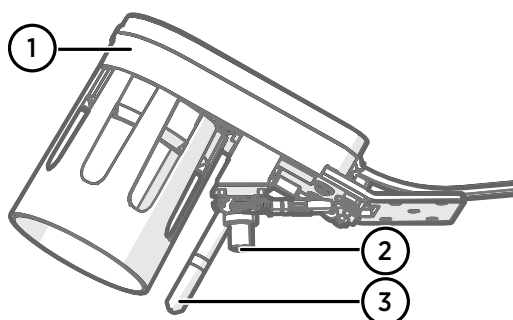


### MD30 maintenance



- 1 Surface state sensor
- 2 Surface temperature sensor MT10
- 3 Air temperature and humidity sensor HMP113

Table 1 MD30 maintenance

| Task   | Frequency |
|--|-----------|
| <b>Preventive maintenance</b>  |           |
| Check error messages   | –         |
| Clean surface state sensor window  | As needed |
| Clean surface temperature sensor   | Annually  |
| Replace filter of air temperature and humidity sensor                    | Annually  |
| Perform 3-step calibration (clean, adjust with plate, drive on dry road) | Annually  |
| <b>Repair maintenance</b>  |           |
| Replace air temperature and humidity sensor                              | As needed |
| Replace surface temperature sensor                                       | As needed |

For the MD30 spare parts and accessories, see *Vaisala Mobile Detector MD30 Product Description Reference Guide*.



For MD30 instructions, including documents and videos, see <https://www.vaisala.com/en/support/md30>.



### More information

- [Cleaning surface state sensor window \(page 3\)](#)
- [Cleaning surface temperature sensor \(page 4\)](#)
- [Replacing filter of air temperature and humidity sensor \(page 5\)](#)
- [Replacing air temperature and humidity sensor \(page 6\)](#)
- [Replacing surface temperature sensor \(page 7\)](#)
- [MD30 troubleshooting \(page 8\)](#)
- [Error bits \(page 10\)](#)
- [Status information \(page 12\)](#)
- [Recycling information \(page 14\)](#)
- [MD30 maintenance checklist \(page 15\)](#)

## Safety information



**WARNING!** Failure to comply with these precautions or with specific warnings elsewhere in these instructions violates safety standards of design, manufacture, and intended use of the product. Vaisala assumes no liability for the customer's failure to comply with these requirements.



**WARNING!** Do not substitute parts or modify the system, or install unsuitable parts in the system. Improper modification can damage the product or lead to malfunction.



