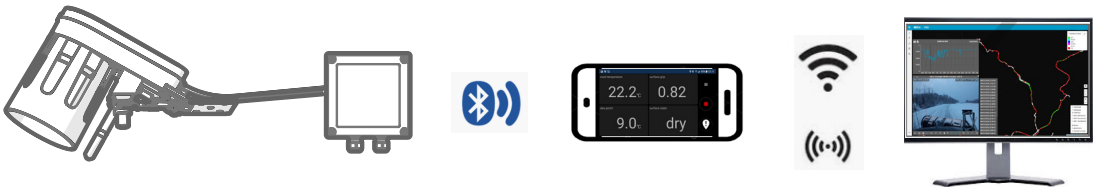
Setup Guide

Installation and Calibration
Vaisala Mobile Detector MD30

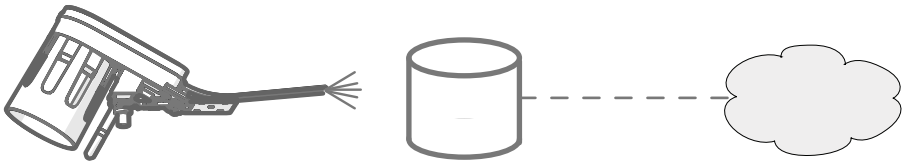
System Overview

System type 1: MD30 and Vaisala RoadAI



Mobile sensor MD30 | Bluetooth module enclosure | RoadAI phone app | RoadAI web app

System type 2: MD30 and other data collection system



Mobile sensor MD30 | In-cabin data collection system | Online server

This document instructs MD30 mobile sensor installation for system types 1 and 2.

Other MD30 instructions include:
1. *MD30 Product and Package Description*
2. *MD30 Maintenance and Troubleshooting*

For system type 1:
3. *RoadAI provisioning setup*
4. *RoadAI mobile application user guide*
5. *RoadAI Map user guide*

For system type 2:
6. *MD30 Interface Description*

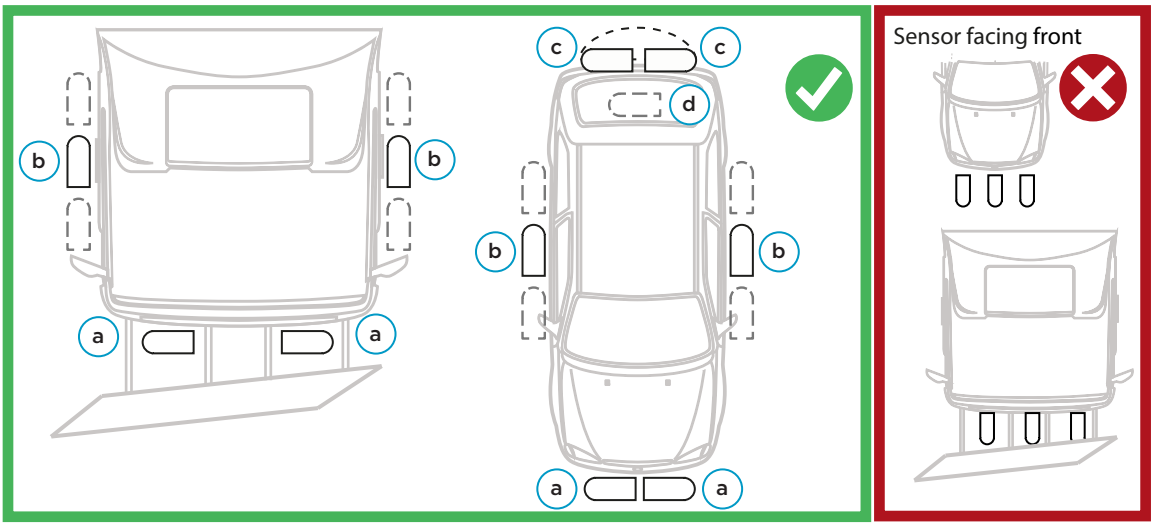
Hand tools not supplied by Vaisala. For more information, see document *MD30 Product and Package Description Reference Guide.*

Install the mobile sensor outside the vehicle.
Install the mobile phone, Bluetooth module, and other equipment and accessories inside the vehicle.

