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USER GUIDE

RWS200

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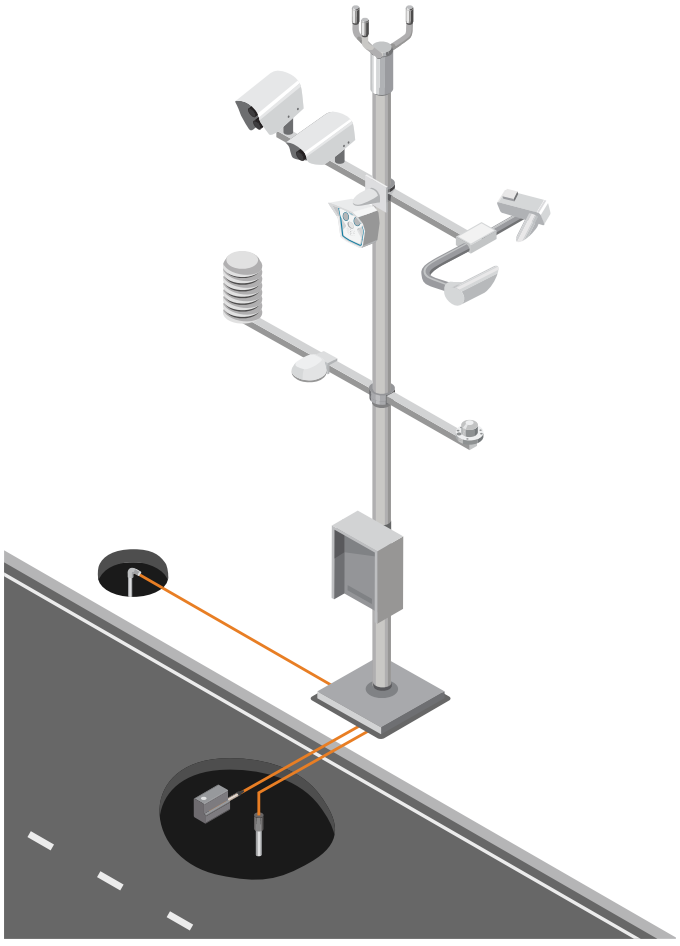


M211803EN-AB

Configuration and Maintenance Manual

Vaisala Road Weather Station

RWS200



VAISALA

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Table of contents

1. About this document 9
1.1 Version information 9
1.2 Related manuals 11
1.3 Documentation conventions 12
1.4 Trademarks 13

2. Configuration and maintenance overview 14
2.1 Product and part names 14
2.2 Safety 15
2.2.1 UL/CSA C22.2 regulatory caution and warning statements 19
2.2.2 ESD protection 19
2.3 Information required for station configuration 21
2.4 Overview of configuration 21
2.5 Overview of maintenance 22

3. Connecting to station 23
3.1 Connecting to station locally 23
3.1.1 Connecting to station with wired connection (LAN) 23
3.1.2 Connecting to station wirelessly (WLAN) 25
3.2 Connecting to station remotely 26
3.3 Logging in 26

4. Configuring sensor settings 28
4.1 Sensor settings 28
4.2 Configuring DSC211 settings 29
4.3 Configuring DST111 settings 31
4.4 Configuring DRS511 settings 33
4.5 Configuring FP2000 settings 38
4.6 Configuring DTS12G settings 42
4.7 Configuring DTS210 settings 44
4.8 Configuring TPS10 settings 45
4.9 Configuring PWD settings 47
4.10 Configuring DRD11A settings 49
4.11 Configuring tipping bucket settings 50
4.12 Configuring HMP155E settings 52
4.13 Configuring WMT700 settings 53
4.14 Configuring WA15 settings 55
4.15 Configuring R.M. Young Wind Monitor settings 57
4.16 Configuring PTB110 settings 59
4.17 Configuring WXT536 settings 60
4.18 Configuring SR50A settings 62
4.19 Configuring global radiation sensor settings 64
4.19.1 Example of calculating gain for LI-200 pyranometer 66
4.20 Configuring fixed camera settings 68
4.20.1 Configuring fixed camera settings in RWS200 68
4.20.2 Logging in to fixed camera 70
4.20.3 Changing IP address of second fixed camera 72
4.20.4 Configuring date and time in fixed camera 74
4.20.5 Storing changes to fixed camera 76
4.20.6 Backing up fixed camera settings 79
4.20.7 Restoring fixed camera settings 80

5. Configuring station settings 87
5.1 Station settings 87
5.2 Setting station name and station ID 87
5.3 Setting station serial number 88
5.4 Setting station location 90
5.5 Setting site information 91
5.6 Setting station time 92
5.7 Setting station units 95

6. Configuring communication settings 97
6.1 Communication settings 97
6.2 RWS200 network 98
6.3 Configuring IX20 cellular router 100
6.3.1 Configuring cellular Ethernet settings for cellular router 100
6.3.2 Logging in to cellular router 102
6.3.3 Updating IX20 firmware 102
6.3.4 Configuring NTP in IX20 cellular router 103
6.3.5 Increasing default timeout value in IX20 cellular router 104
6.3.6 Configuring cellular network in IX20 cellular router 105
6.3.7 Configuring IP routing in IX20 cellular router 109
6.3.8 Configuring firewall in IX20 cellular router 113
6.3.9 Backing up IX20 configuration 115
6.3.10 Restoring IX20 configuration 116
6.4 Configuring WLAN connection 116
6.4.1 Configuring WLAN hotspot 117
6.4.2 Configuring WLAN for data reporting 120

7. Configuring data reporting 123
7.1 Data reporting settings 123
7.2 Configuring MES 12, MES 14, and MES 16 data reporting 123
7.2.1 Configuring serial connection 123
7.2.2 Configuring MES 14 and MES 16 data reporting over FTP 129
7.2.3 Configuring TCP port 131
7.3 Configuring camera image data reporting 133
7.4 Adding new data reporting interfaces 135
7.5 Disabling data reporting interfaces 136
7.6 Removing data reporting interfaces 137

8. Configuring device control 139
8.1 Design principles for device control configuration 139
8.1.1 Device control activation logic 139
8.1.2 Device control activation control 139
8.1.3 Device control activation rules 140
8.1.4 Device control deactivation delay 141
8.1.5 Device control deactivation rules 142
8.1.6 Invalid or missing sensor observations in device control 142
8.1.7 System or sensor faults in device control 143
8.2 Device control settings 143
8.3 Adding device control components to Web UI 144
8.4 Configuring activation logic and control 146
8.5 Configuring activation rule, deactivation delay, and deactivation rule 149
8.6 Example of configuring device control for slippery road due to icy conditions warning 153

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9. Configuring digital inputs 157
9.1 Digital inputs 157
9.2 Configuring digital inputs 157

10. Managing system security certificates 159
10.1 System security certificates 159
10.2 Using certificate signed by trusted certificate authority 159
10.2.1 Generating new self-signed certificate 159
10.2.2 Creating certificate signing request 162
10.2.3 Updating current certificate 163
10.3 Using certificate signed by organization certificate authority 165
10.3.1 Replacing current certificate 165

11. Managing user accounts 168
11.1 User roles 168
11.2 Adding new user accounts 168
11.3 Searching for user accounts 171
11.4 Modifying user accounts 171
11.5 Removing user accounts 172

12. Configuring user interface 174
12.1 Adding new pages 174
12.2 Modifying pages 174
12.3 Removing pages 175
12.4 Adding new components 176
12.5 Modifying components 177
12.6 Removing components 178
12.7 Changing shown observations 178

13. Finalizing installation 181
13.1 Checking station setup 181
13.2 Recording station setup 182

14. Status reporting 183
14.1 Generating station summary report 183
14.2 Generating event history report 183

15. MES interface commands 185
15.1 MES interface commands 185
15.2 Commands OPEN and CLOSE 185
15.3 Command MES 12 186
15.4 Command MES 14 187
15.5 Command MES 16 187
15.6 Command HIST 188
15.7 Command CONF HIST 189
15.8 Command DATE 190
15.9 Command TIME 190

16. Preventive maintenance 192
16.1 Preventive maintenance 192
16.2 Maintenance tools and equipment 192
16.2.1 Tools and equipment needed when climbing to mast 193
16.2.2 Preparing for site visit 193
16.3 Site maintenance 195
16.4 Cleaning and maintaining painted surfaces 195

16.5 Inside enclosure maintenance....196
16.5.1 IX20 cellular router maintenance....199
16.5.2 Checking PMU701 and backup battery condition remotely....199
16.5.3 Checking PMU701 and backup battery condition onsite....202
16.6 DSC maintenance....205
16.6.1 Cleaning DSC....206
16.6.2 Setting DSC211 clean limit....207
16.6.3 Adjusting DSC211 signal strength....208
16.6.4 DSC dry calibration....209
16.6.5 Calibrating DSC211....210
16.6.6 Replacing DSC weather shield....211
16.7 DST111 maintenance....211
16.7.1 Cleaning DST111....212
16.7.2 Replacing HMP60 filter and humidity sensor....212
16.8 DRS511 maintenance....215
16.8.1 Checking DRS511 position....215
16.8.2 Testing DRS511 operation....216
16.8.3 Lowering DRS511....220
16.8.4 Calibrating DRS511....222
16.9 FP2000 maintenance....227
16.10 DTS12G maintenance....228
16.11 DTS210 maintenance....228
16.12 TPS10 maintenance....228
16.12.1 Updating TPS10 settings....228
16.13 PWD maintenance....230
16.13.1 PWD cleaning flowchart....232
16.13.2 Cleaning PWD....233
16.13.3 Setting new clean value for PWD....234
16.13.4 Calibrating PWD....235
16.13.5 Monitoring PWD window cleanliness remotely....237
16.14 DRD11A maintenance....238
16.14.1 Cleaning RAINCAP rain sensor....238
16.14.2 Setting new clean value for DRD11A....239
16.15 RG13(H) maintenance....240
16.16 HMP155 maintenance....241
16.16.1 Changing HMP155 probe filter....242
16.16.2 Sending HMP155 to calibration....243
16.17 WMT700 maintenance....243
16.17.1 Testing operation....244
16.18 WA15 maintenance....246
16.18.1 Updating WA15 maintenance information....246
16.19 R.M. Young Wind Monitor maintenance....247
16.19.1 Updating R.M. Young Wind Monitor maintenance information....247
16.20 PTB110 maintenance....248
16.21 Weather transmitter maintenance....248
16.21.1 Replacing PTU module....249
16.21.2 Updating weather transmitter maintenance information....251
16.22 SR50A maintenance....251
16.22.1 Setting up SR50A for water level measurement....252
16.22.2 Setting up SR50A for snow depth measurement....256
16.23 SP Lite2 maintenance....258
16.24 Mobotix fixed camera maintenance....258

17. Repair maintenance 259
17.1 Replacing sensors 259
17.2 Replacing system components 260
17.2.1 Replacing DMU703 260
17.2.2 Replacing DMU703 lithium battery 262
17.2.3 Replacing backup battery 263
17.2.4 Replacing AC (mains) input assembly 266
17.2.5 Replacing surge protector 273
17.2.6 Replacing AC/DC power supply unit 273
17.2.7 Replacing LED light fuse 275
17.2.8 Replacing WR21 cellular router with IX20 275
17.2.9 Replacing PMU701 279
17.2.10 Replacing PMU701 plug-in modules 281
17.2.11 Replacing DRI701 282

18. System upgrades 290
18.1 Adding new sensors to RWS200 290
18.1.1 Adding new sensors to PMU701 290
18.1.2 Adding new sensors to DRI701 293
18.2 Adding new DRI701 cards 294
18.3 Changing system settings 301
18.3.1 Changing sensor and device configuration for PMU701 301
18.3.2 Changing sensor and device configuration for DRI701 304
18.3.3 Importing new configuration to station 308
18.3.4 Exporting current station configuration 311
18.3.5 Restoring previous settings 312
18.3.6 Restoring factory settings 313
18.4 Updating software 314
18.4.1 Updating DMU703 (station) software 315
18.4.2 PMU701 hardware and software compatibility 317
18.4.3 DRI701 hardware and software compatibility 319
18.4.4 Updating sensor software 322

19. Troubleshooting 324
19.1 Troubleshooting checklist 324
19.2 General troubleshooting procedure 324
19.3 Resetting DMU703 to factory settings 326
19.4 Restarting DMU703 or system remotely 327
19.5 Restarting sensors 327
19.6 Restarting DRI701 328
19.7 Reverting station software to previous version 329
19.8 Resetting cellular router 330
19.9 Device configuration errors 331
19.10 Identifying DRI701 cards and DRS511 sensors 332
19.11 Troubleshooting device control 334
19.11.1 Device control status changes when observation value stays the same 334
19.11.2 Sensor nickname is not updated in device control rules 334
19.11.3 Station units are not updated in device control rules 335

Appendix A: RWS200 security checklist 336

Appendix B: Configuring combined MES 14 data polling 338
B.1 Configuring combined MES 14 interface 338

B.2 Using data polling interface....339

Appendix C: RWS200 system device map....340

Appendix D: Spare parts and accessories....342
D.1 Safety-critical spare parts....342
D.2 Enclosure spare parts and accessories....342
D.3 Support arm spare parts and accessories....344
D.4 DMU703 spare parts and accessories....345
D.5 PMU701 spare parts and accessories....345
D.6 DRI701 spare parts and accessories....347
D.7 Powering spare parts....347
D.7.1 AC (mains) input spare parts....347
D.7.2 AC/DC power supply unit spare parts....348
D.7.3 Backup battery spare parts....348
D.8 Communication device spare parts and components....348
D.8.1 Cellular router spare parts and accessories....348
D.8.2 Antenna options and spare parts....349
D.9 Device control spare parts....349
D.10 Sensor spare parts and accessories....350
D.10.1 DSC211 options, spare parts, and accessories....350
D.10.2 DST111 options, spare parts, and accessories....350
D.10.3 DRS511 options and accessories....351
D.10.4 DTS12G options and accessories....352
D.10.5 TPS10 options and accessories....352
D.10.6 WMT700 options, spare parts, and accessories....353
D.10.7 R.M. Young Wind Monitor options, spare parts, and accessories....354
D.10.8 WA15 spare parts and accessories....354
D.10.9 PWD options, spare parts, and accessories....355
D.10.10 DRD11A options and spare parts....356
D.10.11 RG13(H) options, spare parts, and accessories....356
D.10.12 HMP155 options, spare parts, and accessories....356
D.10.13 PTB110 options, spare parts, and accessories....357
D.10.14 WXT530 options, spare parts, and accessories....358
D.10.15 SR50A options, spare parts, and accessories....358
D.10.16 SP Lite2 options, spare parts, and accessories....359
D.10.17 Mobotix options, spare parts, and accessories....359
D.10.18 IR illuminator options, spare parts, and accessories....360

Appendix E: Recycling instructions....361

Index....363

Warranty....373

Technical support....373

1. About this document

1.1 Version information

This document provides instructions for configuring and maintaining Vaisala Road Weather Station RWS200.

Table 1 Document versions (English)

Document code	Date	Description
M211803EN-AB	September 2026	Vaisala Weather Station Enclosure ENC722 with slim backplate has been removed from the offering. Vaisala Air Quality Transmitter AQT560 has been removed from the offering. The option of Vaisala HUMICAP Humidity and Temperature Probe HMP155 with heating, HMP155-CFG10, has been replaced with HMP155-CFG18, which has a sensor with improved corrosion resistance. The AXIS PTZ camera model Q6125-LE has been replaced with Q6325-LE. The Mobotix fixed camera model M16 has been replaced with M ONE. The missing checksum has been added to the examples of MES 12 data message. PMU701 firmware versions 3.1.0 and 2.1.0 contain the following changes related to this document: • If the backup battery is faulty, PMU701 stops charging the battery and reports it in the Web UI and in the DTO XML data reporting interface. • To reset the battery status after replacing the battery, press the WLAN **WAKE UP** button on the PMU701 front panel for more than 5 seconds. • If you want to activate WLAN, briefly press the WLAN **WAKE UP** button on the PMU701 front panel.

Document code	Date	Description
M211803EN-AA	August 2025	Vaisala Air Quality Transmitter AQT530 has been replaced with AQT560. Instructions on enhancing the cybersecurity of your RWS200 have been added. A checklist for cybersecurity related issues has been added to this document. Instructions for using DSC/DST and PWD cleaning tools have been added. The length of Rain Gauge RG13H cable has been corrected to 10 m (32 ft 10 in). A set of end brackets has been added a spare part. These end brackets can be attached to the DIN rail without removing the DIN rail from the back plate. RWS200 and DMU703 software version 7.0 contains the following changes related to this document: • Support for sharing observations between several RWS200 stations has been added. For more information, see RWS200 Observation Sharing Configuration Guide (M213114EN). • Support for sending camera images over HTTPS to a data collection system has been added. • Default DMU703 user accounts have been removed. If you take a new DMU703 into use, you need to create the user accounts when logging in to the Web UI for the first time. • IX20 cellular router is now delivered with the firewall enabled. Instructions for configuring the firewall have been added. With these security enhancements, RWS200 is compliant with Radio Equipment Directive 2014/53/EU (RED) by fulfilling EN 18031-1:2024. This and some other RWS200 documents are now publicly available in vaisala.com/RWS200/docs. To access other RWS200 documents, log in with your Vaisala or MyVaisala account.
M211803EN-Y	March 2024	Support for up to 4 DRI701 cards has been added, providing connections for up to 8 DRS511 and DTS12G or FP2000 and DTS210 sensors. The following cables have been added to the offering: • HMP155: 50 m / 164 ft 1 in (245931) and 100 m / 328 ft 1 in (279350) • PWD12/PWD22: 50 m / 164 ft 1 in (CBL210518-50M) • WMT700: 50 m / 164 ft 1 in (278371) A new version of the EN 15518-3 standard (*Winter maintenance equipment. Road weather information systems. Part 3: Requirements on measured values of stationary equipment*) was published in 2023. The Vaisala classes used for surface state reporting by DSC211 are according to the new EN 15518-3:2023 standard. Instructions for configuring WR21 cellular router have been removed. PWD maintenance and calibration instructions have been updated. System release 6.0.1 contains the following changes that relate to this manual: • As a security measure, the Web UI is now locked for 20 minutes after 10 login attempts with an incorrect username or password. • The station summary report shows the supported NTCIP standards. • Status view of DRS511 sensors has been added. The status view helps you troubleshoot DRI701 and the sensors and determine which DRI701 each sensor is connected to. • Remote update of PWD12 and PWD22 software is now possible through the Web UI.

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1.2 Related manuals

Some of these documents can be found in our product documentation portal at docs.vaisala.com.

Table 2 RWS200 manuals

Document code	Name
M211607EN	Vaisala Road Weather Station RWS200 System Description
M211608EN	Vaisala Road Weather Station RWS200 Installation Manual
M211803EN	Vaisala Road Weather Station RWS200 Configuration and Maintenance Manual
M212635EN	*Vaisala RWS200 Installation Quick Guide*
M212636EN	*Vaisala RWS200 Web UI Quick Guide*
M213223EN	Vaisala Road Weather Station RWS200 Quick Connect User Guide
M213114EN	Vaisala RWS200 Observation Sharing Configuration Guide
M211763EN	*Vaisala RWS200 Retrofit Guide*
M211896EN	*Vaisala RWS200 Communication Options Guide*
M211824EN	Vaisala RWS200 PTZ Camera Setup Guide
M211826EN	*Vaisala RWS200 Traffic Sensor Setup Guide*
M211935EN	*Vaisala RWS200 DTO XML Interface Description*
M212089EN	*Vaisala RWS200 NTCIP Interface Description*
M212094EN	*Vaisala RWS200 DATEX II Interface Description*
M212912EN	*Vaisala RWS200 Camera Image REST API Interface Description*

Table 3 Other manuals

Document code	Name
M211786EN	Grounding and Lightning Protection in Vaisala Outdoor Installations Technical Reference
M211785EN	Vaisala Lightning Protection Kits DKL201 and DKL202 Installation Guide
M211651EN	*Vaisala Remote Road State Sensor DSC211 User Guide*
M210716EN	Vaisala Remote Road Surface Temperature Sensor DST111 User Guide
M010032EN	*Vaisala Embedded Road and Runway Sensor DRS511 and Subsurface Temperature Sensor DTS12G Installation and Maintenance Guide*
DOC220141	*Vaisala FP2000 Pavement Sensor and DTS210 Sub-Surface Temperature Probe Installation Manual*
M210912EN	Vaisala HUMICAP® Humidity and Temperature Probe HMP155 User Guide

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Document code	Name
M210542EN	*Vaisala Present Weather Detector PWD12 User's Guide*
M210543EN	*Vaisala Present Weather Detector PWD22/52 User's Guide*
U334en	*Vaisala Rain Detector DRD11A Instruction Manual*
M211095EN	Vaisala WINDCAP® Ultrasonic Wind Sensor Series WMT700 User Guide
M210822EN	Vaisala Serial Wind Transmitter WAC155 User Guide
M210293EN	Vaisala Anemometer WAA151 User Guide
M210294EN	Vaisala Wind Vane WAV151 User Guide
M210839EN	*Vaisala BAROCAP® Barometer PTB110 Series User's Guide*
M211840EN	Vaisala Weather Transmitter WXT530 Series User Guide
M211724EN	Vaisala RG13 and RG13H User Guide
–	*Mobotix M ONE Quick Installation*
–	*R.M. Young Wind Monitor User Manual*
–	*Kipp & Zonen SP Lite2 Instruction Sheet*
–	*Campbell Scientific SR50A Sonic Ranging Sensor Instruction Manual*
–	*FinMeas Temperature Profile Sensor TPS10 Operating Manual*
–	*Digi IX20 User Guide*

1.3 Documentation conventions

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! Alerts you to 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.

Highlights important information on using the product.

Gives information for using the product more efficiently.

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Lists tools needed to perform the task.

Indicates that you need to take some notes during the task.

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2. Configuration and maintenance overview

2.1 Product and part names

Table 4 Enclosures and system components

Item	Name	Maximum number
RWS200	Vaisala Road Weather Station	1
ENC652 ENC653	Vaisala weather station enclosure with standard backplate	1
BOXALU-US	Vaisala weather station enclosure for North America with standard backplate, aluminum	
BOXSS-US	Vaisala weather station enclosure for North America with standard backplate, stainless steel	
DMU703	Data Management Unit	1
DRI701	Road Sensor Interface Card	4
Cellular, GPS, (and WLAN) antenna	Mobile Mark multiband antenna	1
WLAN antenna	LSR WLAN antenna (North America only)	1
PMU701	Power Management Unit	1
PMP701	Plug-in module for solar panels and external DC supply	1
PMA701	Plug-in module for analog sensor interfaces	2
PMS701	Plug-in module for serial sensor interfaces	6 [1)]
PME701	Plug-in module for Ethernet sensor interfaces	4 [1)]
IX20	Digi IX20 cellular router	1

1) The 4 serial/Ethernet slots in PMU701 can house either serial PMS701 or Ethernet PME701 plug-in modules.

Table 5 Sensors and devices

Item	Common/Full name	Maximum number
DSC211	Vaisala Remote Road State Sensor	2
DST111	Vaisala Remote Road Temperature Sensor	2

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Item	Common/Full name	Maximum number
DRS511	Vaisala Embedded Road and Runway Sensor	8 [1]
FP2000	Vaisala Embedded Road Sensor (North America only)	
DTS12G	Vaisala Subsurface Temperature Sensor	8 [2]
DTS210	Vaisala Subsurface Temperature Sensor (North America only)	
TPS10	FinMeas Temperature Profile Sensor	1
HMP155E	Vaisala HUMICAP Humidity and Temperature Probe	1
PWD12	Vaisala Present Weather Detector	1
PWD22	Vaisala Present Weather Detector	
DRD11A	Vaisala Rain Detector	1
RG13H	Vaisala Rain Gauge (or another tipping bucket)	1
R.M. Young Wind	R.M. Young Wind Monitor	1
WMT700	Vaisala WINDCAP Ultrasonic Wind Sensor	
WA15 (WAA151, WAV151, WAC155)	Vaisala Wind Set consisting of Vaisala Anemometer, Vaisala Wind Vane, and Vaisala Serial Transmitter	
WXT536	Vaisala Weather Transmitter	
PTB110	Vaisala BAROCAP Barometer	1
SR50A	Campbell Water and Snow Level Sensor	2
SP Lite2	Kipp & Zonen Pyranometer (or another global radiation sensor)	1 [3]
Mobotix	Mobotix fixed camera	2 [4]
AXIS PTZ	AXIS PTZ (pan-tilt-zoom) camera	1 [4]
VARIO2	Raytec VARIO2 IR illuminator	2
SmartSensor	Support for Wavetronix SmartSensor HD traffic sensor	1

1) *DRI701 supports 2 DRS511 or FP2000 sensors. RWS200 supports a maximum of 4 DRI701 cards.*
2) *DRI701 supports 2 DTS12G or DTS210 sensors.*
3) *Only the first DRI701 card supports a global radiation sensor. When a global radiation sensor is connected, DRI701 has place for only 1 subsurface temperature sensor.*
4) *RWS200 supports one PTZ camera or 1 or 2 fixed cameras.*

2.2 Safety

This product has been type-tested for safety and approved as shipped from the factory.

Note the following warning labels on the product:



WARNING! Electricity hazard



WARNING! Replacing the battery with an incorrect type of battery may result in serious injury. Always use the correct type of battery.



WARNING! The system is powered from several power sources to ensure uninterrupted service. To make the system non-energized, disconnect all power sources.



WARNING! Use Cu cable with operating temperature over +70 °C.



WARNING! This socket is for service use only.



Protective ground.

Note the following precautions:



WARNING! For safety reasons, do not install the system alone. Safe installation requires at least 2 people.



WARNING! Consult local electricity professionals for the local and state legislation and regulations about grounding.



WARNING! Ground the product and verify outdoor installation grounding periodically. Failure to provide proper grounding can result in injury or death from electrical shock and can severely damage the equipment.



WARNING! Lightning protection is required to prevent injury and damage to equipment due to direct lightning strikes and lightning-induced current surges.



WARNING! Ground remote units properly. A lightning strike through a communication wire can cause a lethal current surge.



WARNING! A long cable between units (sensors, transmitters, power supplies, and displays) can cause a lethal lightning-induced current surge. Always ground the enclosure to a suitable grounded location with a short, low-resistance cable.



WARNING! Do not service the system alone. Do not reach into parts and assemblies that are AC (mains) powered and live except in the presence of someone who can provide first aid.



WARNING! Do not perform installation or maintenance procedures when there is a risk of thunderstorm or lightning activity in the area.



WARNING! Assess the risks from the installation work. Consider also the effects of local weather conditions.



WARNING! If ice or snow accumulates on the mast, guy wires, or sensors, the ice or snow can fall and cause injury to persons below.



WARNING! Some instruments and sensors or versions are heated. To avoid injury, do not touch heated parts when heating is on.



WARNING! Do not operate in an explosive atmosphere, for example, when flammable gases or fumes are present. Operation of electrical equipment in such an environment constitutes a safety hazard.



WARNING! When performing installation and maintenance procedures at the roadside, follow local and state legislation and regulations for road safety.



WARNING! Only licensed experts may install electrical components. They must adhere to local and state legislation and regulations.



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



WARNING! After disconnecting the power cable, dangerous voltages can exist for some time. To avoid injury, disconnect the power and discharge circuits before touching them.



WARNING! Do not replace components when the system is powered up. Disconnect all power sources before performing maintenance procedures.



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! Do not throw the battery into a hot oven or fire, or mechanically crush or cut the battery. Improper disposal can cause an explosion.



WARNING! Do not leave the battery in an environment surrounded by extremely high temperatures. Extremely high temperature can result in deflagration or leakage of flammable liquid or gas.



WARNING! Make sure that the battery is not subjected to an extremely low air pressure. Extremely low air pressure can result in deflagration or leakage of flammable liquid or gas.



WARNING! Do not connect the battery until the system is ready for powering up.



WARNING! If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.



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.

2.2.1 UL/CSA C22.2 regulatory caution and warning statements

Note the following warning labels on the product:

Notez l'étiquette d'avertissement suivante sur le produit :



WARNING! The system is powered from several power sources to ensure uninterrupted service. To make the system non-energized, disconnect all power sources.
AVERTISSEMENT ! Le système est alimenté par plusieurs sources de courant afin de garantir un service ininterrompu. Pour mettre le système hors tension, déconnectez toutes les sources d'alimentation.



WARNING! Use Cu cable with operating temperature over +70 °C.
AVERTISSEMENT ! Utiliser un câble Cu avec une température de fonctionnement supérieure à +70 °C.



WARNING! This socket is for service use only.
AVERTISSEMENT ! Cette prise est uniquement prévue pour la maintenance.

2.2.2 ESD protection

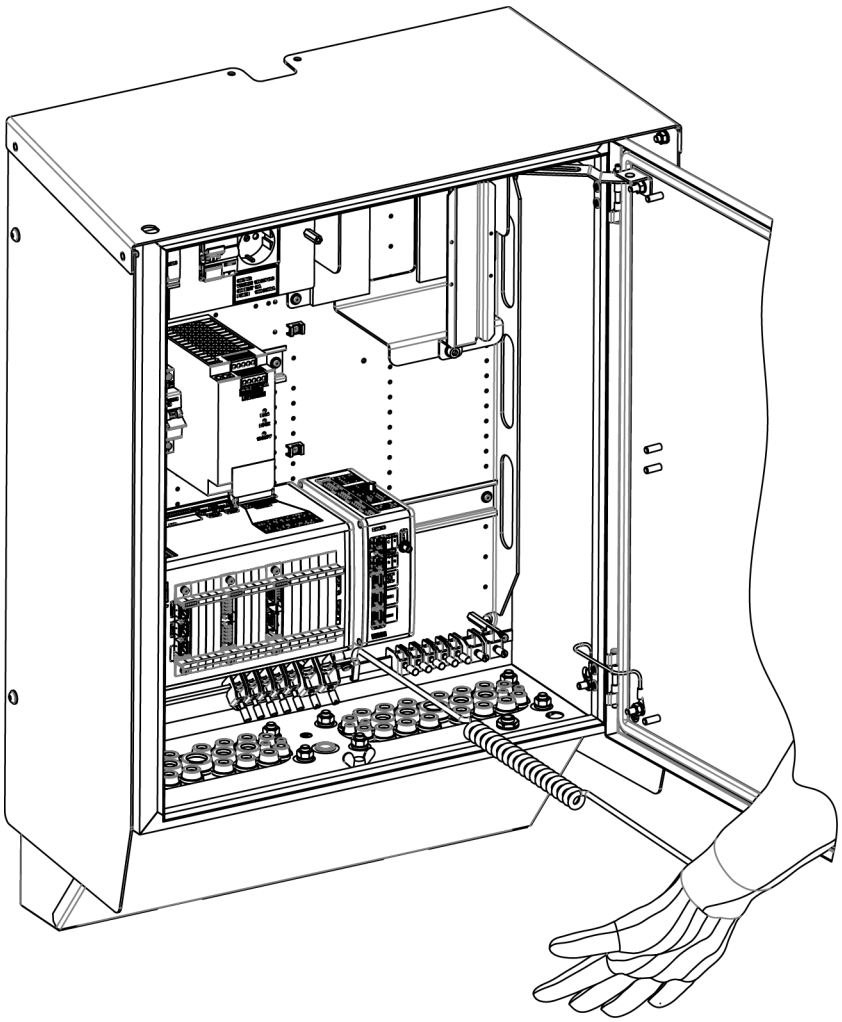
Electrostatic discharge (ESD) can damage electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects in the equipment housing.

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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.

For example, the RAINCAP rain sensor in PWD is sensitive to ESD.



1) Internal cabling not shown

Figure 1 ESD protection through grounding rail for sensor cables

2.3 Information required for station configuration

Table 6 Information required for station configuration

Information	Necessity	Source
New user name and password for the administrator	Mandatory	Customer
New password for the WLAN hotspot	Only if hotspot is used	Customer
WLAN name and password	Mandatory when WLAN is used for data reporting	Customer
SIM card and the PIN code	Mandatory for cellular network connection outside of North America	Cellular network provider
Cellular network settings (IP address, dynamic DNS service, or APN settings)	Mandatory for cellular network connection	Cellular network provider
Customer network settings	Mandatory for customer-provided Ethernet-based communication device	Customer
Data reporting settings (transmission protocol, server address, user names and passwords)	Mandatory	Data collector
Station name	Optional in installation. Can be configured later remotely.	Customer
Type of de-icing compound used on the road	Optional in installation. Can be configured later remotely.	Customer
Naming policy for sensors	Optional in installation. Can be configured later remotely.	Customer
HTTPS certificate	Optional in installation. Can be configured later remotely.	Customer

2.4 Overview of configuration

To configure the station after installation, perform the following procedures in the order presented:

1. Connect to the station and log in to the Web UI:
   - Connecting to station locally (page 23)
   - Logging in (page 26)
2. Configure the WLAN hotspot, if needed:
   - Configuring WLAN hotspot (page 117)
3. (Optional) Import an existing settings file to the station. The file can be a copy of an existing station's settings or a file that Vaisala has created for you:
   - Importing new configuration to station (page 308)
4. Change the default administrator (RWS200administrator) password:
   - Modifying user accounts (page 171)

5. Configure the sensors in the installation:
   - Sensor settings (page 28)
6. Configure the station settings:
   - Station settings (page 87)
7. Configure the communication settings:
   - Communication settings (page 97)
8. Configure data reporting:
   - Data reporting settings (page 123)
9. (Optional) Configure device control:
   - Design principles for device control configuration (page 139)
10. (Optional) Configure digital inputs:
    - Digital inputs (page 157)
11. (Optional) Create or import HTTPS certificate to the station:
    - System security certificates (page 159)
12. Create the necessary user accounts:
    - Adding new user accounts (page 168)
    - Modifying user accounts (page 171)
13. Configure the user interface:
    - Adding new pages (page 174)
    - Modifying pages (page 174)
    - Adding new components (page 176)
    - Modifying components (page 177)
    - Changing shown observations (page 178)
14. Check that the configuration succeeded, and record the setup:
    - Checking station setup (page 181)
    - Recording station setup (page 182)

2.5 Overview of maintenance

For the recommended preventive maintenance procedures, see:

- Preventive maintenance (page 192)

For repair instructions, see:

- Replacing sensors (page 259)
- Replacing system components (page 260)

For upgrade instructions, see:

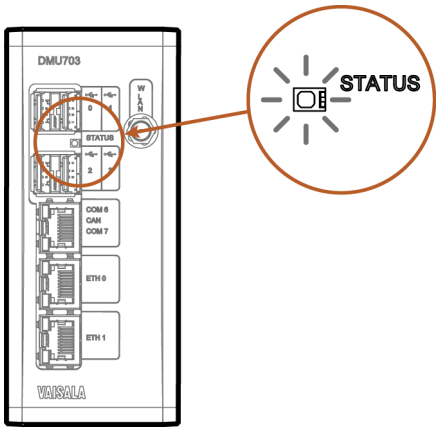
- Adding new sensors to RWS200 (page 290)
- Adding new DRI701 cards (page 294)
- Changing system settings (page 301)
- Updating software (page 314)

For troubleshooting instructions, see:

- General troubleshooting procedure (page 324)

3. Connecting to station

3.1 Connecting to station locally



After powering up the station, it takes several minutes until the station is up and running. Wait until the green status LED in DMU703 starts blinking.