**WARNING!** Follow local and state legislation and regulations on occupational safety.

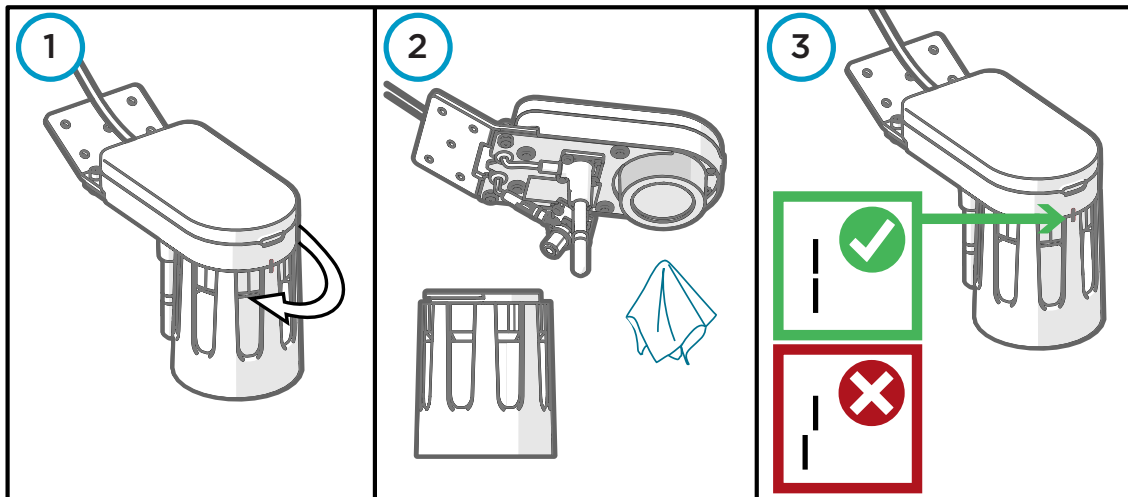
## Cleaning surface state sensor window



- Cloth
- Glass cleaner

Clean the surface state sensor window when sensor gives a window contamination warning.

For cleaning, the mobile sensor can remain mounted on the vehicle. When cleaning, remove possible dirt, ice, and snow.



- ▶ 1. Remove the hood by turning it counterclockwise.
2. Apply glass cleaner on the window of the surface state sensor. Clean with a soft, lint-free cloth. Clean also the hood.
3. Attach the hood to the body by turning the hood clockwise. Make sure that the markings in the hood and sensor body are aligned.

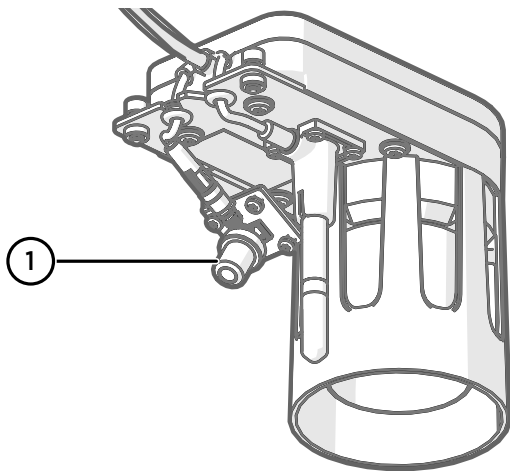
### More information

- ▶ [MD30 maintenance \(page 1\)](#)
- ▶ [MD30 maintenance checklist \(page 15\)](#)

# Cleaning surface temperature sensor



- Cotton swab
- Compressed air or air pump
- Glass cleaner



1 Surface temperature sensor

Clean the surface temperature sensor annually, or more often if conditions require it.

- ▶ 1. Remove the surface temperature sensor from the body.
2. Apply glass cleaner on the surface temperature sensor. Insert a cotton swab in the thread and turn it clockwise. Remove the cotton swab by turning it counterclockwise in the thread. If required, use compressed air or an air pump.
3. Attach the surface temperature sensor to the body.

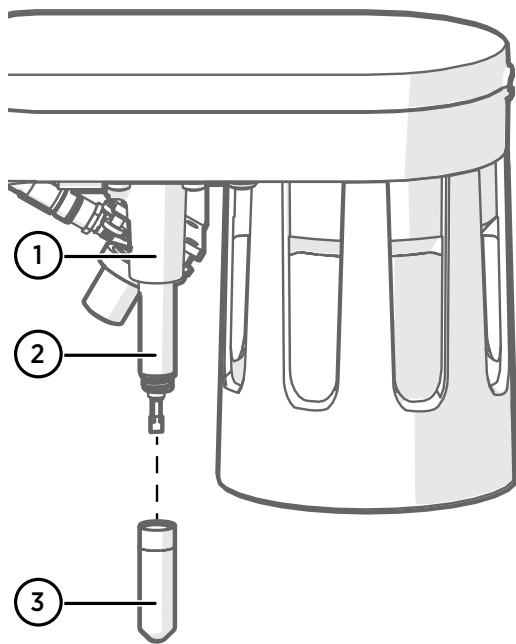
## More information

- ▶ [MD30 maintenance \(page 1\)](#)
- ▶ [MD30 maintenance checklist \(page 15\)](#)

# Replacing filter of air temperature and humidity sensor



- Screwdriver Torx 10



- 1 Air temperature and humidity sensor
- 2 Probe body
- 3 Filter

Replace the filter when it is damaged or dirty.