If you have trouble setting up MD30, see *Vaisala Mobile Detector MD30 Maintenance and Troubleshooting Quick Guide.*

1 Mounting MD30 on Vehicle

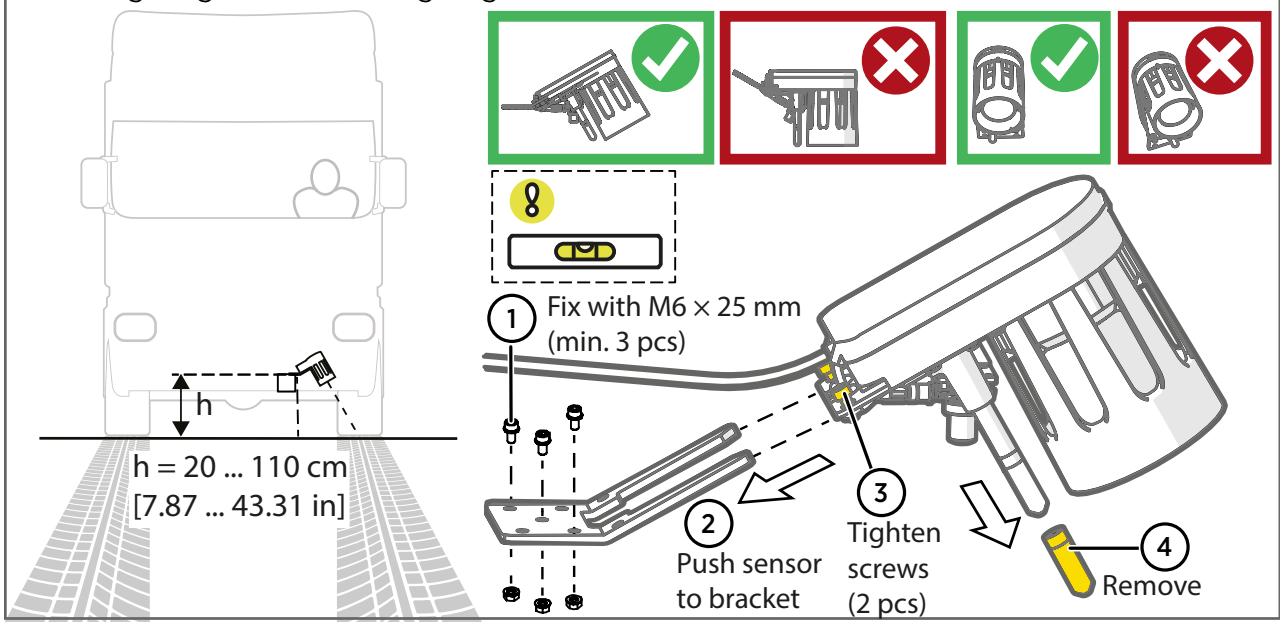
Sensor Location on Vehicle



Installation position suitability for measurements		a Front of car (behind plow)	b Side of car	c Back of car	d Under car
X_s	Surface state	++	++	+	++
T_s	Surface temperature	++	++	+	+++
T_a	Air temperature	++	+	−−	−−
T_d	Dew point and frost point temperature	++	+	−	−
RH	Relative humidity	++	+	−−	−−

You can detach the surface temperature sensor and air temperature and humidity sensor and install them separately if needed. See 1.1 on the next page.

Mounting Height and Mounting Angle

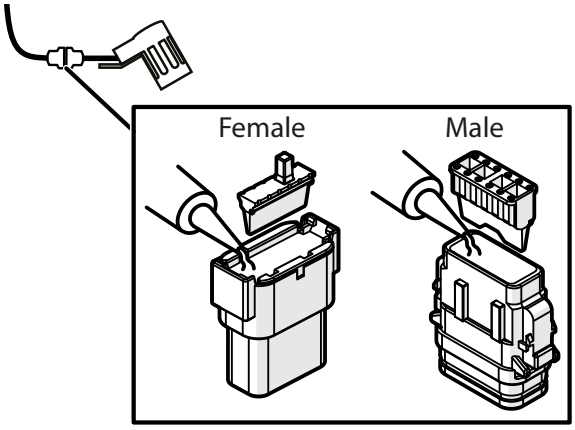


Depending on the vehicle, you may need to use a custom installation extension.

