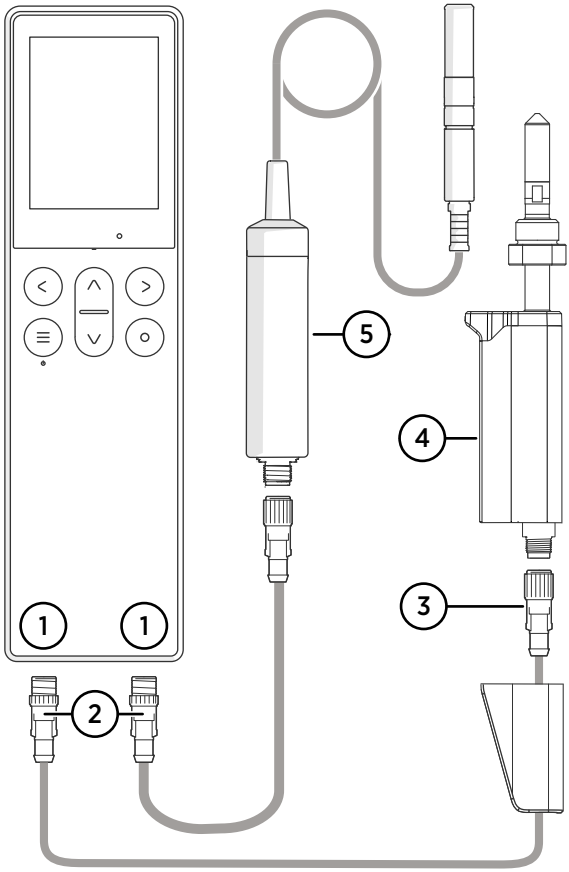
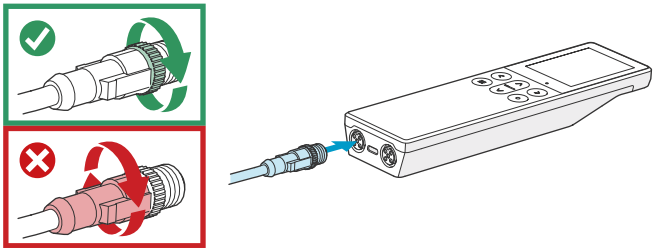


Figure 7 Connecting probes to Indigo80

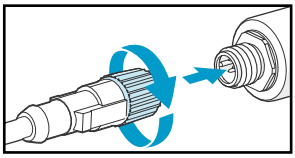
1 M12-5F ports on the bottom of Indigo80 for connecting compatible Vaisala devices. Ports are labeled ❶ and ❷.
2 M12-5M A-coded cable connector
3 M12-5F A-coded cable connector
4 DMP80 probe, displayed as ❶ by Indigo80
5 HMP7 probe, displayed as ❷ by Indigo80

1. If the indicator is powered and no devices are connected to it, the text **Please connect a probe** will be shown on the display.

2. Insert the probe connection cable in one of the ports on the bottom of the indicator.
   - **Note the orientation of the cable connector when inserting it**
   - **Hold the connector in place while turning its locking ring clockwise – never twist the connector body!**



3. Connect the probe to the M12-5F end of the probe connection cable.



   When the indicator recognizes the connected probe, it shows a notification on the display (for example, **DMP80 connected**). A probe connected to the leftmost port in the indicator is labeled ❶ on the indicator's display, while the probe in the rightmost port is labeled ❷.

4. To change probes, simply detach the cable from the probe and connect a new probe.

5.3 Measurement location

When taking measurements with the probe, consider the following:

- Verify the operating environment specification of the probe model.
- If the temperature of the measured environment differs greatly from ambient temperature, preferably the entire probe shaft must be inside the measured environment. This prevents measurement inaccuracy caused by heat conduction along the probe shaft.
- Mount the probe head horizontally to prevent any water condensing on the probe head from running to the sensors.

Use the optional magnetic hanger accessory (Vaisala item code ASM214318SP) to attach Indigo80 to a metallic surface when taking measurements.