Figure 2 DMU703 status LED

You can connect to the station locally using wired connection (Ethernet/LAN). When you have established a connection to the Web UI, you can activate the WLAN hotspot for local access.

3.1.1 Connecting to station with wired connection (LAN)

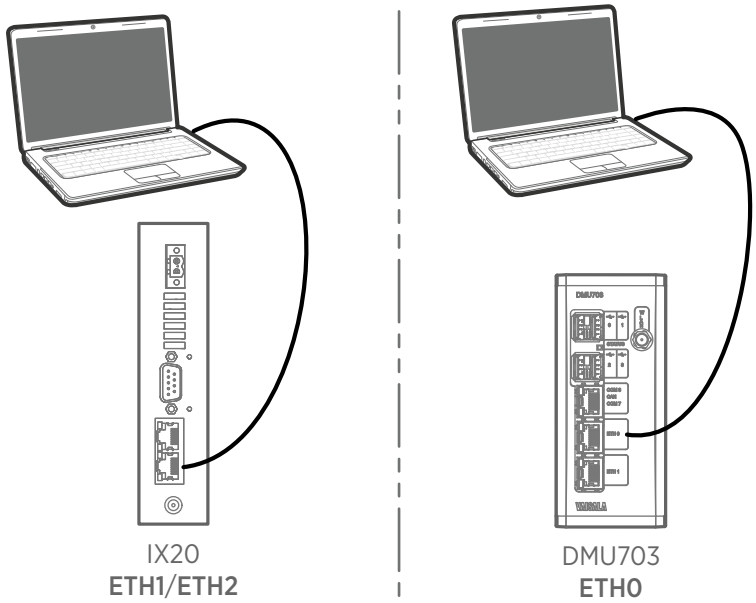
The default LAN/Ethernet connection is available through the cellular router or through DMU703. You can use a straight or a crossover Ethernet cable for the connection.

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1. Connect your computer to an Ethernet port in the cellular router.

   If the station does not include the router, connect the computer to the **ETH 0** port in DMU703.

   > Only the DMU703 **ETH 0** port can be used for the connection.



2. Open a web browser in your computer and go to the Web UI address:

   `https://192.168.2.2:8443/aws`

3. If you cannot connect to this address, change the local Ethernet settings in your computer.

   a. In your computer, go to **Settings** and **Network & internet**.

   b. Select the local Ethernet connection and change the IP settings.

   c. Set the following:

   IP address
   Type any unique IP address in the same subnet as DMU703. For example, `192.168.2.9`.

   Subnet mask
   Type the same subnet mask as in the cellular Ethernet settings in DMU703. The default value is `255.255.255.0`.

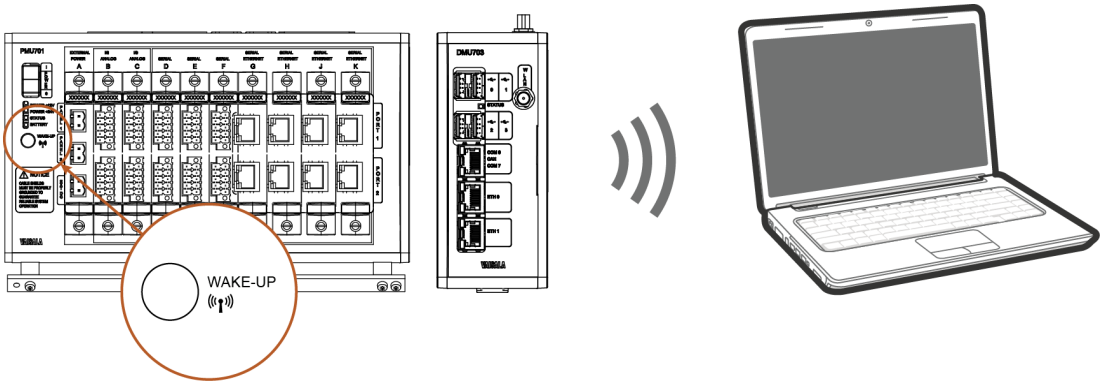
   Default gateway
   Type the IP address of DMU703. The default value is `192.168.2.2`.

   d. Save the changes and try connecting to the station again.

3.1.2 Connecting to station wirelessly (WLAN)

The WLAN hotspot has been pre-configured at the factory. To activate it, set a password for the WLAN connection. After that, you can use the WLAN connection for local access.

1. Connect to the station with an Ethernet cable.
2. Set a password for the WLAN hotspot in the Web UI.
3. To switch on the WLAN network, briefly press the WLAN **WAKE UP** button on the PMU701 front panel.



If you lose the connection at some point, press the **WAKE UP** button again.

4. Connect your computer to the following WLAN:

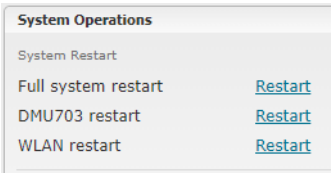
   Network
   RWS200 WLAN network SID: **`RWS200`**

   Password
   The password that you set in the hotspot configuration.

5. Open a web browser in your computer and go to the Web UI address:

   `https://192.168.217.2:8443/aws`
   If you are using a Windows or Linux computer, the following address also works:
   `https://rws200.local:8443/aws`

When the WLAN hotspot is enabled, you can switch on WLAN by selecting **WLAN restart** in **System Operations**.



More information

- Configuring WLAN hotspot (page 117)

3.2 Connecting to station remotely

Access to the Web UI over a cellular network requires at least 3G network coverage.

After you have configured the communications settings for the station, you can connect to the station remotely through a web browser. The address of the Web UI depends on the configuration and the settings provided by the cellular network provider.

1. Open a web browser in your computer and go to the Web UI address:

   https://<public IP address or hostname>/aws



In some networks, access to the port and address must be opened separately. If you encounter problems when trying to access the station, contact your IT system administrator.

3.3 Logging in

For connecting to the station, you need user or administrator credentials and the address of the station.



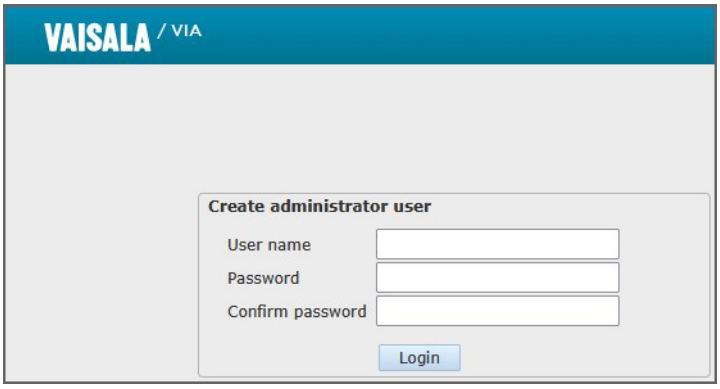
CAUTION! For security reasons, passwords cannot be retrieved from the system. If you forget a password, contact Vaisala.

The Web UI has been tested with the latest versions of Microsoft Edge, Microsoft Internet Explorer, Mozilla Firefox, Google Chrome, and Apple Safari at the time of publishing this document.

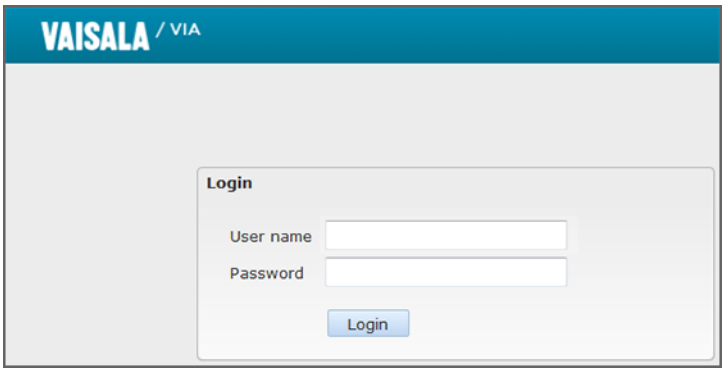
1. Open a web browser and go to the Web UI address:
   - Local connection (WLAN):
     https://192.168.217.2:8443/aws
   - Local connection (LAN):
     https://192.168.2.2:8443/aws
   - Remote connection:
     https://<public IP address or hostname>:8443/aws
2. If you are logging in for the first time and a trusted certificate has not been imported to the system, the browser indicates that the connection is untrusted or not secure. Ignore the warning and continue to the site.

3. If you are logging in for the first time, create an admin user by typing a username and a password in the fields.

   If you are starting the station for the first time, it may take several minutes for the page to open.



4. If a user account already exists, the **Login** page opens. Type your username and password in the fields.



5. Select **Login**.

   If you try to log in to the Web UI 10 times in a row with an incorrect username or password, the account will be locked for 20 minutes.

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4. Configuring sensor settings

4.1 Sensor settings

On the **Station Settings** page, configure the sensors in your installation.

If you imported the settings from another station, some of the settings are already defined. Check that all settings are correct for this station, and calibrate those sensors that need calibration.

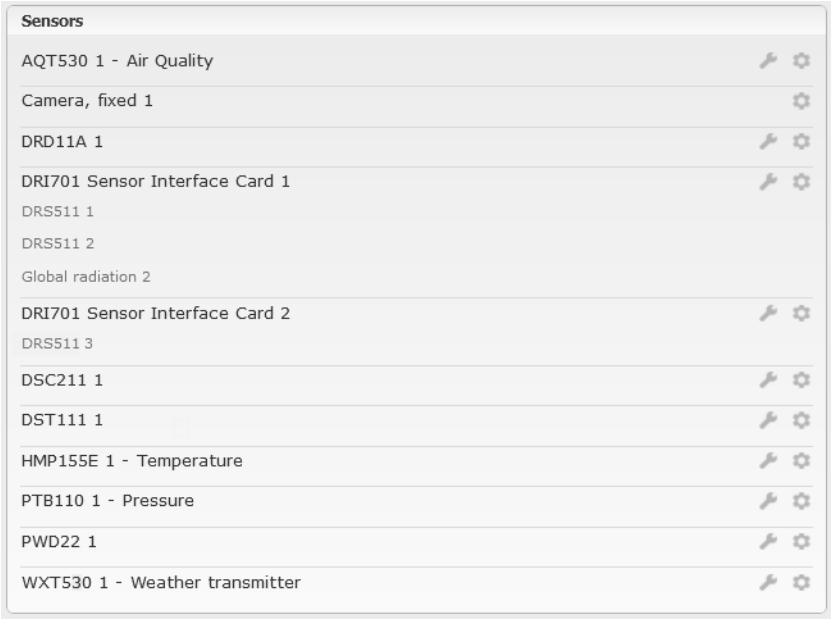


Figure 3 Example of sensors component

Settings marked with the icon ⚠ affect system observations. All other settings are for station metadata only.

When the station is operational, Vaisala recommends that you always export the current settings as a backup before making any changes to the configuration.

More information

- Exporting current station configuration (page 311)
- Sensor nickname is not updated in device control rules (page 334)

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4.2 Configuring DSC211 settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for DSC211.

3. In the **Sensor Settings** window, set the following:

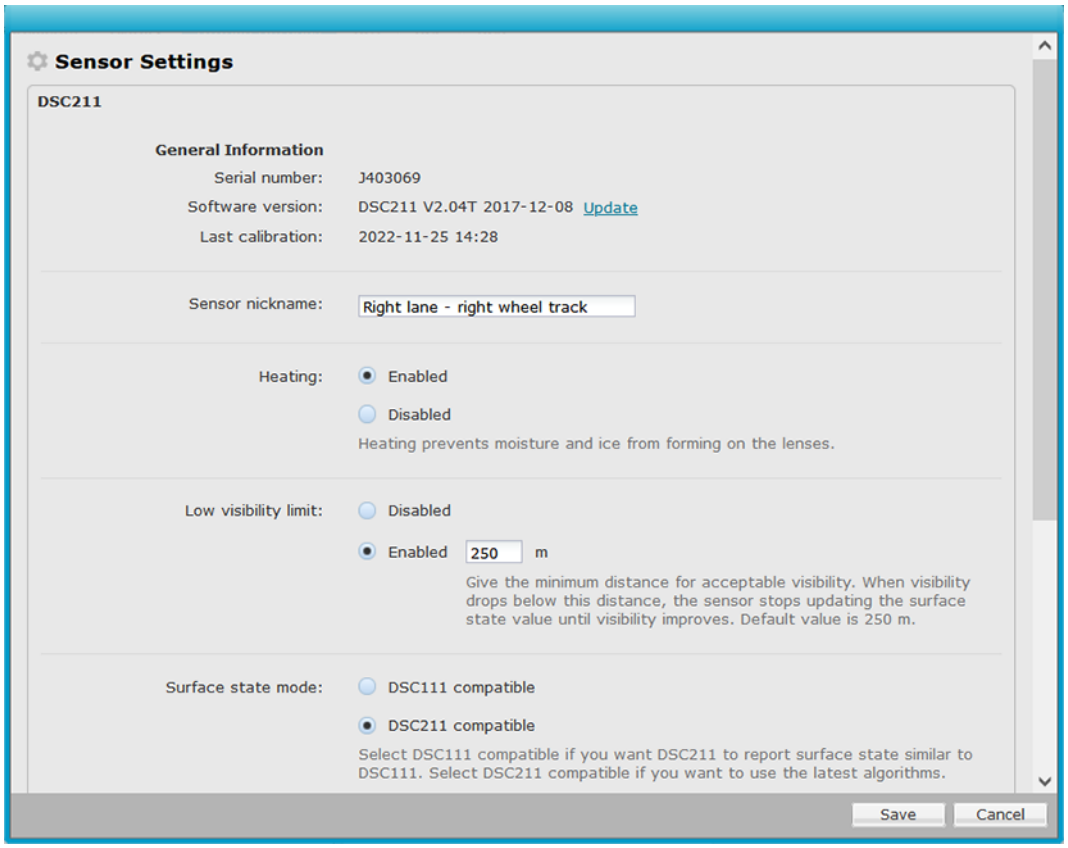
Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

Heating
Enable (recommended during winter time) or disable heating. If heating is enabled, the heating power increases automatically when there is a risk of freezing or ice build-up. When the station enters battery mode, PMU701 switches off sensor heating.

Low visibility limit
Minimum distance for acceptable visibility (default = 250 m). If the measured visibility drops below this limit, the sensor stops updating the surface state value until visibility improves. This is useful in areas where thick fog is common.

Surface state mode
Select **DSC111 compatible** for DSC211 to report surface state similar to DSC111.
Select **DSC211 compatible** (default) for DSC211 to use the latest algorithms.

When the system enters the battery mode, PMU701 switches off sensor heating. If the DSC211 software version is earlier than 2.02, heating stays on unless you turn it off manually by selecting **Disabled** in the DSC211 sensor settings.

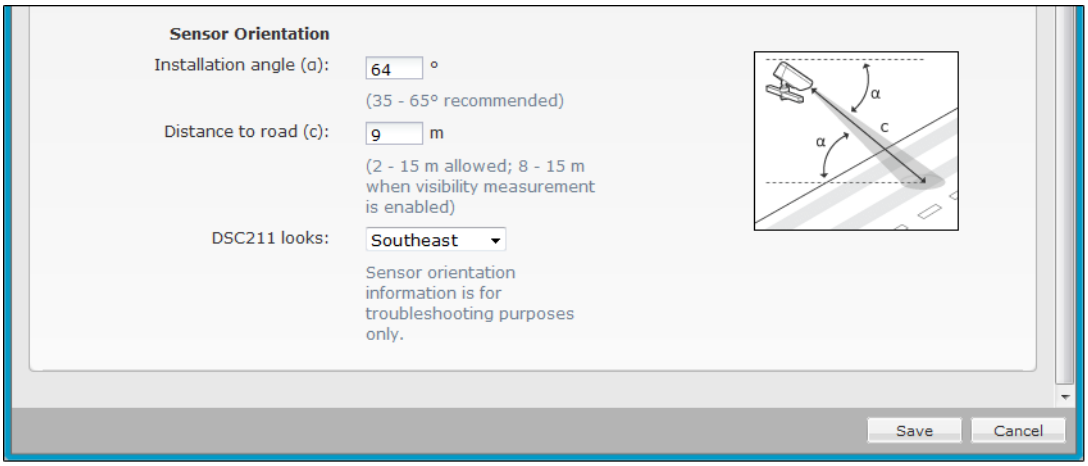


4. In **Sensor Orientation**, set the following:

   Installation angle (α)
   The angle in degrees in which the sensor is installed in reference to the road surface. For more information about sensor orientation, see RWS200 Installation Manual (M211608EN).

   Distance to road (c)
   Distance of the sensor from the road surface. The measuring distance is individual for each installation location and DSC211 must be adjusted according to that distance. By default, each unit has been configured to 10 m (33 ft).

   DSC211 looks
   The compass point where the sensor is pointing.



5. To save the changes, select **Save**.
6. Adjust the sensor signal strength.
7. If the road has been dry for several hours, calibrate the sensor.

More information

- DSC maintenance (page 205)
- Adjusting DSC211 signal strength (page 208)
- DSC dry calibration (page 209)

4.3 Configuring DST111 settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for DST111.

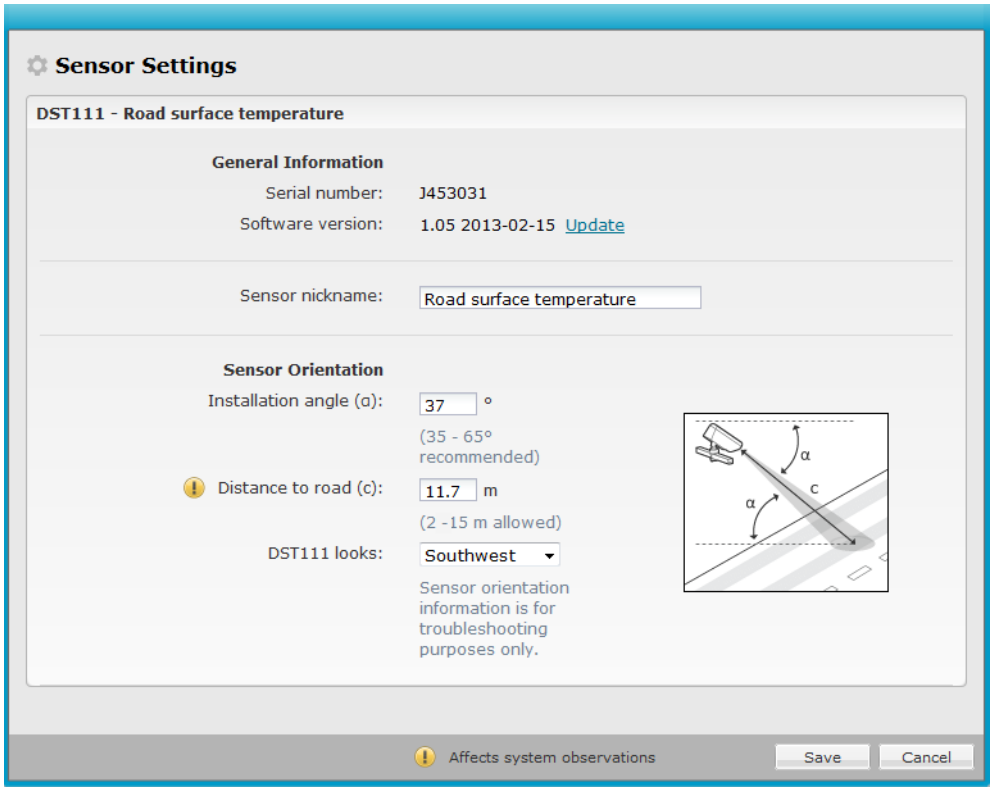
3. In the **Sensor Settings** window, set the following:

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Installation angle (α)
   The angle in degrees in which the sensor is installed in reference to the road surface. For more information about sensor orientation, see RWS200 Installation Manual (M211608EN).

   Distance to road (c)
   Distance of the sensor from the road surface. This setting affects system observations.

   DST111 looks
   The compass point where the sensor is pointing.



4. To save the changes, select **Save**.

More information

- DST111 maintenance (page 211)

4.4 Configuring DRS511 settings

On the Web UI, DRS511 settings are located under the DRI701 sensor interface card to which the sensor is connected.

If you do not know which DRS511 sensor you are configuring, pour salt water on the sensor and check which observation component on the Web UI reacts. You can also use a calibrator plate to achieve the same.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** for the DRI701 sensor interface card.

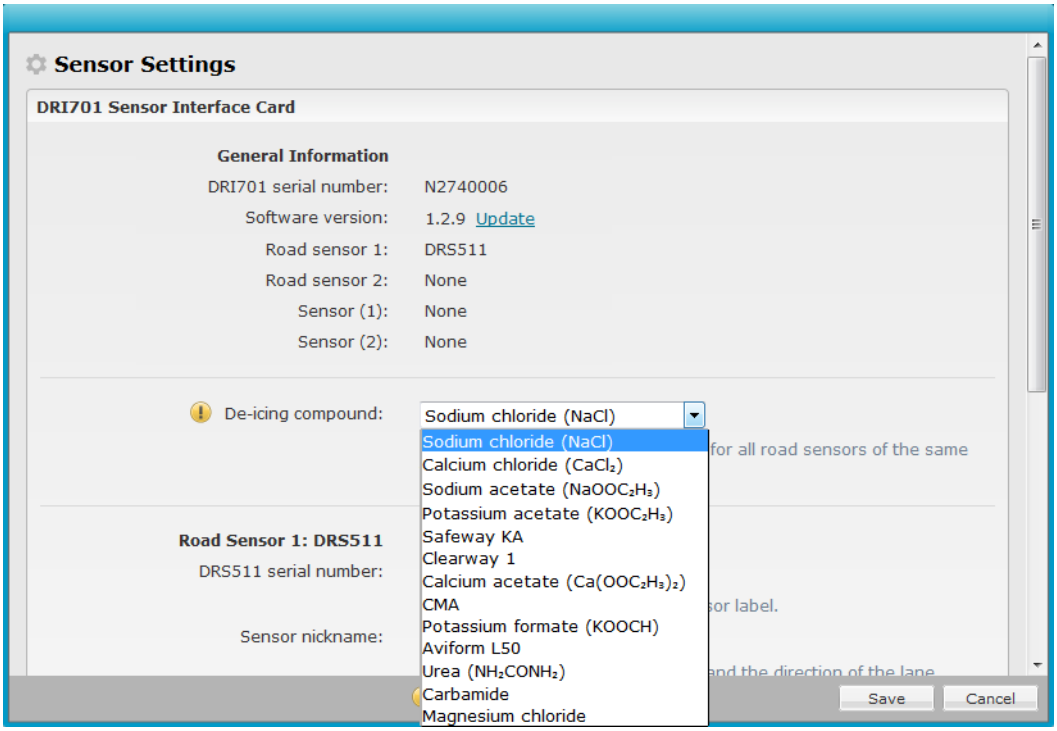
   Check the DRI701 serial number to make sure that you are configuring the correct card.

3. In **De-icing compound**, select the de-icing compound that is used on this section of the road. This setting affects system observations ⚠.

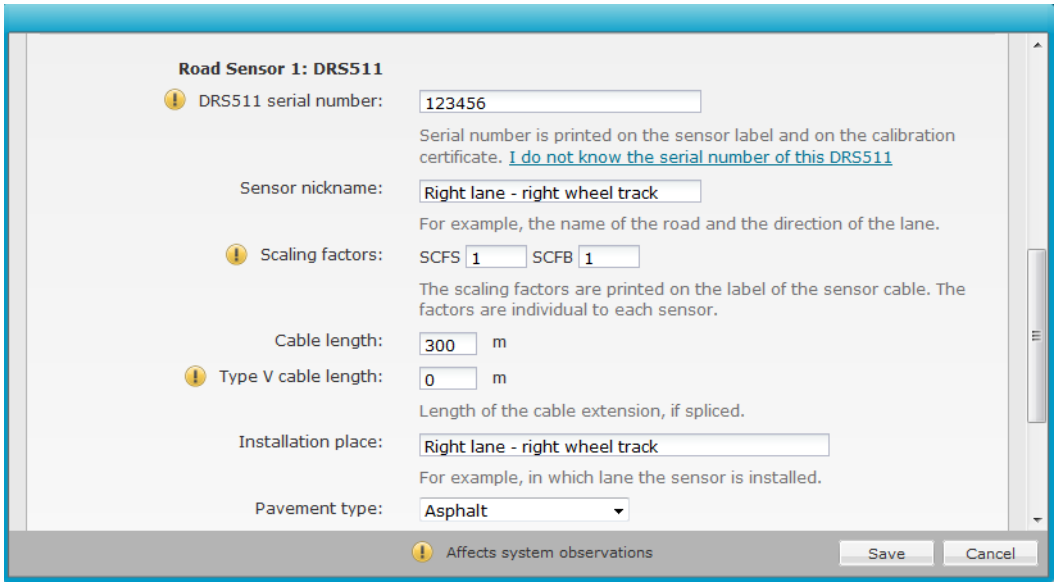
> Define the same de-icing compound to all DRI701 cards that have the same type of embedded sensors connected to them.
> If the chemical that you are using is not listed, contact Vaisala for further instructions.

De-icing compound	Chemical formula
Sodium chloride	NaCl
Calcium chloride	$CaCl_2$
Sodium acetate	$NaOOC_2H_3$
Potassium acetate	$KOOCH_2H_3$
Safeway KA	–
Clearway 1	–
Calcium acetate	$Ca(OOC_2H_2)_2$
CMA	–
Potassium formate	KOOCH
Aviform L50	–
Urea	NH_2CONH_2
Carbamide	–
Magnesium chloride	MgCl

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Sensor Settings
DRI701 Sensor Interface Card
General Information
DRI701 serial number:
N2740006
Software version:
1.2.9 Update
Road sensor 1:
DRS511
Road sensor 2:
None
Sensor (1):
None
Sensor (2):
None
De-icing compound:
Sodium chloride (NaCl)
Sodium chloride (NaCl)
Calcium chloride (CaCl₂)
Sodium acetate (NaOOC₂H₃)
Potassium acetate (KOOC₂H₃)
Safeway KA
Clearway 1
Calcium acetate (Ca(OOC₂H₃)₂)
CMA
Potassium formate (KOOCH)
Aviform L50
Urea (NH₂CONH₂)
Carbamide
Magnesium chloride
for all road sensors of the same
Road Sensor 1: DRS511
DRS511 serial number:
sor label.
Sensor nickname:
nd the direction of the lane
Save
Cancel

4. In the **DRS511 serial number** field, type the serial number of the sensor. This setting affects system observations.



The serial number is printed on the sensor label and on the calibration certificate.

a. If you cannot find the serial number, select **I do not know the serial number of this DRS511**.

b. When prompted, select the correct manufacturing period for the sensor.



c. To close the window, select **OK**.

The serial number is assigned to the sensor only after you have saved the DRS511 settings.

5. Set the following:

Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

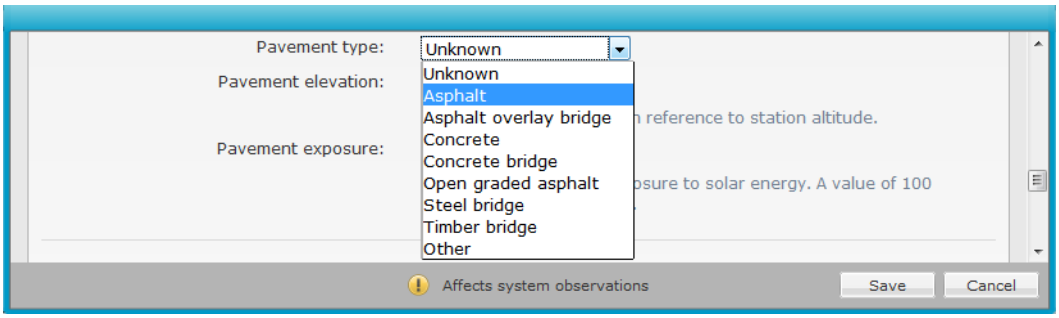
Scaling factors SCFS and SCFB
The scaling factors are printed on the label of the sensor cable. The factors are individual to each sensor. Make sure that you set the correct values, because the scaling factor values affect layer thickness measurement. This setting affects system observations.

Cable length
Length of the sensor cable.

Type V cable length
Length of the optional extension cable. This setting affects system observations.

Installation place
Any notes that help to locate the installed sensor.

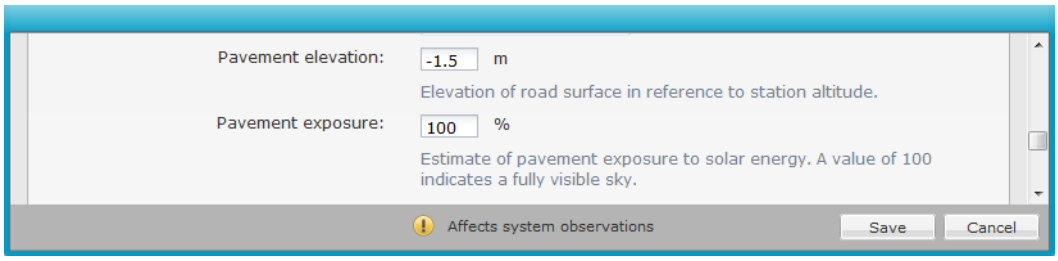
6. In **Pavement type**, select the pavement type that is used on the road.



7. Set the pavement settings:

   Pavement elevation
   Elevation of the road surface in reference to the station altitude in station settings.

   Pavement exposure
   Estimate of pavement exposure to solar energy. A value of `100` indicates a fully visible sky.



8. To save the changes, select **Save**.

More information

- DRS511 maintenance (page 215)

4.5 Configuring FP2000 settings

On the Web UI, FP2000 settings are located under the DRI701 sensor interface card to which the sensor is connected.

If you do not know which FP2000 sensor you are configuring, pour salt water on the sensor and check which observation component on the Web UI reacts.

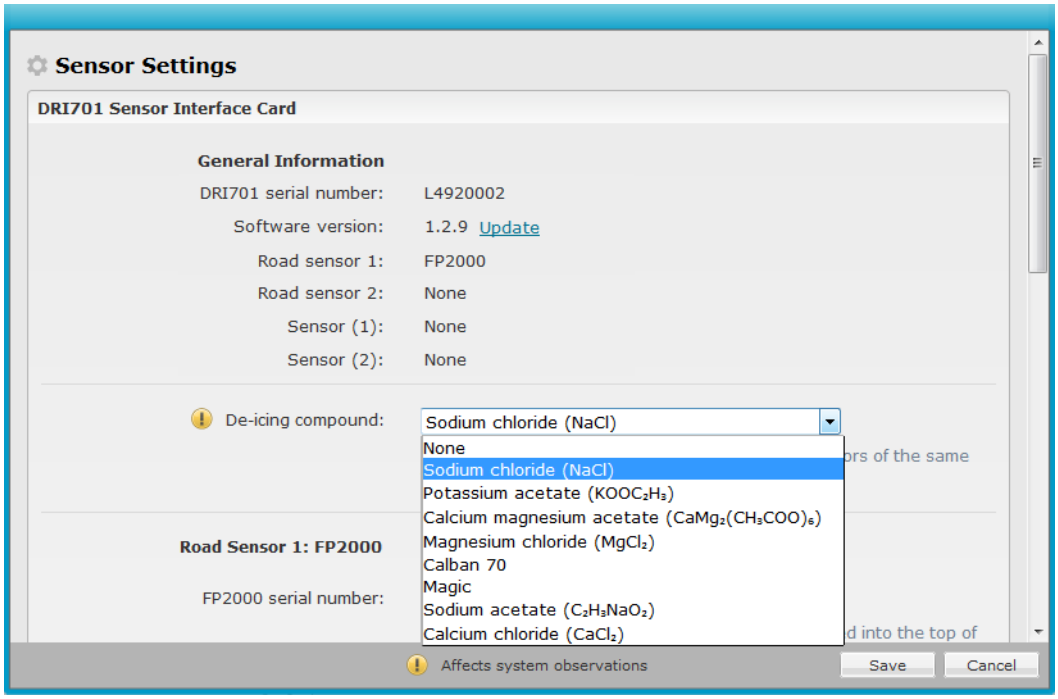
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** for the DRI701 sensor interface card.

   Check the DRI701 serial number to make sure that you are configuring the correct card.

3. In **De-icing compound**, select the de-icing compound that is used on this section of the road. This setting affects system observations .

Define the same de-icing compound to all DRI701 cards that have the same type of embedded sensors connected to them.
If the chemical that you are using is not listed, contact Vaisala for further instructions.

De-icing compound	Chemical formula
Sodium chloride	NaCl
Calcium chloride	$CaCl_2$
Sodium acetate	$NaOOC_2H_3$
Potassium acetate	$KOOCH_2H_3$
Safeway KA	–
Clearway 1	–
Calcium acetate	$Ca(OOC_2H_2)_2$
CMA	–
Potassium formate	KOOCH
Aviform L50	–
Urea	NH_2CONH_2
Carbamide	–
Magnesium chloride	MgCl

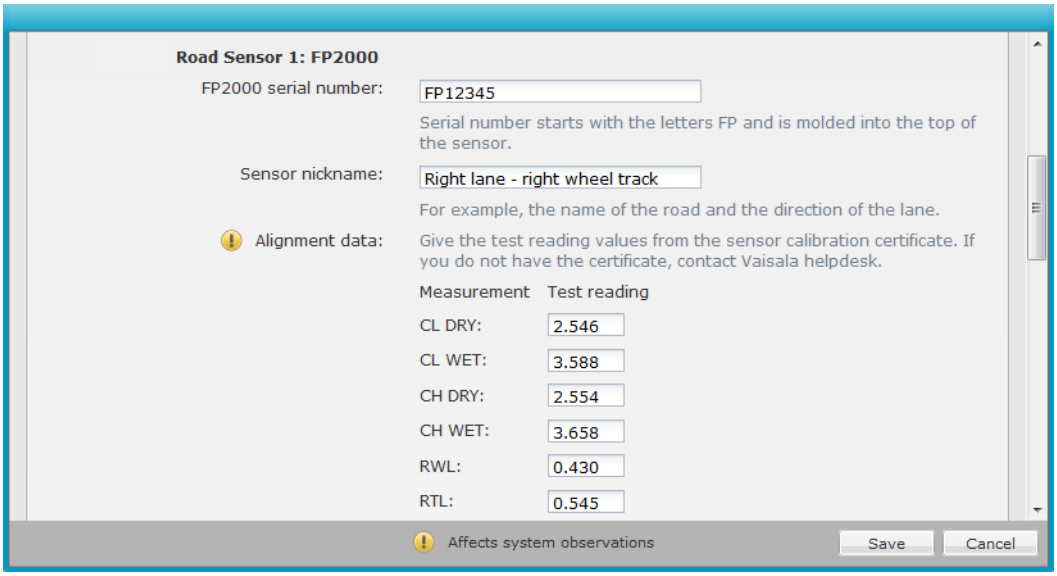

Sensor Settings
DRI701 Sensor Interface Card
General Information
DRI701 serial number:
L4920002
Software version:
1.2.9
Update
Road sensor 1:
FP2000
Road sensor 2:
None
Sensor (1):
None
Sensor (2):
None
De-icing compound:
Sodium chloride (NaCl)
None
Sodium chloride (NaCl)
Potassium acetate (KOOC2H3)
Calcium magnesium acetate (CaMg2(CH3COO)6)
Magnesium chloride (MgCl2)
Calban 70
Magic
Sodium acetate (C2H3NaO2)
Calcium chloride (CaCl2)
ors of the same
Road Sensor 1: FP2000
FP2000 serial number:
d into the top of
Affects system observations
Save
Cancel

4. For each installed FP2000 sensor, set the following:

   FP2000 serial number
   Serial number of the sensor. The serial number starts with the letters **FP** and is molded on top of the sensor.