Make sure that air can flow freely through the hood. This helps to keep the hood clean.

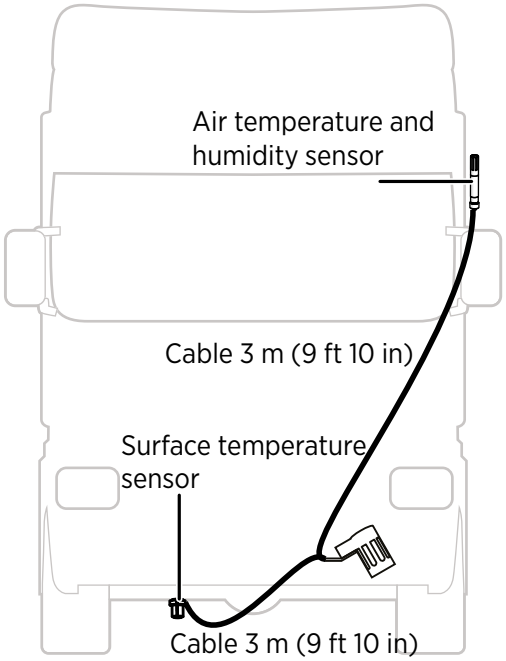
Finalizing Mounting

Apply electric joint compound to the connector between the mobile sensor and 8-m extension cable.



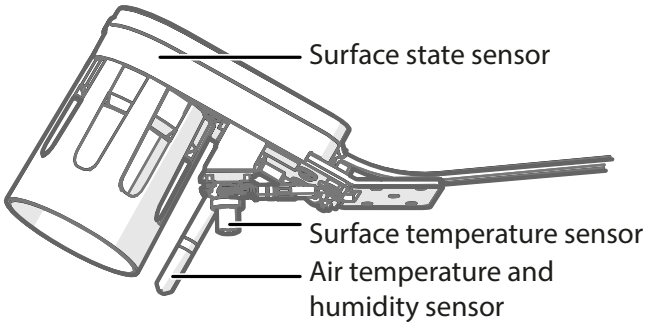
1. Use pliers to remove the orange parts from the female and male connectors.
2. Apply electric joint compound as shown.
3. Insert the orange parts back. Apply electric joint compound on the female connector.
4. Connect the 8-m (26-ft) extension cable to the mobile sensor.

1.1 Mounting Temperature Sensors Separately (Optional)



Install one of the temperature sensors or both separately if you suspect heat sources would cause inaccurate readings.

You need the 3-m (9 ft 10 in) cable. See *Vaisala Mobile Detector MD30 Maintenance and Troubleshooting Reference Guide*.



Air temperature and humidity sensor

1. Remove the screws (4 pcs).
2. Remove the black rubber cap by pulling the sensor through it.
3. Disconnect the sensor cable.
4. Select a place for the sensor, for example under the side mirror of the vehicle.
5. Connect the 3-m (9 ft 10 in) cable between the temperature sensor and MD30 sensor body.
6. Mount the temperature sensor using a fixture of your choice. Attach the cable with cable ties to the vehicle.