5.3.1 Configuring environmental compensations

After installation, configure the pressure compensation setting, if relevant to your probe and its measurement environment.

For example, when you have installed the probe in a process with a pressure differing from normal atmospheric pressure, update the correct pressure into the pressure compensation setpoint parameter or register of the probe. This allows the probe to apply the appropriate pressure compensation into its measurement results.

You can configure the setting with the Insight software or the Indigo80 handheld indicator.

5.4 Configuring probe features with Indigo80 handheld indicator

- Probe connection cable

You can use the Indigo80 handheld indicator to configure probe features such as compensation setpoints, sensor purge settings, and filtering factor. The available features depend on the probe model and firmware version.

Accessing certain configuration options for your probe requires using the free Insight PC software, downloadable at www.vaisala.com/insight.

1. Connect the probe(s) to the indicator.
2. Open the main menu by pressing ☰.
3. Select **Devices**. If you have more than one device connected to the indicator, make a further selection between the devices.
4. Select **Settings** to access and change the features available for your probe.
5. Exit the menu by pressing ⮜ or return to the main menu by pressing ☰.

5.4.1 Example of configuring filtering factor with Indigo80 handheld indicator

- Probe connection cable

The filtering factor allows averaging the output if the measuring environment produces occasional exceptionally high or low readings.

This example shows how to configure the filtering factor as **0.9** using the Indigo80 handheld indicator.

This means that the new measurement output is a combination of the latest measurement (90 %) and the previous measurement (10 %).

1. Connect the probe(s) to the indicator.
2. Open the main menu by pressing ☰.
3. Select **Devices**. If you have more than one device connected to the indicator, make a further selection between the devices.
4. Select **Settings > Filtering**.
5. Select **Filtering factor**.
   a. Use the arrow buttons to set the value as **0.9**.
   b. Select **Set**.
6. Select **Extended filtering on/off > On** to enable measurement filtering using the filtering factor defined in the previous step.
7. Exit the menu by pressing ⮜ or return to the main menu by pressing ☰.

5.5 Configuring environment settings with Indigo80 handheld indicator

- Probe connection cable

For optimal measurement accuracy, you can use the Indigo80 handheld indicator to give additional information about the connected probe's measurement environment.

The environment settings available via Indigo80 correspond to the environmental compensation settings of the probe. Therefore, **Environment settings** and **Settings > Compensation setpoints** are interconnected: the configuration set in either menu is applied to both.

1. Connect the probe(s) to the indicator.
2. Open the main menu by pressing ☰.
3. Select **Devices**. If you have more than one device connected to the indicator, make a further selection between the devices.

4. Select **Environment settings** to access the settings for your probe.

   The available environment settings depend on the probe and probe firmware version.

   Pressure
   Value for pressure compensation. The entered value is persistent and remains unchanged at device restart.

   Temperature
   If any value is entered in this field, the device will use it as its temperature measurement value instead of its own sensor reading. This is needed when sensor warming is used, as it will also heat the temperature sensor of the device.
   At device restart, the value is cleared.

   > The temperature value needs an external source, for example, another probe that is able to provide the value constantly in real time, and the value needs to correspond to the temperature of the measurement environment as accurately as possible. Thus, set the temperature value only if you have another probe connected to the indicator from which you can read the value. Do not set the temperature value manually.

5. Select a setting from the list, for example, **Pressure**.

   a. Select the unit, if prompted.

   b. Use the arrow buttons to set the desired value, and then select **OK** or **Set**.

   You can also select to read the value from another probe connected to the indicator, provided that the probe can output the required compensation parameter. Press ⊂ to highlight the **Read value from** field, and then press ⊙ to select the other probe as the source of the value.

   > For **Temperature**, always set the temperature value to be read from another probe. Do not set the temperature value manually. Make sure that both probes are in the same environment to get the most accurate measurement values.