The replacement filter comes with an O ring, but do not use it.

- ▶ 1. Carefully remove the filter from the probe. Holding the filter by its collar, rotate the filter counter-clockwise, then pull it out.



**CAUTION!** Do not touch the sensor heads.

2. Without delay, install the new filter carefully on the air temperature and humidity sensor. Rotate the filter clockwise, making sure the filter sits straight and meets the threads properly.

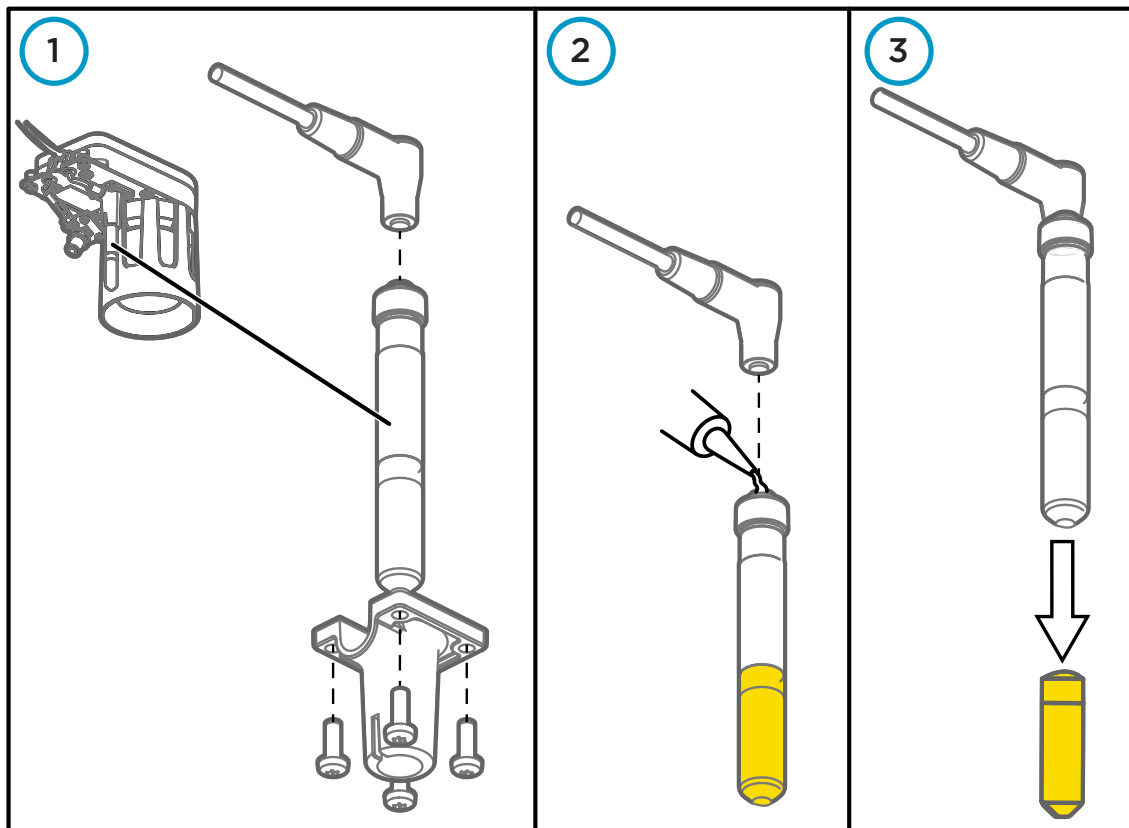
## More information

- ▶ [MD30 maintenance \(page 1\)](#)
- ▶ [MD30 maintenance checklist \(page 15\)](#)

# Replacing air temperature and humidity sensor



- Electric joint compound
- Screwdriver Torx 10



- ▶ 1. Loosen the 4 screws that hold the temperature sensor in place, pull the air temperature and humidity sensor (HMP) through the holder, and disconnect the sensor cable.
2. Add electric joint compound at the end of the connector of the replacement sensor. Connect the sensor cable to the replacement sensor.
3. Remove the yellow cover from the replacement sensor.
4. Push the replacement sensor through the holder and attach the holder with 4 screws.