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

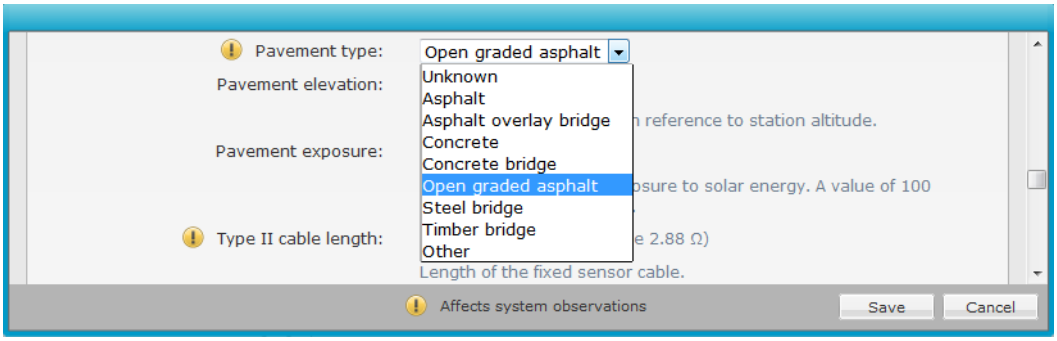
   Alignment data
   The alignment data that is printed on the sensor calibration certificate. If you do not have the certificate, send the sensor serial number to Vaisala helpdesk and ask for a copy. This setting affects system observations.



To improve surface state observations, type a value 0.05 smaller than the value given in the calibration certificate for the **CL WET** measurement. For example, if the calibration certificate gives value **3.638**, type value **3.588** in the **CL WET** field.

5. In **Pavement type**, select the pavement type that is used on the road.

   This setting affects system observations.



6. Set the pavement and cable settings:

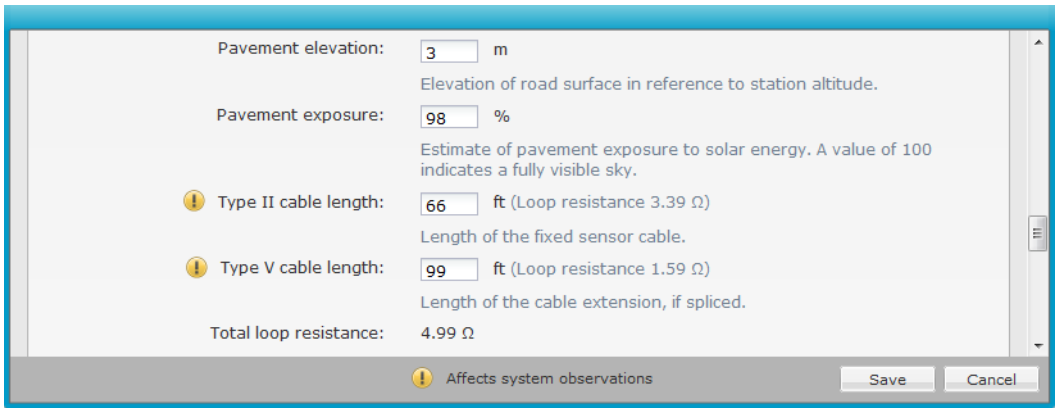
   Pavement elevation
   Elevation of the road surface in reference to the station altitude in station settings.

   Pavement exposure
   Estimate of pavement exposure to solar energy. A value of `100` indicates a fully visible sky.

   Type II cable length
   Length of the sensor cable. The cable length is converted to Ω to show the loop resistance, which is used to compensate for the NTC measurement. This setting affects system observations ⓘ.

   Type V cable length
   Length of the optional extension cable. The cable length is converted to Ω to show the loop resistance, which is used to compensate for the NTC measurement. This setting affects system observations ⓘ.

   Total loop resistance
   The total loop resistance is updated based on the information that you type in the cable length field.



7. To save the changes, select **Save**.

More information

- FP2000 maintenance (page 227)

4.6 Configuring DTS12G settings

On the Web UI, DTS12G settings are located under the DRI701 sensor interface card to which the sensor is connected.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. In the **Sensors** component, select **Settings** ⚙ for the DRI701 sensor interface card.

> Check the DRI701 serial number to make sure that you are configuring the correct card.

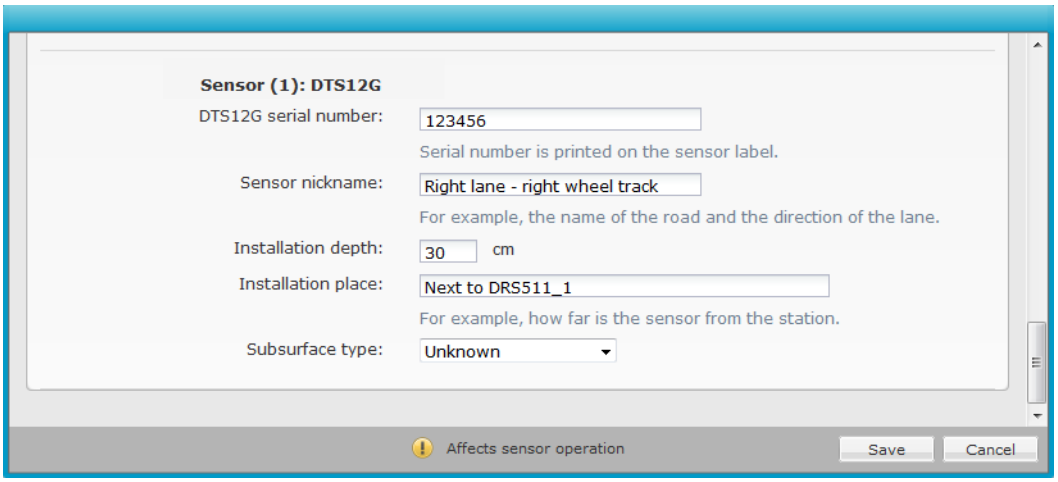
3. In the **Sensor Settings** window, scroll down to DTS12G, and set the following:

DTS12G serial number
Serial number of the sensor. The number is printed on the label attached to the sensor cable.

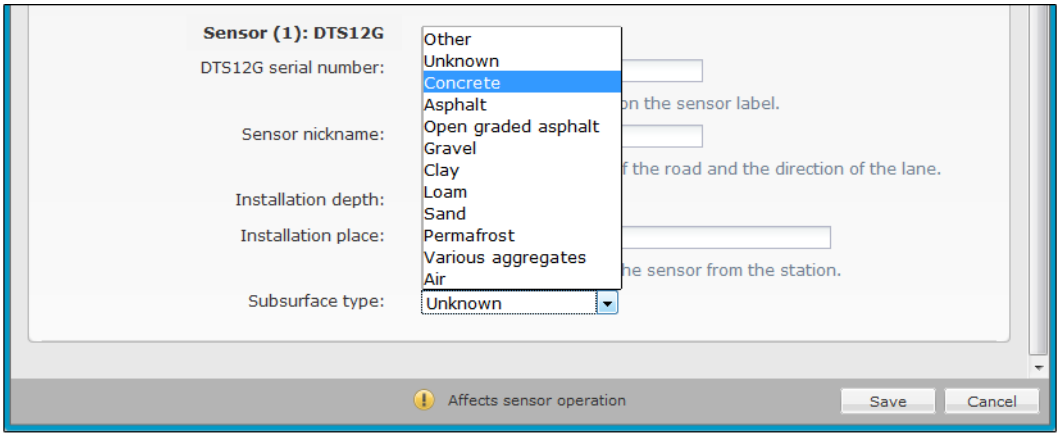
Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

Installation depth
Depth of the tip of the installed sensor from road surface.

Installation place
Any notes that help to locate the installed sensor.



4. In **Subsurface type**, select the subsurface type at the installation place.



5. To save the changes, select **Save**.

More information

- DTS12G maintenance (page 228)

4.7 Configuring DTS210 settings

On the Web UI, DTS210 settings are located under the DRI701 sensor interface card to which the sensor is connected.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for the DRI701 sensor interface card.

   Check the DRI701 serial number to make sure that you are configuring the correct card.

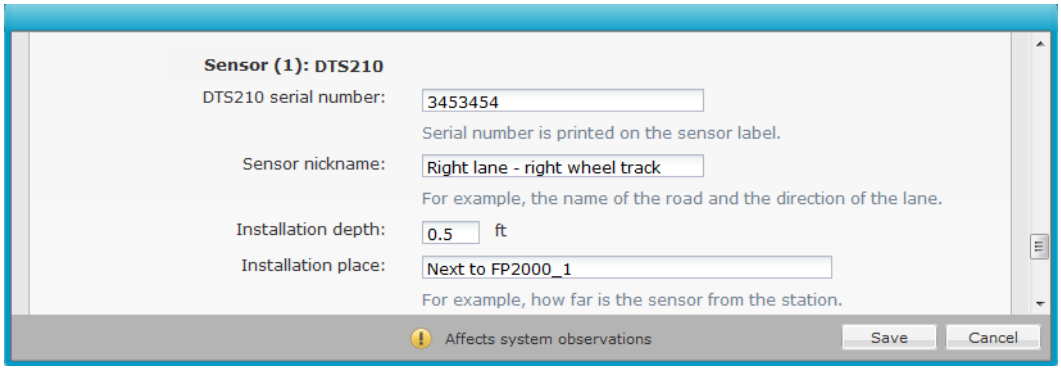
3. In the **Sensor Settings** window, scroll down to DTS210, and set the following:

   DTS210 serial number
   Serial number of the sensor. The number is printed on the sensor label.

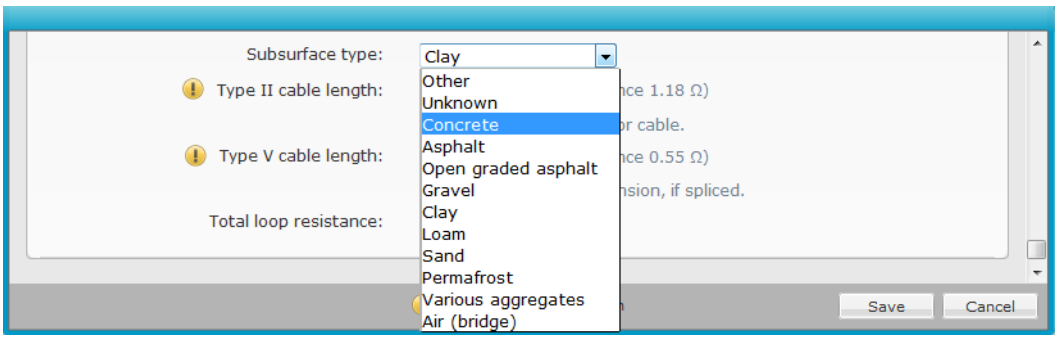
   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Installation depth
   Depth of the tip of the installed sensor from road surface.

   Installation place
   Any notes that help to locate the installed sensor.



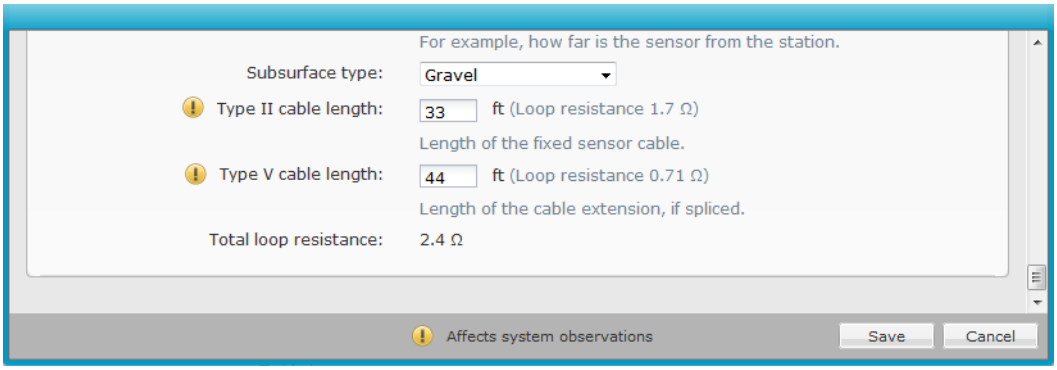
4. In **Subsurface type**, select the subsurface type at the installation place.



5. Set the cable length:

   Type II cable length
   Length of the sensor cable. This setting affects system observations ⓘ.

   Type V cable length
   Length of the optional extension cable. This setting affects system observations ⓘ.



6. To save the changes, select **Save**.

More information

- DTS210 maintenance (page 228)

4.8 Configuring TPS10 settings

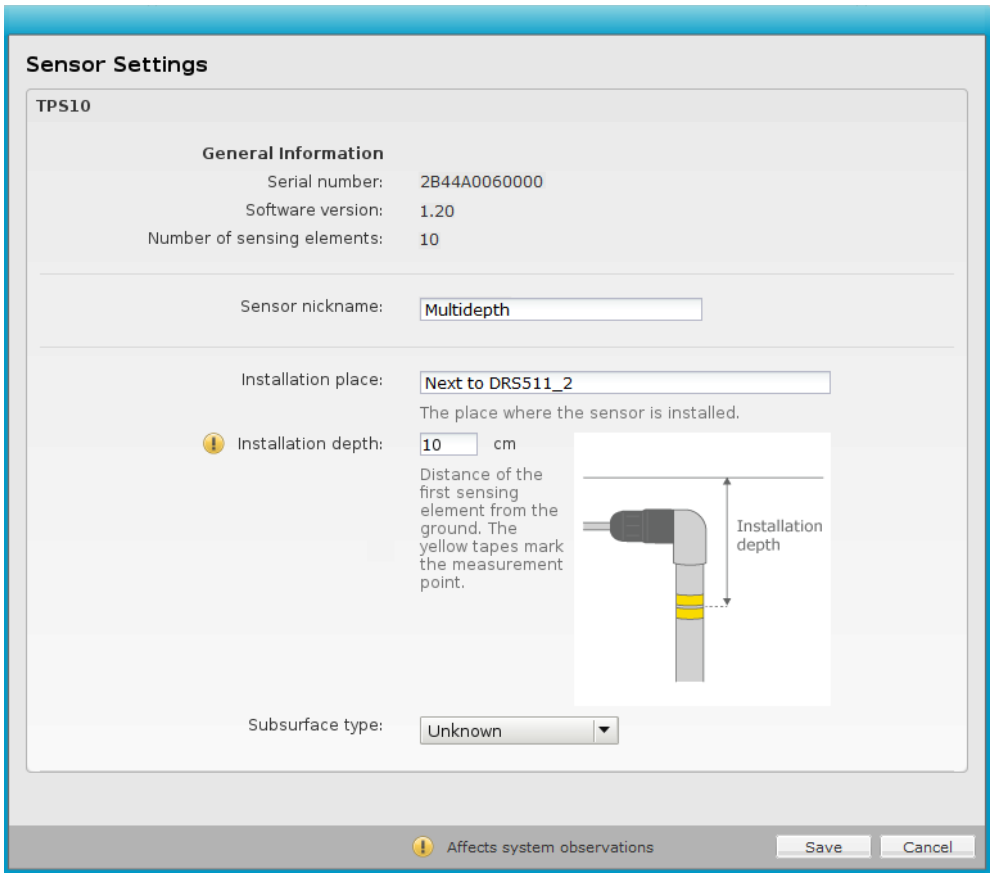
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for TPS10.

3. In the **Sensor Settings** window, set the following:

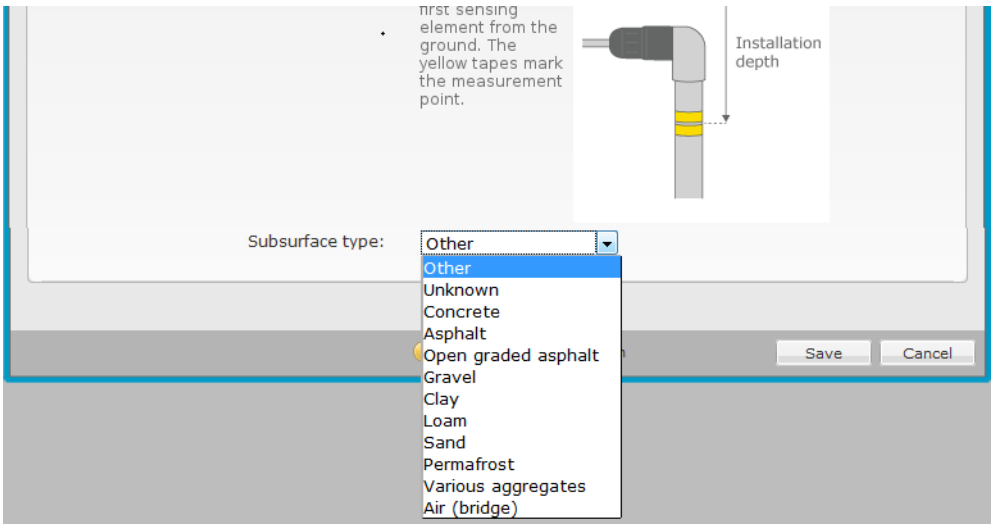
Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

Installation place
Any notes that help to locate the installed sensor.

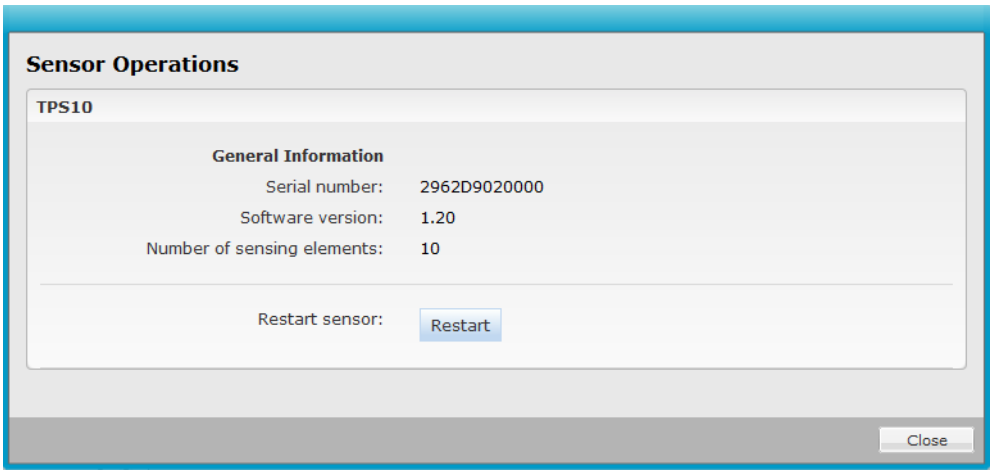
Installation depth
Distance of the first sensing element from the ground. The yellow tapes mark the measurement point. The first sensing element is located between the tapes. This setting affects system observations.



4. In **Subsurface type**, select the subsurface type at the installation place.



5. To save the changes, select **Save**.
6. Restart the sensor.
   a. In the **Sensors** component, select **Operations** for TPS10.



   b. Select **Restart**.

More information

- TPS10 maintenance (page 228)

4.9 Configuring PWD settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** for PWD12 or PWD22.

3. In the **Sensor Settings** window, set the following:

Sensor nickname

A descriptive name for identifying the sensor. Follow the local naming policy.

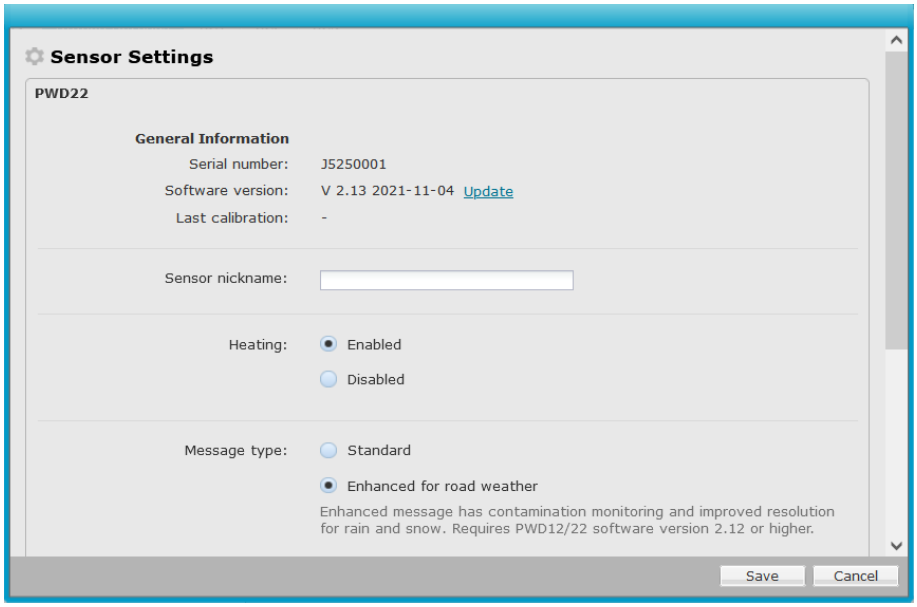
Heating

Enable (recommended during winter time) or disable heating. If heating is enabled, the heating power increases automatically when there is a risk of freezing or ice build-up. When the station enters battery mode, PMU701 switches off sensor heating.

Message type

Select **Standard** if your PWD12/PWD22 software version is earlier than 2.13.
Select **Enhanced for road weather** to receive real-time window contamination information from PWD and to use the improved resolution for rain and snow accumulation. Requires PWD12/PWD22 software version 2.13 or later.

If you select **Enhanced for road weather** for PWD12/PWD22 that does not have software version 2.13 or later, PWD stops reporting.

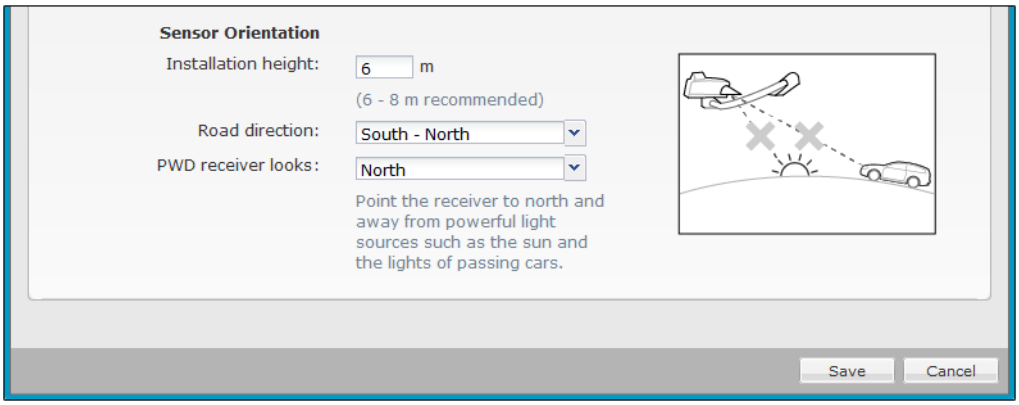


4. In **Sensor Orientation**, set the following:

   Installation height
   Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.

   Road direction
   Direction of the lane closest to the sensor.

   PWD receiver looks
   The compass point where the PWD receiver is pointing.



5. To save the changes, select **Save**.

More information

- PWD maintenance (page 230)
- Calibrating PWD (page 235)

4.10 Configuring DRD11A settings

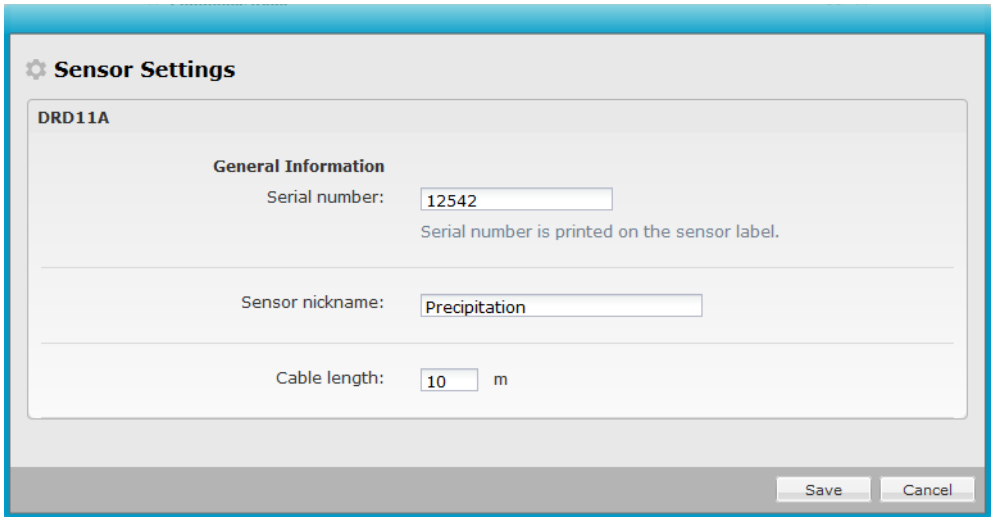
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for DRD11A.

3. In the **Sensor Settings** window, set the following:

   Serial number
   Serial number of the sensor. The serial number is printed on the sensor label.

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Cable length
   Length of the sensor cable.



4. To save the changes, select **Save**.

More information

- DRD11A maintenance (page 238)

4.11 Configuring tipping bucket settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for tipping bucket.

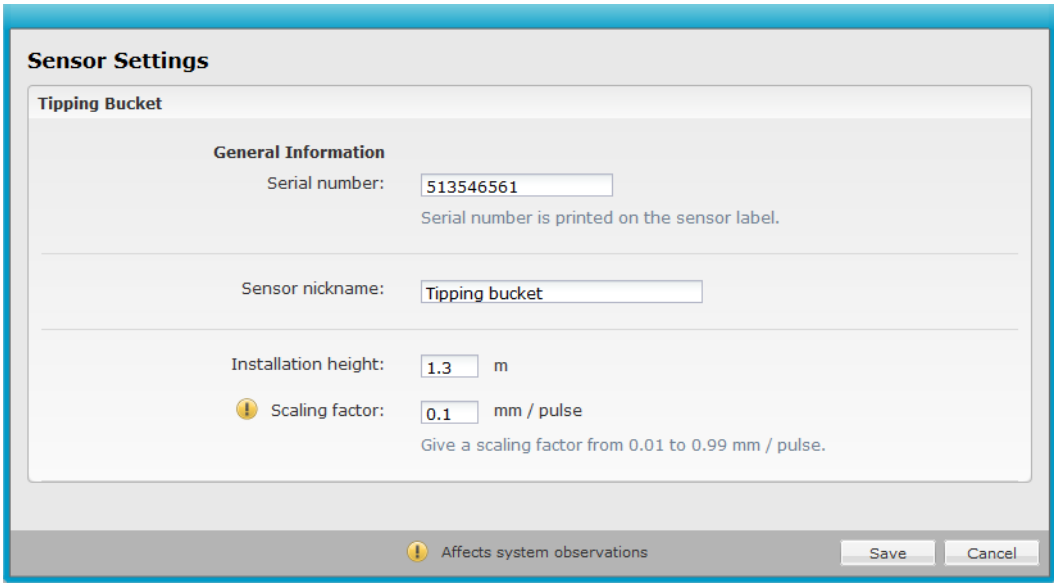
3. In the **Sensor Settings** window, set the following:

   Serial number
   Serial number of the sensor. The serial number is printed on the sensor label.

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Installation height
   Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.

   Scaling factor
   The sensitivity of the sensor. The scaling factor defines the amount of precipitation that tips the bucket. This setting affects system observations.



4. To save the changes, select **Save**.

More information

- RG13(H) maintenance (page 240)

4.12 Configuring HMP155E settings

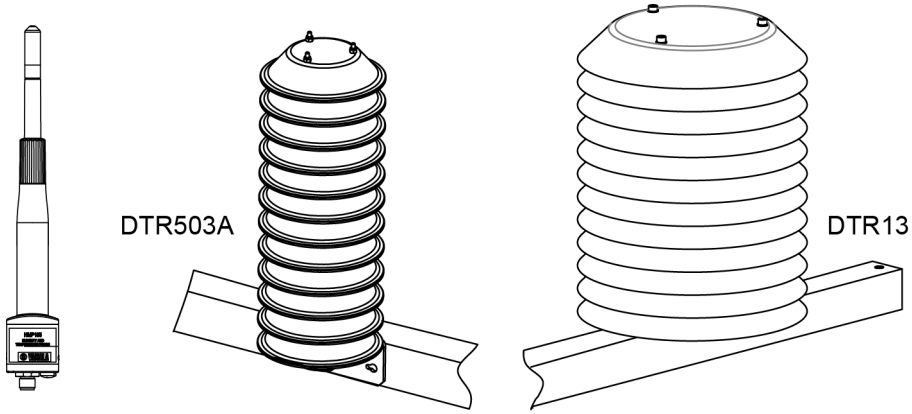


Figure 4 HMP155E with radiation shield options

The Web UI detects the probe type automatically (warmed probe with automatic purge or non-heated probe).

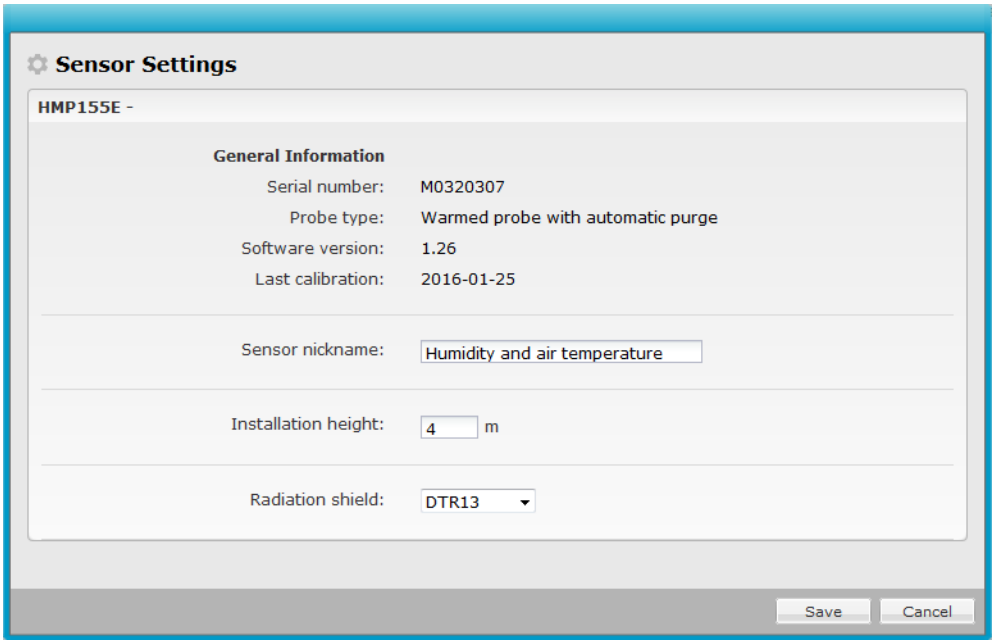
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for HMP155E.

3. In the **Sensor Settings** window, set the following:

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Installation height
   Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.

   Radiation shield
   The radiation shield used: **DTR503A** or **DTR13**.



4. To save the changes, select **Save**.

More information

- HMP155 maintenance (page 241)

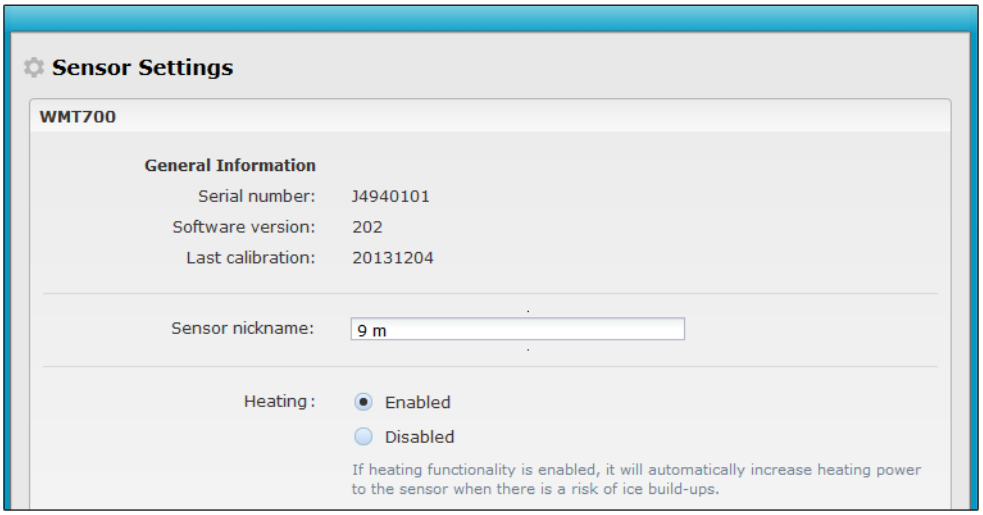
4.13 Configuring WMT700 settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** for WMT700.

3. In the **Sensor Settings** window, set the following:

Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

Heating
Enable (recommended during winter time) or disable heating. If heating is enabled, the heating power increases automatically when there is a risk of freezing or ice build-up. When the station enters battery mode, PMU701 switches off sensor heating.