6. Exit the menu by pressing ⊂ or return to the main menu by pressing ☰.

More information

- Environmental compensation (page 16)

6. Configuration with Insight software

6.1 Vaisala Insight PC software

Vaisala Insight PC software is a configuration software for Indigo-compatible probes and other supported devices. Insight is available for Microsoft Windows® operating systems (64-bit only).

With the Insight software, you can:

- See probe information and status
- See real-time measurement data
- Record data for up to 48 hours and export in CSV format
- Configure probe features such as measurement filtering and sensor purge
- Update probe calibration information:
  - Calibration date and text
  - Calibration interval and expiry date
  - Enable or disable calibration reminder function

Adjustment of measurement is not available in Insight software for DMP80 series probes. If adjustment is necessary, contact Vaisala.

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

6.2 Connecting to Insight software

- Computer with a Microsoft Windows® operating system (64-bit version) and Vaisala Insight PC software installed
- Indigo USB adapter (item code USB2) or USB connection cable (item code 242659)

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

1. Open the Insight software on your PC.
2. Verify the operating mode of Insight from the **Settings** menu and change it if appropriate.
   - **Basic mode** is suitable for most use cases
   - **Advanced mode** provides access to additional configuration options. Use **Advanced mode** only when instructed to do so by product documentation or Vaisala technical support.

3. Connect the USB adapter to a free USB port on the PC or USB hub.
4. Connect the probe to the USB adapter.
5. Wait for the Insight software to detect the probe.

6.3 Configuration options

The complete probe configuration is accessible via the Insight software. After connecting the probe, select ⚙ **> Configure device** to access the configuration options in Insight software.

> You can restore the probe back to its default settings using the **Factory default settings > Restore settings** function. Doing this will also revert the latest entered calibration information to the information that was stored with the factory calibration.

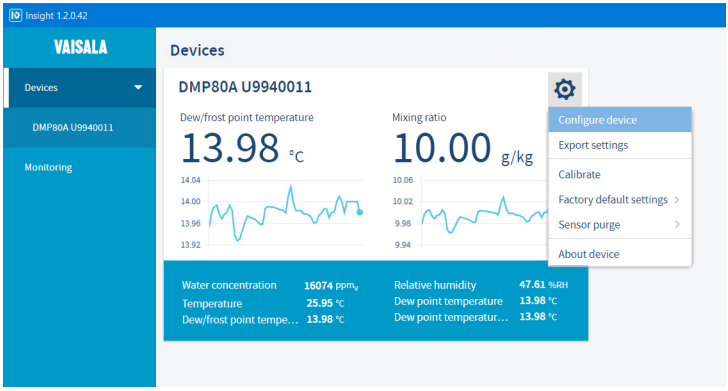


Figure 8 DMP80A in Insight software

More information

- Restoring factory default settings with Insight software (page 36)

6.4 Diagnostics in Insight

Messages sent by the connected devices are shown automatically in Insight. Additional diagnostic data is available on the **Diagnostics** page. The data available depends on the probe model and Insight operating mode (basic or advanced). The data can be very useful when diagnosing issues together with Vaisala support, particularly the diagnostic files.

Diagnostic files

If Insight is in **Advanced mode**, you can retrieve the following diagnostic files from the connected probe:

- **SSR/T_s histogram**: Table of humidity and temperature conditions measured by the probe
- **Error log**: Cumulative total of the error and status events tracked by the probe

Both files contain data from since the probe was manufactured, or since the files were last cleared. Clearing the files is not recommended unless instructed by Vaisala support. The buttons to clear the files are located at the bottom of the **Diagnostics** page.

The files are in comma separated value (CSV) format. They can be opened for viewing in spreadsheet programs such as Microsoft Excel or in text editors.

