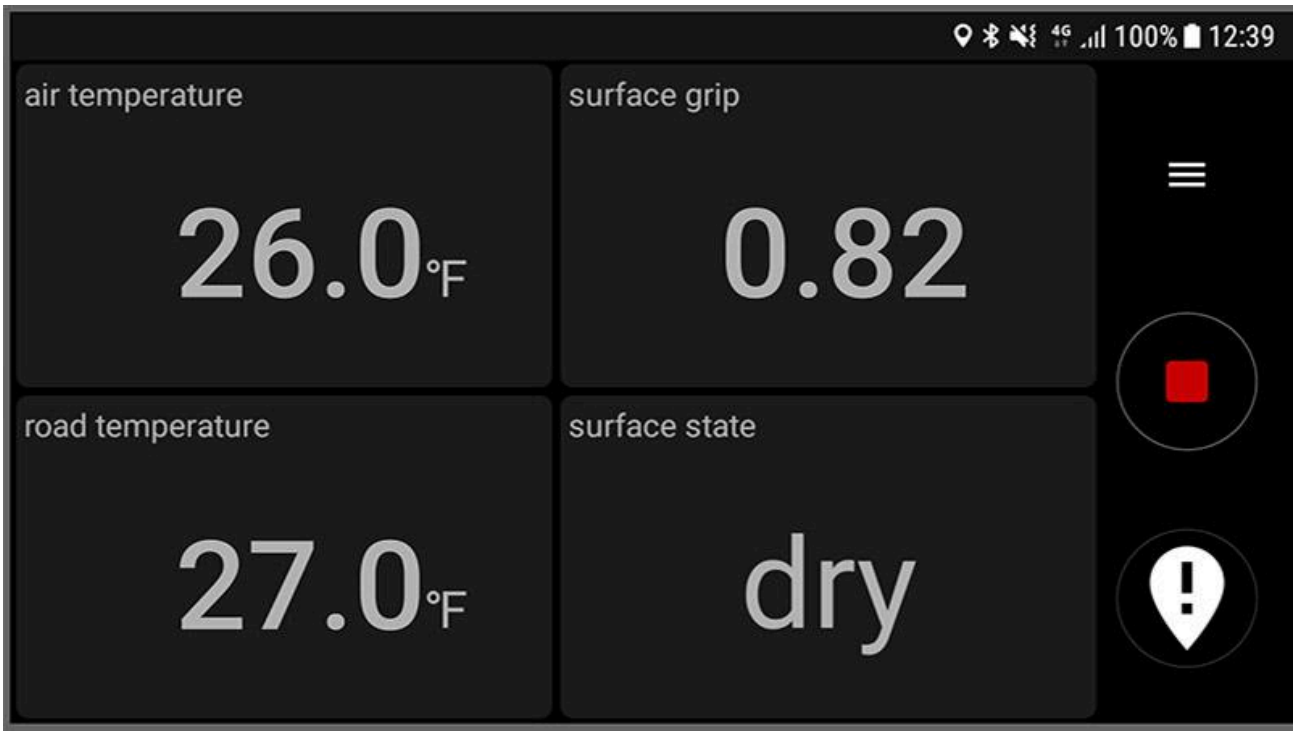
USER GUIDE

MD30

Vaisala · Authorized Partner

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M213213EN-A

User Guide

MD30 Mobile App and Wx Horizon

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Vaisala Oyj
Vanha Nurmijärventie 21, FI-01670 Vantaa, Finland
P.O. Box 26, FI-00421 Helsinki, Finland
+358 9 8949 1
vaisala.com
docs.vaisala.com

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Table of contents

1. About this document 5
1.1 Version information 5
1.2 Related manuals 5
1.3 Trademarks 5

2. Overview 6
2.1 MD30 Mobile with MD30 6
2.2 Mobile Detector MD30 6
2.3 MD30 data collection 7

3. MD30 Mobile app setup 9
3.1 Setting up Android mobile device 9
3.2 Setting up MD30 Mobile app 13
3.3 Pairing Bluetooth module (MD30 Mobile) 18
3.3.1 MD30 Mobile screen elements 21
3.4 MD30 calibration 22
3.5 Verifying MD30 operation 22

4. Viewing MD30 data with Wx Horizon 25
4.1 Logging into Wx Horizon for the first time 25
4.2 Wx Horizon user interface 26
4.3 Viewing mobile sensor observations 28
4.4 Viewing MD30 fleet summary 30
4.5 Viewing mobile sensor errors and warnings 32
4.5.1 Error messages 33
4.5.2 Status information 35
4.6 Editing MD30 details 37

5. MD30 data API 38

Warranty **39**

Technical support **39**

1. About this document

1.1 Version information

This document provides instructions for using Mobile Detector MD30 with Wx Horizon.

Table 1 Document versions (English)

Document code	Date	Description
M213213EN-A	April 2025	First version.

1.2 Related manuals



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

Table 2 Related manuals

Document code	Name
M212998EN	Vaisala Mobile Detector MD30 User Guide
M212201EN	Vaisala Mobile Detector MD30 Interface Description
M212535EN	Vaisala Mobile Detector MD30 Release Notes

1.3 Trademarks

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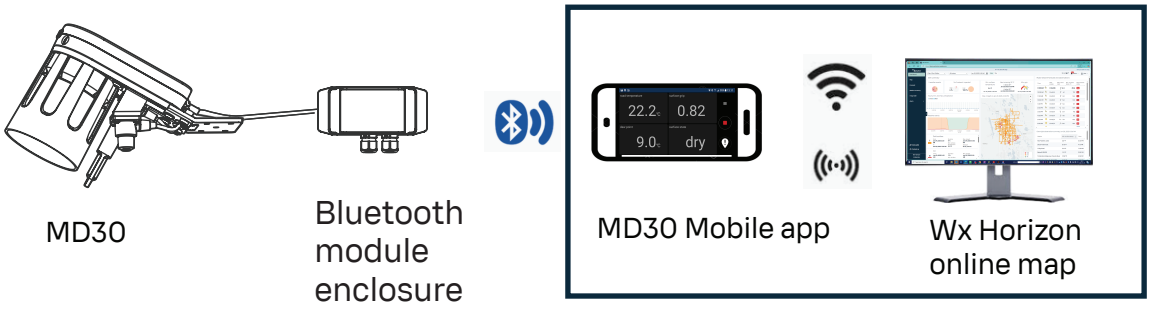
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2. Overview

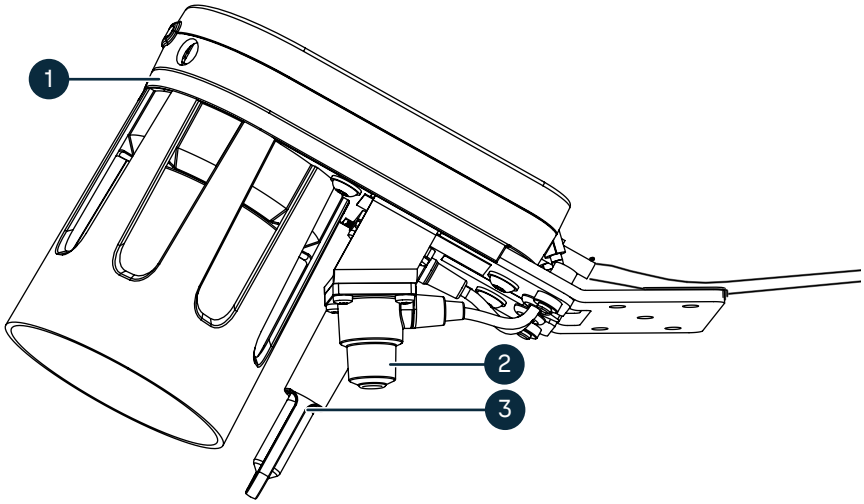
2.1 MD30 Mobile with MD30

MD30 data is sent over the Bluetooth module to the MD30 Mobile app and to the online map. MD30 Mobile is a mobile app for the driver for visualizing MD30 data. An online map is for viewing recorded data.



2.2 Mobile Detector MD30

MD30 is a road condition detector that houses the following sensors.



1 Surface temperature sensor detects if the road is slippery.
2 Surface state sensor detects if the road is cold.
3 Air temperature and humidity sensor detects if the air is cold or humid.