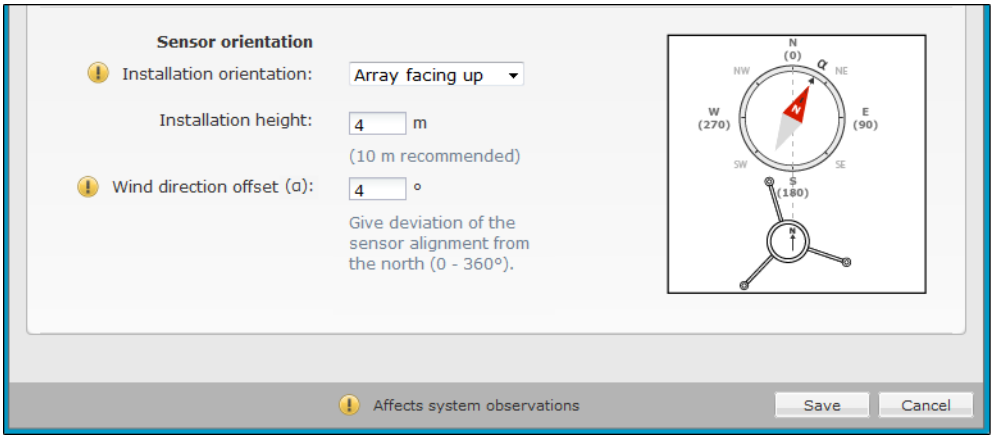


4. In **Sensor Orientation**, set the following:

   Installation orientation
   Orientation of the sensor array (array facing up or down). This setting affects system observations.

   Installation height
   Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.

   Wind direction offset
   Deviation of sensor alignment to the North in degrees (`0–360°`). For instructions on how to measure the wind direction offset, see RWS200 Installation Manual (M211608EN). This setting affects system observations.



5. To save the changes, select **Save**.

More information

- WMT700 maintenance (page 243)

4.14 Configuring WA15 settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** for WA15.

3. In the **Sensor Settings** window, set the following:

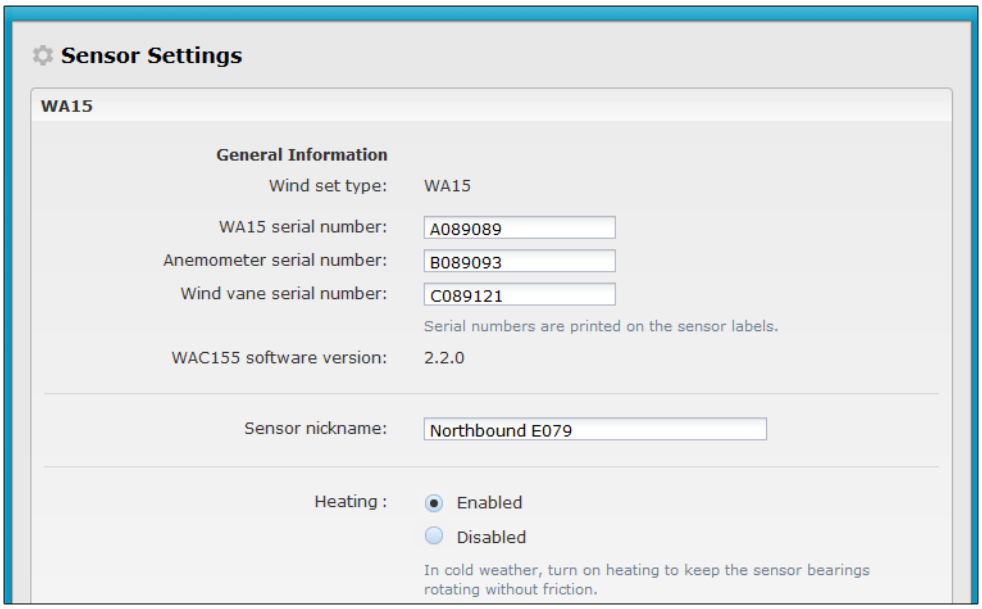
WA15 serial number
Serial number of the wind set. The serial number is printed on the label attached to the cross arm.

Anemometer serial number
Serial number of the anemometer (WAA151). The serial number is printed on the sensor label.

Wind vane serial number
Serial number of the wind vane (WAV151). The serial number is printed on the sensor label.

Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

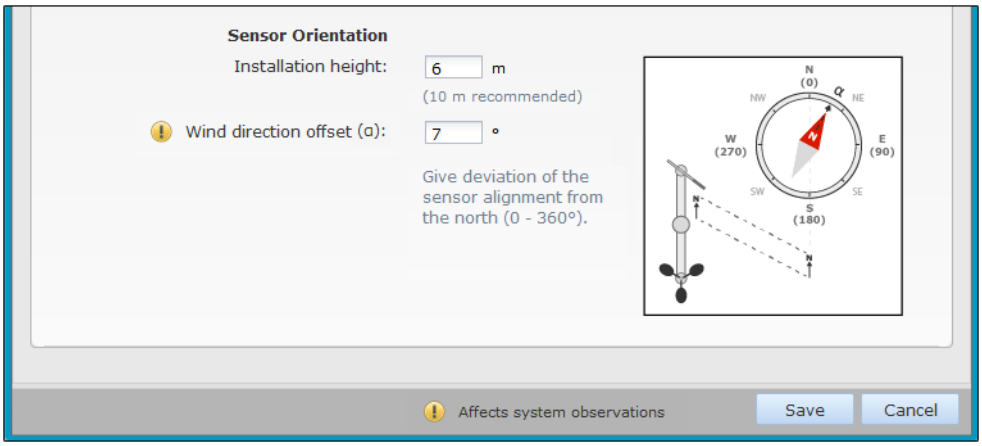
Heating
Enable (recommended during winter time) or disable heating. If heating is enabled, the heating power increases automatically when there is a risk of freezing or ice build-up. When the station enters battery mode, PMU701 switches off sensor heating.



4. In **Sensor Orientation**, set the following:

   Installation height
   Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.

   Wind direction offset
   Deviation of sensor alignment to the North in degrees (`0–360°`). For instructions on how to measure the wind direction offset, see RWS200 Installation Manual (M211608EN). This setting affects system observations.



5. To save the changes, select **Save**.

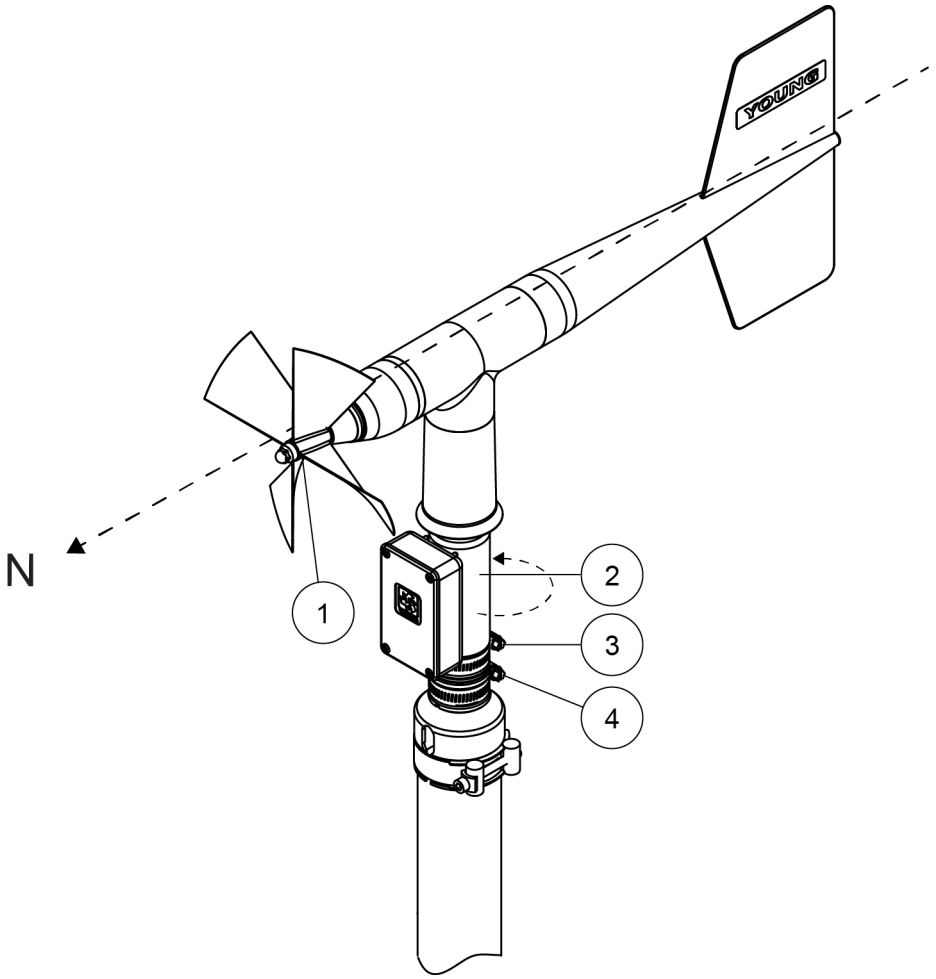
More information

- WA15 maintenance (page 246)

4.15 Configuring R.M. Young Wind Monitor settings

1. Log in to the Web UI as an administrator or super user, and go to the **Measurements** page.

2. Align the sensor:
   a. Using a compass and sighting down the centerline of the sensor, point the nose cone to a reference point for North or true North, depending on your requirements.
   b. Holding the sensor in place, slowly turn the sensor base until the Web UI shows that wind direction is 0 °.
   c. Lift the orientation ring to the sensor base.
   d. Rotate the ring until the indexing pin on the ring is engaged with the notch in the sensor.
   e. Tighten the orientation ring and the band clamp.



1 Nose cone
2 Sensor base
3 Band clamp
4 Orientation ring

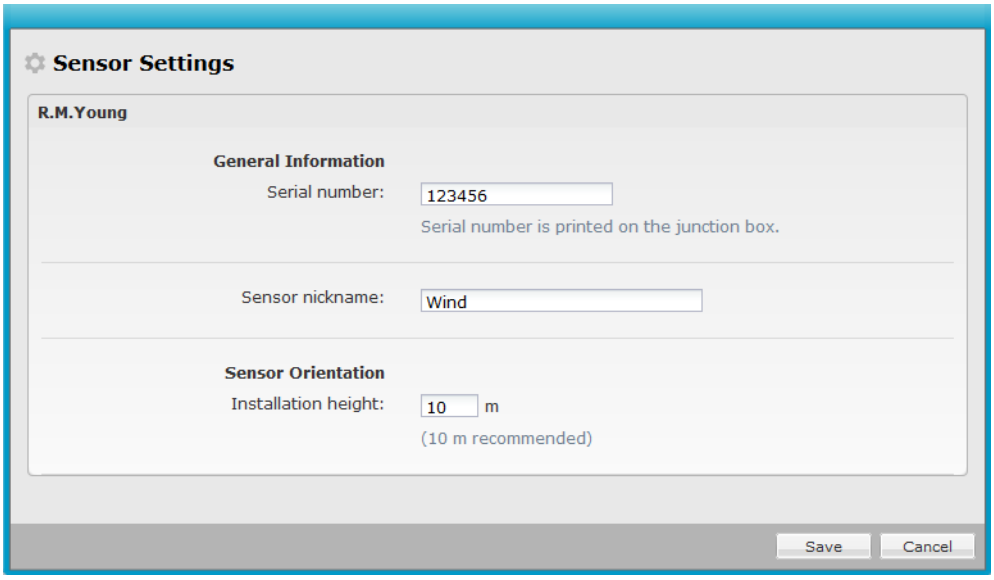
3. Go to the **Station Settings**page and in the **Sensors** component, select **Settings** ⚙ for R.M. Young Wind Monitor.

4. In the **Sensor Settings** window, set the following:

   Serial number
   Serial number of the sensor. The serial number is printed on the junction box.

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Installation height
   Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.



5. To save the changes, select **Save**.

More information

- R.M. Young Wind Monitor maintenance (page 247)

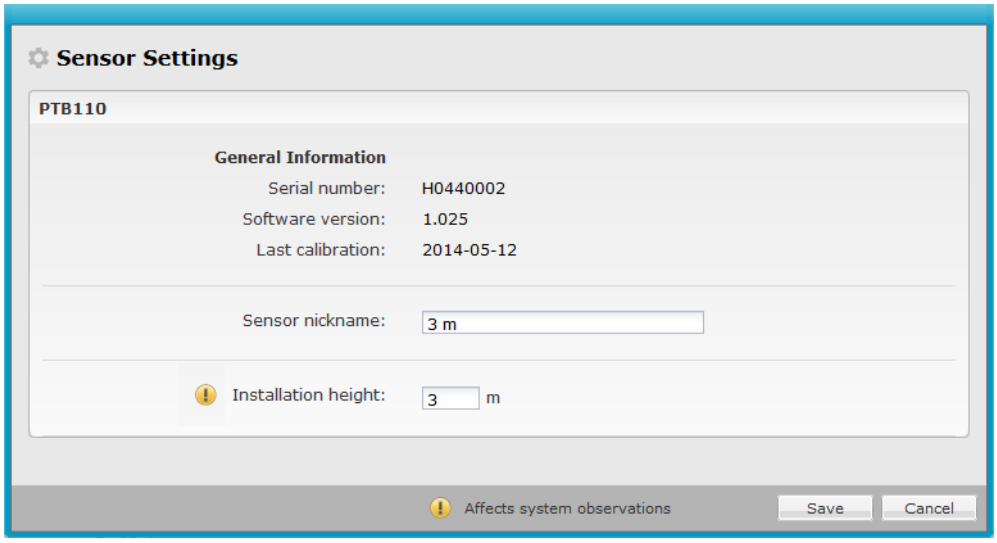
4.16 Configuring PTB110 settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for PTB110.

3. In the **Sensor Settings** window, set the following:

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Installation height
   Distance of the installed sensor from ground level. If you change the installation height, restart the station to add the new value to data reporting.
   This setting affects the QFE value (air pressure reduced to ground level). The QFE value is also used for calculating QFF (air pressure reduced to mean sea level by taking into account the actual temperature conditions) and QNH (air pressure reduced to mean sea level according to ICAO standard atmosphere corrections to QFE) values.



4. To save the changes, select **Save**.

More information

- PTB110 maintenance (page 248)

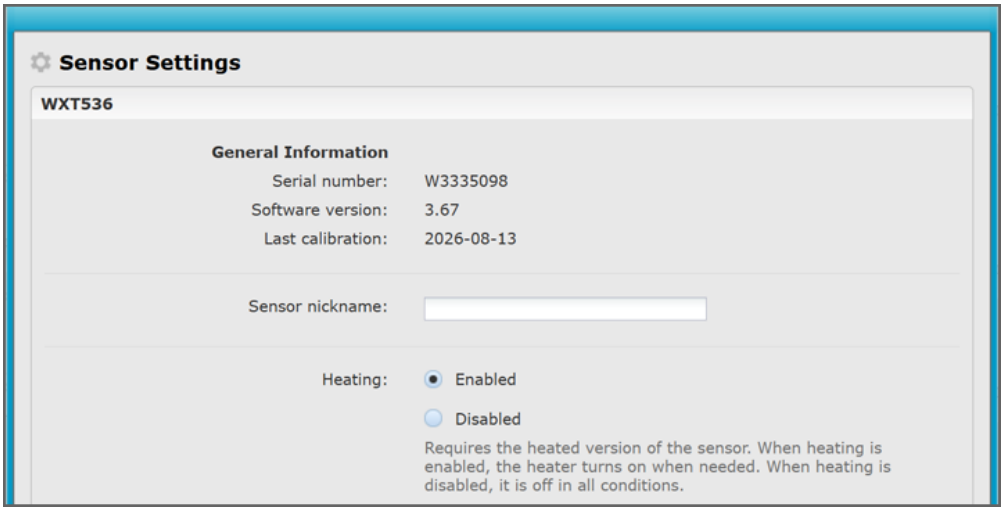
4.17 Configuring WXT536 settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for WXT536.

3. In the **Sensor Settings** window, set the following:

Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

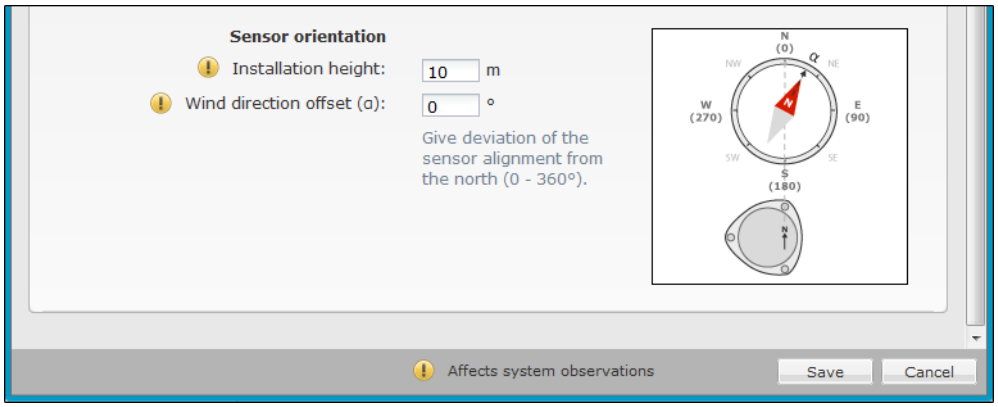
Heating
Enable (recommended during winter time) or disable heating. If heating is enabled, the heating power increases automatically when there is a risk of freezing or ice build-up. When the station enters battery mode, PMU701 switches off sensor heating.



4. In **Sensor Orientation**, set the following:

   Installation height
   Distance of the installed sensor from ground level. If you change the installation height, restart the station to add the new value to data reporting.
   This setting affects the QFE value (air pressure reduced to ground level). The QFE value is also used for calculating QFF (air pressure reduced to mean sea level by taking into account the actual temperature conditions) and QNH (air pressure reduced to mean sea level according to ICAO standard atmosphere corrections to QFE) values.

   Wind direction offset
   Deviation of sensor alignment to the North in degrees (`0–360°`). For instructions on how to measure the wind direction offset, see RWS200 Installation Manual (M211608EN). This setting affects system observations.



5. To save the changes, select **Save**.

More information

- Weather transmitter maintenance (page 248)

4.18 Configuring SR50A settings

RWS200 supports 2 SR50A sensors with the following IDs:

- First SR50A: 33
- Second SR50A: 34

For system delivery, the IDs are configured at the factory. As a spare part, SR50A always has ID 33. If you add a spare SR50A as the second SR50A to RWS200, first change the sensor ID through the sensor software. For instructions, see the manufacturer documentation. After changing the ID, connect the sensor to RWS200 and configure it.

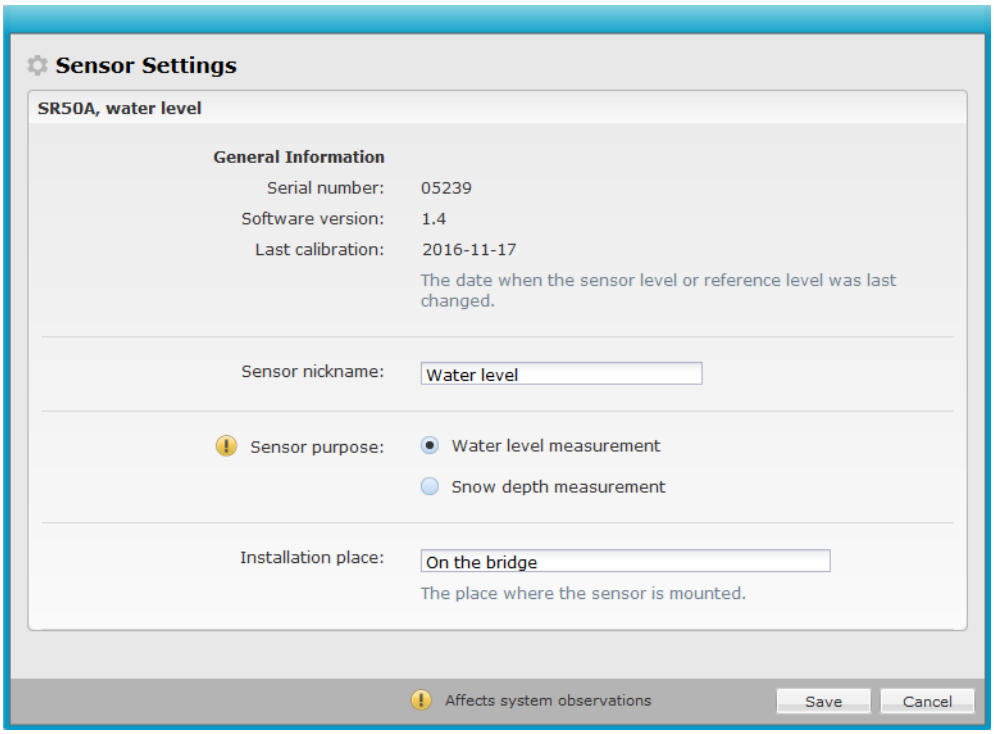
If you have DSC211 and DST111 installed in the same weather station as SR50A, the SR50A serial number information is unreliable.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** for SR50A.
3. In the **Sensor Settings** window, set the following:

   Sensor nickname
   A descriptive name for identifying the sensor. Follow the local naming policy.

   Sensor purpose
   Select whether to use the sensor for water level or snow depth measurement. This setting affects system observations.

   Installation place
   Any notes that help to locate the installed sensor.



4. To save the changes, select **Save**.
5. To calibrate the sensor, configure it for either water level measurement or snow depth measurement.

More information

- Setting up SR50A for water level measurement (page 252)
- Setting up SR50A for snow depth measurement (page 256)

4.19 Configuring global radiation sensor settings

On the Web UI, global radiation sensor settings are located under the DRI701 sensor interface card to which the sensor is connected.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for the first DRI701 sensor interface card.

> Always connect the global radiation sensor to the first DRI701.

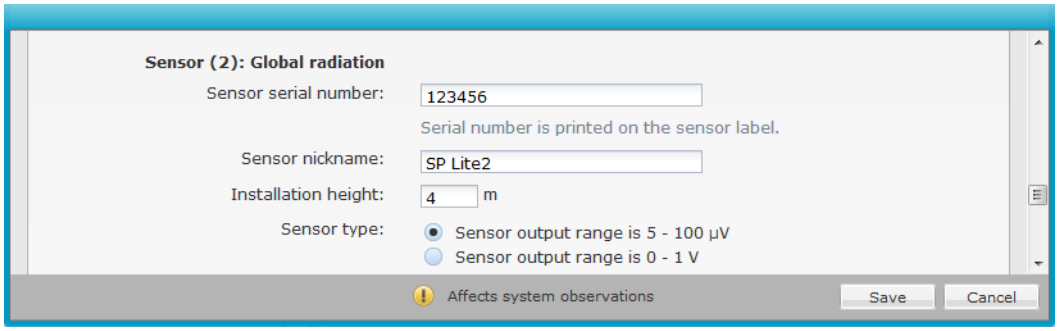
3. In the **Sensor Settings** window, scroll down to **Sensor (2): Global Radiation**, and set the following:

Sensor serial number
Serial number of the sensor. The serial number is printed on the sensor label.

Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

Installation height
Distance of the installed sensor from the ground level. If you change the installation height, restart the station to add the new value to data reporting.

Sensor type
Select the correct output range for the sensor.



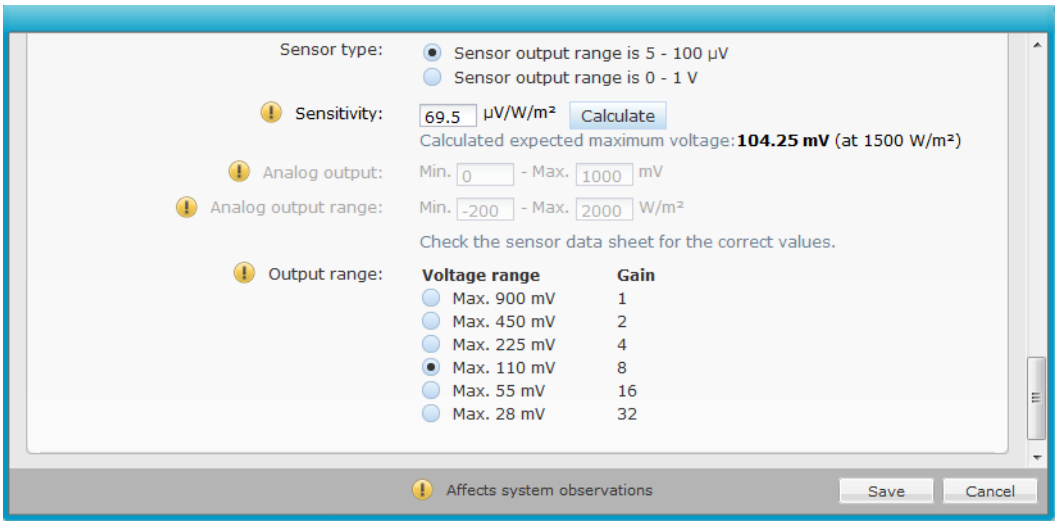
4. If you selected **Sensor output range is 5 - 100 µV**, set the following:

   Sensitivity

   Type the sensitivity of the sensor and select **Calculate**. The system calculates the expected maximum voltage for the sensor at 1500 W/m^2. This setting affects system observations.

   Output range

   Select the gain corresponding to the calculated expected maximum voltage. This setting affects system observations.

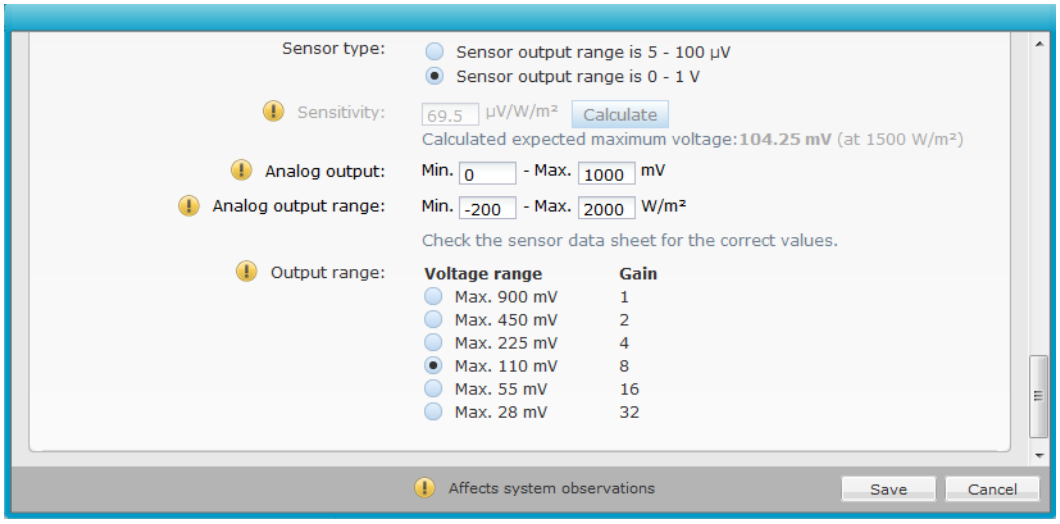


5. If you selected **Sensor output range is 0 - 1 V**, set the following:

   Analog output
   The minimum and maximum voltage measurement of the sensor. This setting affects system observations.
   See the sensor data sheet for the correct values. For example, for Kipp & Zonen SMP3 pyranometer the correct values are minimum **4** mV and maximum **20** mV.

   Analog output range
   The irradiance range of the sensor. This setting affects system observations.
   See the sensor data sheet for the correct values. For example, for Kipp & Zonen SMP3 pyranometer the correct values are minimum **-200** W/m^2 and maximum **2000** W/m^2.

   Output range
   Select the gain corresponding to the maximum analog output. This setting affects system observations.
   For example, for Kipp & Zonen SMP3 pyranometer the correct value is **Max. 28 mV**.



6. To save the changes, select **Save**.

More information

- SP Lite2 maintenance (page 258)
- Example of calculating gain for LI-200 pyranometer (page 66)

4.19.1 Example of calculating gain for LI-200 pyranometer

The LI-200 pyranometer produces a current proportional to the radiation intensity. Typically, the sensor sensitivity is 75 µA / 1000 W/m^2. To convert microamperes to millivolts as required by RWS200, the sensor manufacturer recommends using a 147 Ω (0.1-%) resistor at the output. For guidance on how to choose and connect the resistor, see the sensor documentation.

Follow the wiring instructions for global radiation sensor. To ensure correct observations, the signal to DRI701 must always be positive.

The following steps show how to calculate the maximum voltage with maximum global radiation (1500 W/m^2).

1. Based on the sensitivity value, calculate the maximum sensor output.

   $$I_{\text{out}}\text{max} = \frac{1500}{1000} \times 75\mu\text{A} = 112.5\mu\text{A}$$

2. Convert the maximum sensor output to millivolts.

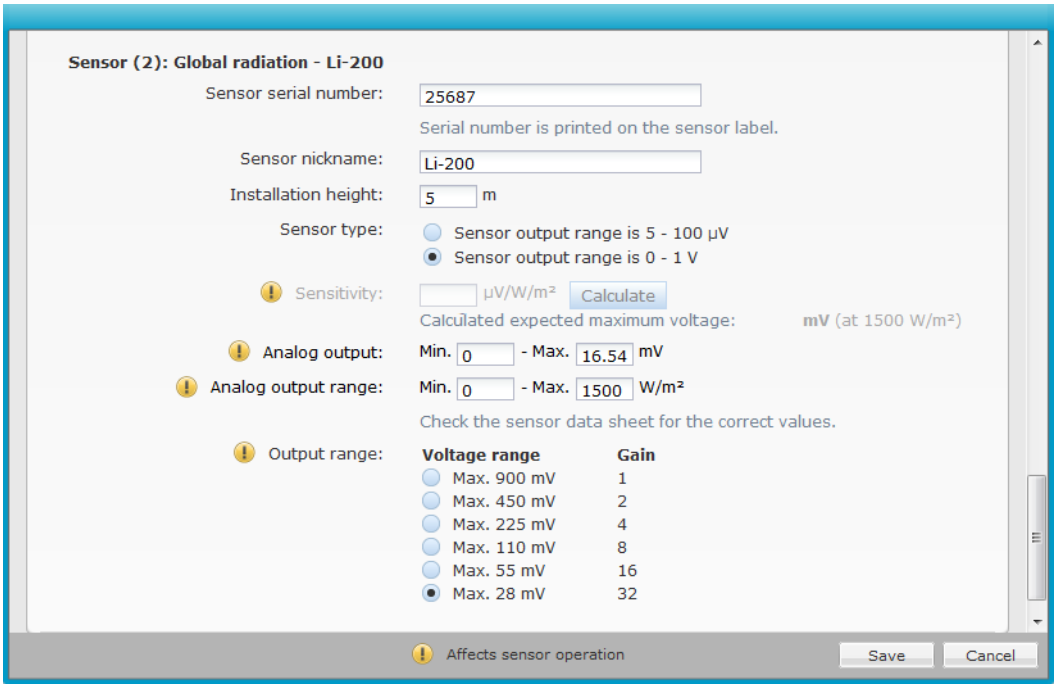
   $$V_{\text{out}}\text{max} = 112.5\mu\text{A} \times 147\Omega = 16.54\text{mV}$$

3. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
4. In the **Sensors** component, select **Settings** ⚙ for the first DRI701 sensor interface card.

   Global radiation sensor is always connected to the first DRI701.

5. In **Sensor type**, select the correct output range for the sensor.

   For LI-200, the maximum output is **16.54** mV.



6. In **Analog output**, set the minimum and maximum outputs for the sensor.

   For LI-200, the minimum voltage measurement is **0** mV and maximum **16.54** mV.

7. In **Analog output range**, set the minimum and maximum analog output range for the sensor.

   For LI-200, the minimum irradiance is **0** W/m^2 and maximum **1500** W/m^2.

8. In **Output range**, select the maximum voltage range for the sensor.

   For LI-200, the maximum voltage measurement is **16.54** mV, so select **Max. 28 mV**.

More information

- Configuring global radiation sensor settings (page 64)

4.20 Configuring fixed camera settings

If you order RWS200 with a fixed camera, the camera IP address is preconfigured for the system at the factory. If you order two cameras, they have different IP addresses.

If you later add a second camera, open a port in the cellular router for the camera and change the IP address of the new camera to be different from the IP address of the first camera. All cameras that are delivered individually have the same IP address.



You must be connected to RWS200 over a local connection (WLAN or LAN).

To configure the fixed camera, perform the following procedures in the order presented:

1. Configuring IP routing in IX20 cellular router (page 109)
2. Configuring fixed camera settings in RWS200 (page 68)
3. Logging in to fixed camera (page 70)
4. (Only when adding a second camera separately) Changing IP address of second fixed camera (page 72)
5. Configuring date and time in fixed camera (page 74)
6. Storing changes to fixed camera (page 76)
7. Backing up fixed camera settings (page 79)

If you have backed up the fixed camera settings, you can restore them if needed. See Restoring fixed camera settings (page 80).

More information

- Mobotix fixed camera maintenance (page 258)

4.20.1 Configuring fixed camera settings in RWS200

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Settings** ⚙ for Camera, fixed.

3. In the **Sensor Settings** window, set the following:

Sensor nickname
A descriptive name for identifying the sensor. Follow the local naming policy.

Camera type
Select **Mobotix** to use the RWS200 default camera image settings. Select also normal resolution (640×480 px) or high resolution (1920×1080 px) images. This setting affects system observations.

> The selected interval and resolution affect the time how long the images are stored in DMU703, as well as the speed and cost of data transfer.

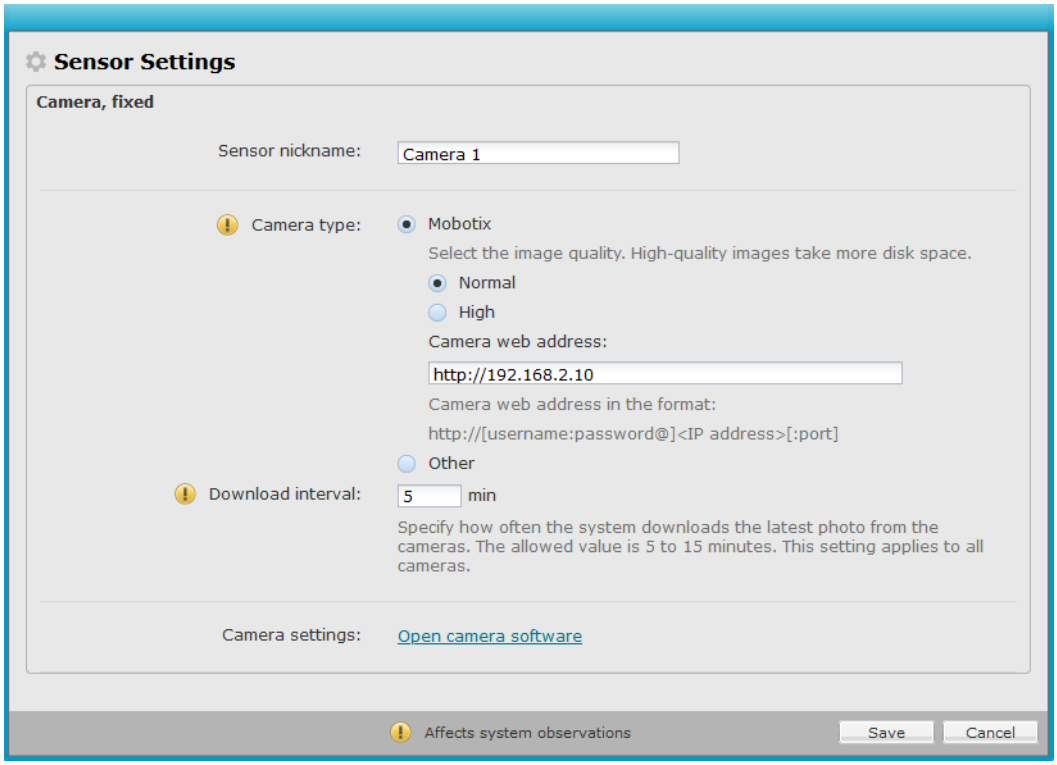
Select **Other** to customize the camera settings. Configure the settings in the camera software.