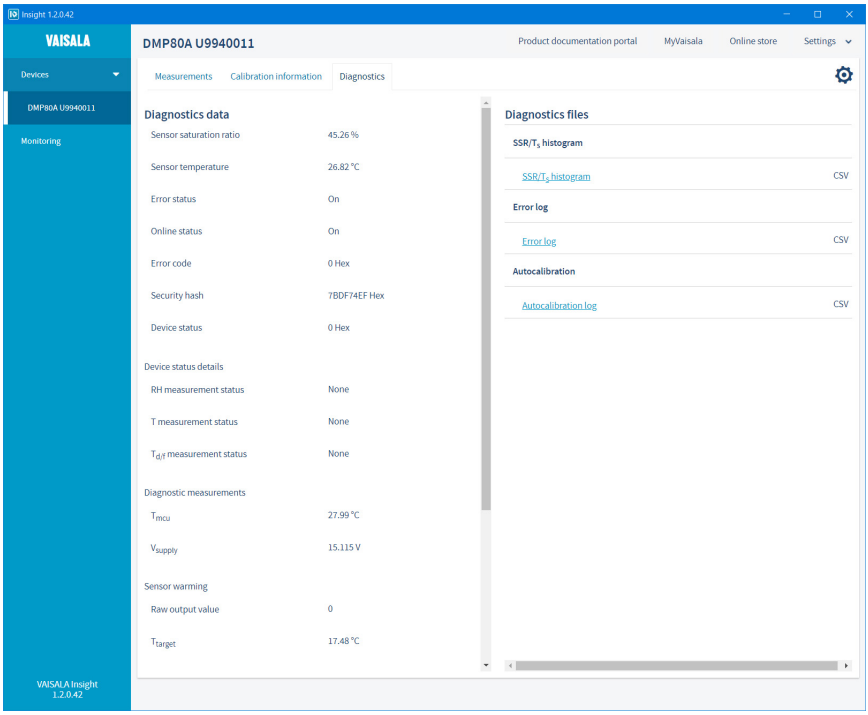


Figure 9 DMP80A diagnostics in Insight (advanced mode)

7. Maintenance

7.1 Cleaning the probe

CAUTION! Do not attempt to clean the sensors under the filter.

Do not spray anything directly on the probe head, since that may deposit impurities on the sensors.

You can clean the probe, probe handle, and cable by wiping them with a soft, lint-free cloth moistened with water or a suitable cleaning agent, such as isopropyl alcohol. Do not wipe the filter: wiping the filter may block its pores and/or deposit residue on the filter. If the filter is heavily contaminated, replace it.

When cleaning, follow these precautions:

- Avoid touching the filter. If you need to touch the filter, always wear clean gloves (cotton, rubber or similar material). Keep the filter free of any grease or oil.
- Do not scrape the probe or the probe handle, and avoid abrasive cloths when wiping the surface.
- Do not immerse the probe or the probe handle in liquid to clean them.
- Wipe cleaning agents off the probe, probe handle, and the cable after cleaning.

7.1.1 Chemical tolerance

Avoid exposing the probe to cleaning agents for unnecessarily long periods of time.

The following chemicals can be used to clean the probe:

- Deionized water
- Isopropyl alcohol (70 %).

More information

‣ DMP80 specifications (page 38)

7.2 Changing the probe filter

- New compatible filter
- Clean lint-free gloves

CAUTION! Sensors are easily damaged when the filter is not in place. Handle the probe head carefully.

1. Put on clean gloves before touching the filter.
2. Turn the filter counter-clockwise to loosen it.
3. Remove the filter from the probe head. Be careful not to touch the sensors with the filter.
4. Install a new filter on the probe head. Tighten the filter properly.

7.3 Calibration and adjustment

Calibration means comparing the measurement output of the device to a known reference, such as a known environment in a calibration chamber or the output of a reference instrument. Correcting the reading of the device so that it measures accurately is referred to as **adjustment**.

The probe is fully calibrated and adjusted as shipped from the factory. To maintain the accuracy of the measurement, calibrate and adjust the probe as needed. Typical calibration interval is one year, but depending on the application it may be necessary to check the accuracy more frequently.

When adjustment is necessary, have Vaisala calibrate and adjust the probe.

Factory calibration leads to highest accuracy and lowest uncertainty. After factory calibration the instrument performs as new. For up-to-date information about calibration points and offering, visit store.vaisala.com.