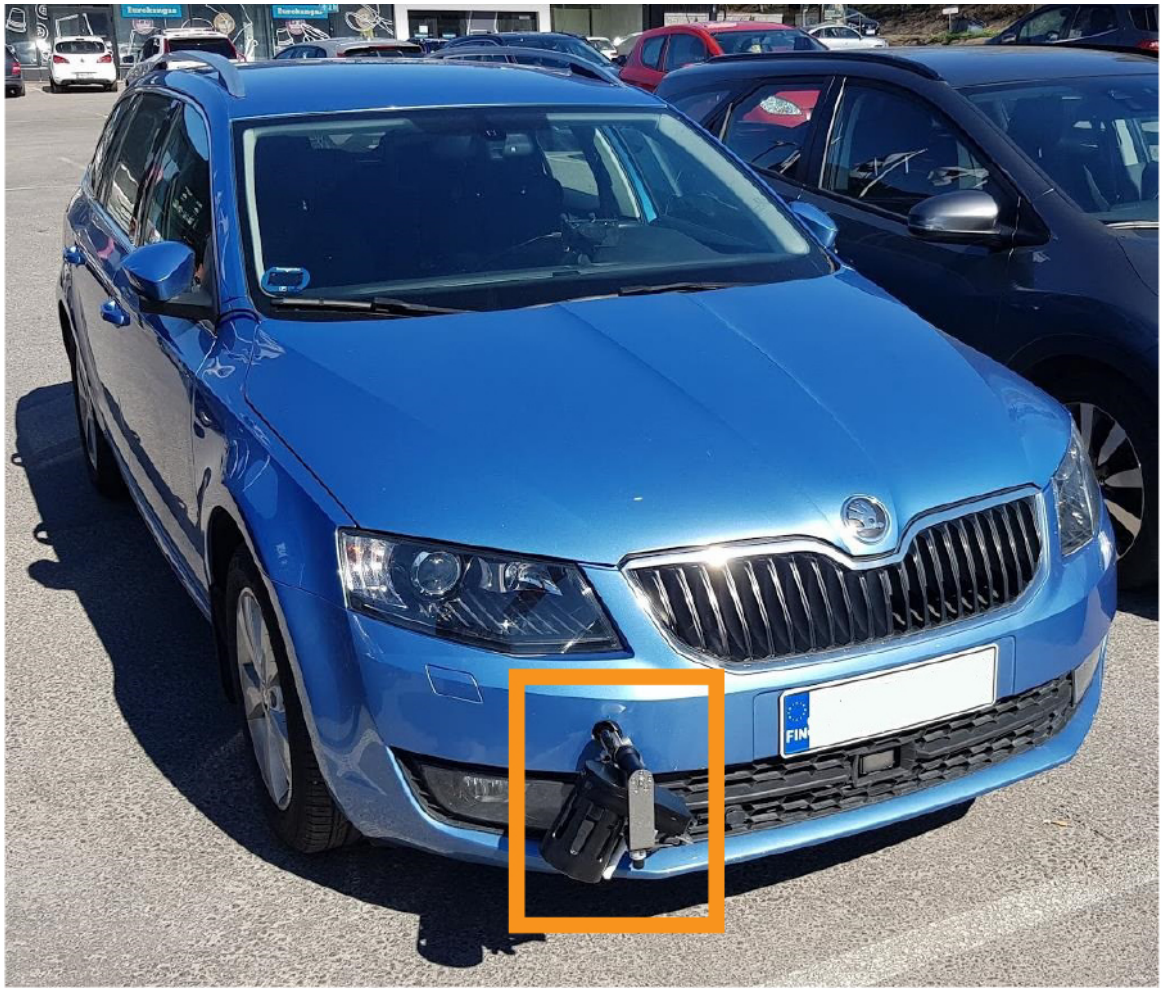


Figure 1 MD30 in front of car



Figure 2 MD30 on winter service vehicle

2.3 MD30 data collection

MD30 data can be collected and locally visualized with Vaisala MD30 Mobile application. The app can record data and take photos.



Figure 3 MD30 Mobile app showing live sensor data to driver

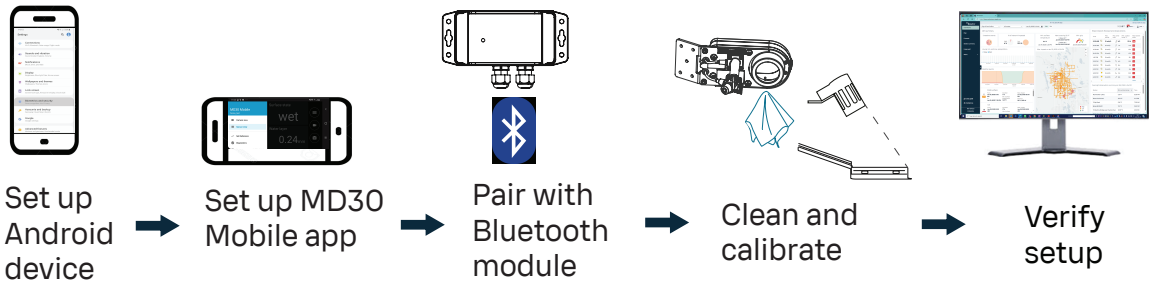
Wx Horizon online map combines sensor data, camera photos, and the GPS location. The color-coded routes are based on MD30 data.



Figure 4 MD30 data and optional photos

3. MD30 Mobile app setup

MD30 Mobile app setup process:



More information

- Setting up Android mobile device (page 9)
- Setting up MD30 Mobile app (page 13)
- Pairing Bluetooth module (MD30 Mobile) (page 18)
- MD30 Mobile screen elements (page 21)
- MD30 calibration (page 22)
- Verifying MD30 operation (page 22)

3.1 Setting up Android mobile device

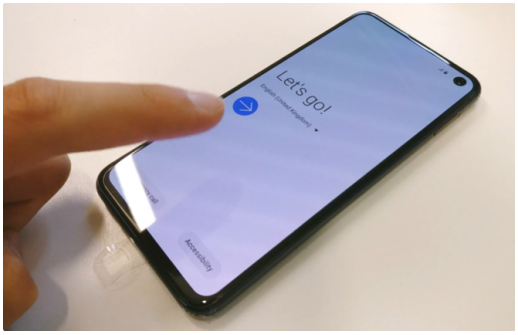
Use the mobile device for displaying and handling MD30 sensor data only.

- If you have a new Vaisala mobile device, it is ready for setup.
- If you are using an old mobile device, remove any Google accounts from it. When Google accounts are removed, perform a factory reset. Use the mobile device search function to find the factory data reset settings on your mobile device.

MD30 Mobile app is designed for Android mobile devices. Vaisala recommends using Samsung S and A Series mobile devices (Android version 10, or newer).
MD30 Mobile may also function on other Android mobile devices but full compatibility cannot be guaranteed.

1. If available, insert an SD card and a SIM card in the mobile device.

2. To turn on the mobile device, hold down the power button.
3. If prompted, enter the SIM card PIN code and wait for the welcome screen.
4. To bypass the installation process, open the QR code scanner. Tap an empty spot on the welcome screen 6 times.



You can access the QR code scanner from this view only. You cannot use other QR code scanning applications for this installation process.
If you cannot return to this view, perform factory reset again.

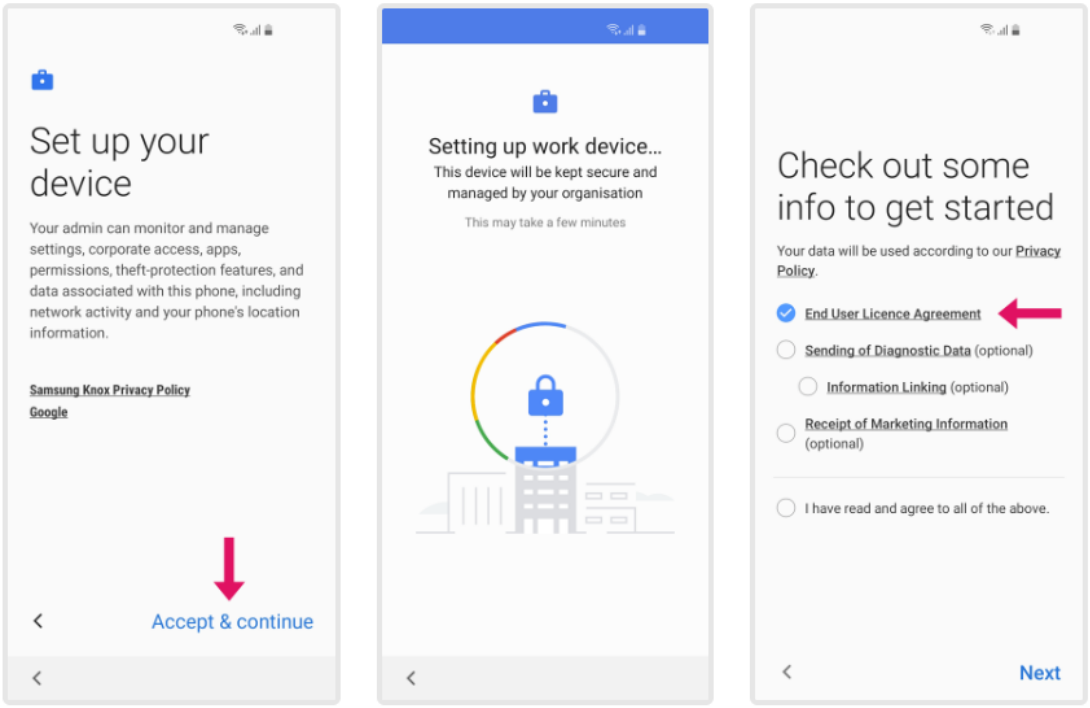
5. Scan the QR code.