Camera web address
Specify the web address of the camera. The address must be the same as configured in the camera software:
- IP address of the first camera: `192.168.2.10`
- IP address of the second camera: `192.168.2.11`

This setting affects system observations.

> If you change the IP address in the **Camera web address** field, do not select **Save** before changing the IP address in the camera software. If you select **Save**, you cannot access the camera software through the Web UI.

Download interval
Define how often the camera takes a picture. The interval can be from 5 to 15 minutes. This setting affects system observations.
If you selected **Other** as the camera type, you can also specify the path to the image files.



4. To continue, log in to the camera software.
5. When you have completed configuring the fixed camera settings, in the **Sensor Settings** window, select **Save**.

More information

- Logging in to fixed camera (page 70)

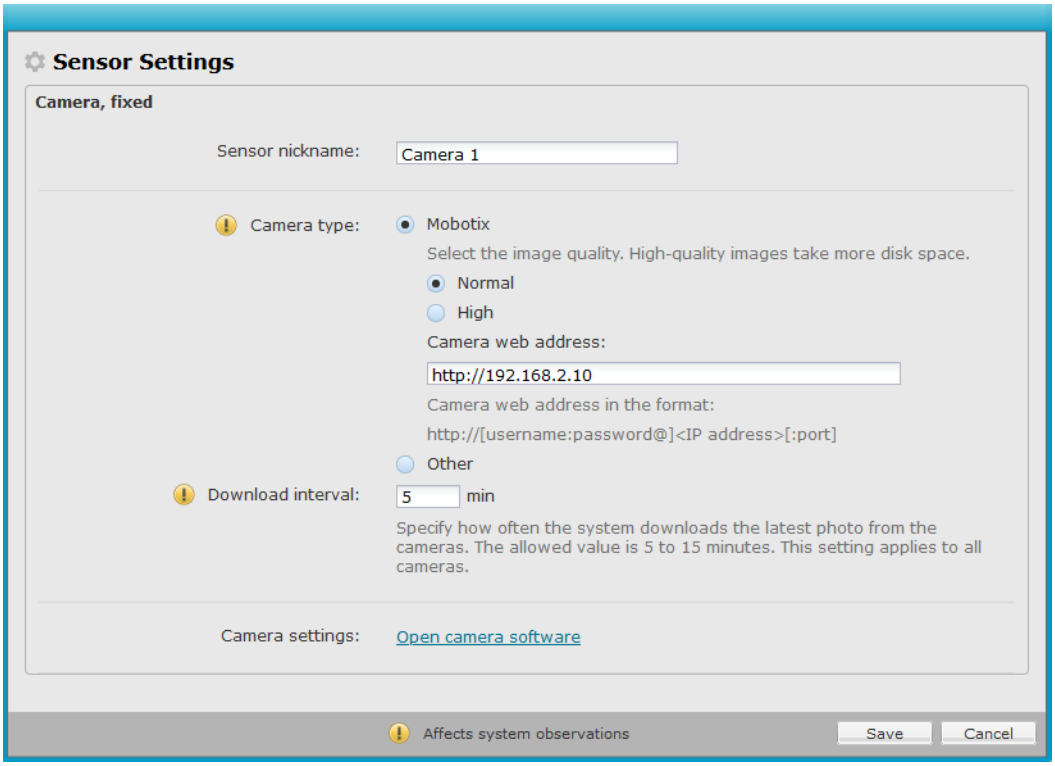
4.20.2 Logging in to fixed camera

After installation, configure the time and date for the camera.

You can also use the camera image to aim the camera to a relevant section of the road. When you are happy with the aim, tighten the camera screws. For aiming instructions, see RWS200 Installation Manual (M211608EN).

If you installed an IR illuminator, you can use the camera image to adjust the vertical position of the illuminator.

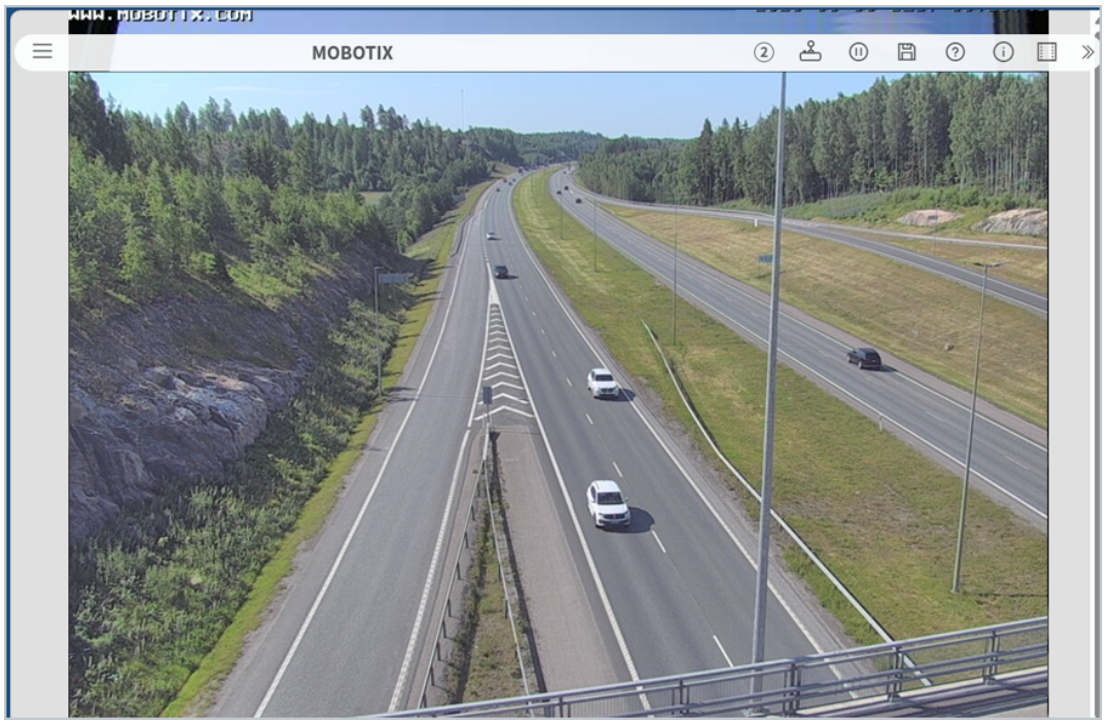
1. Open the camera software.
   - Over a local connection:
     1. Open the **Sensor Settings** window for Camera, fixed.
     2. In the **Sensor Settings** window, select **Open camera software**.



   - Over a remote connection:
     1. Open a browser and go to the following address in the RWS200 network:
        https://`<public IP address or hostname>:<port number>/`
        - Port number of the first camera: **`8043`**
        - Port number of the second camera: **`8044`**

2. On the camera main page, on the upper left corner, select **Admin Menu**, and log in.

   For the default username and password, see *RWS200 Installation Quick Guide (M212635EN)*.



4.20.3 Changing IP address of second fixed camera

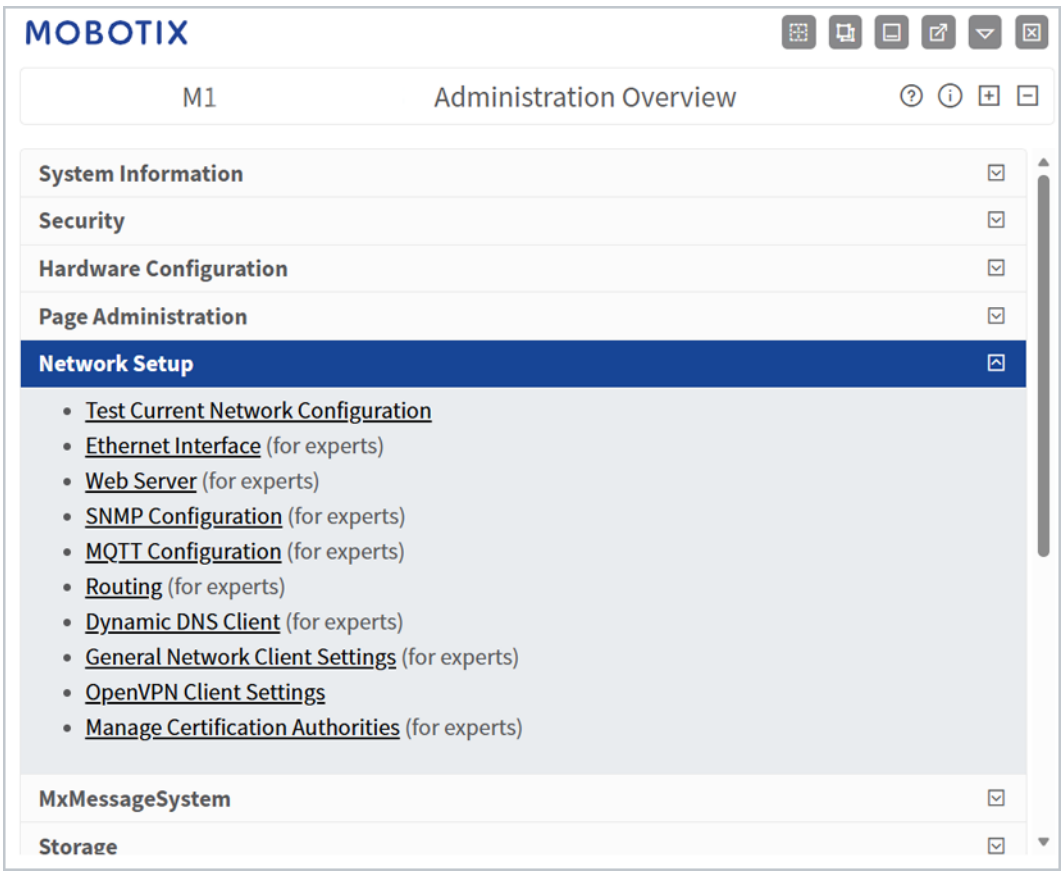
All fixed cameras delivered individually have the same IP address. To enable the second camera, change the camera IP address.

Make sure that the second camera is connected to PMU701 slot **J2** and the first camera is **not** connected to **J1**.

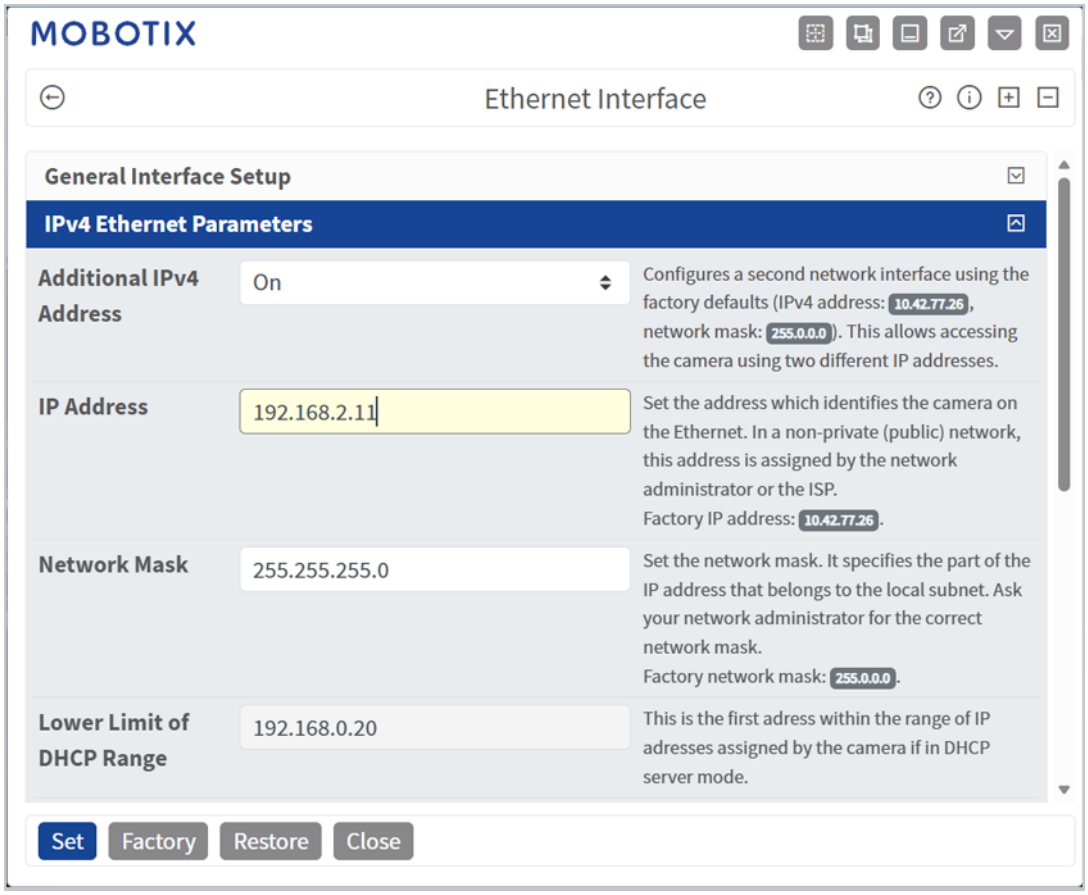
You must be connected to RWS200 over a local connection (WLAN or LAN).

1. Log in to the camera software.

2. Under **Network Setup**, select **Ethernet Interface**.



3. In the **Ethernet Interface** window, in **IPv4 Ethernet Parameters**, change **IP Address** to `192.168.2.11`.



If you change the image URL in the fixed camera settings, change the URL also in the **Sensor Settings** window for the camera.

4. To save the changes, select **Set > Close**.
5. Connect the first camera again to PMU701 slot **J1**.
6. Configure the camera date and time.

More information

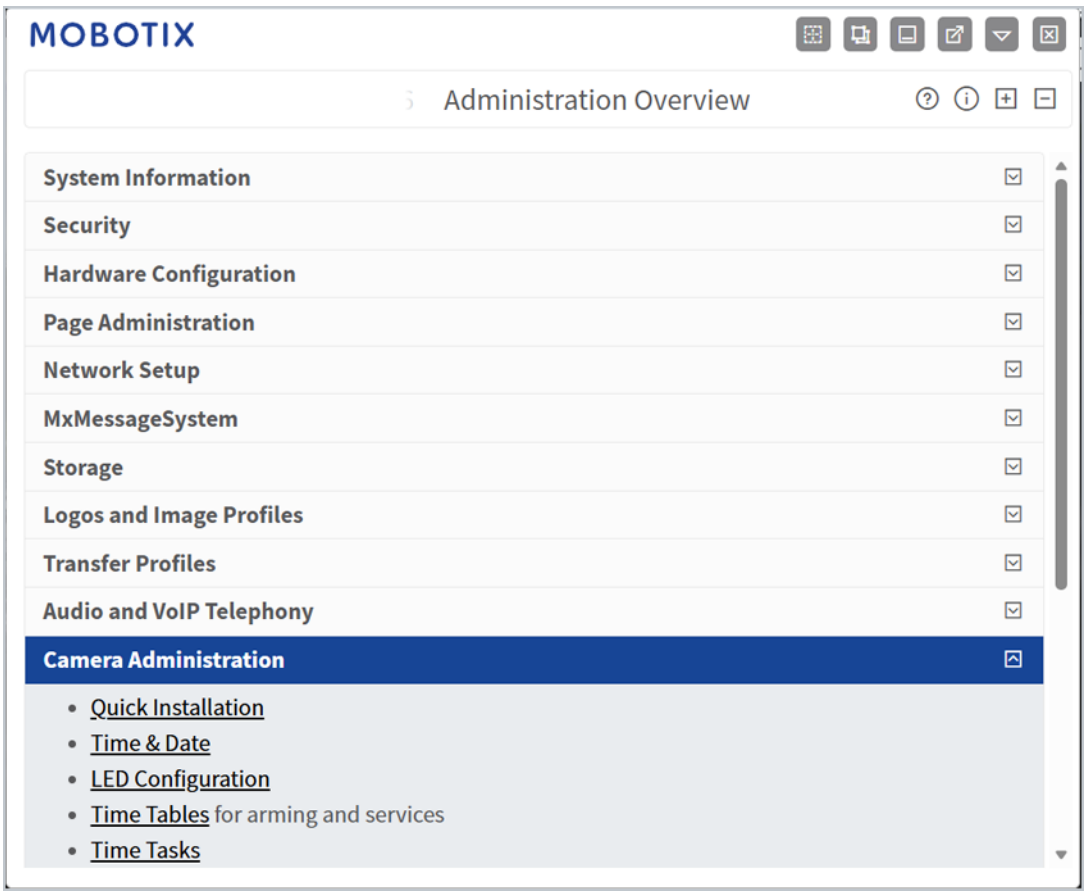
- Configuring date and time in fixed camera (page 74)

4.20.4 Configuring date and time in fixed camera

The camera time is automatically synchronized with the station time, but you must always set the time zone manually. The time is embedded in the camera images.

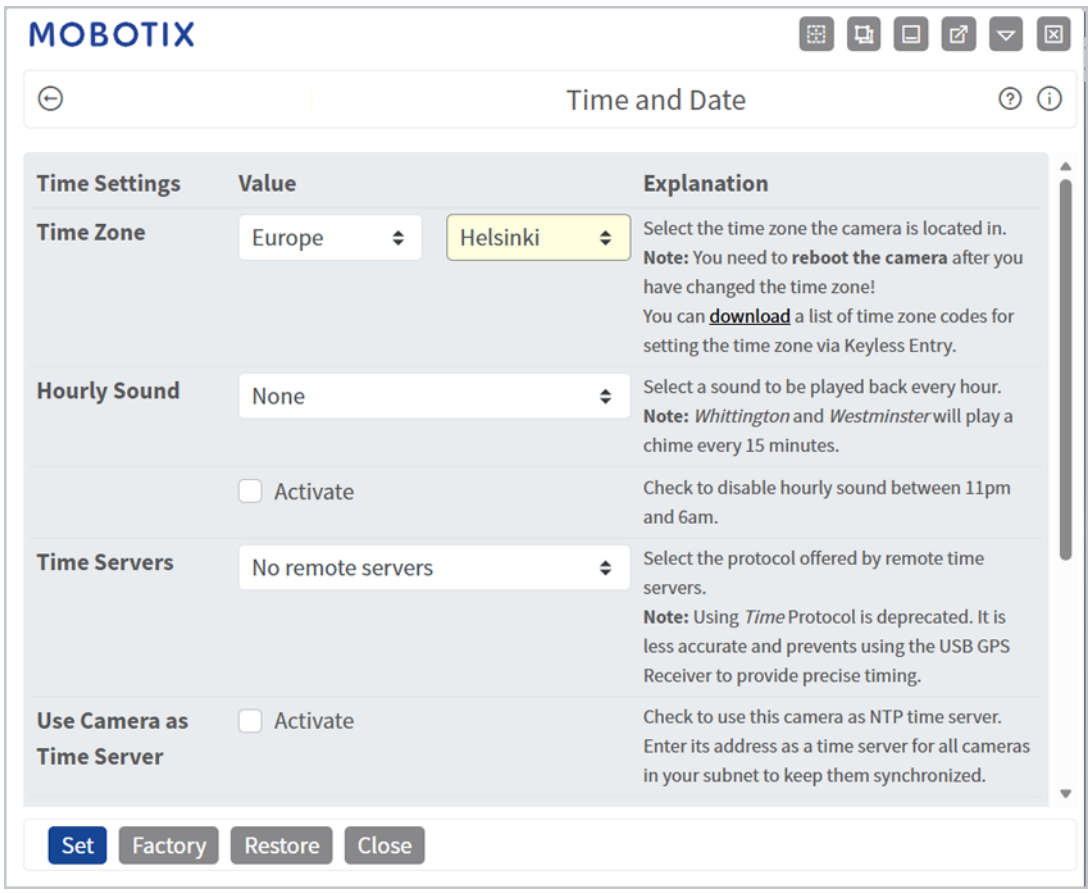
1. Log in to the camera software.

2. Select **Admin Menu > Camera Administration > Time and Date**.



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3. In the **Time and Date** window, set the time zone to be the same as in the station time settings.



4. To save the changes, select **Set > Close**.
5. If you are not satisfied with the photo quality, you can change the fixed camera settings through the camera software. For more information about the options and possibilities, see the manufacturer documentation.

> If you improve the image quality, the image file size increases. This affects the local database as well as the cost and speed of data transfer.

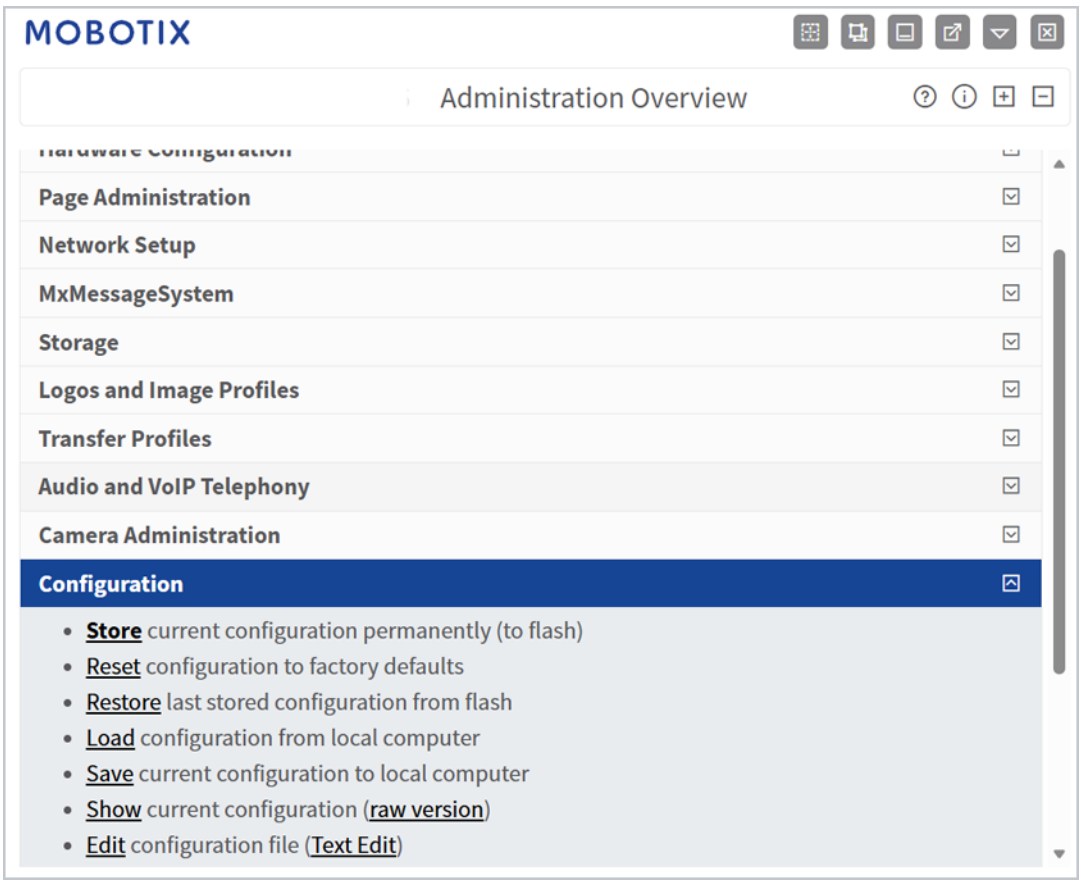
6. Load the changes to the camera memory.

4.20.5 Storing changes to fixed camera

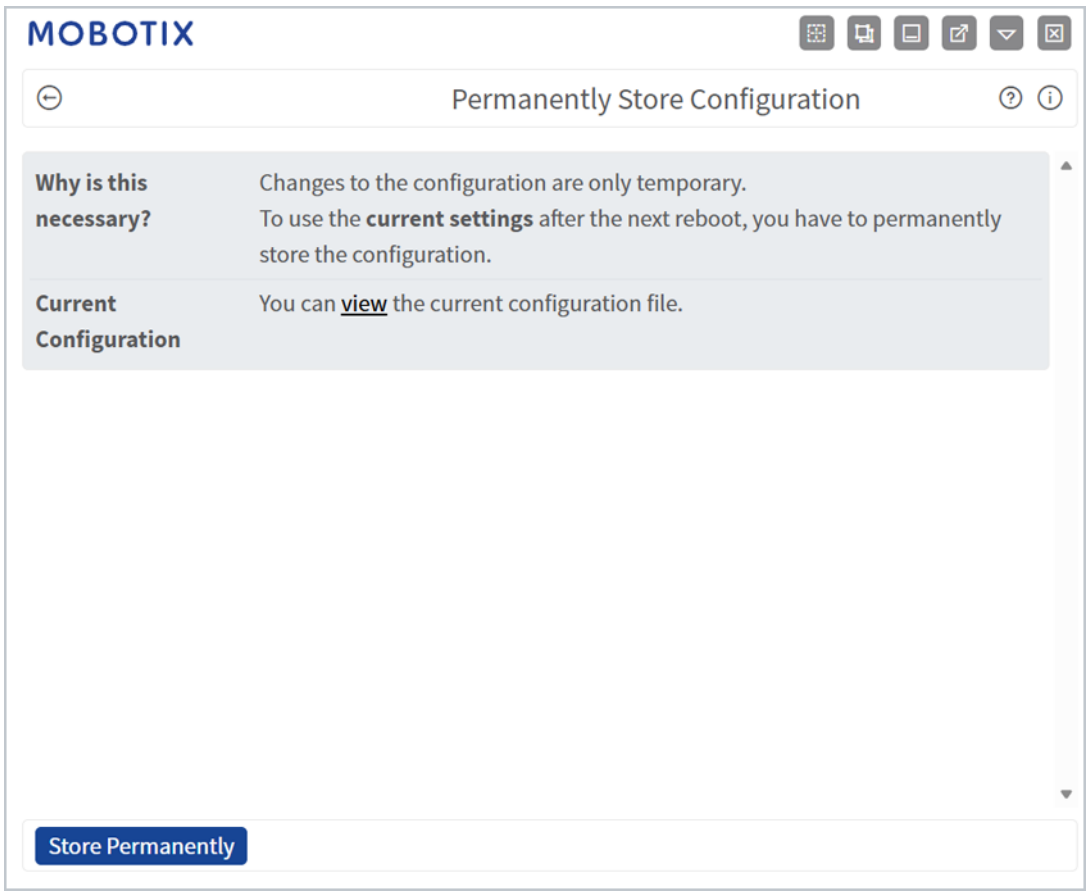
To permanently save any changes to the fixed camera settings, store the settings to the camera memory.

1. Log in to the camera software.

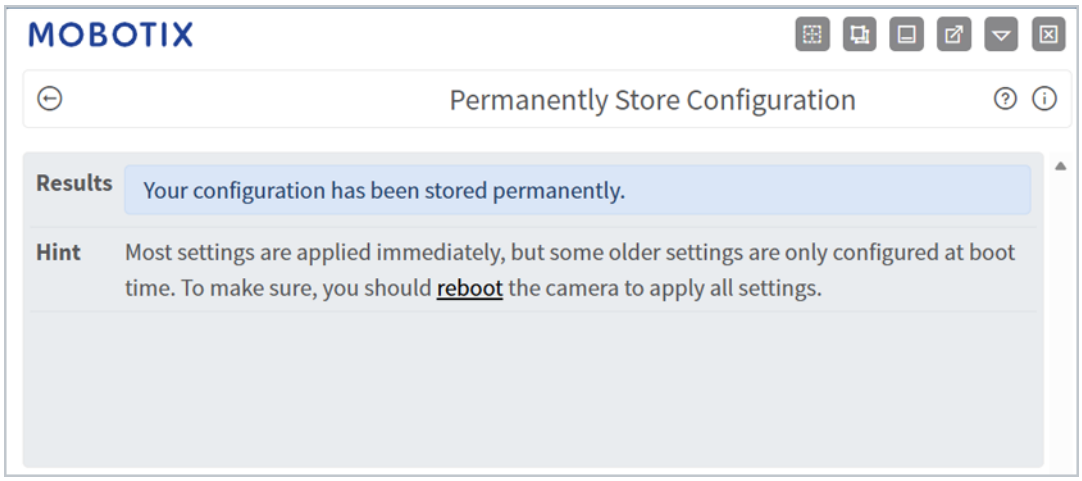
2. Select **Admin Menu > Configuration > Store**.



3. In the **Permanently Store Configuration** window, select **Store Permanently**.

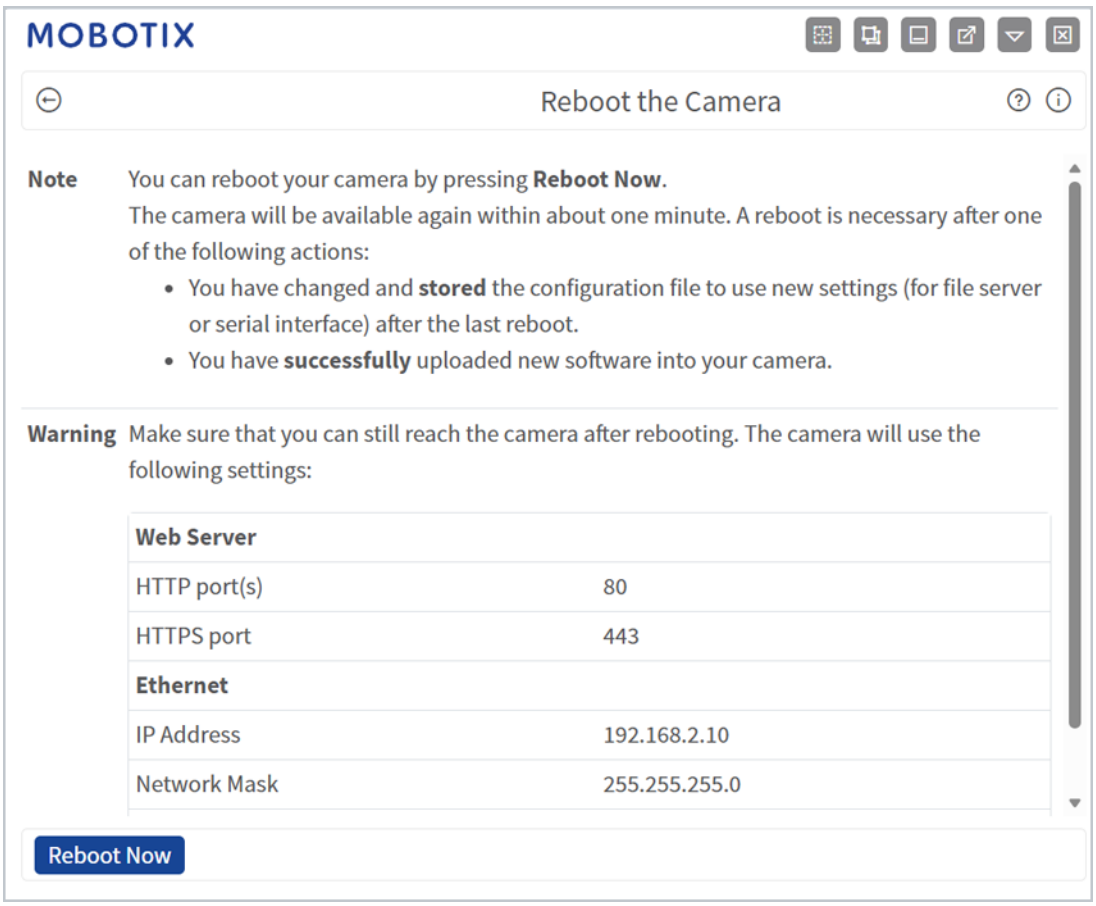


4. In the confirmation window, select **Reboot**.



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5. In the **Reboot the Camera** window, make sure that the network settings are correct, and select **Reboot Now**. The reboot takes approximately 1 minute.



6. Take a backup of the camera configuration, or close the camera window without taking a backup.

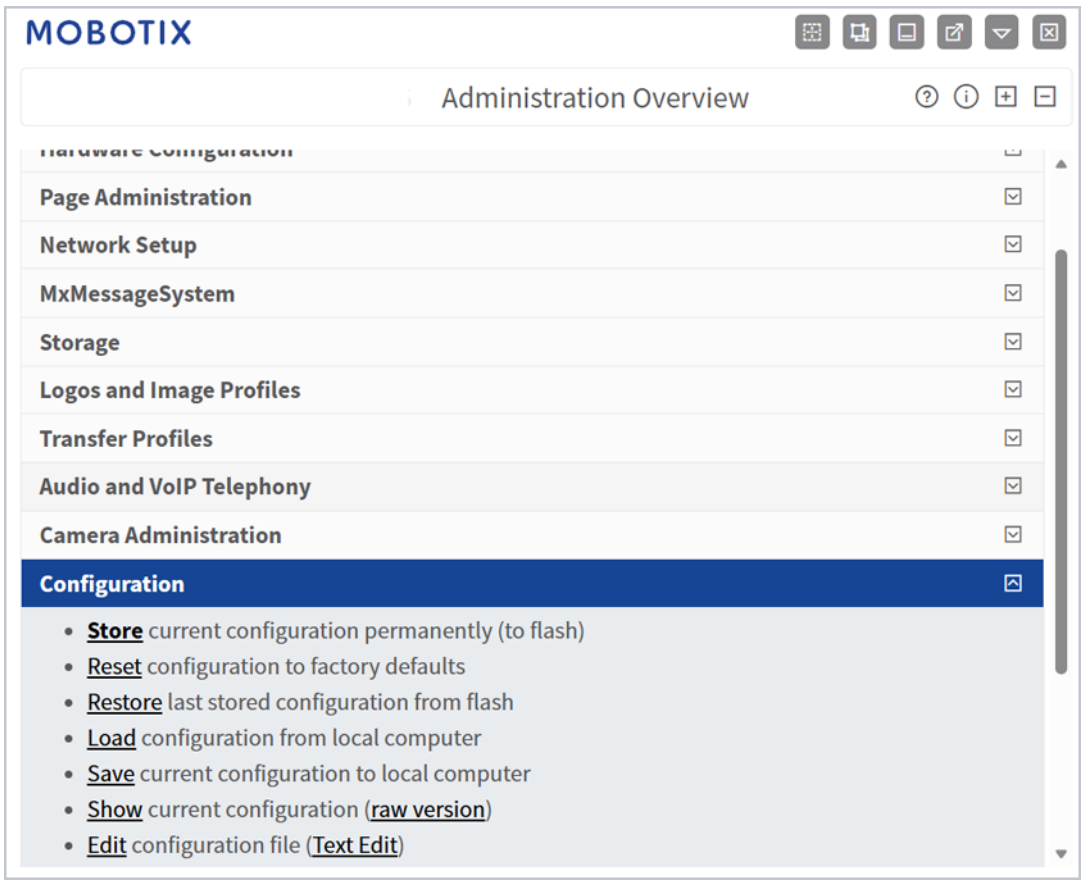
More information

- Backing up fixed camera settings (page 79)

4.20.6 Backing up fixed camera settings

1. Log in to the camera software.

2. Select **Admin Menu > Configuration > Save**.



3. When prompted, select **Save**.

   By default, the CFG file is saved in the *Downloads* folder on your computer.