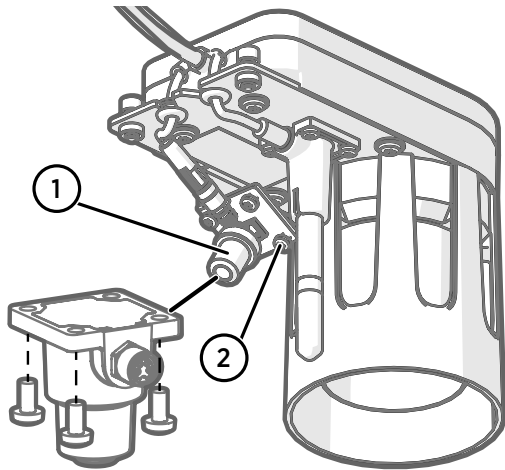
## More information

- ▶ [MD30 maintenance \(page 1\)](#)
- ▶ [MD30 maintenance checklist \(page 15\)](#)

# Replacing surface temperature sensor



- Screwdriver Torx 10



- 1 Surface temperature sensor
- 2 Screw (4 pcs)

- ▶ 1. Loosen the 4 screws that hold the temperature sensor in place, remove the sensor, and disconnect the sensor cable.
2. Connect the sensor cable to the replacement sensor.
3. Attach the replacement sensor with 4 screws.

## More information

- ▶ [MD30 maintenance \(page 1\)](#)
- ▶ [MD30 maintenance checklist \(page 15\)](#)

# MD30 troubleshooting

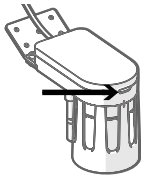
## LED information

In normal startup, the mobile sensor LED goes through the following states:

1. Orange: powered
2. Green (steady): starting
3. Green (blinking): operational

Normal startup takes approximately 10 seconds. In error situations, the LED stays orange or red.

Table 2 LED error states

| Status LED  | Actions                             |  |
|---|-------------------------------------|--|
|  | Orange (steady): sensor malfunction | Check the connections and power input. If the problem persists, contact Vaisala. |
|   | Red (steady): system in error state | Check the status information and error bits and act on any open errors.          |

## Checking error information

Check the status and error information from RoadAI or through the MD30 interface.

- In the RoadAI app:
  - For sensor-related errors, scroll right in the measurement grid to see fields **unit status** and **error status**.
  - For phone-related errors, such as missing internet connection, open the sidebar and go to **Diagnostics**.
- In the MD30 interface, use the SEND DATA message to check the status and error bits.

For detailed information about the error bits and status information, see [Error bits \(page 10\)](#) and [Status information \(page 12\)](#).

Table 3 Troubleshooting

| Problem                       | Probable cause  | Actions   |
|-------------------------------|---|---|
| <b>Installation and setup</b> |   |   |
| Phone is not showing data.    | Device pairing was not successful or system is not getting power. | Check that car charge adapter and car phone charger are connected and mobile sensor and mobile phone are powered. If pairing is still not successful, repeat pairing. |