If you do not have mobile data, you are prompted to connect to a Wi-Fi network. If prompted, accept using location data and accept the settings and legal terms. Company Wi-Fi networks are often protected and you may not be able to install the mobile app in a protected network. Try using a non-protected Wi-Fi, such as a hotspot of another Android phone.

6. Install MD30 Mobile app.
   a. When prompted **Set up your device**, select **Accept & continue**.

      The setup takes a few minutes.

   b. When prompted, select **End user licence agreement** and then **Next**.



MD30 Mobile start screen opens.



- V opens MD30 Mobile app and checks for new app versions.
- ⚙ opens settings.

For other MD30 Mobile icons, see MD30 Mobile screen elements (page 21).

7. Select and depending on if you have a SIM card, do one of the following.
   a. If you have a SIM card, disable the SIM card lock.

      Use the Android mobile device search function to find the SIM card lock setting and disable it.
      If the SIM card lock is enabled, it may prompt the password every time when the vehicle starts and disturb the autorecord function.

   b. If you do not have a SIM card, go to step 9.
8. If you have a SIM card, enable mobile data.

   Use the Android mobile device search to find mobile data settings.
9. To dim the screen in the camera view mode when the device is not in use, disable the always on display setting.

   Use the Android mobile device search function to find the always on display setting.

   In hot environments, Vaisala recommends disabling the always on display feature to avoid excessive heating.

When you have finished configuring your Android mobile device settings, configure MD30 Mobile settings.

More information

- MD30 Mobile app setup (page 9)

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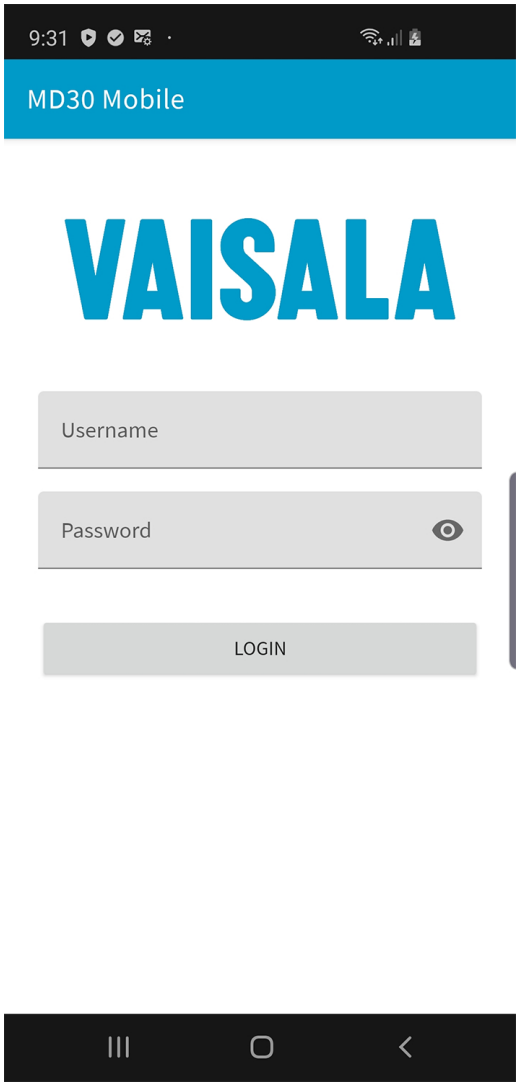
3.2 Setting up MD30 Mobile app

1. To open MD30 Mobile, select V.



2. Log in to MD30 Mobile with the credentials sent to you in the Vaisala MD30 Mobile setup email. You must log in before first use. For this you need an Internet connection.

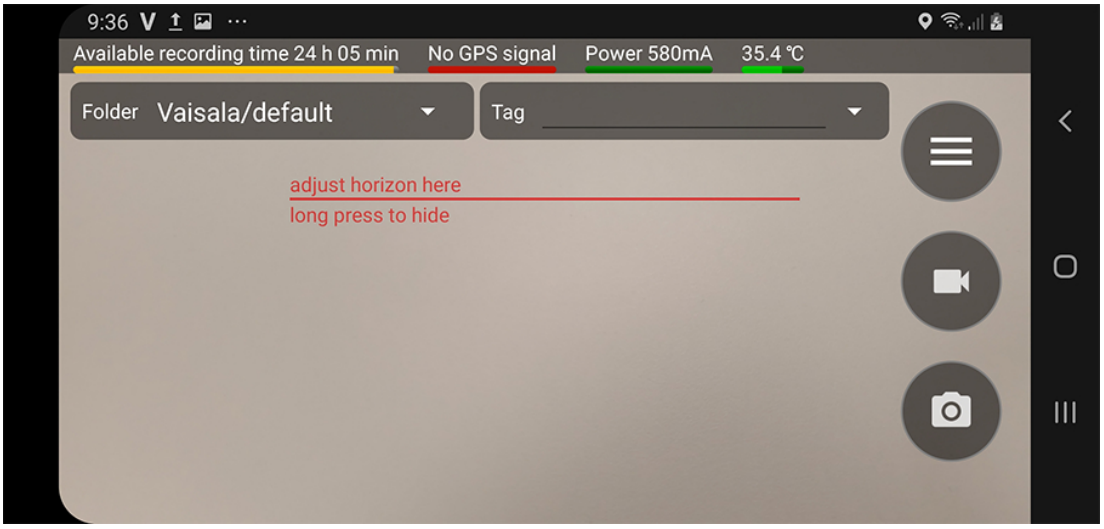
   The MD30 Mobile login credentials are automatically generated usernames, not email addresses.



Use only 1 account per mobile device.

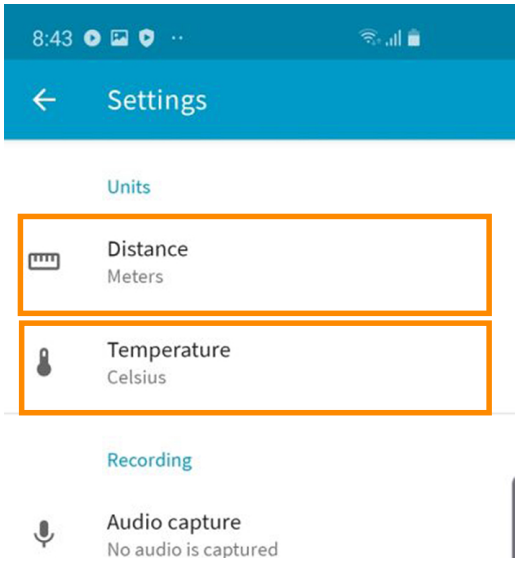
The camera view opens.

3. Mount the mobile device inside the vehicle so that the camera shows the road surface.
   a. Place the suction cup against the window and lock it.
   b. Make sure that the camera shows the road surface, adjust horizon as guided on screen, and lock the mobile device holder arm.
   c. Place the mobile device on the holder with the power button upwards so that the holder does not cover the camera lens or the mobile device buttons.
   d. Select your customer folder in **Folder**.

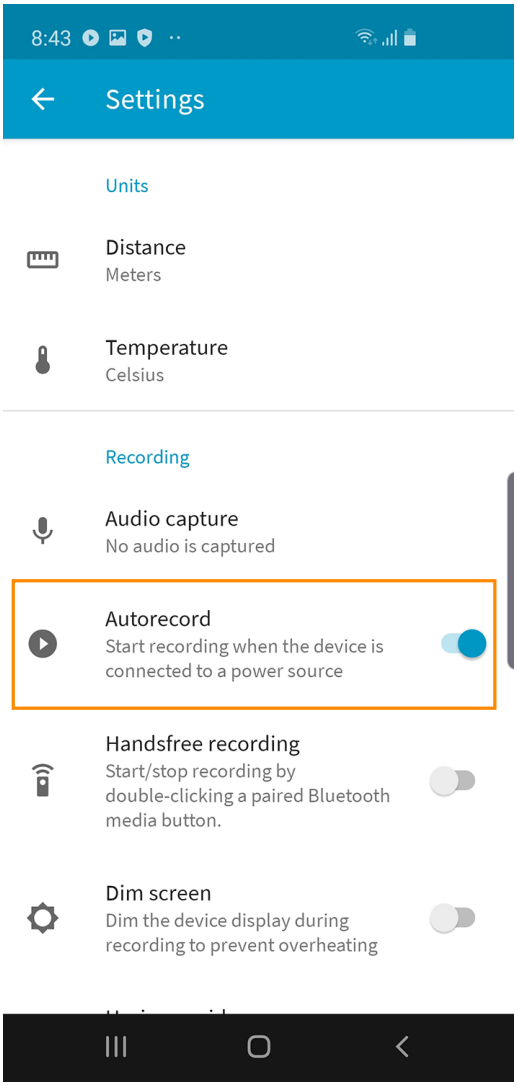


For a video showing how to mount the mobile device holder, see http://vaisala.com/en/support/md30.