4. To exit the camera software, close the windows.

4.20.7 Restoring fixed camera settings

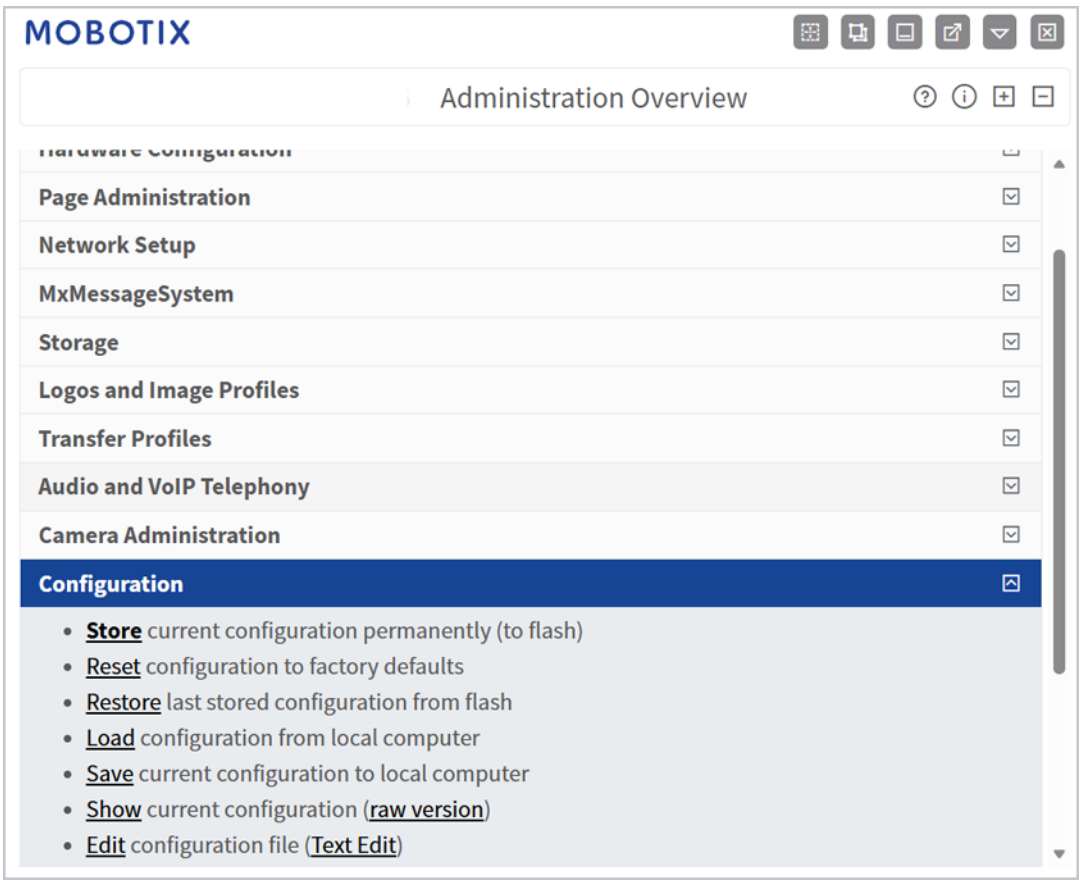
You can restore or update the camera settings from:

- A backup file
- A configuration file provided by Vaisala

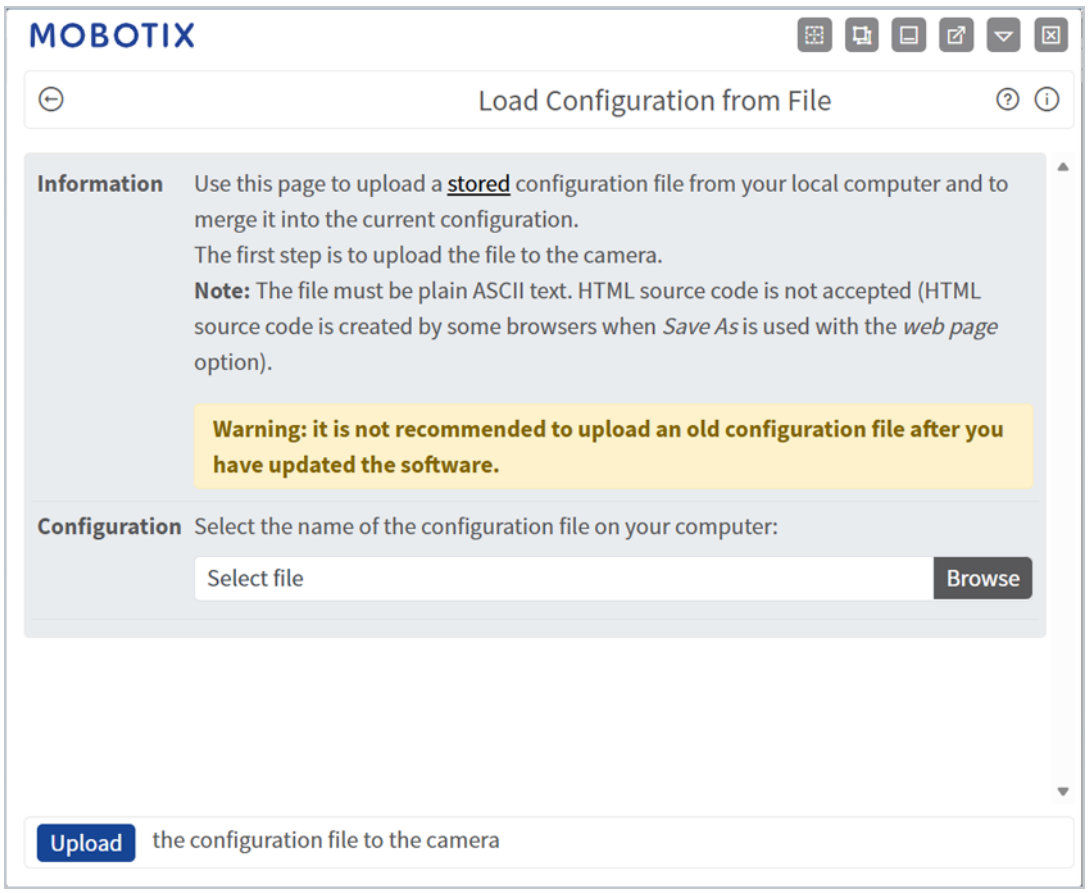
1. Log in to the camera software.

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2. Select **Admin Menu > Configuration > Load**.



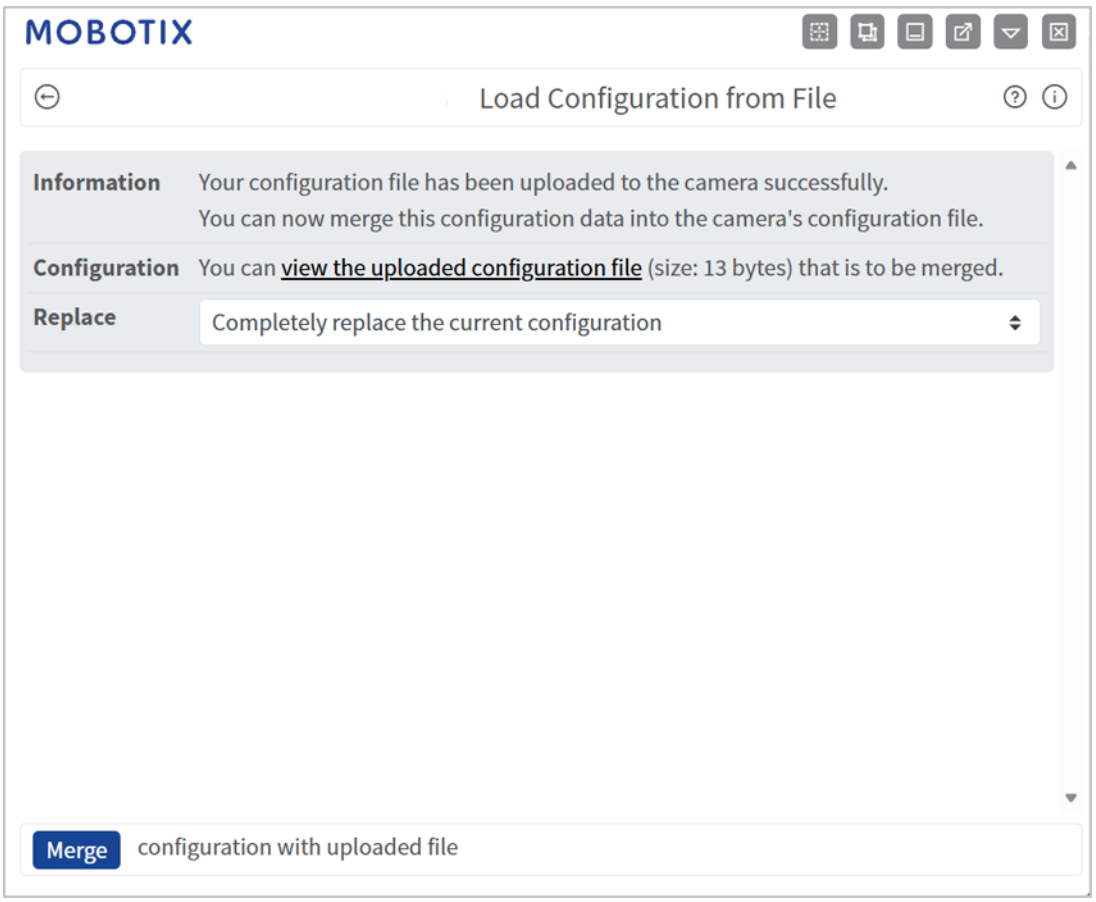
3. In the **Load Configuration from File** window, select **Browse** and the Mobotix settings file.



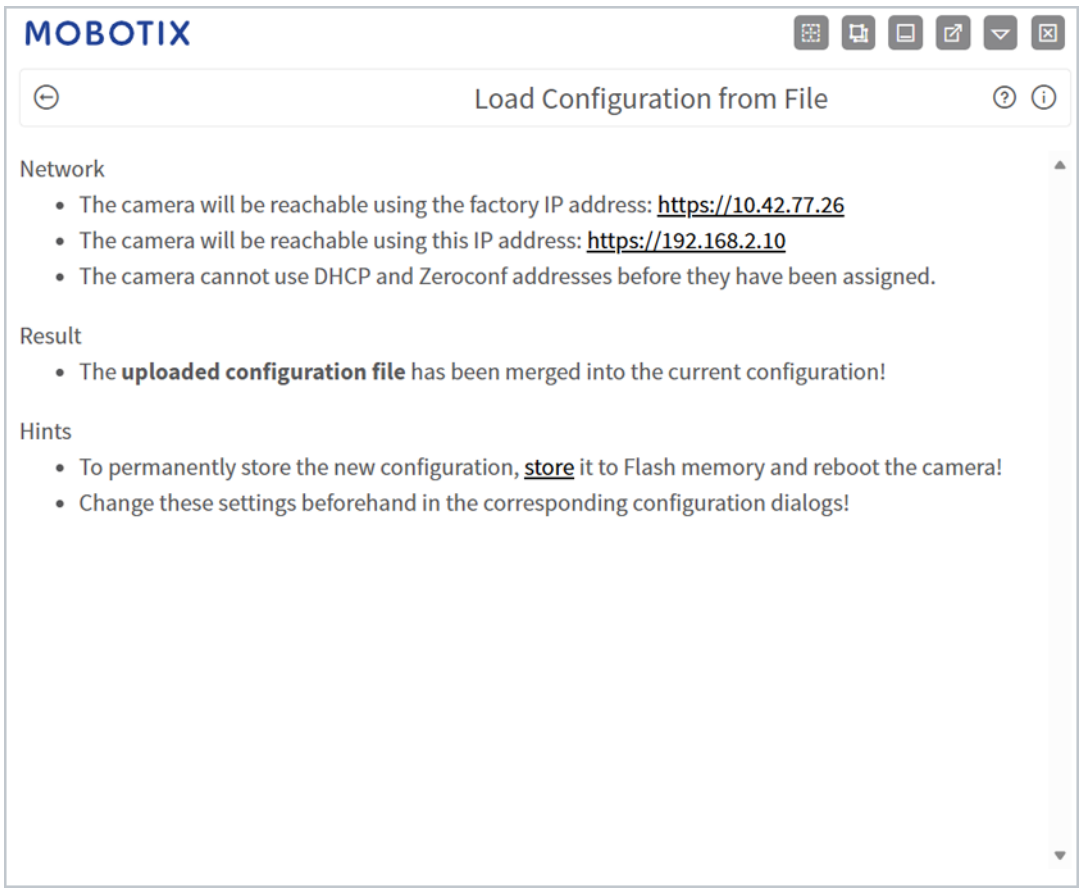
4. Select **Upload**.

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5. When prompted, select **Completely replace the current configuration** and **Merge**.

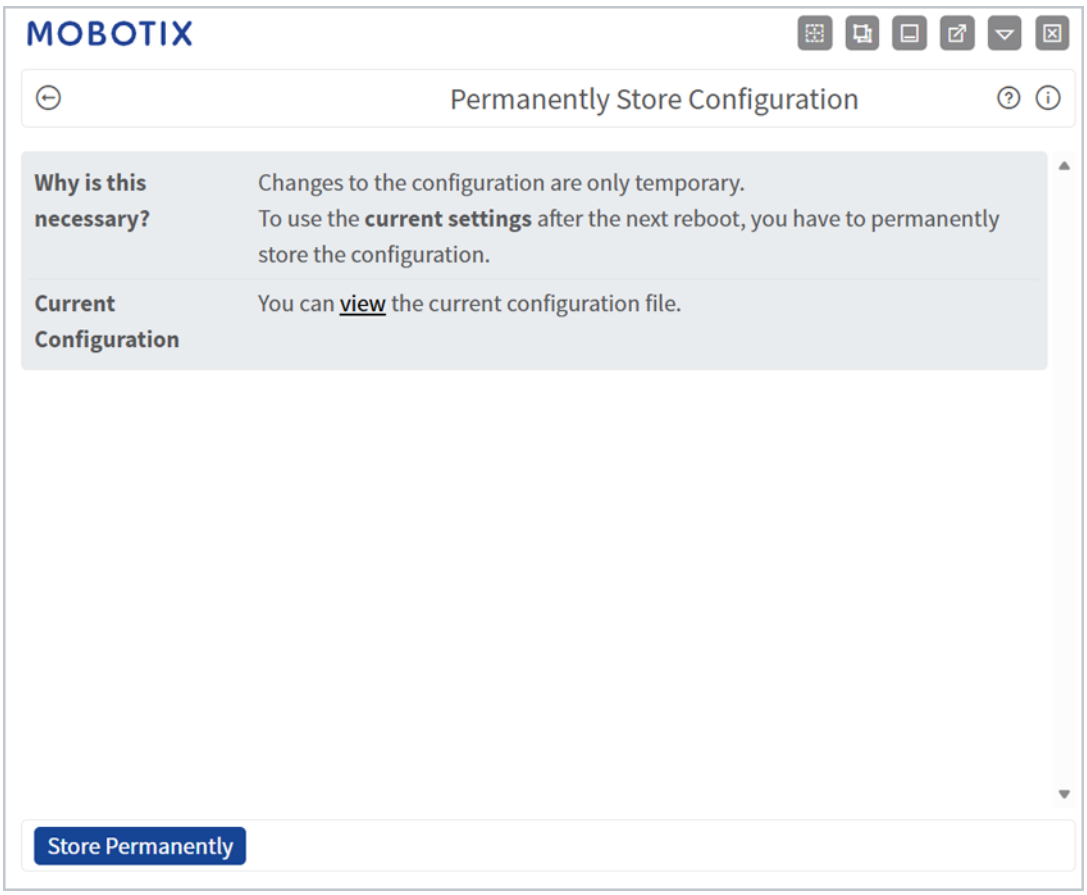


6. When prompted, select **Store**.

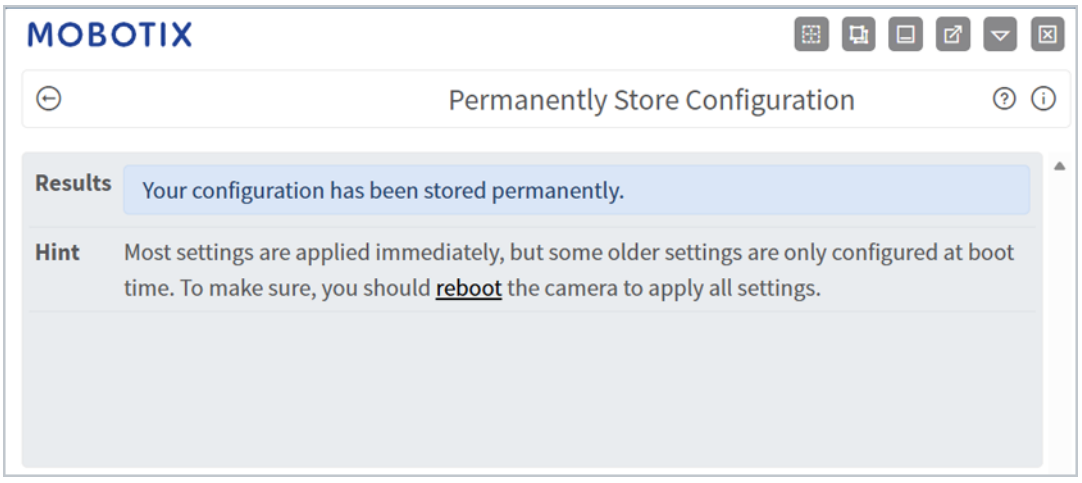


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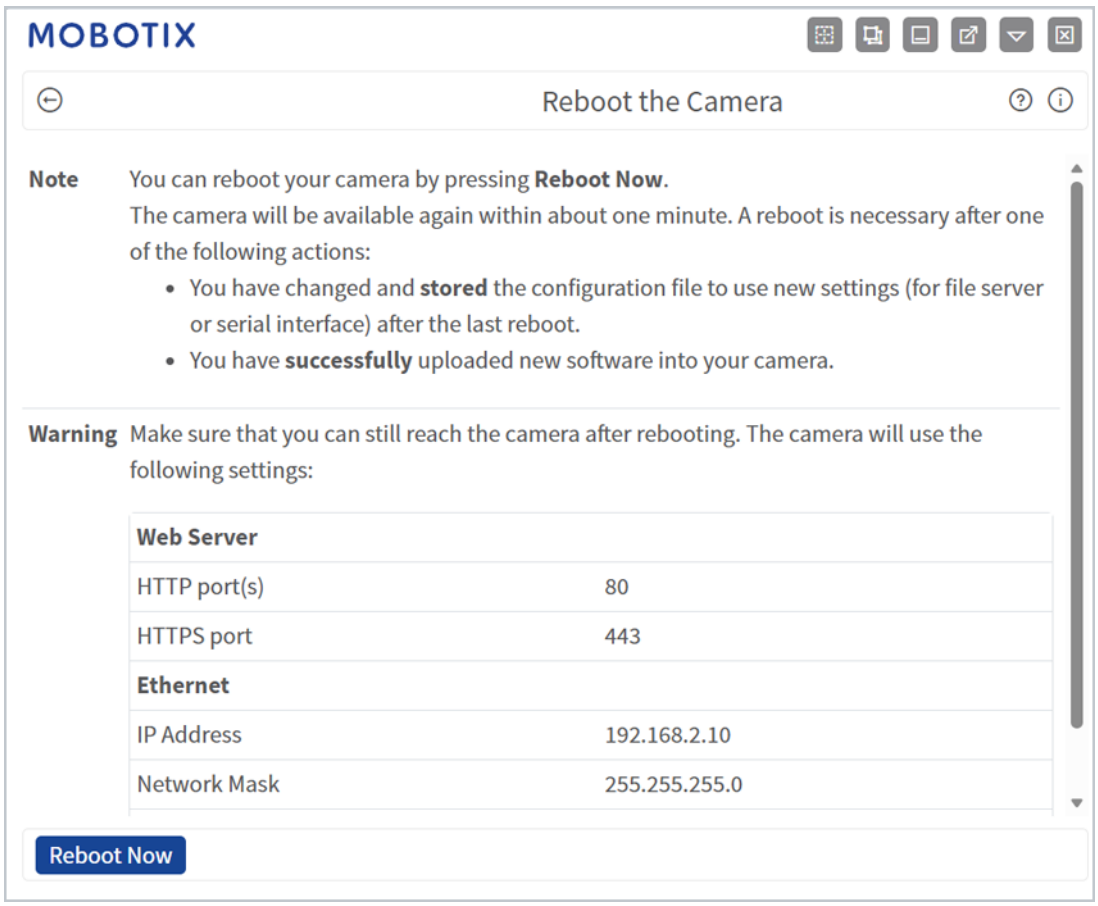
7. In the **Permanently Store Configuration** window, select **Store Permanently**.



8. When prompted, select **Reboot**.



9. In the **Reboot the Camera** window, select **Reboot Now**.



10. To exit the camera software, close the open windows.

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5. Configuring station settings

5.1 Station settings

On the **Station Settings** page, configure the station settings. If you imported the settings from another station, some of the settings are already defined. Check that all settings are correct for this station.

To access the station settings, select **Settings** in the **Station** component.

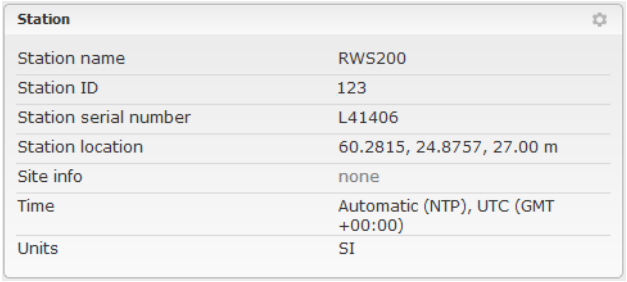


Figure 5 Station component

When the station is operational, Vaisala recommends that you always export the current settings as a backup before making any changes to the configuration.

More information

- Exporting current station configuration (page 311)

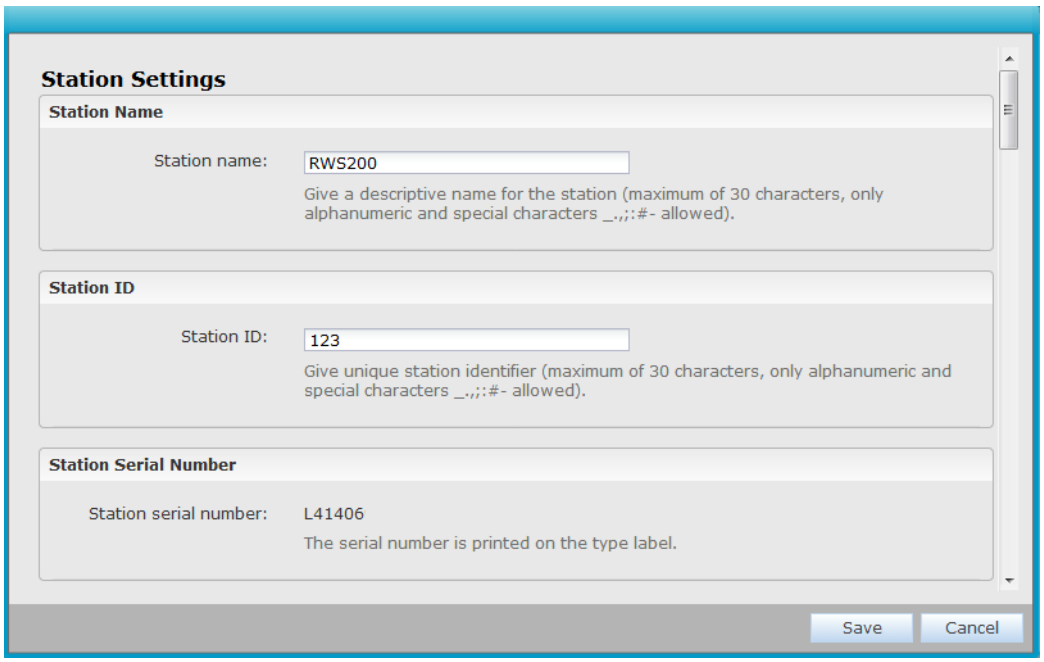
5.2 Setting station name and station ID

The station name and station ID are used for identifying the station in data reports. Changing the station name changes the naming of data message files. The station name is defined by the customer.

The station ID is shown in the source `id` element in the DTO XML report. If station ID is not defined, the station name is shown instead.

The maximum allowed number of characters is 30. Only alphanumeric characters (a-z, A-Z, 0-9), and special characters underscore (_), period (.), comma (,), semicolon (;), colon (:), hash (#), and hyphen (-) are allowed.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Station** component, select **Settings** ⚙.
3. In the **Station name** field, type the name of the station.



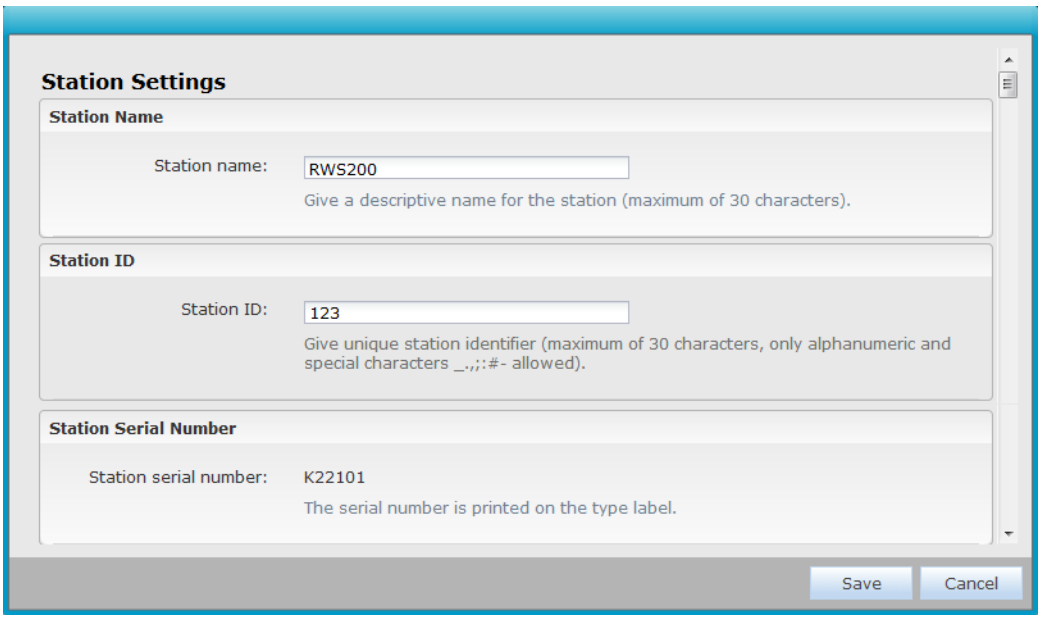
4. In the **Station ID** field, type an ID for the station.
5. To save the changes, select **Save**.

5.3 Setting station serial number

The station serial number is set at the factory. If you replace DMU703, set manually the serial number for the station. The station requires the serial number to operate properly.

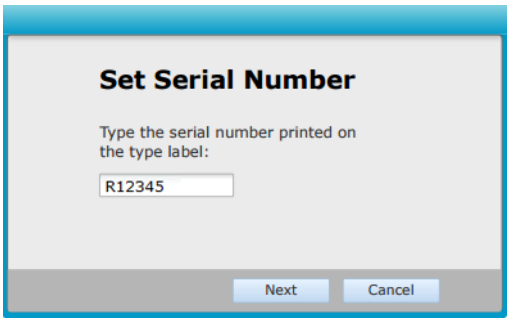
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. If the station serial number is missing, in the **Station** component, select **Settings** ⚙.

3. In the **Station Settings** window, select **Set serial number**.

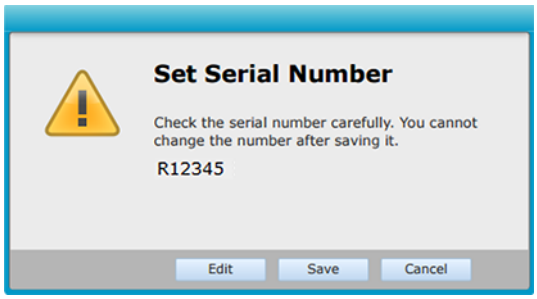


4. In the **Set serial number** window, type the station serial number, and select **Next**.

   The serial number is printed on the station type label, which is located on the enclosure or in the backplate.



5. In the confirmation window, check the serial number carefully.
   - If the serial number is correct, select **Save**.
   - If the serial number is incorrect, select **Edit**, correct the number, and select **Save**.



You cannot change the station serial number after saving it. If you save an incorrect serial number, contact Vaisala helpdesk.

6. To save the changes, select **Save**.

5.4 Setting station location

The GPS receiver and antenna are used for:

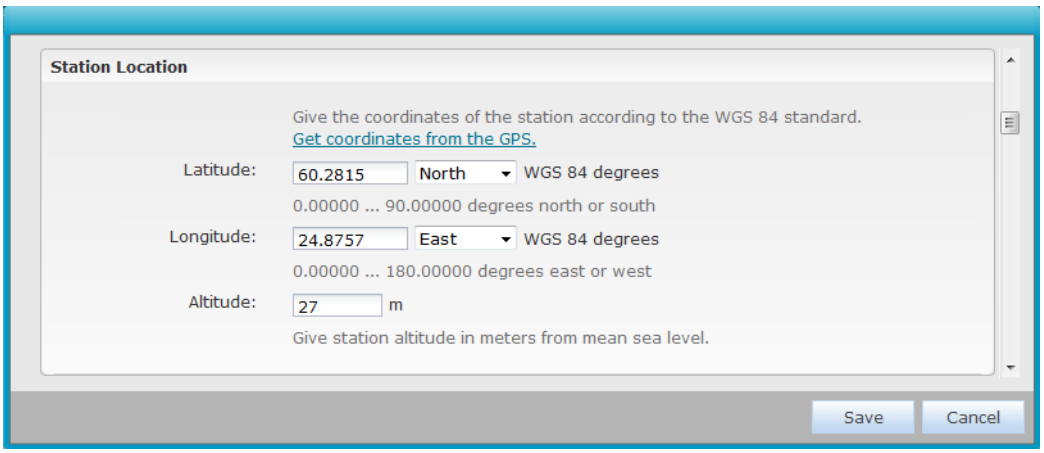
- Getting an accurate location for the station
- Synchronizing the station clock

If the station does not have a GPS antenna, use another method to find out the coordinates, and type them in the **Latitude** and **Longitude** fields.

The altitude information in the station settings is used for pressure observations. If you need exact pressure observations, check the correct altitude value from some other source than the GPS. The value given by the GPS may be inaccurate.

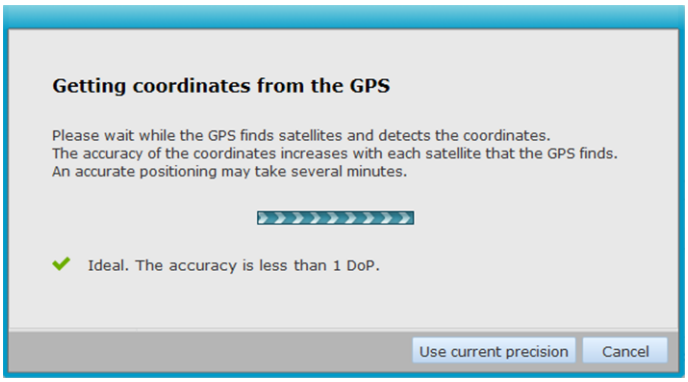
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. In the **Station** component, select **Settings** ⚙, and scroll to **Station Location**.



3. In **Station Location**, select **Get coordinates from the GPS**.

   The link is not visible if there is no GPS antenna in the system.



   The GPS starts locating satellites. Accurate positioning requires that the dilution of precision (DoP) value is as low as possible. Reaching value 1 may take up to 10 minutes.

4. When you are happy with the current DoP value, select **Use current precision**.

   The system updates the coordinates.

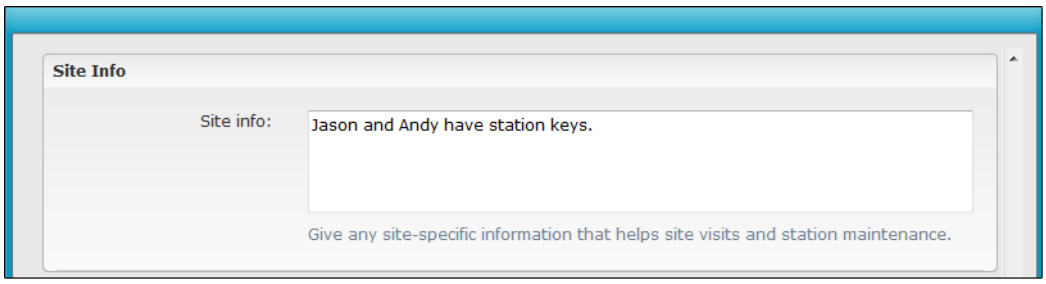
5. To save the changes, select **Save**.

5.5 Setting site information

The site information field provides a place to record useful information for onsite maintenance activities.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. In the **Station** component, select **Settings** ⚙, and scroll to **Site Info**.