WARNING! When returning a product for calibration or repair, make sure it has not been exposed to dangerous contamination, and is safe to handle without special precautions.

If you think the device is not measuring correctly, calibration and adjustment is not the first thing to do. Check the following first:

- Make sure nothing is interfering with the measurement: heat sources, temperature differences, or condensation.
- Check that there is no moisture on the probe. If the sensor has become wet, wait for it to dry.
- Always wait for the measurement to stabilize.

More information

‣ Maintenance and calibration services (page 47)

8. Troubleshooting

8.1 Problem situations

Table 6 Troubleshooting table

Problem	Possible cause	Solution
Measurement output seems incorrect	Installation location is not representative of actual conditions you want to measure	Verify the installation location and reinstall or relocate the probe if necessary.
	Heat conduction along probe head and cable is interfering with measurement accuracy	Follow the installation recommendations for cases when temperature of measured environment differs greatly from ambient. See Measurement location (page 24).
	Probe is in need of adjustment	Have the probe adjusted by Vaisala. See Calibration and adjustment (page 32).
Values of measurement parameters stop changing for a few minutes	Probe is performing a sensor heating function such as sensor purge or waiting for the sensor to cool down	Wait for the function to complete and measurement parameters to be available again.

More information

- Technical support (page 47)

8.2 Error messages

Probes can communicate with error messages when they are connected to Indigo80 indicator or Insight software. The messages are categorized according to the severity of the status:

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

Error message	Description	Recommended action
Critical errors		
Firmware checksum mismatch [49]	The installed firmware is corrupted.	Contact Vaisala technical support.
Device settings corrupted [50]	Parameter memory is corrupted.	
Additional configuration settings corrupted [51]		
Sensor coefficients corrupted [52]		
Main configuration settings corrupted [53]		
Factory default settings corrupted [54]		
Non-volatile memory read write failure [57]	Hardware fault.	
Errors		
Temperature measurement error [44]	Readings from sensor(s) are missing or out of range.	Inspect probe head and sensors visually. If the probe is completely wet, allow it to dry out. If the sensors are damaged or missing and the error message(s) stay active, contact Vaisala to have the probe repaired.
Humidity measurement error [45]		
Humidity sensor failure [46]		
Capacitance reference error [47]	Hardware fault.	Contact Vaisala technical support.
Sensor heater error [212]		
General device failure [994]	High number of measurement errors, capacitance reference errors, or sensor heater errors written in the error log.	
Ambient temperature out of range [48]	Probe handle is too hot or cold.	Relocate the probe handle so that its ambient temperature is within the specified operating range.
Supply voltage out of range [55]	Probe supply voltage is too high or low.	Check and correct the supply voltage.

Warnings		
Autocalibration failed	Measurement environment is not suitable for autocalibration.	Autocalibration can only be performed successfully in dry and stable conditions. This warning is expected if the probe head is in normal room humidity. Occasional autocalibration failures are not a cause for concern as long as autocalibration is usually successful.
Calibration has expired [353]	This warning is displayed by the calibration reminder functionality if the calibration interval has been exceeded.	Calibrate the probe and update the calibration date information.
Software restart [679]	The probe has automatically restarted itself.	Check that supply voltage is stable and operating environment is within specification.
Unexpected device restart [216]		
Status messages		
Calibration is about to expire [352]	This message is displayed by the calibration reminder functionality.	Calibrate the probe and update the calibration date information.
Purge in progress [287]	Sensor purge of the humidity sensor is ongoing.	Wait for sensor purge to complete.
The readings stay frozen until the sensor cools down [288]	Probe is waiting for its sensors to cool down.	Wait for measurement readings to become available.

More information

- Technical support (page 47)

8.3 Restoring factory default settings with Insight software

If needed, you can restore the probe back to its factory default settings using the Insight software. Doing this will also clear any user adjustment and restore the latest adjustment performed by Vaisala.

1. Connect the probe to the Insight software.
2. Select ⚙ **> Factory default settings > Restore settings**.
3. Wait for the probe to be re-detected.