4. To adjust MD30 Mobile settings to your needs, select ☰ and go through the settings.
   a. Select the distance and temperature units to use.



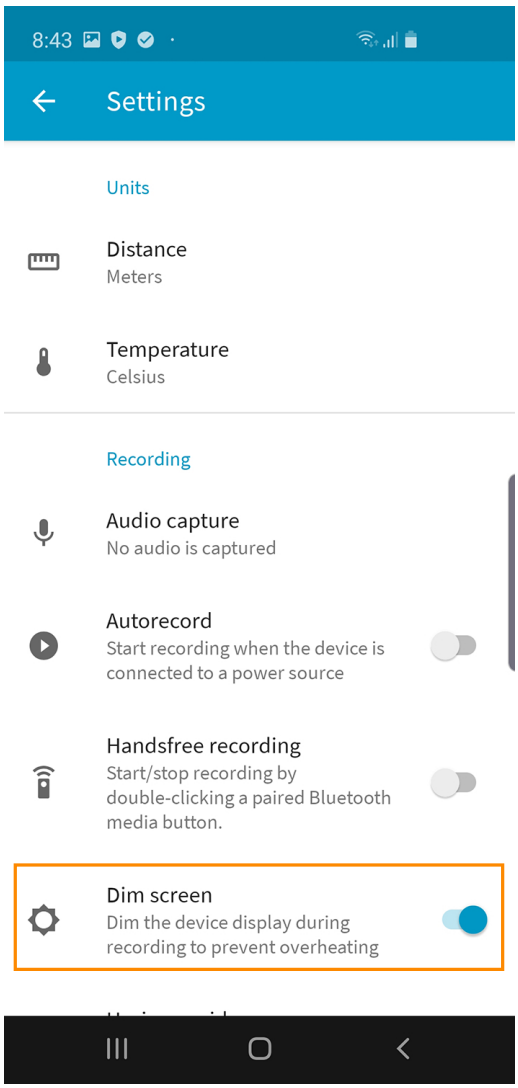
   b. If you want to enable automatic recording, select **Autorecord**.



You must enable features such as autorecord and screen dimming both in the Android mobile device settings and MD30 Mobile settings.

When autorecord is selected, MD30 starts recording when it is connected to a power source.

c. To prevent the mobile device from overheating in hot environments, select **Dim screen**.



When you have adjusted the MD30 settings that best suit your needs, pair the Bluetooth module.

More information

- MD30 Mobile app setup (page 9)

3.3 Pairing Bluetooth module (MD30 Mobile)

Bluetooth module BM10 is in responder mode. Pairing is activated automatically when you power on MD30 and the blue LED light is blinking.

Table 3 BM10 Bluetooth module LED lights

LED light	Description
Blue blinking	Pairing mode is active.

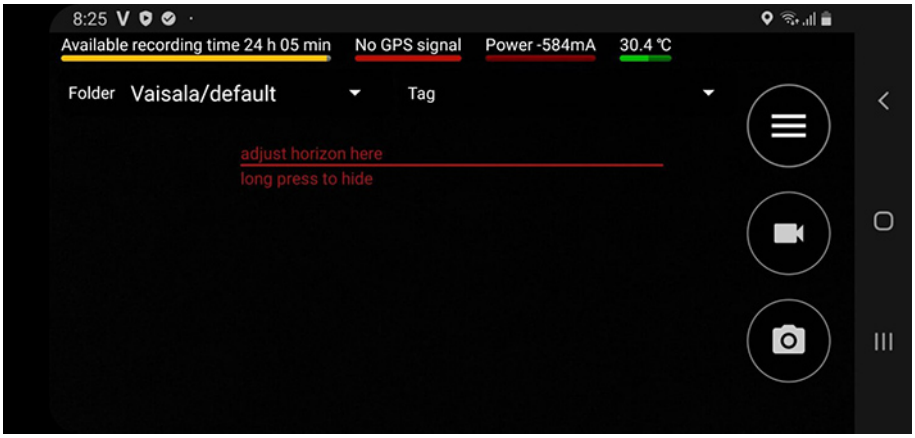
LED light	Description
Blue constant	Bluetooth connection is active.
Green	The device is on but there is no Bluetooth connection.
Red	Error. Try pairing again.

1. Switch on Bluetooth module BM10.

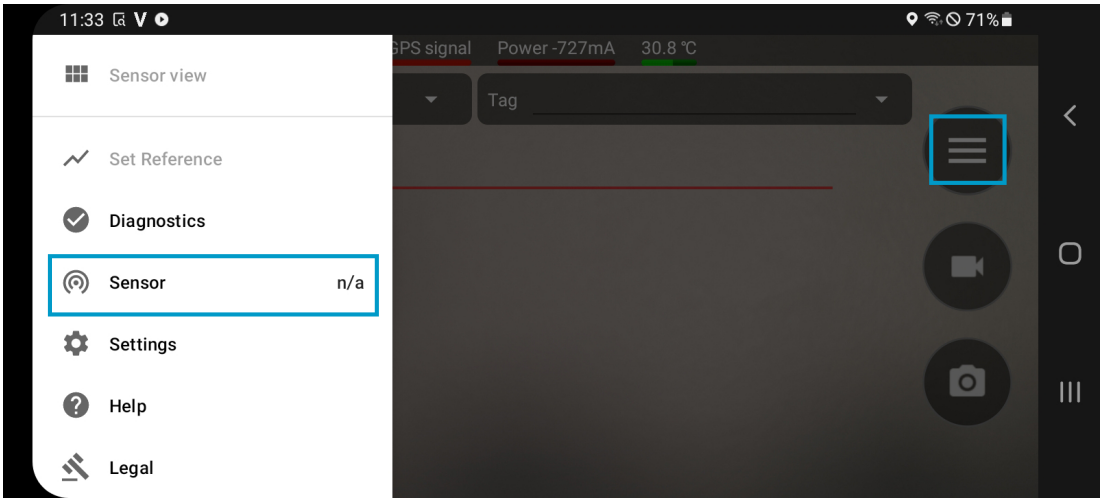
   The blue light starts blinking.

2. To open MD30 Mobile app, select V on MD30 Mobile start screen.

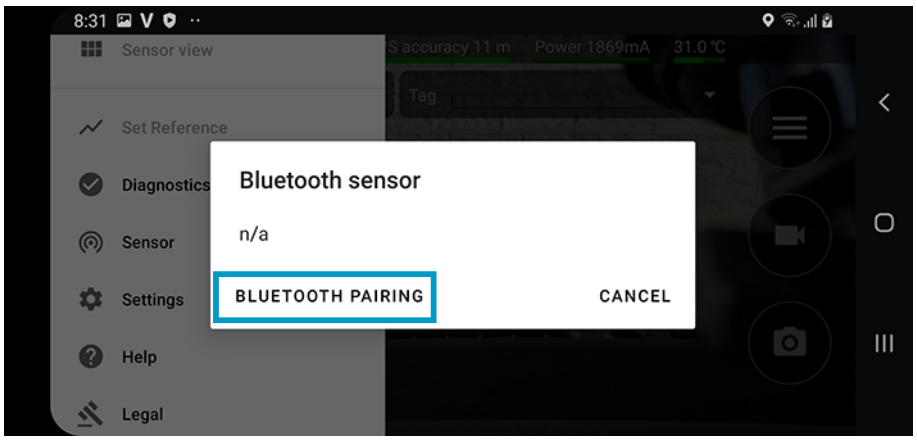
   Camera view opens.



3. To open the sidebar menu, select ☰ and then **Camera view** in the side bar menu. Verify that the camera has a clear view of the road.
4. To open the sidebar menu, select ☰ again and from the sidebar menu select **Sensor**.



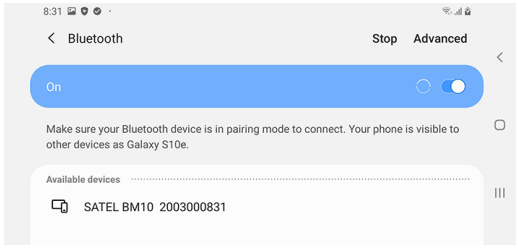
5. Select **Bluetooth pairing**.



6. Pair the mobile device with the Bluetooth module BM10 with the BM10 serial number. When paired, select < to go back.

> You can check your BM10 serial number from the cover of the Bluetooth module enclosure.

7. From the sidebar menu, select **Sensor**.
8. In the Android mobile device settings, make sure Bluetooth is on and select the sensor you just paired.



   If pairing is successful, the blue light turns constant. If the light is red, switch off the Bluetooth module power and perform the steps again.

After Bluetooth pairing, you can also access **Sensor view** with the measurements from the sidebar menu.

Camera view shows the camera view and **Sensor view** shows the sensor data.