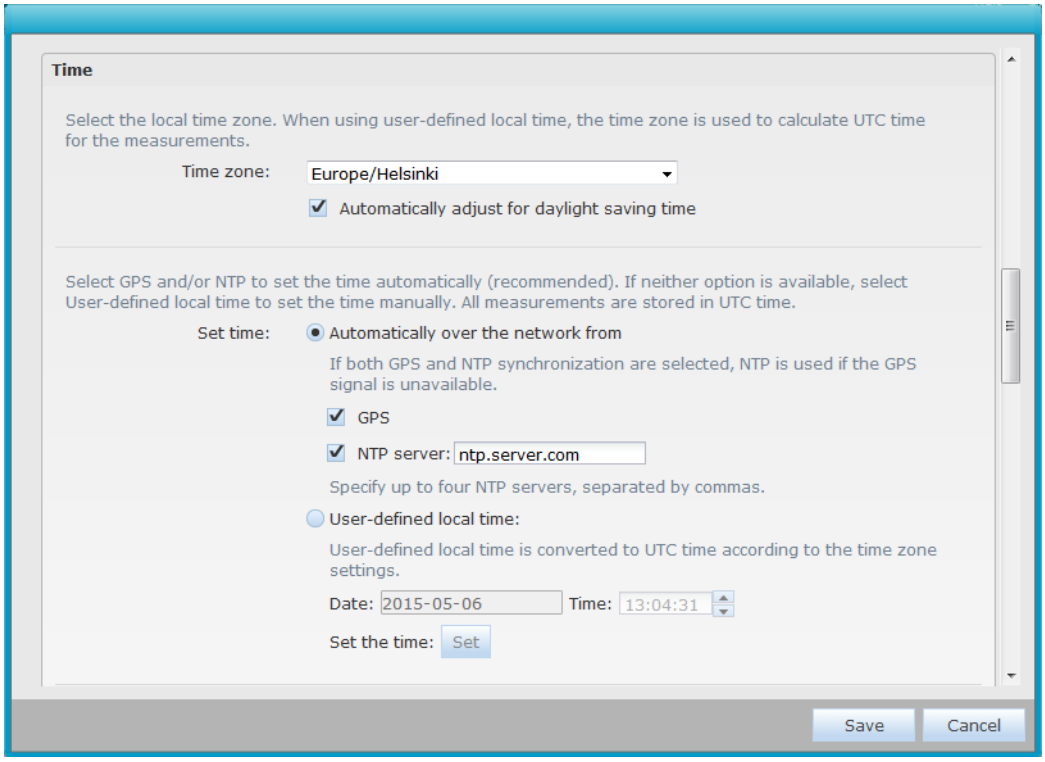


3. In the **Site Info** field, type any additional info about the station.
4. To save the changes, select **Save**.

5.6 Setting station time

The station always uses UTC time. Time synchronization is needed for keeping the station clock in time.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Station** component, select **Settings** ⚙, and scroll to **Time**.



3. In **Time zone**, select the local time zone.

   Select also if you want to adjust the time automatically for daylight saving.

   The time zone setting only affects the local time and date shown in the user interface and the reset time for precipitation accumulation calculation (06:00 station time). It does not affect the timestamps for observation data.

4. In **Set time**, select **Automatically over the network from** (recommended) and set the following:

   GPS (recommended)
   Use GPS synchronization.

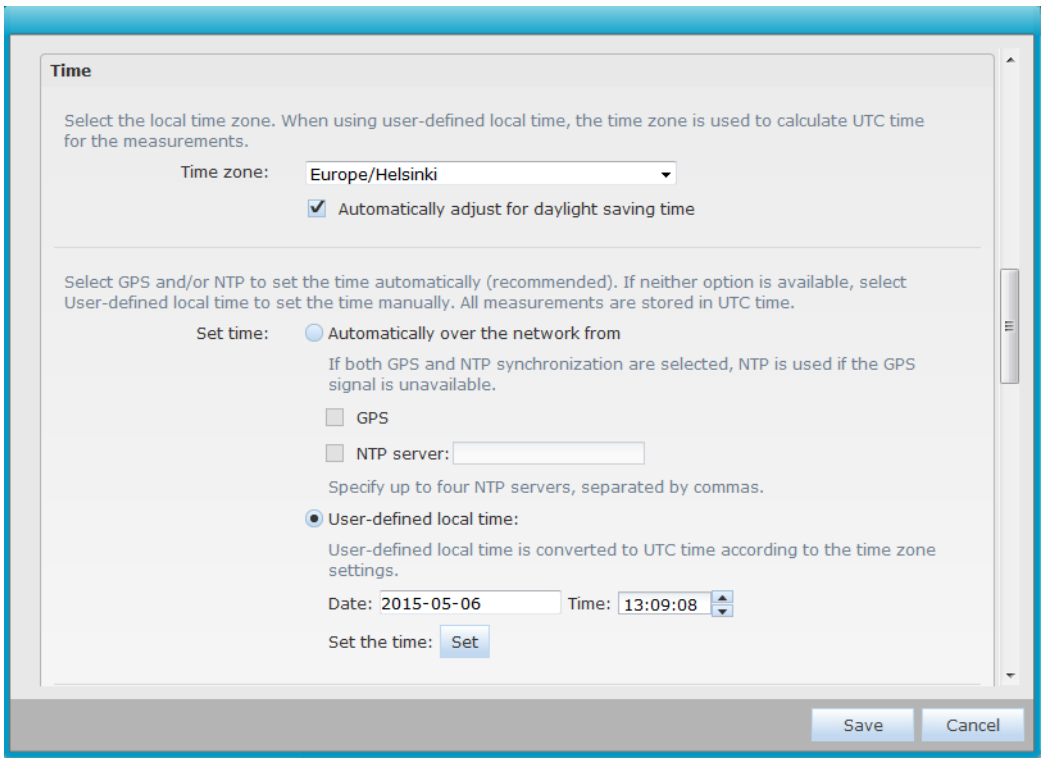
   NTP server
   Use NTP server synchronization.
   Type the name of the server in the field (for example, **`pool.ntp.org`**). You can specify up to four servers, separated by commas (**`,`**).

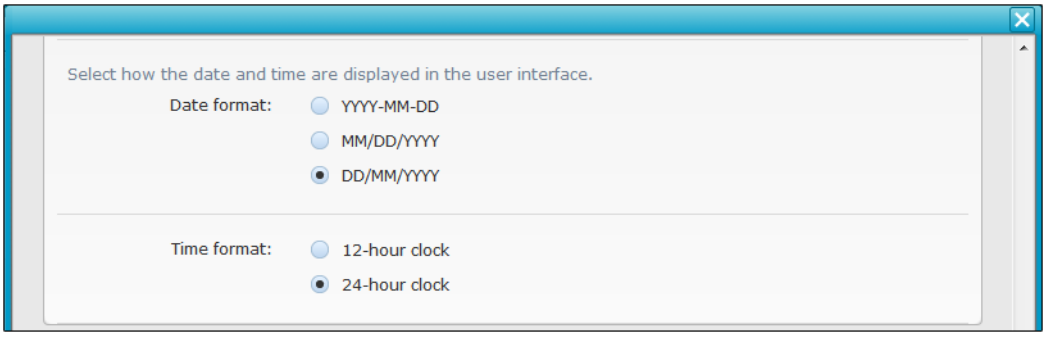
   If you also select GPS, NTP is used only when GPS is unavailable.

5. If you cannot set the time to be automatically synchronized, set the time manually.
   a. In **Set time**, select **User-defined local time**.
   b. Select the current date and time.
   c. To change the time, select **Set**.
   d. To save the time settings, select **Save**.

      The system logs you out.
   e. Log back in to continue.



6. In **Date format**, select the format in which the day, month, and year are shown in the user interface.



7. In **Time format**, select the format in which time is shown in the user interface.

8. To save the changes, select **Save**.

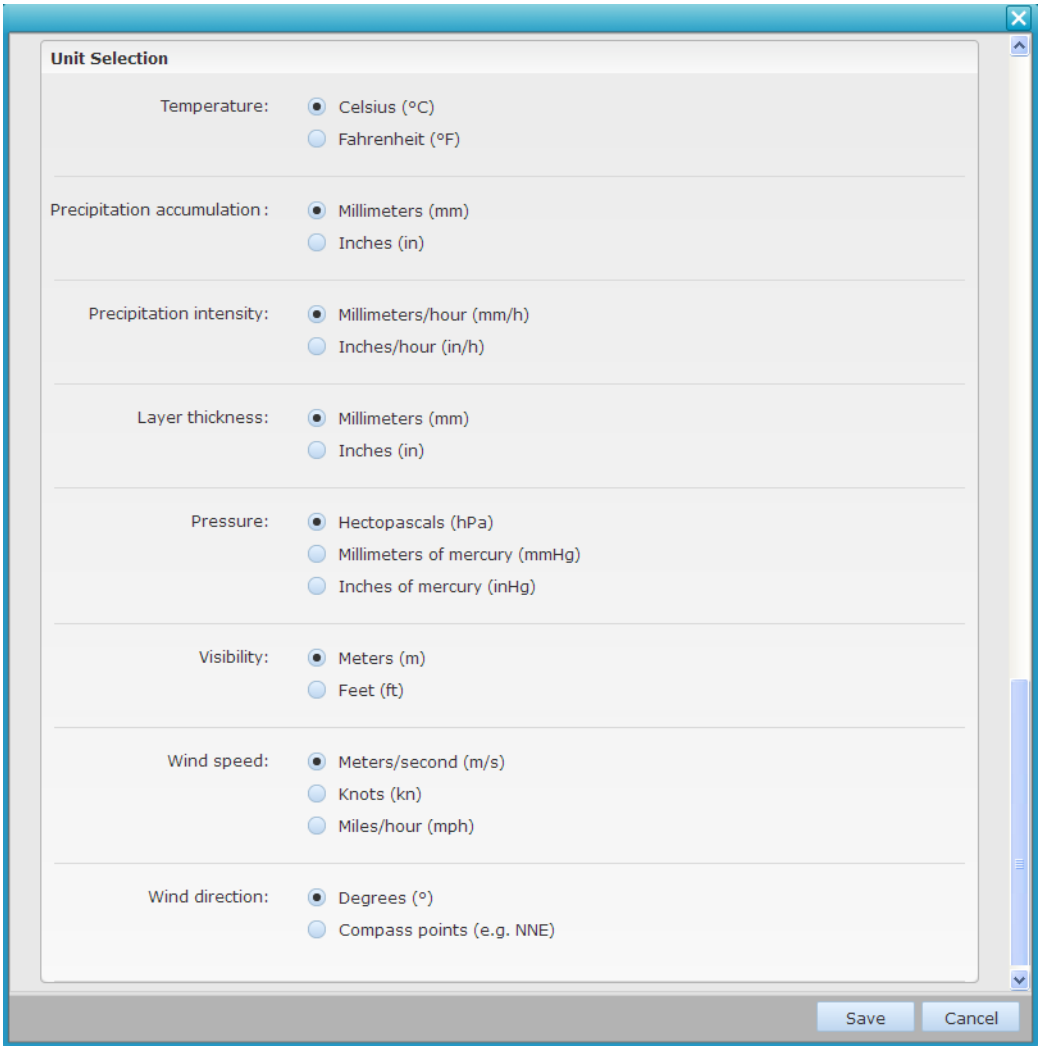
5.7 Setting station units

The station unit selection sets the units displayed in the user interface.



The unit selection does not affect observation data, which is always recorded and stored in SI units.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Station** component, select **Settings** ⚙, and scroll to **Unit Selection**.



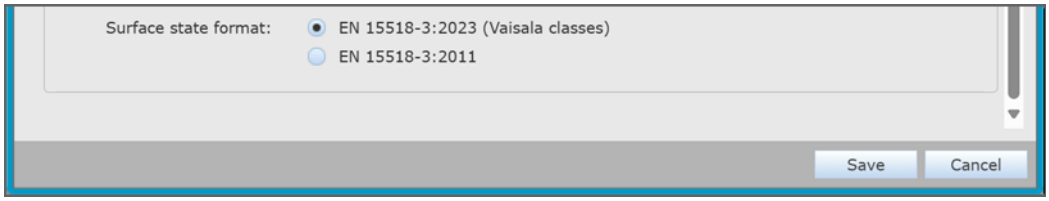
3. In **Unit Selection**, select the units used for observation values.

4. Scroll to **Surface state format**, and select whether the system reports surface state changes according to the Vaisala classification or the EN 15518-3:2011 standard.

   Table 7 Supported surface state formats

Sensor	Selection	Classification
DSC211	Vaisala	EN 15518-3:2023 (Vaisala classes)
	EN 15518	EN 15518-3:2011
DRS511	Vaisala	Vaisala classes
	EN 15518	EN 15518-3:2011

   For more information, see RWS200 System Description (M211607EN).



5. To save the changes, select **Save**.

More information

- Station units are not updated in device control rules (page 335)

6. Configuring communication settings

6.1 Communication settings

Communication configuration consists of the following:

1. Configuring communication settings (physical connections):
   - Configuring IX20 cellular router (page 100)
   - Configuring WLAN connection (page 116)
2. Configuring data reporting (software settings):
   - Data reporting settings (page 123)

Some of the communication settings are preconfigured at the factory. Check all settings and correct them, if needed. For the correct network settings, contact your system administrator.

For more information about the communication options, see:

- RWS200 System Description (M211607EN)
- *RWS200 Communication Options Guide (M211896EN)*

For more information on the RWS200 network configuration, see RWS200 network (page 98).



When the station is operational, Vaisala recommends that you always export the current settings as a backup before making any changes to the configuration.

More information

- Exporting current station configuration (page 311)

6.2 RWS200 network

The following figure shows the RWS200 network configuration when a cellular router is used. The Web UI is available over the cellular network and WLAN. The cellular router forwards the request from the browser to the correct address and port in DMU703.

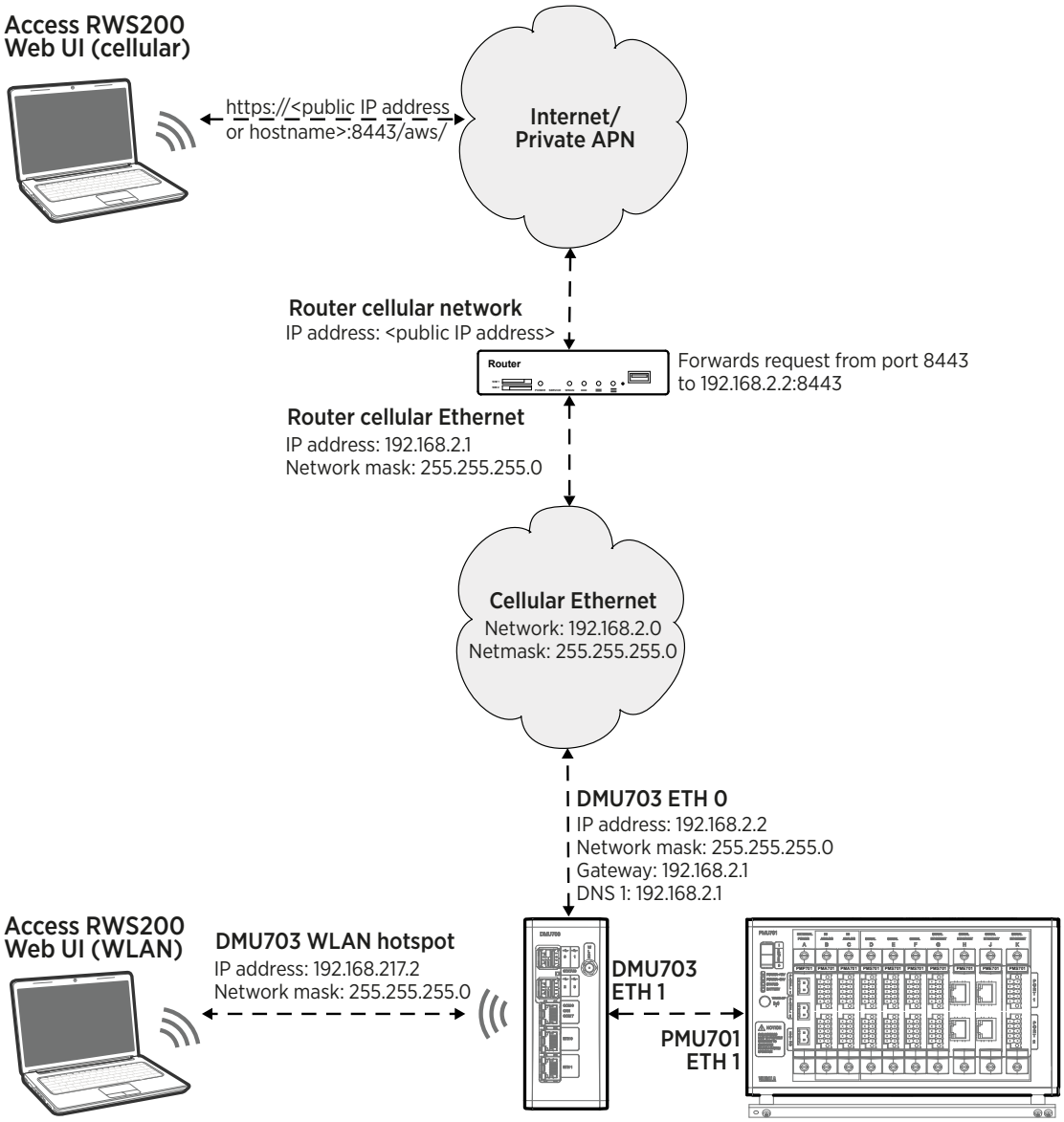


Figure 6 RWS200 network

The following figure shows the RWS200 network configuration with the fixed camera when a cellular router is used. Logically, the camera belongs to the cellular Ethernet network. The cellular router forwards the request from the browser to the correct address and port in DMU703.

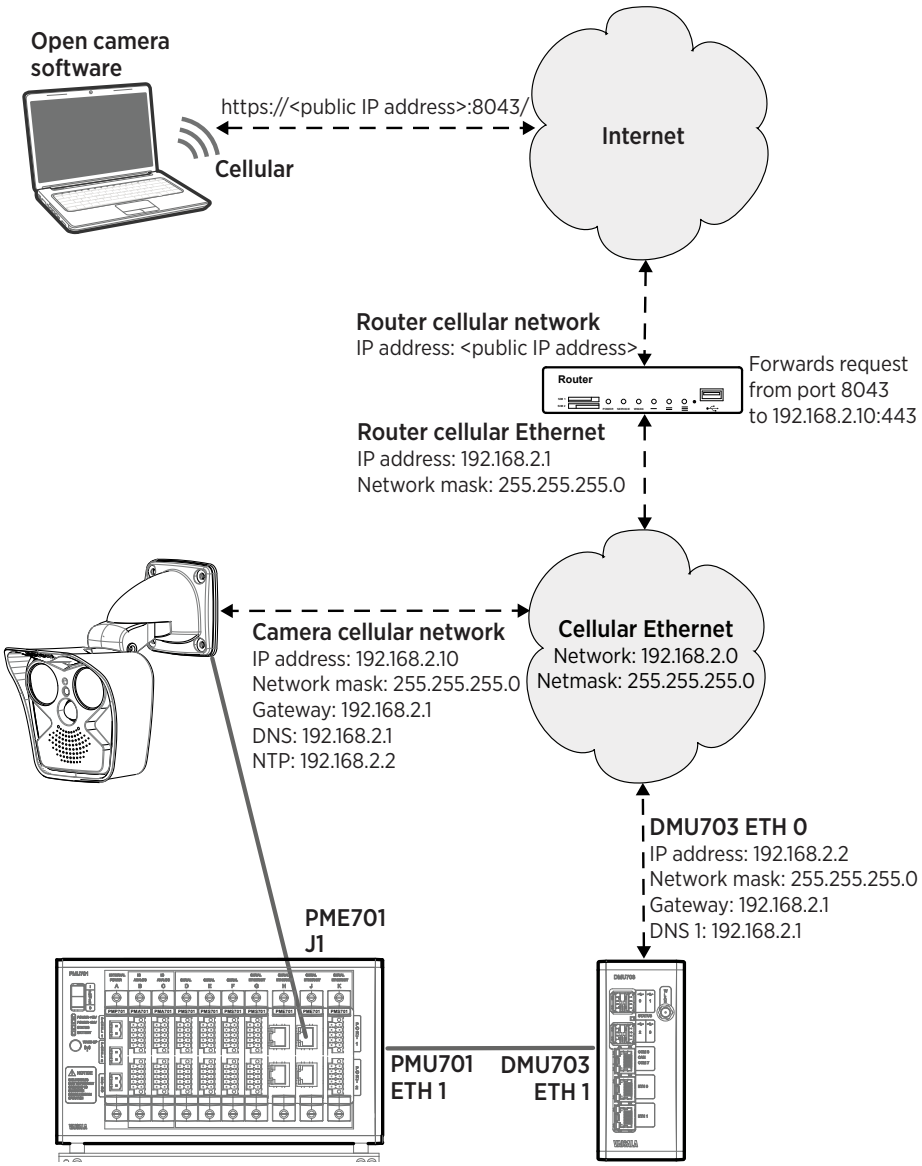


Figure 7 RWS200 network with camera

6.3 Configuring IX20 cellular router

Before starting the cellular router configuration, make sure that the router has a SIM card installed.

More information

- Configuring cellular Ethernet settings for cellular router (page 100)
- Logging in to cellular router (page 102)
- Updating IX20 firmware (page 102)
- Configuring NTP in IX20 cellular router (page 103)
- Increasing default timeout value in IX20 cellular router (page 104)
- Configuring cellular network in IX20 cellular router (page 105)
- Configuring IP routing in IX20 cellular router (page 109)
- Configuring firewall in IX20 cellular router (page 113)
- Backing up IX20 configuration (page 115)
- Restoring IX20 configuration (page 116)

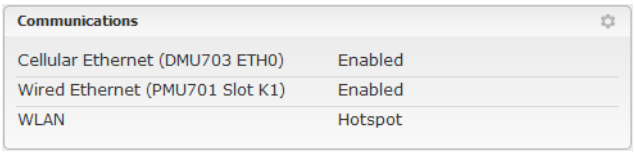
6.3.1 Configuring cellular Ethernet settings for cellular router

The cellular Ethernet settings define the interface between the system and the cellular router. The cellular connection is used for data reporting or remote access to the station.

You can also use the cellular connection for accessing the Internet, if you need to verify the connection to the data collection system.

The settings must match the Ethernet device settings. Do not change the default settings unless absolutely necessary. If you change the configuration, you may lose the connection.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Communications** component, select **Settings** .



3. Scroll to **Cellular Ethernet (DMU703 ETH 0)**. Check that the default settings are correct.

   IP address type
   Select **Static IP address**.

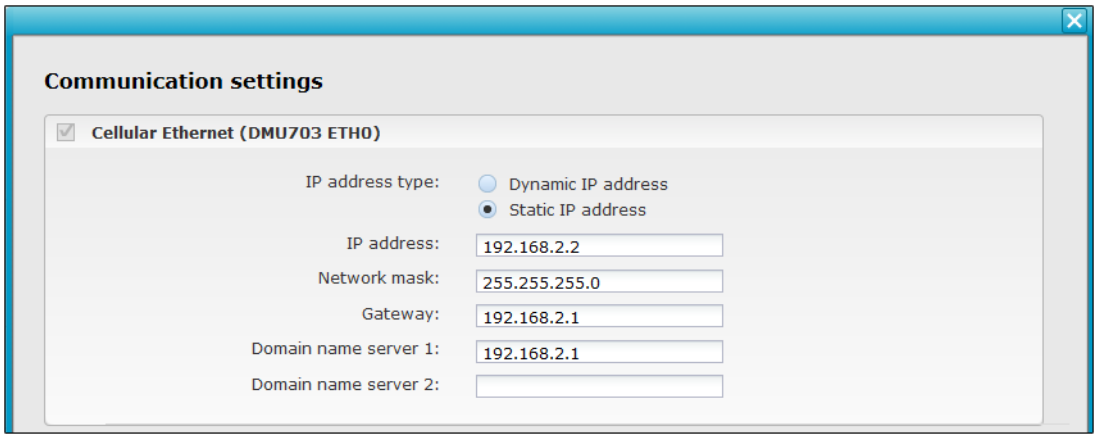
   IP address
   Set to `192.168.2.2`.

   Network mask
   Set to `255.255.255.0`.

   Gateway
   Set to `192.168.2.1`.

   RWS200 supports only one gateway. If you configure a gateway in the **Cellular Ethernet (DMU703 ETH 0)** settings, you cannot configure another gateway in the **Wired Ethernet (PMU701 Slot K1)** settings, and vice versa. Take this also into account in the DHCP server settings, if DHCP is used.

   Domain name server 1
   Set to `192.168.2.1`.



If the station has a signed certificate and you change the station hostname or IP address in the station communication settings, you must create a new certificate and have it signed again or obtain a new signed certificate.

More information

- System security certificates (page 159)

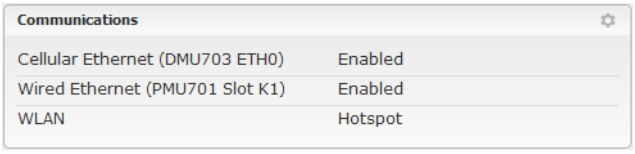
6.3.2 Logging in to cellular router

If the cellular router has a public IP address or if it is connected to a private access point that allows remote connection, you can connect to the router remotely at:

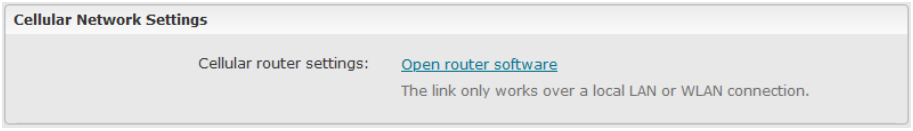
https://<public IP address or hostname>

If you are connected to the station locally through LAN or WLAN, you can access the cellular router settings through the Web UI.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Communications** component, select **Settings** ⚙.



3. Scroll to **Cellular Network Settings**, and select **Open router software**.



4. Log in to the cellular router.

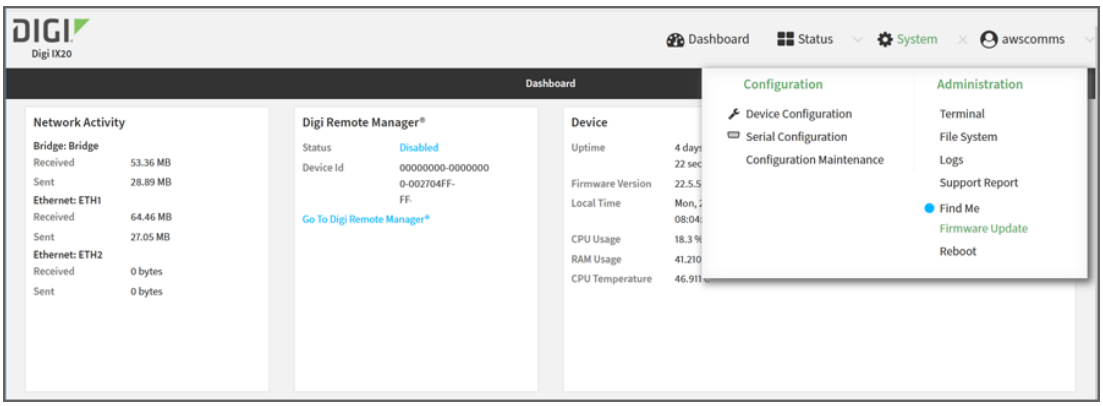
   For the default username and password, see *RWS200 Installation Quick Guide (M212635EN)*.

6.3.3 Updating IX20 firmware

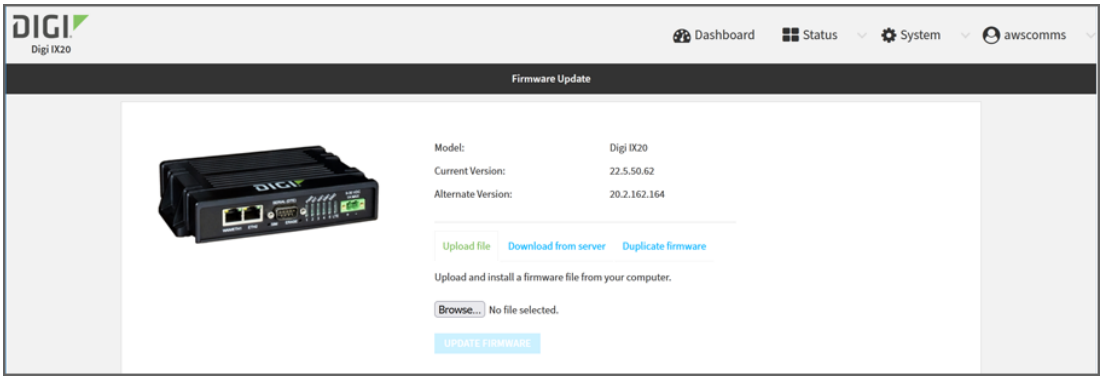
Before configuring the cellular router, update the firmware. Check the Digi support web site regularly for the latest firmware updates.

1. Download the latest firmware version from the Digi support web site to your computer.

2. In the Digi software toolbar, select **System > Firmware Update**.



3. In **Firmware Update**, select **Browse**, browse to the downloaded software package, and select **Open**.
4. To update the firmware, select **Update Firmware**.



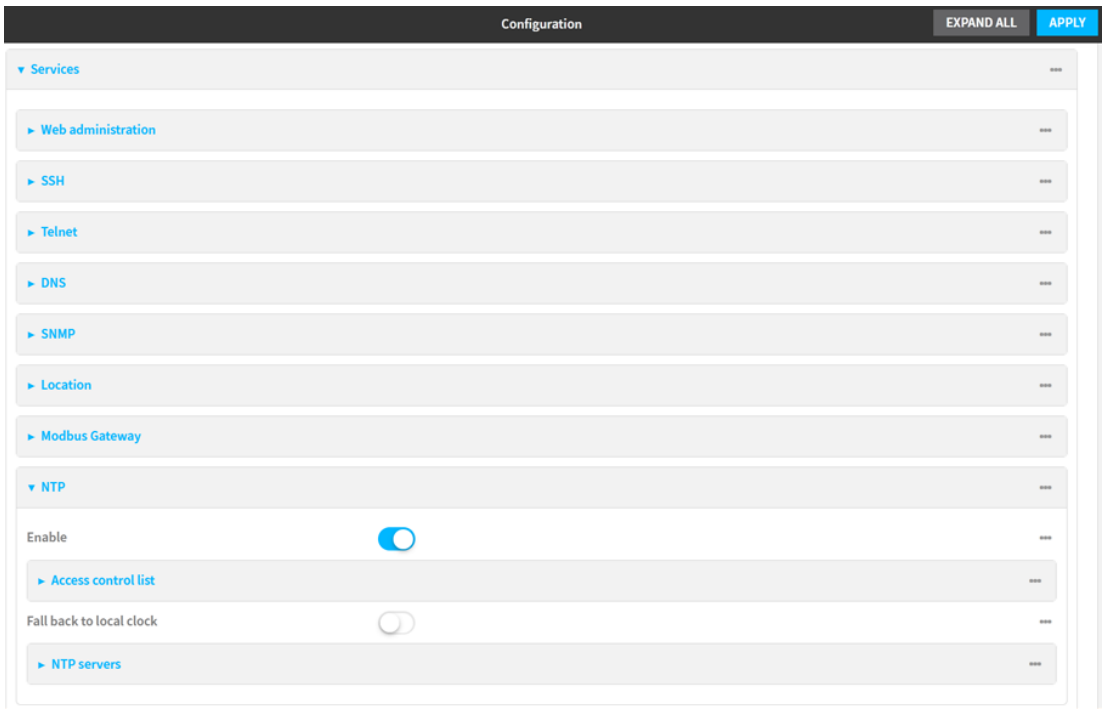
5. Wait for the update to complete and the cellular router to restart.

6.3.4 Configuring NTP in IX20 cellular router

To be sure that the router time is correct, Network Time Protocol (NTP) has been enabled in the default configuration. The configuration contains the `time.devicecloud.com` NTP server. You can change it or add other NTP servers if needed.

1. In the toolbar, select **System > Device configuration**.

2. In **Services > NTP**, check that **NTP** is enabled.



3. In **NTP servers**, select **Add Server**, and add the new NTP servers.

   Remove the default NTP server if needed.

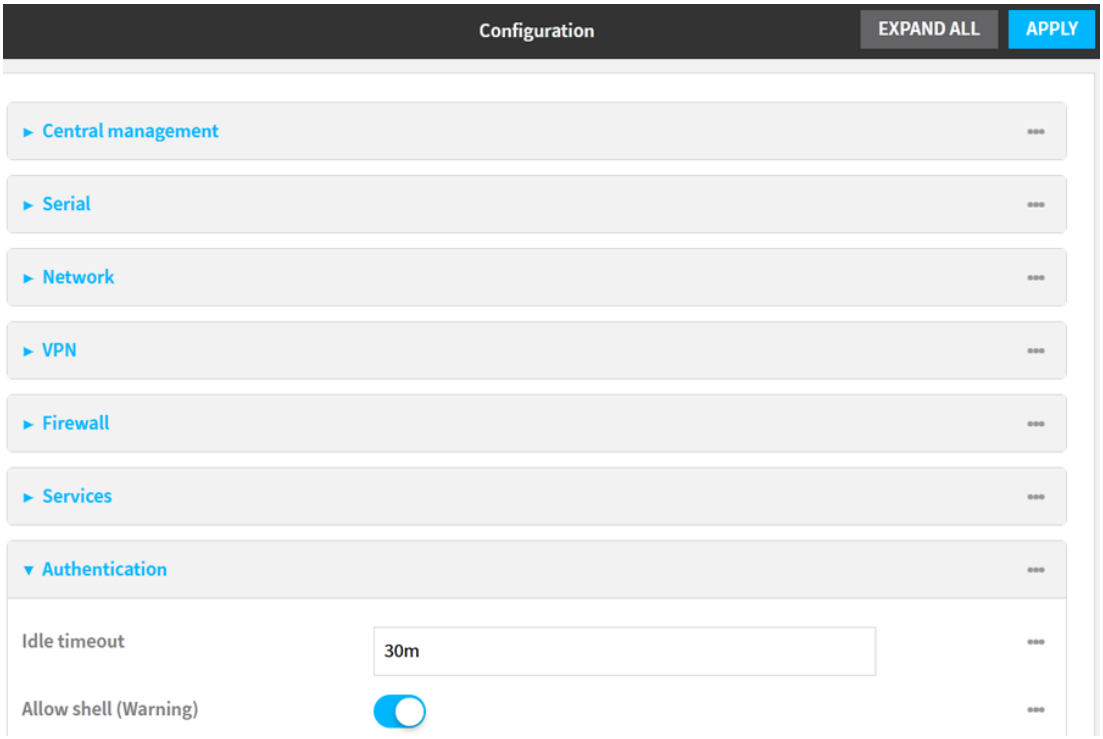
4. To save the changes, select **Apply** at the top of the page.

6.3.5 Increasing default timeout value in IX20 cellular router

When configuring the cellular router, increase the default timeout for the user interface so that you do not have to log in so often.