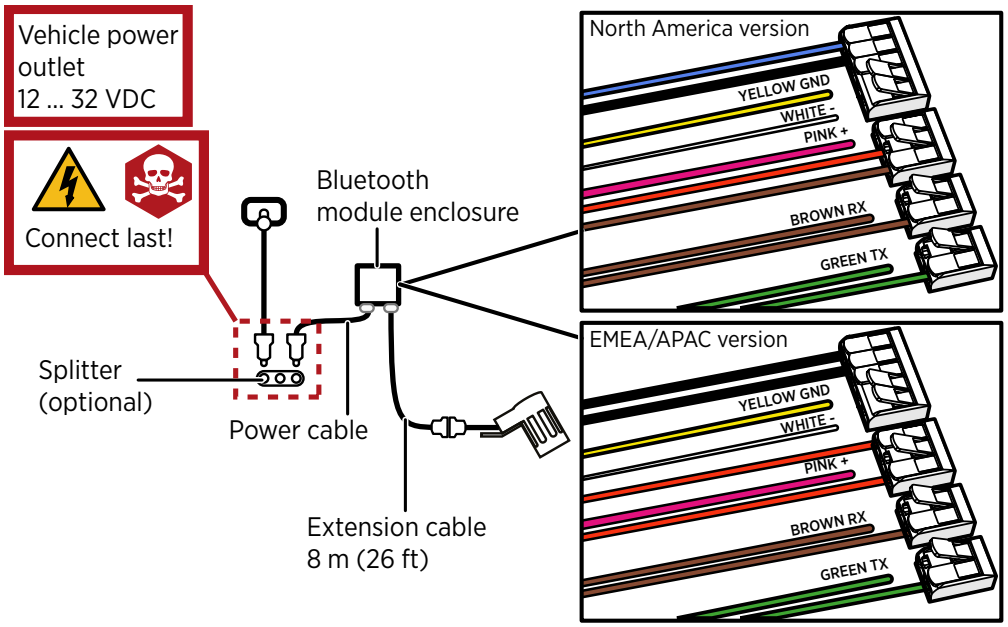
Surface temperature sensor

1. Loosen the black rubber cap.
2. Disconnect the sensor cable.
3. Remove the screws (4 pcs).
4. Select a place for the sensor, for example under the vehicle.
5. Connect the 3-m (9 ft 10 in) cable between the temperature sensor and MD30 sensor body. Put back the rubber cap.
6. Mount the temperature sensor using a fixture of your choice. Attach the cable with cable ties to the vehicle.

2 System Type 1 Setup: MD30 and Vaisala RoadAI (with phone)

Cabling Bluetooth Module Enclosure

1. Select a suitable location for the Bluetooth module enclosure in the vehicle cabin.
2. Open the enclosure by removing the 4 screws and the lid.
3. Route the extension cable from the mobile sensor towards the Bluetooth module enclosure.
4. Connect the extension cable wires in the Bluetooth module enclosure as shown.