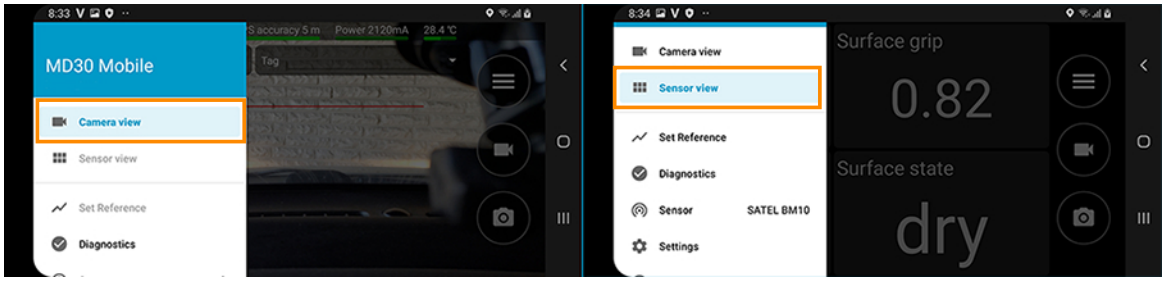
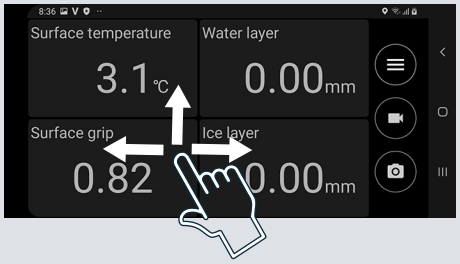


Figure 5 Camera view and Sensor view

In **Sensor view**, scroll from left to right to see all the measurements.
You can arrange the icons to best suit your needs: long-press and move the icons you need in the start view.



More information

- MD30 Mobile app setup (page 9)

3.3.1 MD30 Mobile screen elements

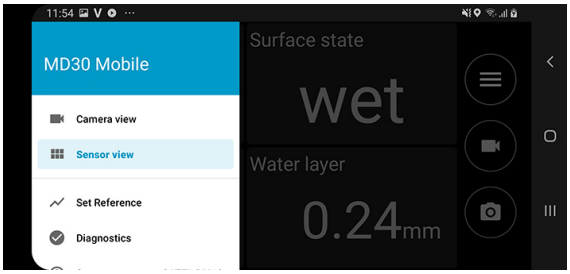
Icon	Description	Icon	Description
	Opens a list to settings and features.		Indicates recording is on.
	Starts camera and data recording.		Sends a note to the online map about interesting events.
	Takes single photos.		

When you want to start data and camera recording, make sure that you press on the recording button and the red recording light is on.

indicates that the recording is on.

indicates that the camera is ready to start recording.





The sidebar menu:

- **Sensor view** and **Camera view** for changing between views
- **Set reference** for calibrating the sensor
- **Diagnostics** for accessing the mobile device and sensor diagnostics
- **Sensor** for pairing MD30 Mobile application software with MD30 sensor through BM10
- **Settings** for other MD30 Mobile application settings

More information

‣ MD30 Mobile app setup (page 9)

3.4 MD30 calibration

Perform cleaning and plate calibration after setup. Follow the calibration instructions in MD30 User Guide.

More information

‣ MD30 Mobile app setup (page 9)

3.5 Verifying MD30 operation

For instructions on logging into Wx Horizon and viewing MD30 data, see Viewing MD30 data with Wx Horizon (page 25).

1. To check that the connection works, in Wx Horizon, go to **SETTINGS > Mobile sensors** and make sure that your mobile device shows on the list.

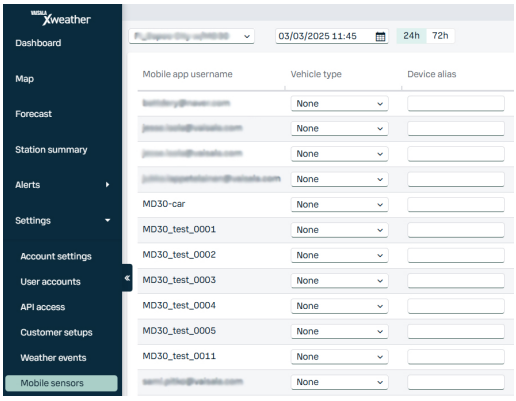


Figure 6 Recording data with application

2. On MD30 Mobile, go to the left sidebar menu and check the different diagnostics categories, especially **Upload** and **Connections**.

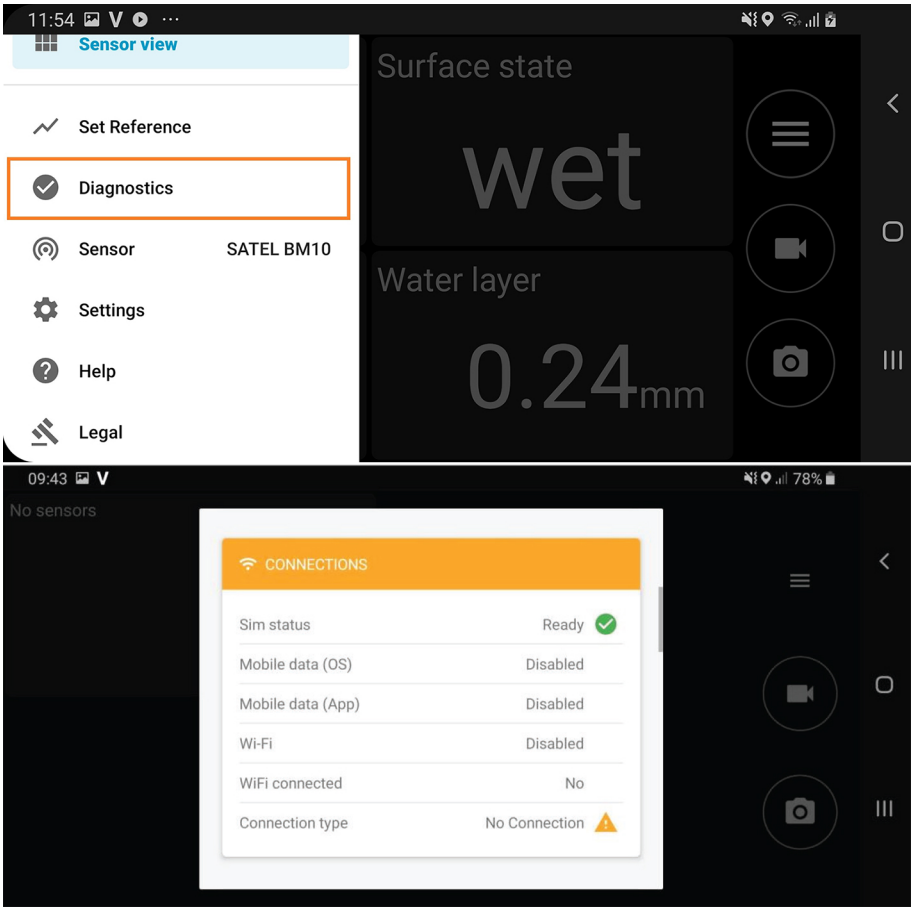


Table 4 Troubleshooting

Problem	Action
The mobile device does not have an active Internet connection.	Go to the mobile device settings and activate the connection.
Photos and data files cannot be uploaded.	Restart the mobile device.
The same username is used on multiple devices.	Log out from other devices. Use a different username on each device.

More information

- MD30 Mobile app setup (page 9)
- Viewing MD30 data with Wx Horizon (page 25)
- Logging into Wx Horizon for the first time (page 25)

4. Viewing MD30 data with Wx Horizon

These instructions describe Wx Horizon features that are useful for MD30 users. For Wx Horizon User Guide, go to http://guide.wxhorizon.vaisala.com.

More information

- Logging into Wx Horizon for the first time (page 25)
- Wx Horizon user interface (page 26)
- Viewing mobile sensor observations (page 28)
- Viewing MD30 fleet summary (page 30)
- Editing MD30 details (page 37)

4.1 Logging into Wx Horizon for the first time

1. Go to your emails and open the welcome email from Wx Horizon. It contains your login information, which includes a temporary password.
2. Follow the link in the email to the Wx Horizon website.
3. Enter your login information and select **Sign in**.
4. You will be prompted to change your password. Enter a new password and repeat it, then select **Send**.
5. Sign in with your new password.