| Problem  | Probable cause  | Actions   |
|--|---|---|
| Installation was verified with reference plate and mobile sensor adapted to road surface types, but mobile sensor gives inaccurate readings. | Road was not completely dry when dry road reference was performed.  | Carry out dry road reference again. See <i>Vaisala Mobile Detector MD30 Setup Guide</i> .                         |
|  | Road surface type in area of operation differs significantly from road surface type in location where dry road reference was performed. |   |
|  | Plate was not clean and dry during plate calibration.   | Carry out plate reference. See <i>Vaisala Mobile Detector MD30 Setup Guide</i> .                                  |
|  | Plate was not positioned correctly during plate calibration.  |   |
| Calibration stops or does not succeed.   | There is an active error.   | Check status and error information, and act on any open errors.   |
| Dry road not available.  | –   | Type the values manually or use factory settings until local dry road becomes available.                          |
| <b>Operation</b>   |   |   |
| System is in error state (mobile sensor LED is red).   | Several possible causes.  | Restart mobile sensor.<br>If the error persists, see error messages for more information.                         |
| Phone is not showing data.   | System is not getting power.  | Check that car charge adapter and car phone charger are connected and mobile sensor and mobile phone are powered. |
| Phone does not upload data to network.   | Phone battery level is < 85 % and phone is not connected to charger.  | Connect phone to charger.   |
|  | No network connection.  | Check Internet connection settings. Check that SIM card is inserted.  |
|  |   | Change location.  |
| Phone SD card is empty.  | Data has been uploaded to server.   | –   |

### More information

- ▶ [Error bits \(page 10\)](#)
- ▶ [Status information \(page 12\)](#)

## Error bits

Error bits indicate error situations in the unit or in communication. The erroneous bits are reported in the GET UNIT STATUS, SEND DATA, and SET REFERENCES messages.



Error is indicated by setting bit to 1.

Table 4 Error messages

| Bit <sup>1)</sup> | Message   | Probable cause  | Actions   |
|-------------------|---|---|---|
| 0                 | Surface temperature sensor error                            | Cables may be loose, damaged, or disconnected.            | Check cables and connectors. If the problem persists, replace mobile sensor.            |
| 1                 | Air temperature error                                       |   |   |
| 2                 | Relative humidity error                                     |   |   |
| 3                 | Window contamination alarm <sup>2)</sup>                    | Mobile sensor window is heavily contaminated.             | Clean the window.   |
| 4                 | Laser status error  | -   | Restart mobile sensor.  |
| 5                 | Laser heating error   |   |   |
| 6                 | Excessive ambient light detected                            | Sunlight is reflected from road surface to mobile sensor. | Move vehicle or reposition mobile sensor.   |
| 7                 | Receiver error  | -   | Restart mobile sensor.  |
| 8                 | Signal level out of range, gain adjustment limit reached    | -   | Check installation height and angle of mobile sensor.                                   |
| 9                 | Received signals contain too much noise                     | -   | Check that mobile sensor is firmly attached to vehicle.                                 |
| 10                | Optical measurement data timeout                            | -   | Restart mobile sensor.  |
| 11                | Low input voltage   | Incorrect operating voltage.                              | Check operating voltage.  |
| 12                | High input voltage  |   |   |
| 13                | Flash failure status  | -   | Restart mobile sensor.  |
| 14                | Internal temperature too high                               | Mobile sensor overheated.                                 | Disconnect mobile sensor from power supply.   |
| 15                | Reference status:<br>0 = OK<br>1 = Invalid or not set       | -   | Verify installation with reference plate and adapt mobile sensor to road surface types. |
| 16                | Factory calibration status:<br>0 = OK<br>1 = Not calibrated | -   | Return mobile sensor to Vaisala.  |
| 17-31             | Reserved for future use                                     | -   | -   |

1) Bit is shown in MD30 interface response data message, not in RoadAI.

2) Reported by MD30 models that have the window contamination feature.



The reference setting cannot be started or is interrupted if an error is detected and indicated by bits 3 ... 14, or 16.

**More information**

- [MD30 troubleshooting \(page 8\)](#)
- [Status information \(page 12\)](#)

## Status information

The status information is used to indicate the current status of the mobile sensor and to issue warnings. The status information is reported in the GET UNIT STATUS, SEND DATA, and SET REFERENCES messages.