More information

- Configuration options (page 29)

8.4 Restoring factory default settings with Indigo80 handheld indicator

- Probe connection cable

If needed, you can restore the probe back to its factory default settings using the Indigo80 handheld indicator. The user adjustment of the probe and the settings or log files of the indicator itself are not affected.

1. Connect the probe(s) to the indicator.
2. Open the main menu by pressing ☰.
3. Select **Devices**. If you have more than one device connected to the indicator, make a further selection between the devices.
4. Select **Factory default settings > Restore settings > OK**.
5. Confirm by selecting **OK**.
6. Exit the menu by pressing ⮜ or return to the main menu by pressing ☰.

8.5 Writing a problem report

When troubleshooting the product, write a problem report including:

- What failed (what worked / did not work)?
- Where did it fail (location and environment)?
- When did it fail (date, immediately / after a while / periodically / randomly)?
- How many failed (only one defect / other same or similar defects / several failures in one unit)?
- What was done when the failure was noticed?
- What was connected to the product and to which connectors?
- Input power source type, voltage, and list of other items (such as lighting, heaters, and motors) that were connected to the same power output.
- Are all parts connected and grounded properly? Take a photo to help the troubleshooting.

9. Technical data

9.1 DMP80 specifications

Table 7 DMP80A measurement performance

Property	Description/Value
Dew point	
Sensor	DRYCAP® 180S
Measurement range	−40 ... +60 °C (−40 ... +140 °F) $T_{d/f}$
Accuracy	Up to ±2 °C (±3.6 °F) $T_{d/f}$
Response time 63 % [90 %]:	
From dry to wet	5 s [10 s]
From wet to dry	45 s [5 min]
Temperature	
Measurement range	0 ... +60 °C (+32 ... +140 °F)
Accuracy	±0.2 °C (±0.36 °F) at room temperature
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751
Mixing ratio	
Measurement range (typical)	0 ... 150 g/kg (0 ... 1050 gr/lbs)
Accuracy (typical)	±12 % of reading
Absolute humidity	
Measurement range	0 ... 130 g/m^3
Accuracy (typical)	±10 % of reading

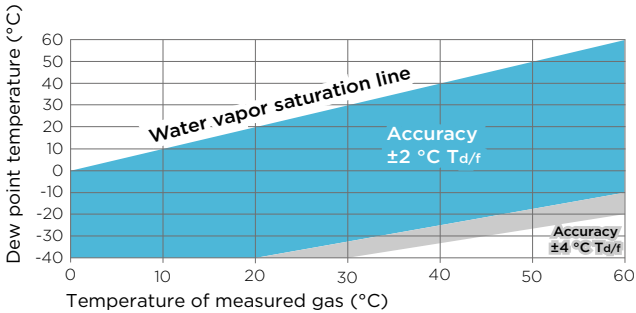


Figure 10 Dew point accuracy vs. measurement conditions (DMP80A)

Table 8 DMP80B measurement performance

Property	Description/Value
Dew point	
Sensor	DRYCAP® 180M
Measurement range	−70 ... +60 °C (−76 ... +140 °F) $T_{d/f}$
Accuracy	Up to ±2 °C (±3.6 °F) $T_{d/f}$
Response time 63 % [90 %]:	
From dry to wet	5 s [15 s]
From wet to dry	45 s [8 min]
Temperature	
Measurement range	0 ... +60 °C (+32 ... +140 °F)
Accuracy	±0.2 °C (±0.36 °F) at room temperature
Temperature sensor	Pt100 RTD Class F0.1 IEC 60751
Relative humidity	
Measurement range	0 ... 70 %RH
Accuracy (RH <10 %RH, at +20 °C)	±0.004 %RH + 20 % of reading
Concentration by volume (ppm)	
Measurement range (typical)	10 ... 2500 ppm
Accuracy (at + 20 °C, 1 bar)	1 ppm + 20 % of reading