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4.2 Wx Horizon user interface

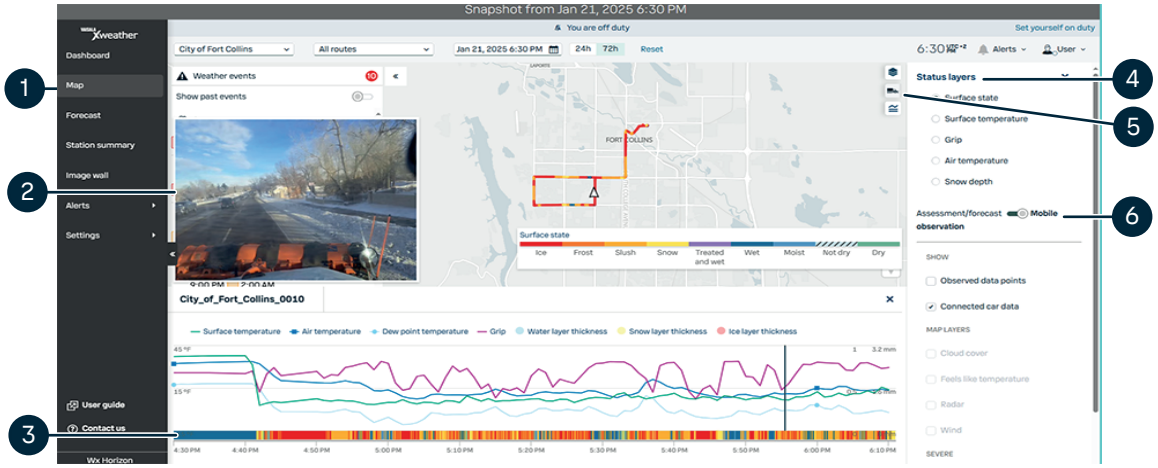


Figure 7 Wx Horizon user interface

1 Main menu
2 Camera view
3 Timeline
4 Status layers and air temperature
5 Drives icon
6 Assessment/Forecast - Mobile observations toggle

Map view

To see the map, in the main menu, go to **Map**.

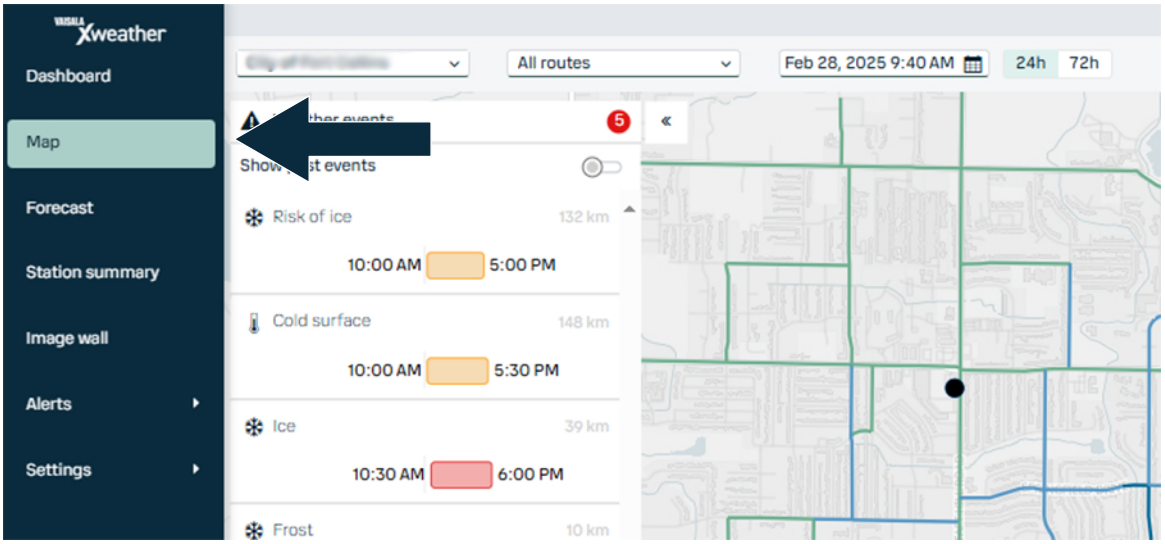


Figure 8 Map view

You can set the observation time with the timeline located at the bottom of the screen or you can use the snapshot view to see the data of a specific date and time.

Timeline

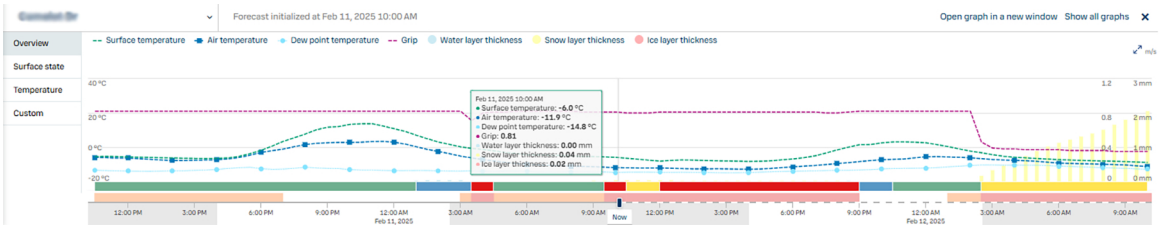


Figure 9 Timeline

You can adjust the time span of the timeline with the 24 h / 72 h toggle. The selection affects what is visible in the graphs.

- If you select 24 h, the timeline at the bottom of the screen goes from -24 hours to +24 hours.
- If you select 72 h, the timeline goes from -24 hours to +72 hours.

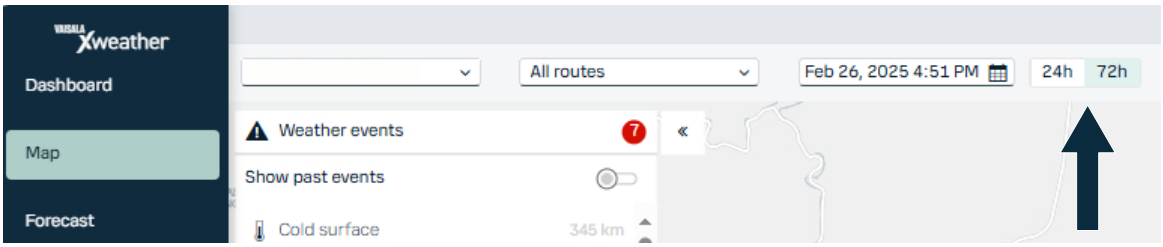


Figure 10 Timeline toggle

Snapshot mode

In the snapshot mode, you can see all the data as it appeared at a specific date and time in the past. Select a time when the vehicle was driven in the area.

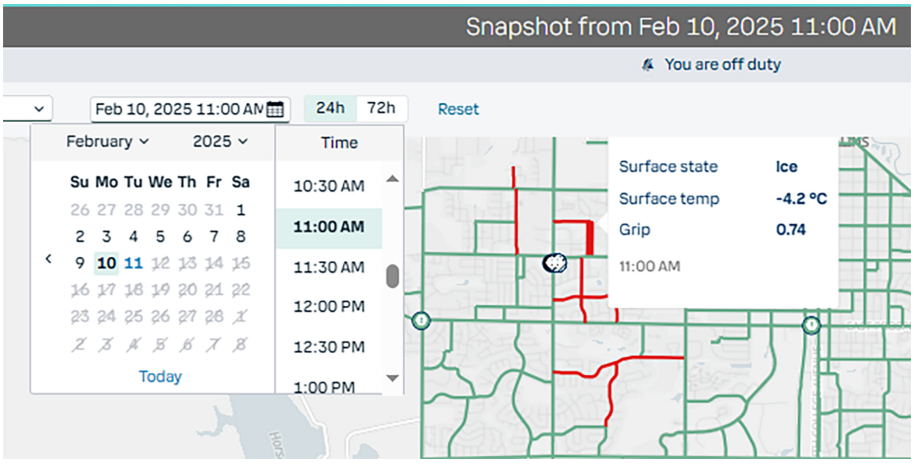
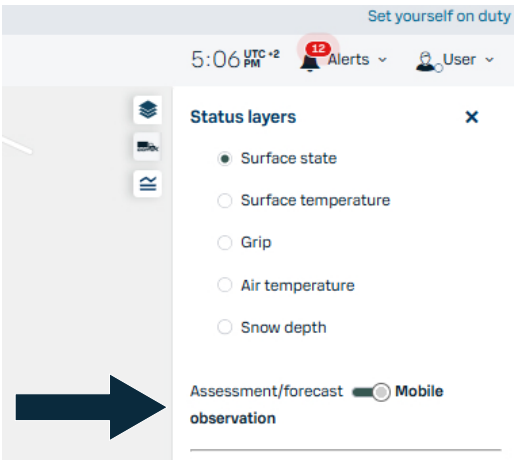


Figure 11 Snapshot

To go back to current time, select **Reset**.