Table 5 Status information

| Bit <sup>1)</sup> | Message   | Value                                      | Description   |
|-------------------|---|--|---|
| 0                 | Not ready to measure  | 0 = Ready<br>1 = Not ready                 | Unit is starting up. When unit reaches full operational status, the flag is cleared. Measurement data may be invalid.<br>If the condition persists, check error bits. |
| 1                 | Reference setting ongoing   | 0 = Not ongoing<br>1 = Ongoing             | If reference setting does not start, check status information bits 10 ... 13 and error bits.  |
| 2                 | Laser temperature change in progress                                      | 0 = Not ongoing<br>1 = Ongoing             | Unit operational, but measurement data may be invalid.<br>Wait for laser temperature change to finish.<br>If the condition persists, check error bits.                |
| 3                 | Window contamination warning <sup>2)</sup>                                | 0 = OK<br>1 = Contaminated                 | Window is getting contaminated. Clean the window.   |
| 4                 | Window heating  | 0 = OK<br>1 = Not working                  | If heating is not working, monitor window contamination.  |
| 5                 | Low input voltage detected  | 0 = Voltage OK<br>1 = Voltage low          | Unit operational, but check input voltage.  |
| 6                 | High input voltage detected   | 0 = Voltage OK<br>1 = Voltage high         |   |
| 7                 | High internal temperature detected  | 0 = Temperature OK<br>1 = Temperature high | First notification of unit getting too hot.   |
| 8                 | Temperature unit  | 0 = °C<br>1 = °F                           | –   |
| 9                 | Layer thickness unit  | 0 = mm<br>1 = inch                         | –   |
| 10                | Reference setting interrupted due to laser temperature change             | 0 = False<br>1 = True                      | Repeat reference setting when laser temperature change has finished.  |
| 11                | Reference setting interrupted due to hardware error, check parameter 0x56 | 0 = False<br>1 = True                      | Check error bits and parameter 0x56, which contains reason for error.   |

| Bit <sup>1)</sup> | Message  | Value                 | Description   |
|-------------------|--|-----------------------|---|
| 12                | Reference setting values are not updated due to poor signal quality                        | 0 = False<br>1 = True | Excessive variation in road surface type. Find more representative road surface.  |
| 13                | Reference setting was interrupted by client  | 0 = False<br>1 = True | -   |
| 14                | Signal levels low, uncertainty in surface layer thickness results                          | 0 = False<br>1 = True | Unit operational, but measurement data may be invalid.<br>Verify installation and clean window.                                     |
| 15                | Road surface type significantly different from road surface type used in reference setting | 0 = False<br>1 = True | Unit is operational, but measurement data can be invalid. If condition persists, perform reference setting.                         |
| 16                | Layer thickness result produced undefined result   | 0 = False<br>1 = True | Verify installation. If condition persists, perform reference setting.  |
| 17                | Measurement over range, layer thickness measurement range exceeded                         | 0 = False<br>1 = True | Maximum reported layer thickness 60 mm (2.36 in) exceeded. If this does not represent actual conditions, perform reference setting. |
| 18 - 31           | Reserved for future use  | -                     | -   |

1) Bit is shown in MD30 interface response data message, not in RoadAI.

2) Reported by MD30 models that have the window contamination feature.



Reference setting cannot be started if status info bit 0, 1, or 2 is set.



Laser temperature change stops the ongoing reference setting.