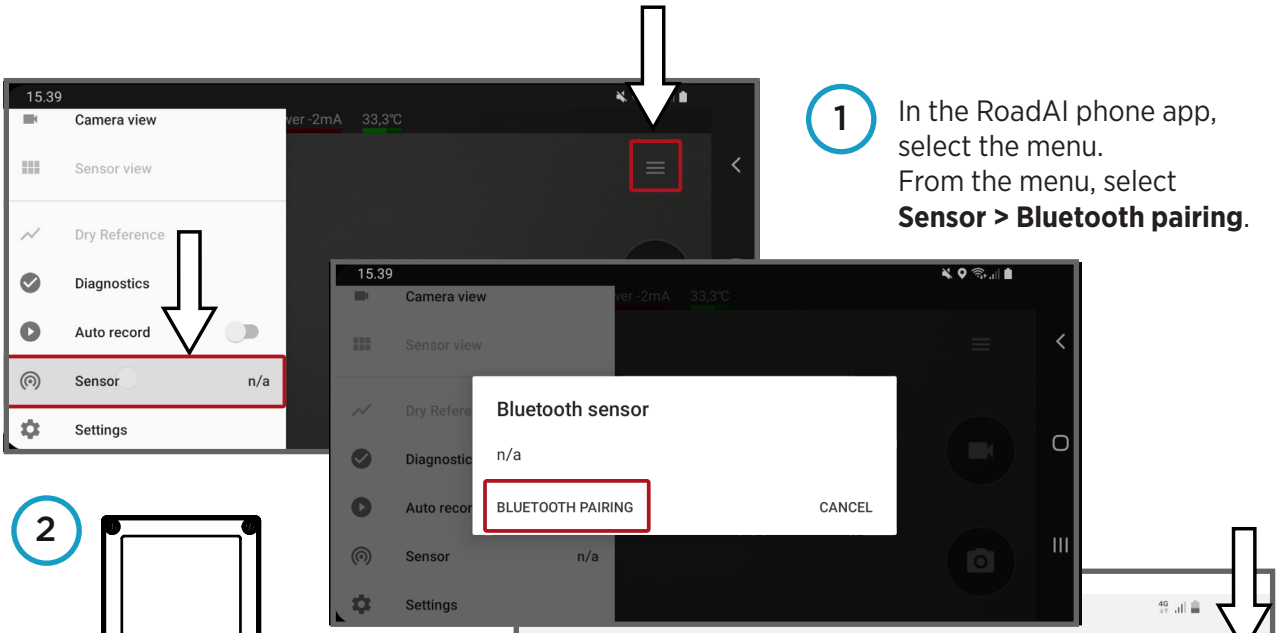


5. Route the power cable from the Bluetooth module enclosure next to the vehicle power outlet and connect it. If you use a splitter, connect that first. You can use the existing plug or unscrew the plug, strip the cable and connect the wires.
6. Attach the lid to the enclosure. Tighten the cable glands. Attach the enclosure to a suitable location in the vehicle cabin using adhesive tape or other fasteners. Secure the MD30 cable and connector to the vehicle with cable ties.

Configuring Phone

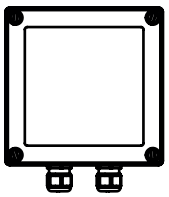
1. If you have not set up the RoadAI phone app, go to setup.vaisala.ai on the web and follow the instructions. Check also that you have the email from Vaisala RoadAI Support that you have received earlier.
2. When done, make sure that the phone is showing the following.