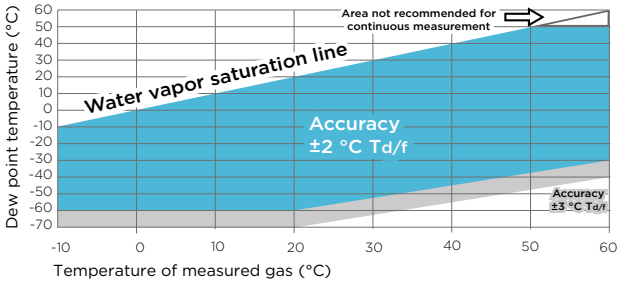


Figure 11 Dew point accuracy vs. measurement conditions (DMP80B)

Table 9 DMP80 series operating environment

Property	Description/Value
Operating temperature range	−10 ... +60 °C (+14 ... +140 °F)
Storage temperature	−20 ... +60 °C (−4 ... +140 °F)
Operating pressure of probe head	0 ... 20 bar (absolute) (0 ... 290 psi (absolute))
Measurement environment	For air, nitrogen, hydrogen, argon, helium, and oxygen [1)]
Chemical tolerance	Temporary exposure during cleaning: • Deionized water • Isopropyl alcohol (70 %)
IP rating of probe handle:	
With probe connection cable connected to the probe	IP66: Dust-tight. Protected from powerful water jets from any direction.
Without cable	IP55: Limited protection against dust. Protected from water jets from any direction.

1) *Consult Vaisala if other chemicals are present. Consider safety regulations with flammable gases.*

Table 10 DMP80 series inputs and outputs

Property	Description/Value
Operating voltage	15 ... 30 V DC
Current consumption	10 mA typical, 500 mA max.
Digital output	RS-485, non-isolated

Table 11 DMP80 series output parameters

Output parameter name and unit	
Absolute humidity (g/m^3)	Relative humidity (%RH)
Absolute humidity at NTP (g/m^3)	Relative humidity (dew/frost) (%RH)
Dew point temperature (°C)	Temperature (°C)
Dew/frost point temperature (°C)	Water concentration (ppm$_v$)
Dew/frost point temperature at 1 atm (°C)	Water concentration (wet basis) (vol-%)
Dew point temperature at 1 atm (°C)	Water mass fraction (ppm$_w$)
Dew point temperature difference (°C)	Water vapor pressure (hPa)
Enthalpy (kJ/kg)	Water vapor saturation pressure (hPa)
Mixing ratio (g/kg)	

Table 12 DMP80 series compliance

Property	Description/Value
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) amended by 2015/863
Electromagnetic compatibility (EMC)	EN 61326-1, industrial environment
Rough handling (excluding sensor inside probe head)	IEC 60068-2-31
Compliance marks	CE, China RoHS, RCM, UKCA

Table 13 DMP80 series mechanical specifications

Property	Description/Value
Connector type	M12 5-pin A-coded male
Weight	250 g (9 oz)
Mechanical connection options	G1/2″ ISO 228/1 NPT1/2″
Materials	
Probe handle	Polyamide (PA) and thermoplastic elastomer (TPE)
Probe shaft	Stainless steel (AISI 316L)

Property	Description/Value
Filter	Porous stainless steel (AISI 316L) [1]

1) *Vaisala item code: HM47280SP*

9.2 Dimensions

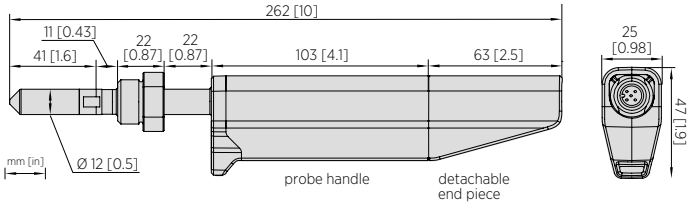


Figure 12 Dimensions of DMP80 series probes with G1/2″ thread, side and bottom view