### More information

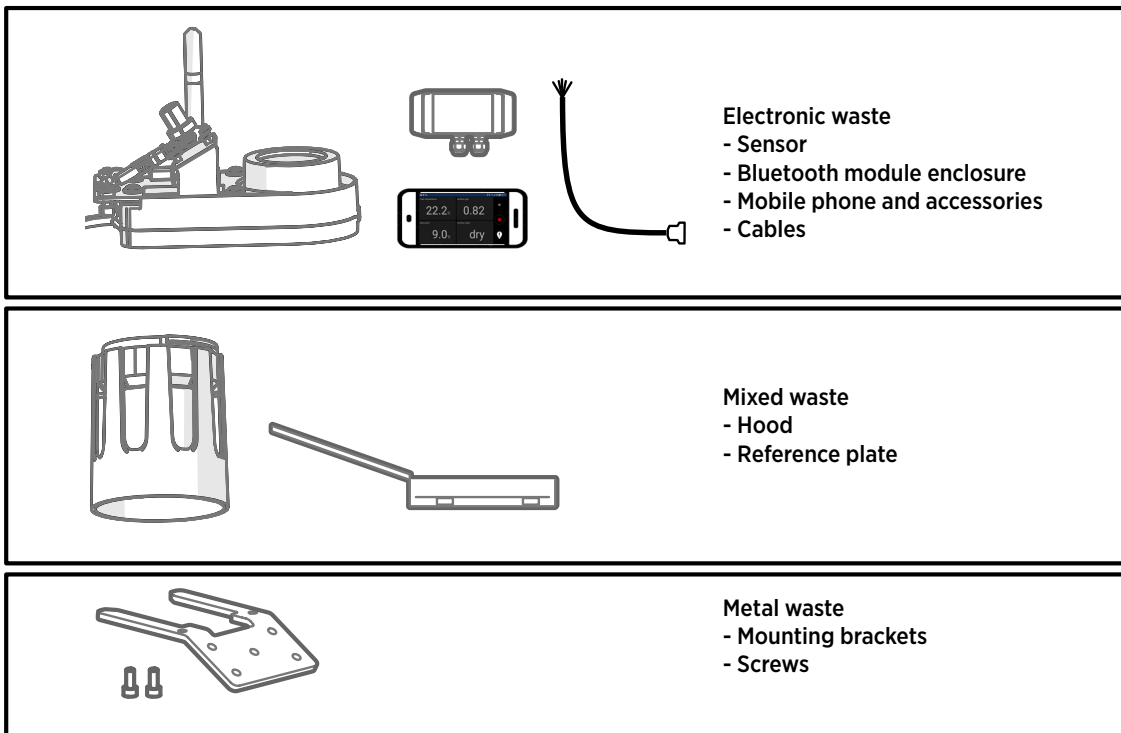
- ▶ [MD30 troubleshooting \(page 8\)](#)
- ▶ [Error bits \(page 10\)](#)

# Recycling information

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.



# MD30 maintenance checklist



Fill in the checklist and save it to record completed tasks.  
Make copies of the list as needed.

Table 6 MD30 maintenance checklist

| Maintenance details    |  |
|------------------------|--|
| MD30 serial number:    |  |
| Maintenance person:    |  |
| Date (day/month/year): |  |

| #                                       | Task  | Reference  | OK/ Not OK | Remarks |
|---|---|--|------------|---------|
| <b>Maintenance preparations</b>         |   |  |            |         |
| 1                                       | Check error messages                                  | <a href="#">MD30 troubleshooting (page 8)</a> <ul style="list-style-type: none"> <li>RoadAI: scroll right on measurement grid</li> <li>Through interface: use SEND DATA request</li> </ul> |            |         |
| <b>Annual maintenance</b>               |   |  |            |         |
| 1                                       | Clean surface temperature sensor                      | <a href="#">Cleaning surface temperature sensor (page 4)</a>   |            |         |
| 2                                       | Replace filter of air temperature and humidity sensor | <a href="#">Replacing filter of air temperature and humidity sensor (page 5)</a>   |            |         |
| 3                                       | Perform 3-step calibration                            | See <i>Vaisala Mobile Detector MD30 Setup Guide</i>  |            |         |
| <b>As needed</b>                        |   |  |            |         |
| 1                                       | Clean surface state sensor window                     | <a href="#">Cleaning surface state sensor window (page 3)</a>  |            |         |
| 2                                       | Replace air temperature and humidity sensor           | <a href="#">Replacing air temperature and humidity sensor (page 6)</a>   |            |         |
| 3                                       | Replace surface temperature sensor                    | <a href="#">Replacing surface temperature sensor (page 7)</a>  |            |         |
| <b>Notes for next maintenance check</b> |   |  |            |         |
|   |   |  |            |         |
|   |   |  |            |         |
|   |   |  |            |         |
|   |   |  |            |         |

**More information**

- [MD30 maintenance \(page 1\)](#)