Setting up Data Transfer

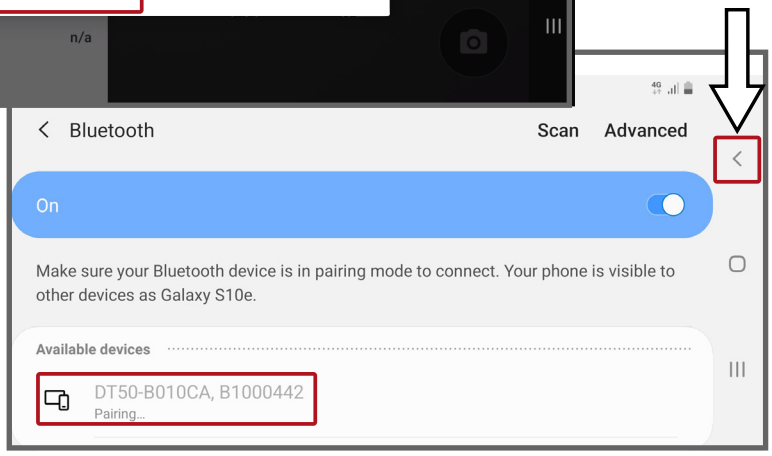


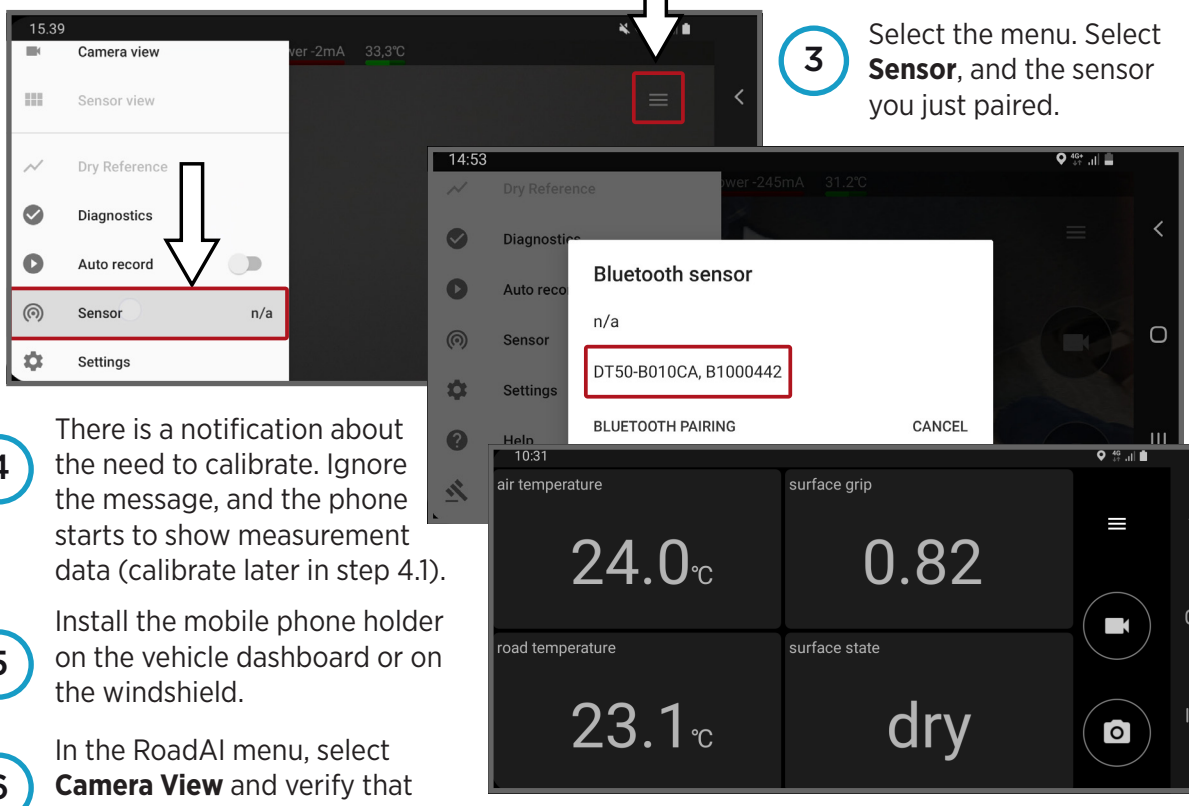
1 In the RoadAI phone app, select the menu. From the menu, select **Sensor > Bluetooth pairing**.

2



Pair the mobile phone with the Bluetooth module, which is shown with a serial number. The serial number is marked on the cover of the Bluetooth module enclosure. When paired, select the small arrow to go back.





3 Select the menu. Select **Sensor**, and the sensor you just paired.

4 There is a notification about the need to calibrate. Ignore the message, and the phone starts to show measurement data (calibrate later in step 4.1).

5 Install the mobile phone holder on the vehicle dashboard or on the windshield.

6 In the RoadAI menu, select **Camera View** and verify that the camera has a clear view of the road.

Continue to step 4.1.

3 System Type 2 Setup: MD30 and Other Data Collection System (no phone)

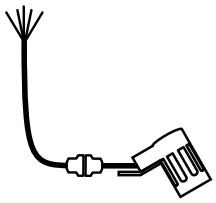
Preparations

For direct data transfer from the mobile sensor to an in-cabin data collection system, implement the MD30 interface. The data is transferred in binary format using RS-232 communication.

The MD30 interface is described in *Vaisala Mobile Detector MD30 Interface Description*.