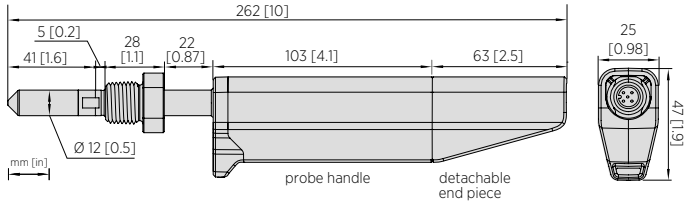


Figure 13 Dimensions of DMP80 series probes with NPT1/2″ thread, side and bottom view

9.3 Spare parts and accessories

Table 14 DMP80 series spare parts and accessories

Property	Description/Value
Cables	
Probe connection cable (M12-M12), 1.5 m (4.11 ft)	272075SP
Flat cable for probes (M12-M12), 1.0 m (3.4 ft)	CBL210493SP
Accessories for ISO G1/2″ thread option	
Sampling cell with quick connector and leak screw	DSC74
Sampling cell with female connectors, inlet G3/8″, outlet G1/4″ ISO	DMT242SC

Property	Description/Value
Sampling cell with Swagelok connectors for 1/4″ tubing	DMT242SC2
Two-pressure sampling cell	DSC74B
Two-pressure sampling cell with coil	DSC74C
Other items	
Indigo USB adapter	USB2
Sintered stainless steel filter	HM47280SP

More information

- Sampling cell accessories for DMP80 probe models with ISO G1/2″ thread (page 12)

Appendix A. Recycling instructions

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

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

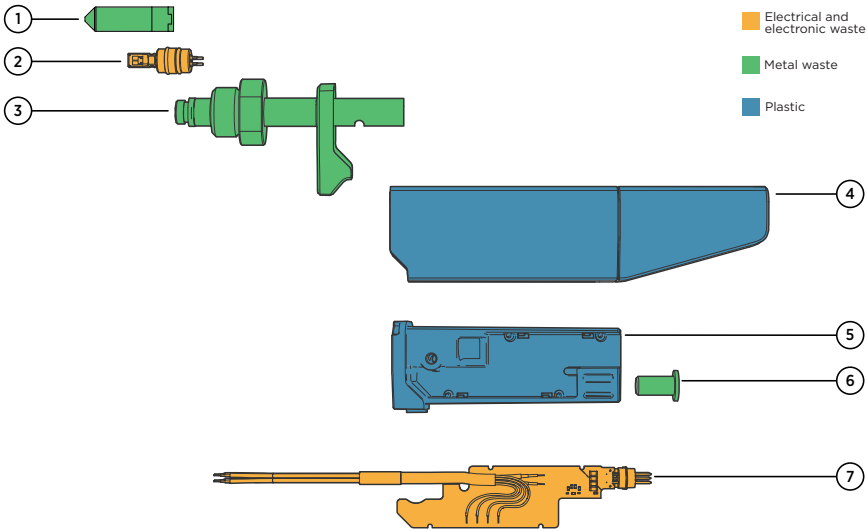


Figure 14 Materials for recycling

Table 15 Materials for recycling

Part		Material	Recycling
1	Filter	Porous stainless steel (AISI 316L)	Metal waste
2	Sensor	Various materials	Electrical and electronic waste

Part		Material	Recycling
3	Probe shaft	Stainless steel (AISI 316L)	Metal waste
4	Probe handle	Polyamide (PA), glass reinforced and thermoplastic elastomer (TPE)	Dispose of or recycle as plastic according to local waste management practices and regulations
5	Electronics housing	Polyamide (PA), glass reinforced	Dispose of or recycle as plastic according to local waste management practices and regulations
6	Screw	Stainless steel (AISI 316L)	Metal waste
7	Component board and wiring	Various materials	Electrical and electronic waste

More information

- Probe structure (page 11)
- DMP80 specifications (page 38)

Maintenance and calibration services

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

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

Warranty

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

Technical support

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

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

For more information, see www.vaisala.com/support.

Recycling

Recycle all applicable material according to local regulations.

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