4.3 Viewing mobile sensor observations

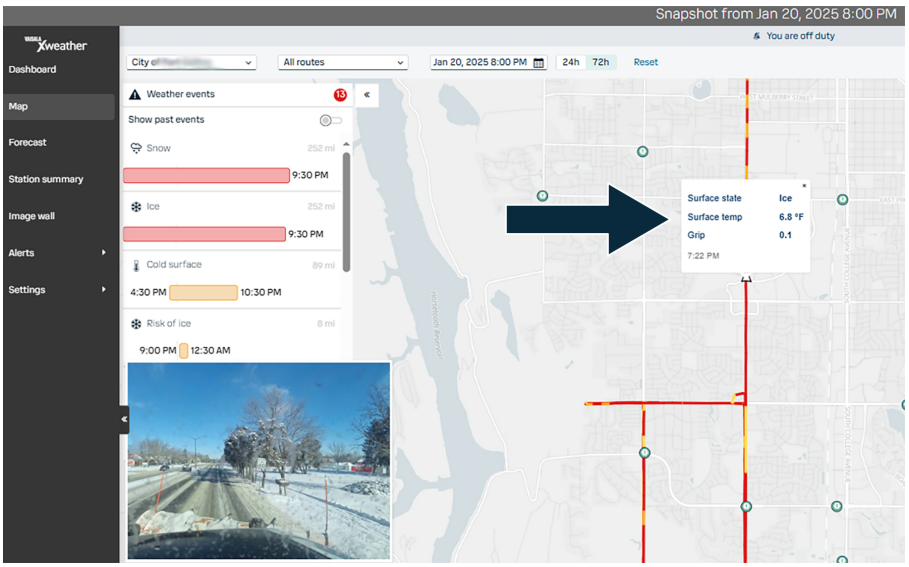
1. To view MD30 observations, in the main menu, go to **Map** and select **Mobile observation** in the **Status layers** panel.



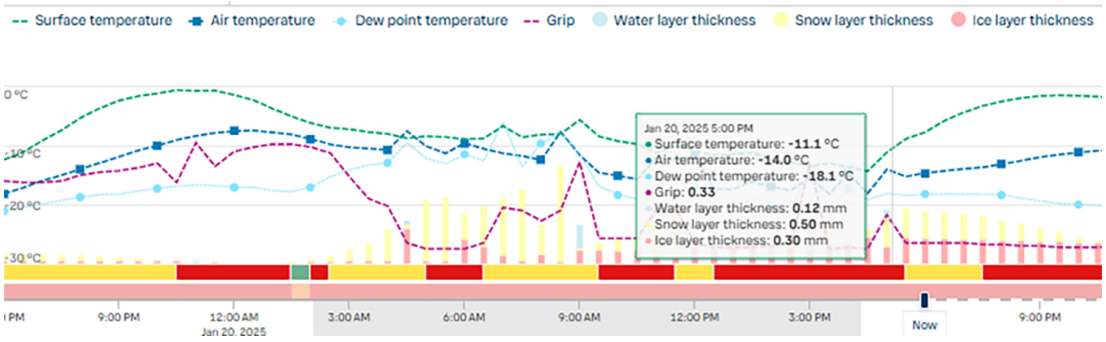
2. To open the list of drives, select the drives icon at the top right of the map or select a drive from the map.

> By default, the drives displayed are from the past 2 hours. To increase or decrease the time window, adjust the 2-hour gap selected in the timeline.
> - To see drives from the past 24 hours, use the timeline.
> - To see drives that are older than 24 hours, use the snapshot mode.

3. To view the details of the drive on the map at a specific moment, hover over the map with the cursor. To view the photo, click the drive.

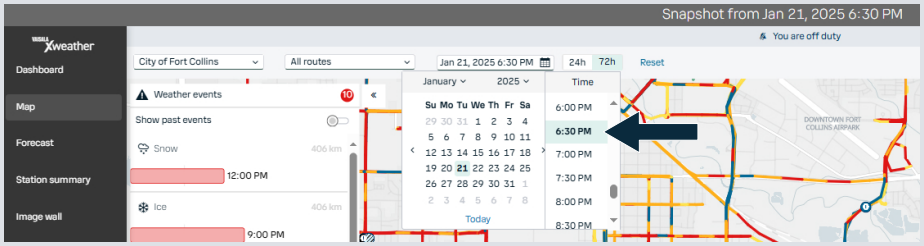


4. To view the details about water, snow, or ice layer thickness, hover over the timeline.

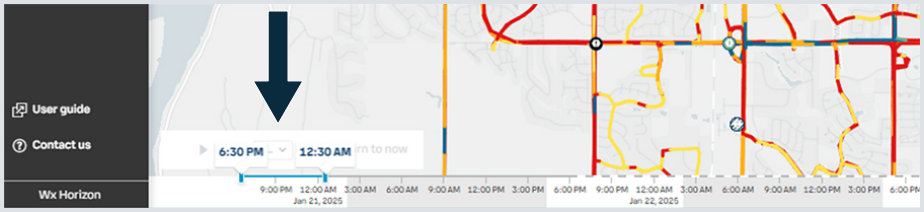


You can use millimeters instead of inches for measuring layer thickness. Using millimeters makes it easier to read small amounts.
To edit the units, in the main menu, go to **Settings > Account settings**.

When you want to the see drives of a specific moment of time, select the date and time in the calendar.



Adjust the span of the timeline at the bottom of the screen.



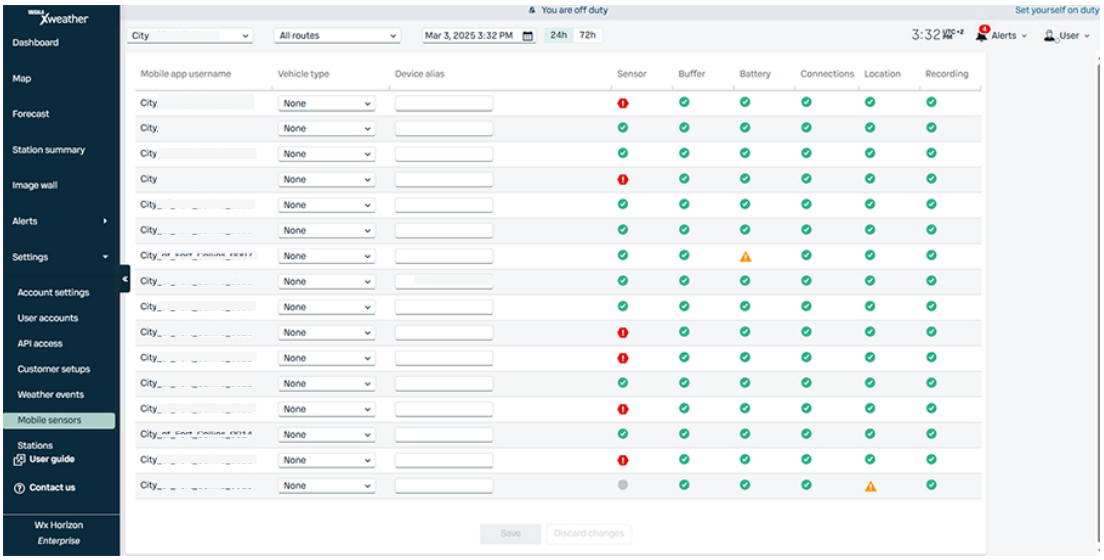
4.4 Viewing MD30 fleet summary

Mobile sensors shows all MD30 error and warning information.

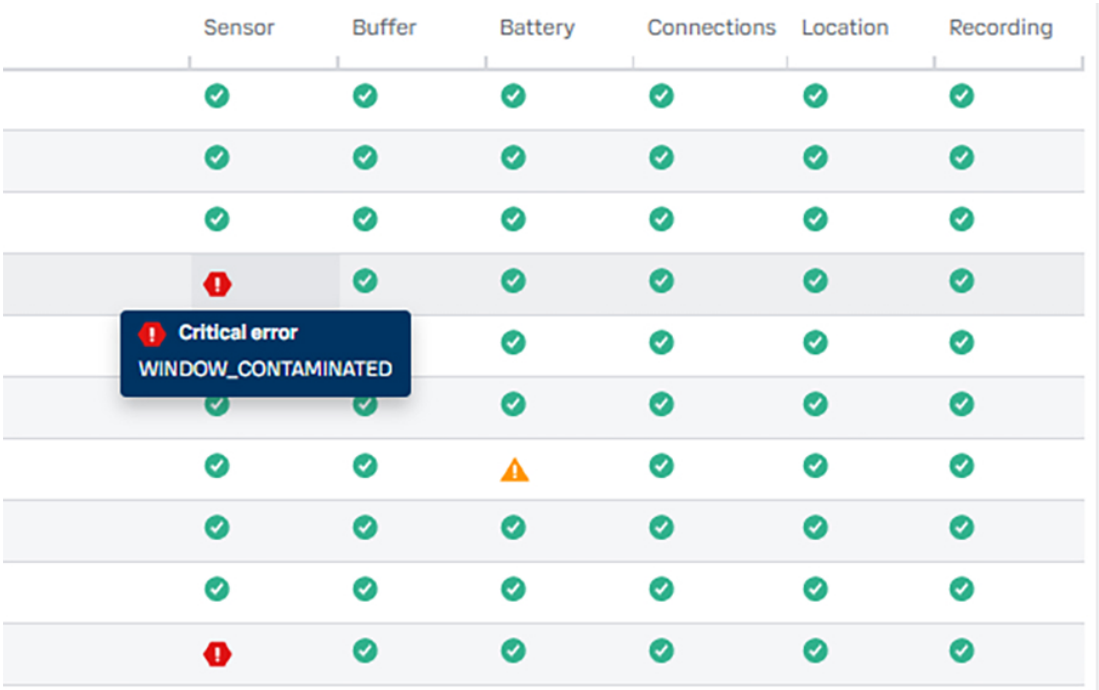
You must have admin rights to see **Settings** and the mobile sensor information.