Cabling and Data Transfer

1. Connect the open-ended extension cable to your vehicle system. The pinout is shown in the table.

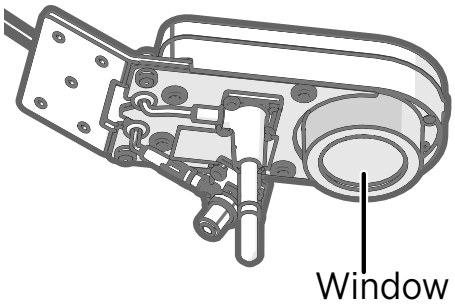


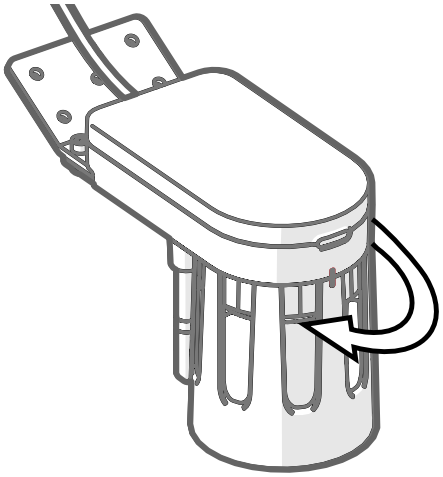
Wire Color	RS-232/Power
Pink	Vin+
White	Vin-
Yellow	GND (RS-232)
Green	TX (RS-232)
Brown	RX (RS-232)

Continue to step 4.1.

4.1 Calibration Step 1: Cleaning Surface State Sensor Window

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.





3. Clean the hood.
4. Attach the hood to the body by turning the hood clockwise 180 degrees. Make sure that the markings in the hood and sensor body are aligned (see next page).

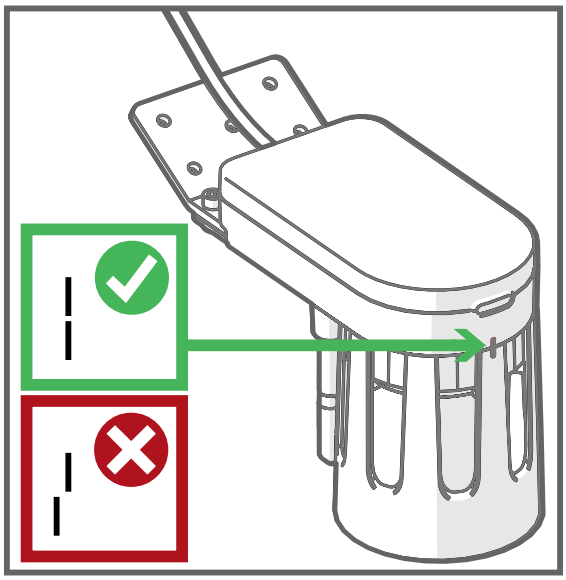
For the cleaning instructions, see *Vaisala Mobile Detector MD30 Maintenance and Troubleshooting Reference Guide)*.

4.2 Calibration Step 2: Plate Adjustment

Plate adjustment minimizes the effects caused by different installation heights and differences between individual mobile sensors. Repeat this procedure when changing the installation position.

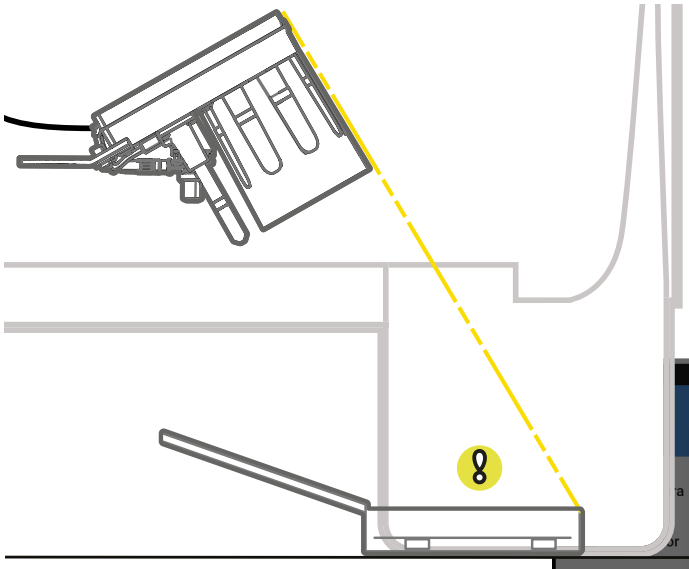
Requirement	Description
Mobile sensor placement	Installed on vehicle
Vehicle position	At a standstill
Reference plate surface	Dry, no condensation
Conditions, indoors	Clean and dry space
Conditions, outdoors	No precipitation or fog

1. Before you start, check that the markings in the body and hood are aligned as shown.

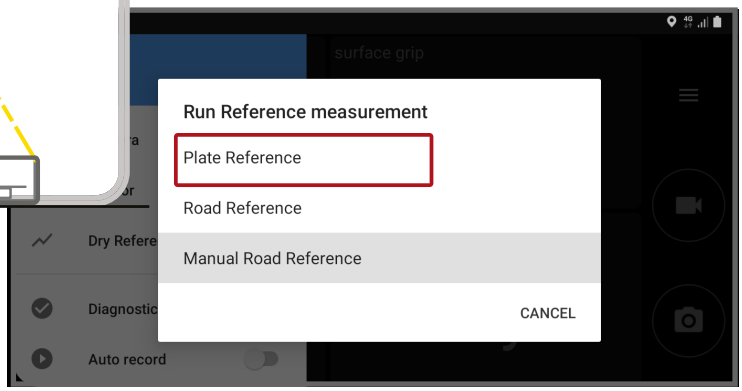


2. Open the reference plate container. Check that the reference plate is clean and dry. If it is not, carefully remove the dirt.

3. Place the reference plate so that the line from the sensor is towards the edge of the container.



4. Check that the mobile sensor is powered and operational (green LED in the mobile sensor is blinking). Check that there are no error messages.



5. Depending on your system:
- System type 1: In RoadAI phone, go to the menu and select **Dry Reference > Plate Reference**.
- System type 2: Through MD30 interface, give the command SET REFERENCES > PLATE.

The adjustment takes typically 30 seconds. If the adjustment was not successful, repeat the procedure. In the RoadAI phone, check possible error messages from **Diagnostics**.

6. Close the container.

CAUTION! Handle the reference plate with care and keep it clean. Avoid scratching the surface. The reference plate is made of optically reflective material.

4.3 Calibration Step 3: Road Type Adaptation on Dry Road

Road type adaptation optimizes the operation in the road surface that is representative of the most common surface type in the area of interest.

Option 1 - Automatic input:
Recommended for first-time use of sensor and first adaptation for the specific road surface type.

Requirement	Description
Mobile sensor location	Installed on vehicle
Vehicle position	Moving
Surface state	Completely dry road surface
Surface condition	Old asphalt; avoid newly laid asphalt
Surface material	Prefer asphalt over concrete unless concrete is the most common surface material in the area of interest

Road type adaptation driving on dry road

1. Select a location where the road surface type is representative of the most commonly existing surface type in the area of interest.
2. Check that the mobile sensor is reporting data and there are no errors.
3. - System type 1: In RoadAI phone, select **Dry Reference > Road Reference**.
   - System type 2: Through the MD30 interface, give the command SET REFERENCES > ROAD.
4. Drive for a minimum of 30 seconds on dry road. Check possible error messages.
   When measurement is done, write down the surface coefficients to use later on with option 2:
   - System type 1: In RoadAI, scroll right in the **Sensor View**.
5. - System type 2: Read parameters 0x53, 0x54 and 0x55 with command GET PARAMETER.
   If the adaptation was not successful, repeat the procedure.

Option 2 - Manual input:
Recommended when road type adaptation has been done on a similar road surface before and surface coefficients are known.

Enter surface coefficients

1. - System type 1: In RoadAI, select **Dry Reference > Manual Road Reference**.
   - System type 2: Through MD30 interface, give the command SET ROAD COEFFICIENTS.
2. Type the 3 values. The adaptation is complete.

Option 3 - Factory settings:
Road not dry, surface coefficients not known

If dry road is not available, use the factory-set surface coefficients until you can do road type adaptation on dry road.

5 Verifying RoadAI Operation

1. Connect the mobile sensor and mobile phone to the vehicle power outlet. Start the car.
2. In RoadAI phone app, enable **Auto-record**. RoadAI automatically starts recording data when the mobile phone is connected to a charger and stops when charging is disconnected.
3. In the RoadAI phone app, check **Diagnostics**. Under heading **Upload**, check that uploading is ongoing.
4. Log in to the web app at https://map.vionice.io and check that data is visible.

Done

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