1. In the main menu, go to **Settings > Mobile sensors**.

   The columns on the right give an overview of the state of MD30.

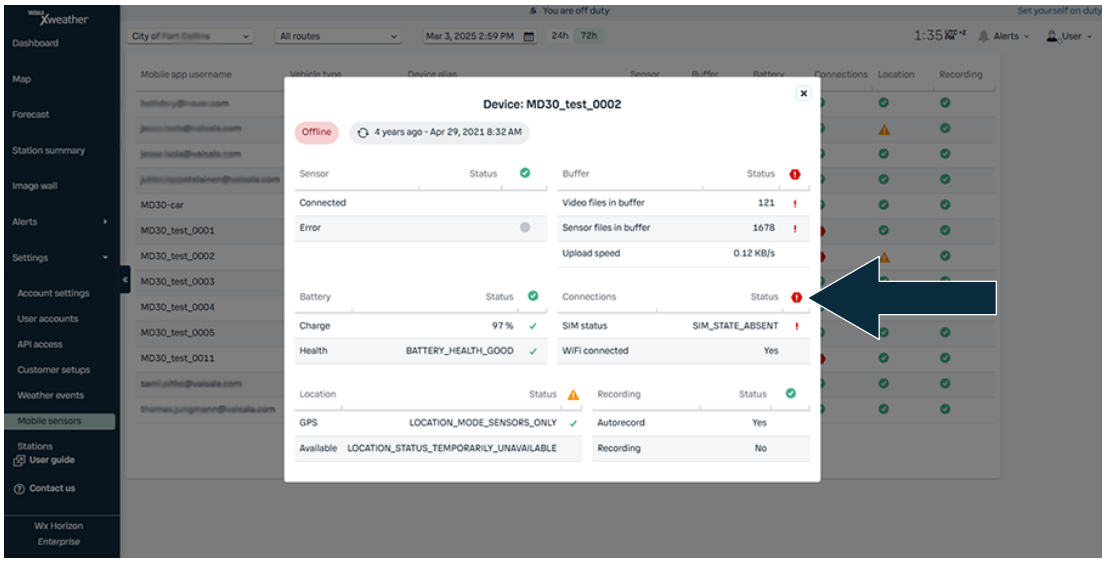


2. To see the error type, hover over the error.



3. To see the details about the error or warning, click the icon.

   A detailed view opens.



More information

- Error messages (page 33)
- Status information (page 35)

4.5 Viewing mobile sensor errors and warnings

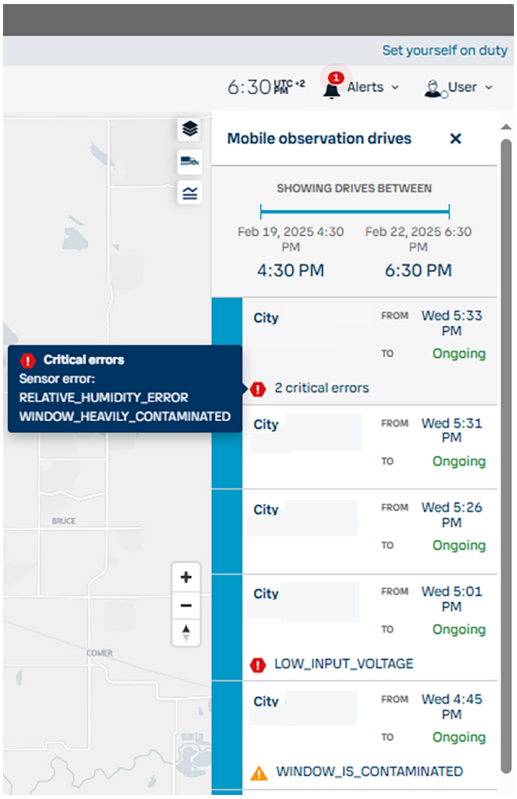
Icon	Description
	Critical error. Requires action.
	Warning. In the **Mobile observation drives** view only window contamination warnings are displayed. Other warnings are not displayed because they are informative and do not require action.

1. To view mobile observations, in the **Status layers** panel, use the toggle button and select **Mobile sensors**.

2. To open the list of drives, select the drives icon at the top right of the map.

> You can also select a drive from the map to open a detailed graph and to see more details.

The critical errors and window contamination warnings of the selected time are displayed.



More information

- Error messages (page 33)
- Status information (page 35)

4.5.1 Error messages

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.

> The error is indicated by setting the bit to **1**.

Table 5 Error messages

Bit [1)]	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	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: `0` = OK `1` = Invalid or not set	–	Verify installation with reference plate and adapt mobile sensor to road surface types.
16	Factory calibration status: `0` = OK `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 Wx Horizon.

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

More information

- Viewing MD30 fleet summary (page 30)
- Viewing mobile sensor errors and warnings (page 32)

4.5.2 Status information

The status information indicates the current status of the mobile sensor and issues warnings. The status information is reported in the `GET UNIT STATUS`, `SEND DATA`, and `SET REFERENCES` messages.

Table 6 Status information

Bit [1)]	Message	Value	Description
0	Not ready to measure	`0` = Ready `1` = Not ready	Unit is starting up. When unit reaches full operational status, the flag is cleared. Measurement data may be invalid. If the condition persists, check error bits.
1	Reference setting ongoing	`0` = Not ongoing `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 `1` = Ongoing	Unit operational, but measurement data may be invalid. Wait for laser temperature change to finish. If the condition persists, check error bits.
3	Window contamination warning	`0` = OK `1` = Contaminated	Window is getting contaminated. Clean the window.
4	Window heating	`0` = OK `1` = Not working	If heating is not working, monitor window contamination.
5	Low input voltage detected	`0` = Voltage OK `1` = Voltage low	Unit operational, but check input voltage.
6	High input voltage detected	`0` = Voltage OK `1` = Voltage high	
7	High internal temperature detected	`0` = Temperature OK `1` = Temperature high	First notification of unit getting too hot.

Bit [1)]	Message	Value	Description
8	Temperature unit	`0` = °C `1` = °F	–
9	Layer thickness unit	`0` = mm `1` = inch	–
10	Reference setting interrupted due to laser temperature change	`0` = False `1` = True	Repeat reference setting when laser temperature change has finished.
11	Reference setting interrupted due to hardware error, check parameter `0x56`	`0` = False `1` = True	Check error bits and parameter `0x56`, which contains reason for error.
12	Reference setting values are not updated due to poor signal quality	`0` = False `1` = True	Excessive variation in road surface type. Find more representative road surface.
13	Reference setting was interrupted by client	`0` = False `1` = True	–
14	Signal levels low, uncertainty in surface layer thickness results	`0` = False `1` = True	Unit operational, but measurement data may be invalid. Verify installation and clean window.
15	Road surface type significantly different from road surface type used in reference setting	`0` = False `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 `1` = True	Verify installation. If condition persists, perform reference setting.
17	Measurement over range, layer thickness measurement range exceeded	`0` = False `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 Wx Horizon.

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

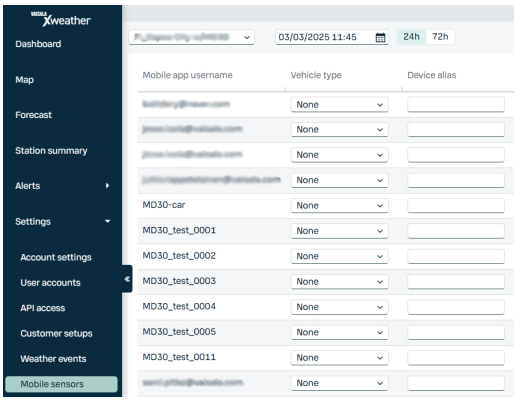
Laser temperature change stops the ongoing reference setting.

More information

- Viewing MD30 fleet summary (page 30)
- Viewing mobile sensor errors and warnings (page 32)

4.6 Editing MD30 details

1. In the main menu, go to **Settings > Mobile sensors**.



2. Select a **Vehicle type** (optional).

Truck: If the mobile device is installed on a plow truck
Patrol: If the mobile device is installed on a vehicle that does not undertake winter maintenance operations

3. To rename a sensor, type an alias in the **Device alias** column.
4. Select **Save**.

5. MD30 data API

If you have purchased the online data service (MD30-ROADAI-WXH), MD30 data is stored on a cloud server. You can access MD30 data through the API interface.

For the MD30 data API description, see https://swagger.vionice.io/

For a Python library to access Vaisala Wx Horizon API, see https://gitlab.com/vionice/roadai-python.

Warranty

For standard warranty terms and conditions, see 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 vaisala.com/support.

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