1. In the toolbar, select **System > Device configuration**.

2. In **Authentication**, change **Idle timeout** to `30m` (30 minutes).



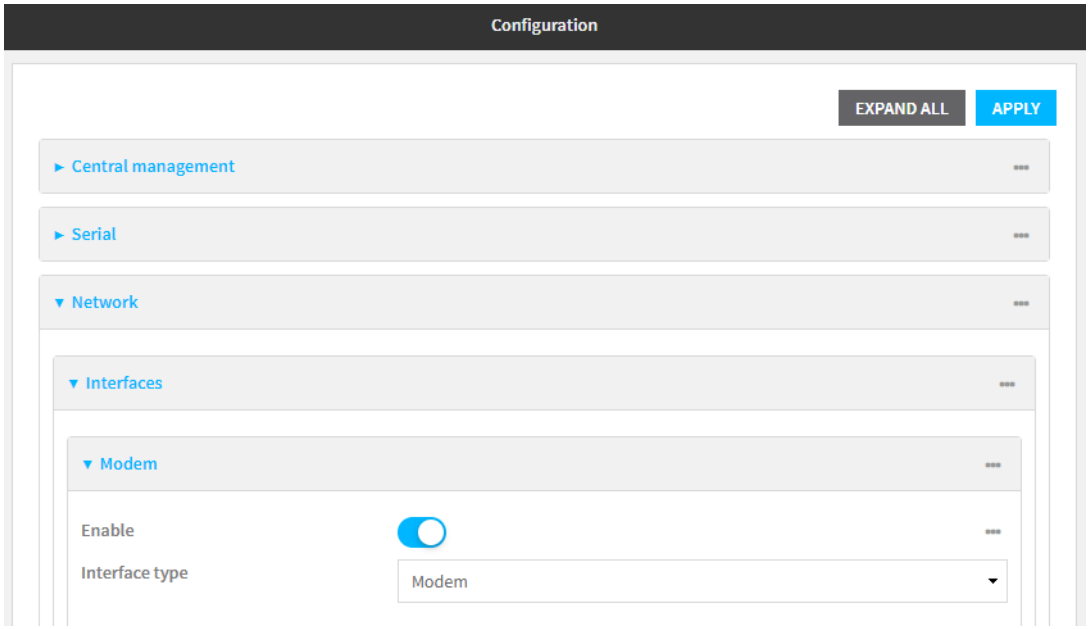
3. To save the changes, select **Apply** at the top of the page.
4. When you have finished with the configuration, change the timeout back to `10m` (10 minutes).

6.3.6 Configuring cellular network in IX20 cellular router

The cellular network settings define the cellular data connection between the cellular router and the cellular network. To obtain the settings, contact your cellular network provider.

1. In the toolbar, select **System > Device configuration**.

2. To add the Access Point Name (APN) to be used when connecting to the cellular network, select **Network > Interfaces > Modem**.

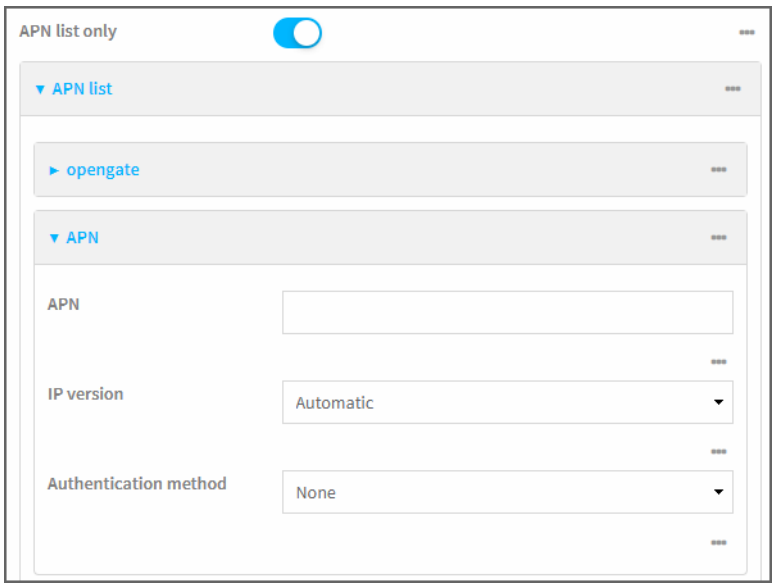


3. Scroll to the end of the modem settings and select **APN list > Add APN**.
4. In **APN**, set the following:

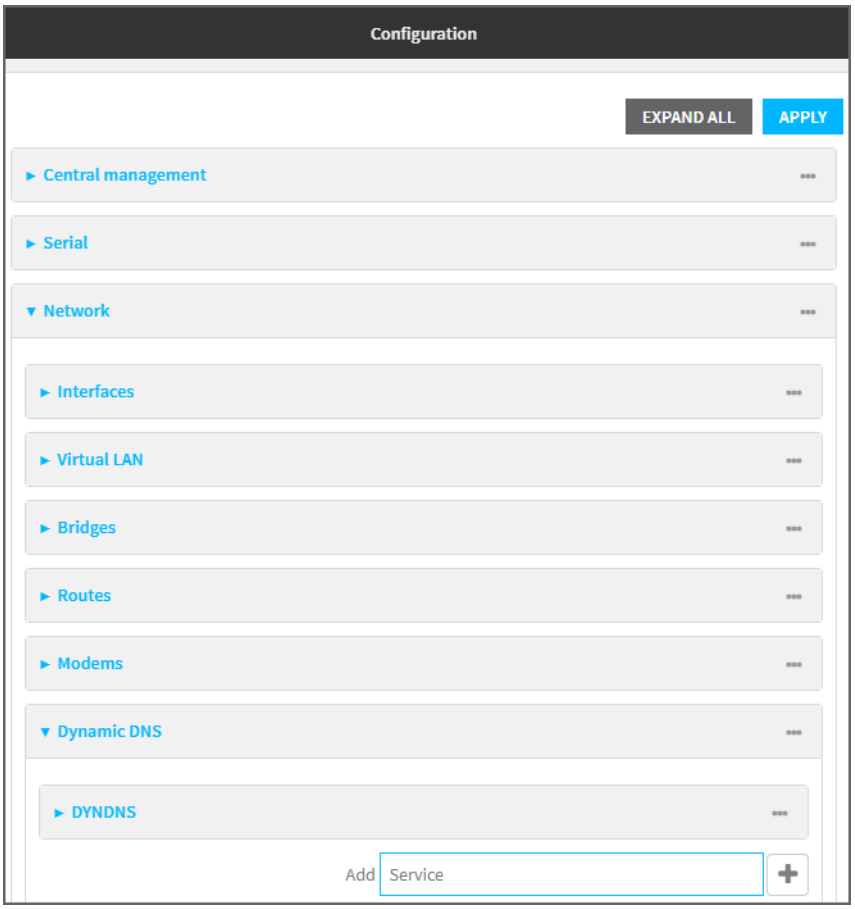
APN
Type the Access Point Name (APN) defined by your cellular network provider.

IP version
Select as specified by your cellular network provider.

Authentication method
Select as specified by your cellular network provider.



5. To save the changes, select **Apply** at the top of the page.
6. To configure Dynamic DNS, under **Network**, select **Dynamic DNS**.
7. In the **Add Service** field, type a name for this Dynamic DNS instance and select the plus sign.



8. Set the following for this DNS instance:

   Enable
   Enable this DNS configuration.

   Interface
   Select **Modem**.

   Service
   Select the Dynamic DNS provider, or select **custom** to enter a custom URL for the provider.

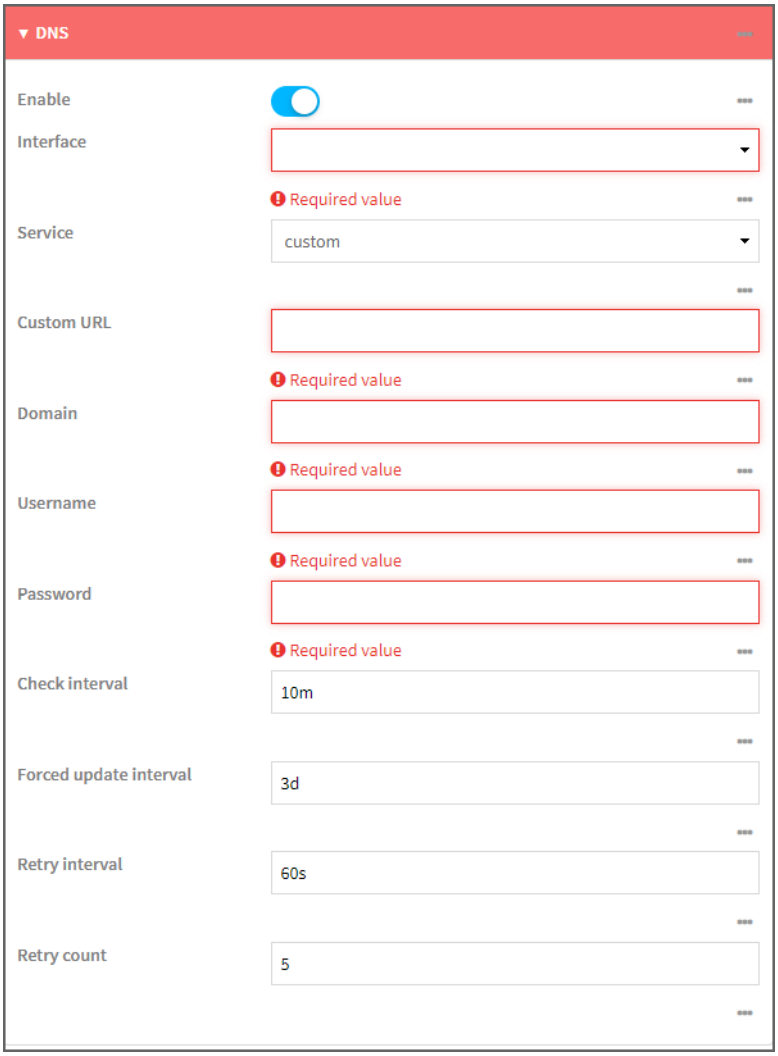
   Custom URL
   If you selected **custom** for the service, type the URL that is used to update the IP address with the Dynamic DNS provider.

   Domain
   Type the domain name of this RWS200 station.

   Username and **Password**
   Type the username and password used to authenticate with the Dynamic DNS provider.

   Use the default values for the rest of the options.

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9. To save the changes, select **Apply** at the top of the page.

6.3.7 Configuring IP routing in IX20 cellular router

To use NTCIP data reporting or traffic sensor, configure IP port routing (forwarding) rules in the cellular router. All other routing rules are included in the default configuration.

Table 8 RWS200 IP port forwarding rules

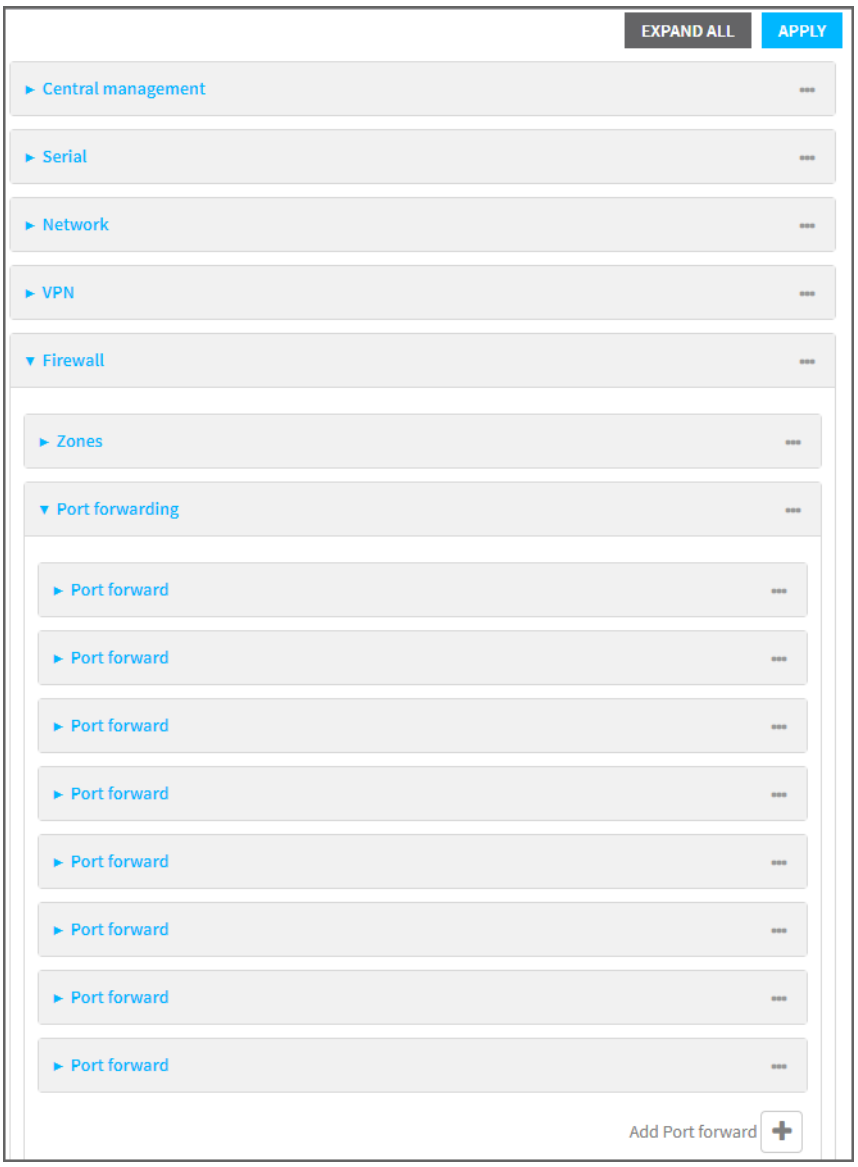
External port	Internal IP address	Default RWS200 internal port	Usage
8043	192.168.2.10	443	HTTPS access to the first fixed camera [1)]
8044	192.168.2.11	443	HTTPS access to the second fixed camera [1)]
8047	192.168.2.14	443	HTTPS access to PTZ camera [1)]
8161	192.168.2.2 [2)]	8161	NTCIP polling

External port	Internal IP address	Default RWS200 internal port	Usage
8443	192.168.2.2 [2)]	8443 (fixed)	HTTPS access to the Web UI [1)] Can also be used for DATEX II polling
9001	192.168.2.16	10001	HTTPS access to traffic sensor
50000	192.168.2.2 [2)]	50000	Server listening TCP port for MES interface [1)]

1) Included in the default configuration for the cellular router.
*2) The IP address must be the same as in cellular network settings for the DMU703 **ETH 0** port.*

1. Log in to the cellular router.
2. In the toolbar, select **System > Device configuration**.

3. In **Configuration**, select **Firewall > Port forwarding**, and **Add port forward**.



4. Add the necessary rules for IP forwarding.

Enable
Enable this port forwarding.

Label
(Optional) Type a description for this rule. For example, **`Web UI`**.

Interface
Select **Modem**.

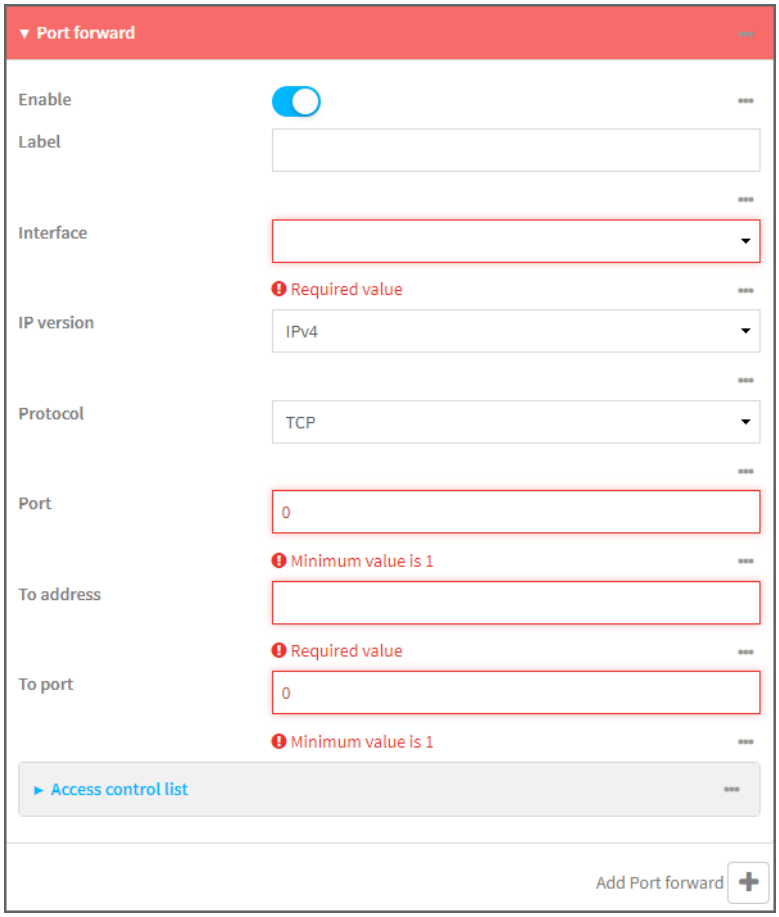
IP version
Select **IPv4**.

Protocol
Select the type of Internet protocol to use. In most cases, this is **TCP**.

Port or **Incoming port(s)**
Type the external port number to use. For example, **`8444`**.

To address
Type the internal IP address to which traffic should be forwarded. For example, **`192.168.3.2`**.

To port or **Destination port(s)**
Type the internal port number to which traffic should be forwarded. For example, **`8443`**.



5. To save the changes, select **Apply** at the top of the page.

6.3.8 Configuring firewall in IX20 cellular router

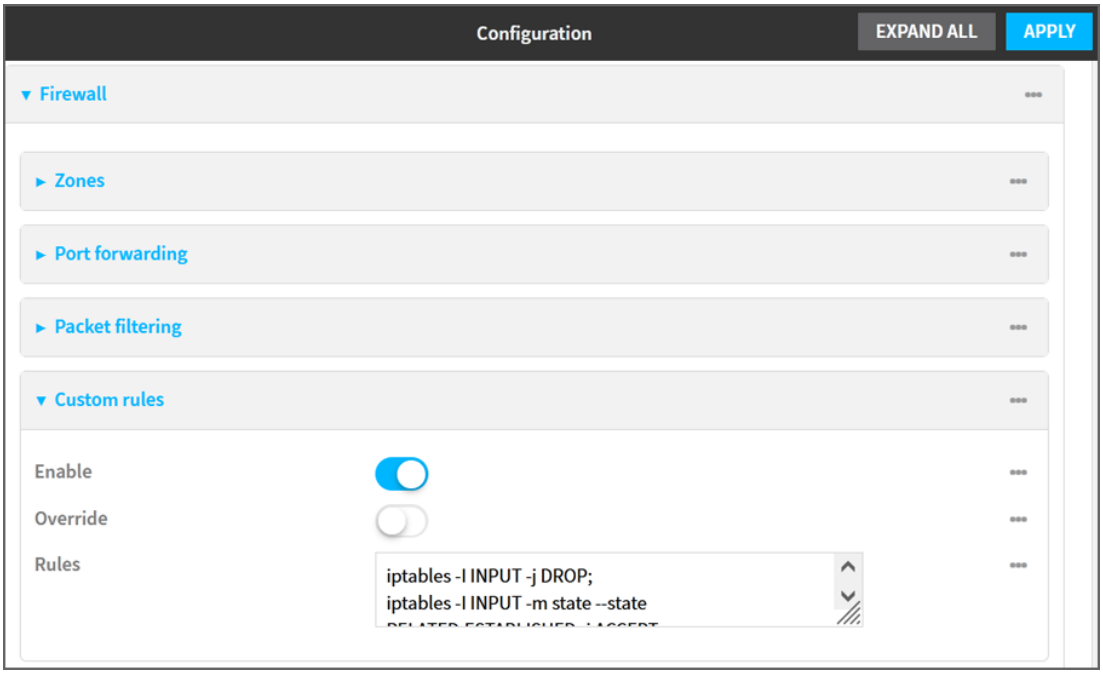
Custom firewall rules set up access control in the cellular router. If you do not set up these rules, the cellular router will be vulnerable to hacking, and the operator may shut down the site due to data overruns.

The firewall blocks all traffic from IP addresses that are not accepted. To allow data reporting, add the IP address of the data collection system to the port forwarding rule's access control list.

1. In the toolbar, select **System > Device configuration**.
2. In **Firewall > Custom rules**, set the following (if not already set):

Enable
Enable custom rules.

Override
Disable override.



3. In **Rules**, add your own access rules.

   The default configuration contains one rule to allow access from Vaisala. If the default rules are missing, copy-paste them to your cellular router.

```
iptables -I INPUT -j DROP;
iptables -I INPUT -m state --state RELATED,ESTABLISHED -j ACCEPT;
#########################
iptables -I INPUT -s <IP address> -j ACCEPT;
#########################
iptables -I INPUT -s 192.168.2.1/24 -j ACCEPT;
iptables -I INPUT -i lo -j ACCEPT;
```

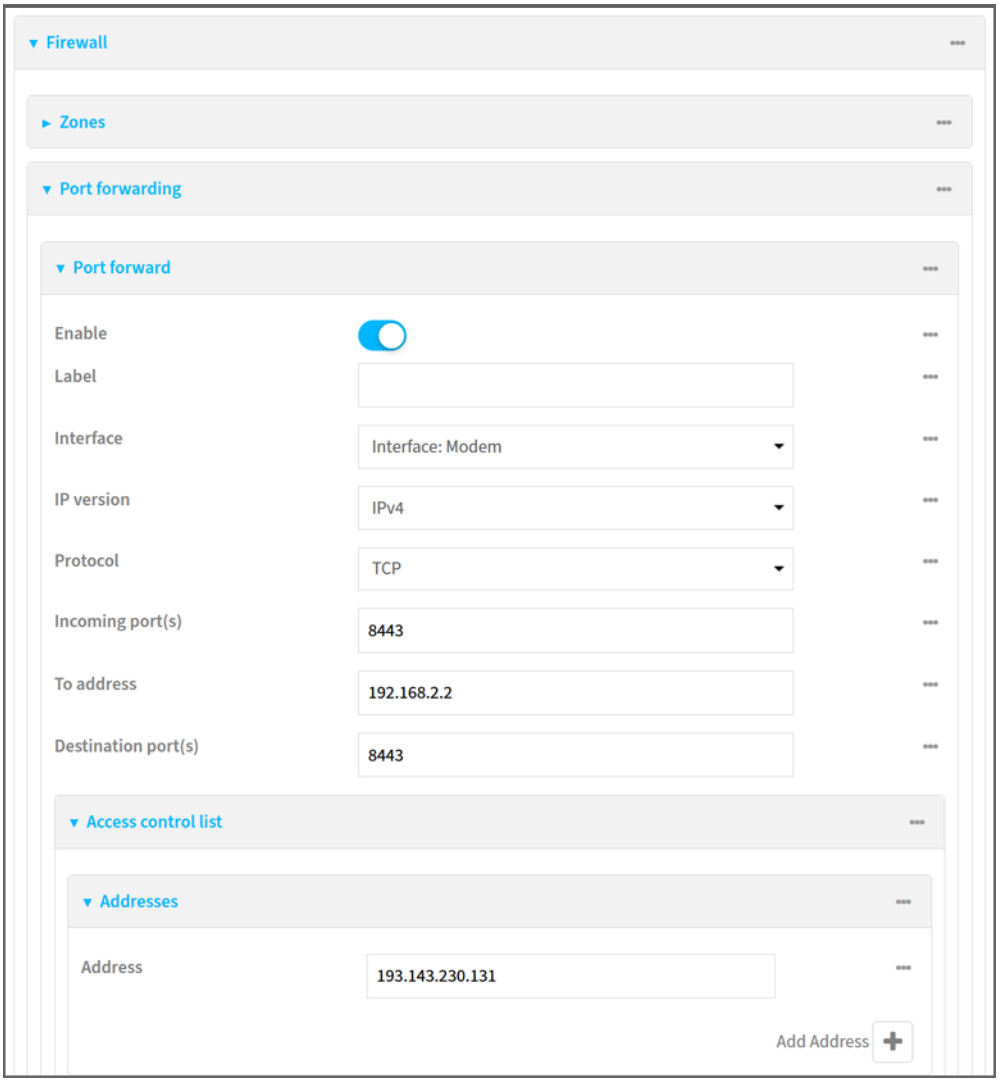
   The rules are executed in reverse order. The starting rule is located at the bottom of the list, and the end rule is located at the top of the list:
   a. Accept loop-back traffic.
   b. Accept all traffic in the local network.
   c. Add a row between the # characters for each IP address that must have access to RWS200 (data collection system, remote device management, event interface, Web UI users).
   d. Accept all traffic from open sessions.
   e. Deny all other incoming traffic.

4. Under **Firewall**, select **Port forwarding** and the first port forward.

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5. Under the port forward, select **Access control list > Addresses** and add all the IP addresses that are allowed to use this port forward.

   For example, for the Web UI port forward, add all the IP addresses of the users who are allowed to use the Web UI.



6. Add access control lists similarly to each port forward.
7. To save the changes, select **Apply** at the top of the page.

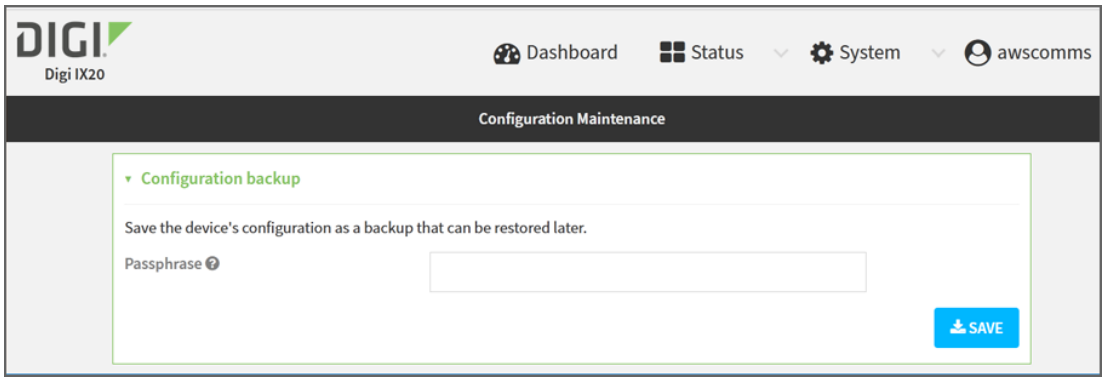
6.3.9 Backing up IX20 configuration

When you have completed the cellular router configuration, take a backup of the configuration.

1. In the toolbar, select **System > Configuration Maintenance**.

2. In **Configuration backup**, select **Save**.

   Do not set a passphrase for the file.

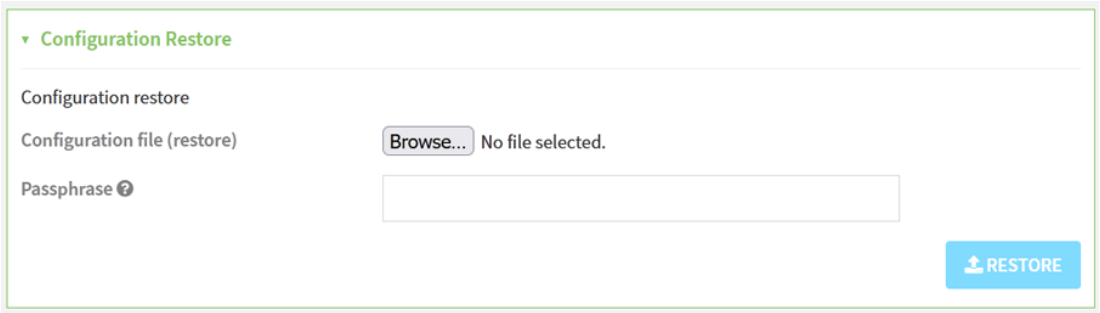


3. Store the backup file in a safe location in your computer.

6.3.10 Restoring IX20 configuration

You can restore the cellular router configuration from the backup file.

1. In the toolbar, select **System > Configuration Maintenance**.
2. In **Configuration restore**, select **Browse**, locate the backup file, and select **Open**.



3. To upload the backup file to the cellular router, select **Restore**.
4. When prompted, select **Confirm**.

   The cellular router restarts. While restarting, the cellular router may show an HTML error message. After a few minutes, the login page is shown again.

6.4 Configuring WLAN connection

WLAN defines the settings for wireless network connection. The settings are used for the following purposes:

- **WLAN Hotspot** defines settings for local access to the Web UI.
- **Connect to Listed WLAN** / **Connect to Unlisted WLAN** defines settings for data reporting to a wireless network.

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If you cannot see the RWS200 WLAN hotspot or if the connection to another WLAN does not work, briefly press the WLAN **WAKE UP** button on the PMU701 front panel.

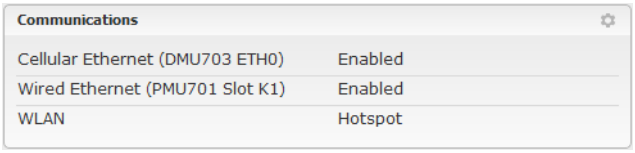
The WLAN transmitter is approved in the following countries and regions:
- EU and EFTA countries
- North America
- Australia
- New Zealand

6.4.1 Configuring WLAN hotspot

The WLAN hotspot has been pre-configured at the factory. To activate it, connect to the station with an Ethernet cable and set a password for the WLAN connection. After that, you can use the WLAN connection for local access.

If you change the WLAN hotspot settings, remember to record the new settings and inform those who may need the hotspot.

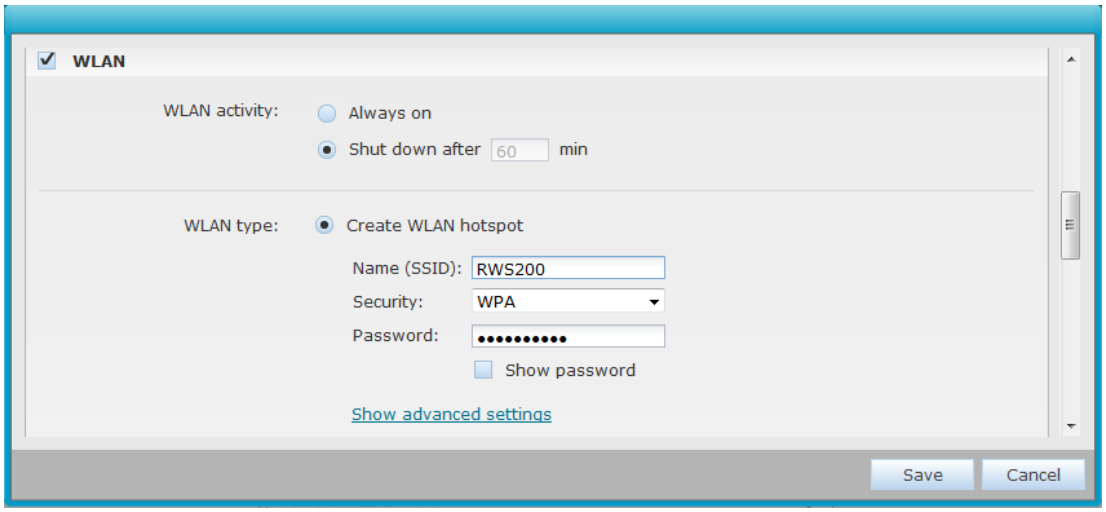
1. Log in to the Web UI as an administrator, and go to the **Station Settings** page.
2. In the **Communications** component, select **Settings** .



3. To activate WLAN, select **WLAN**.

4. In **WLAN activity**, select whether the connection is always on or disconnected after the specified time (**1–1440** min, default = **60** min).

> For data security, do not leave the WLAN connection on when leaving the site.



5. In **WLAN type**, select **Create WLAN hotspot**, and set the following:

Name (SSID)
Name of the network (default = **RWS200**).

Security
Type of security used to control access to the network: **WPA** (default) or **WPA2**

Password
Password for accessing the network. To see the characters as you type, select **Show password**.
In RWS200 software release before 4.3.0, the default password (**RWS200wlan**) was set in the factory. In release 4.3.0 and later, the password must be set before the connection can be used.

6. Select **Show advanced settings**, and set the following:

Hide SSID
Select this if you do not want the network name to be shown when someone searches for available WLANs in that location.

> If you select **Hide SSID**, you can only connect to the network if you know the network name (SSID).

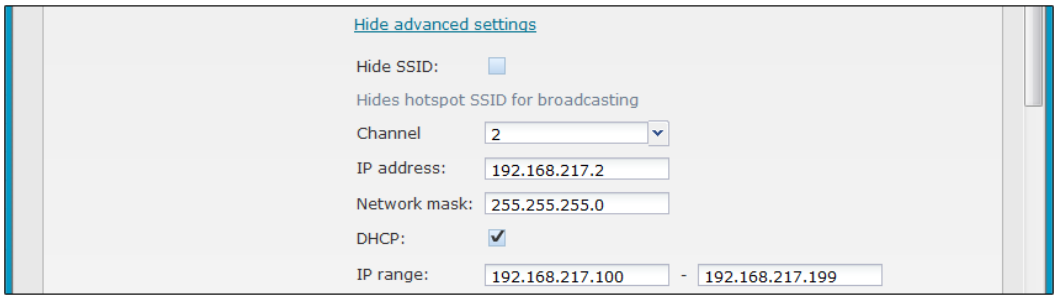
Channel
Channel to use (default = **2**).
If there are several WLANs that may use the same bandwidth (channel), test which channel provides the best connectivity.

IP address
IP address to which devices connect (default = **192.168.217.2**).

Network mask
Network mask used (default = **255.255.255.0**).

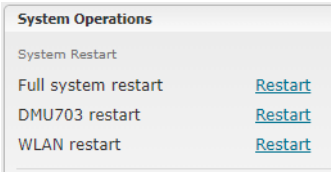
DHCP
Select if you want the connecting devices to receive a dynamic IP address (default).

IP range
If you selected DHCP, type the range of IP addresses that are given to the connecting devices (default = **192.168.217.100 – 192.168.217.199**).



7. To save the changes, select **Save**.

When the WLAN hotspot is enabled, you can switch on WLAN by selecting **WLAN restart** in **System Operations**.



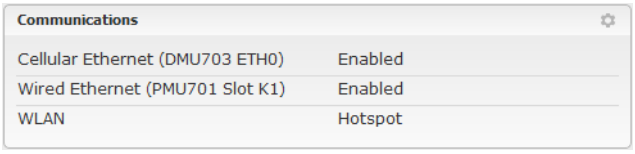
6.4.2 Configuring WLAN for data reporting

To send data reports over WLAN, connect the weather station to that WLAN. To connect to the network, you need the name (SSID) and password of the network, and the type of security used. Contact your system administrator.

You can only connect to networks that are protected with WPA or WPA2.

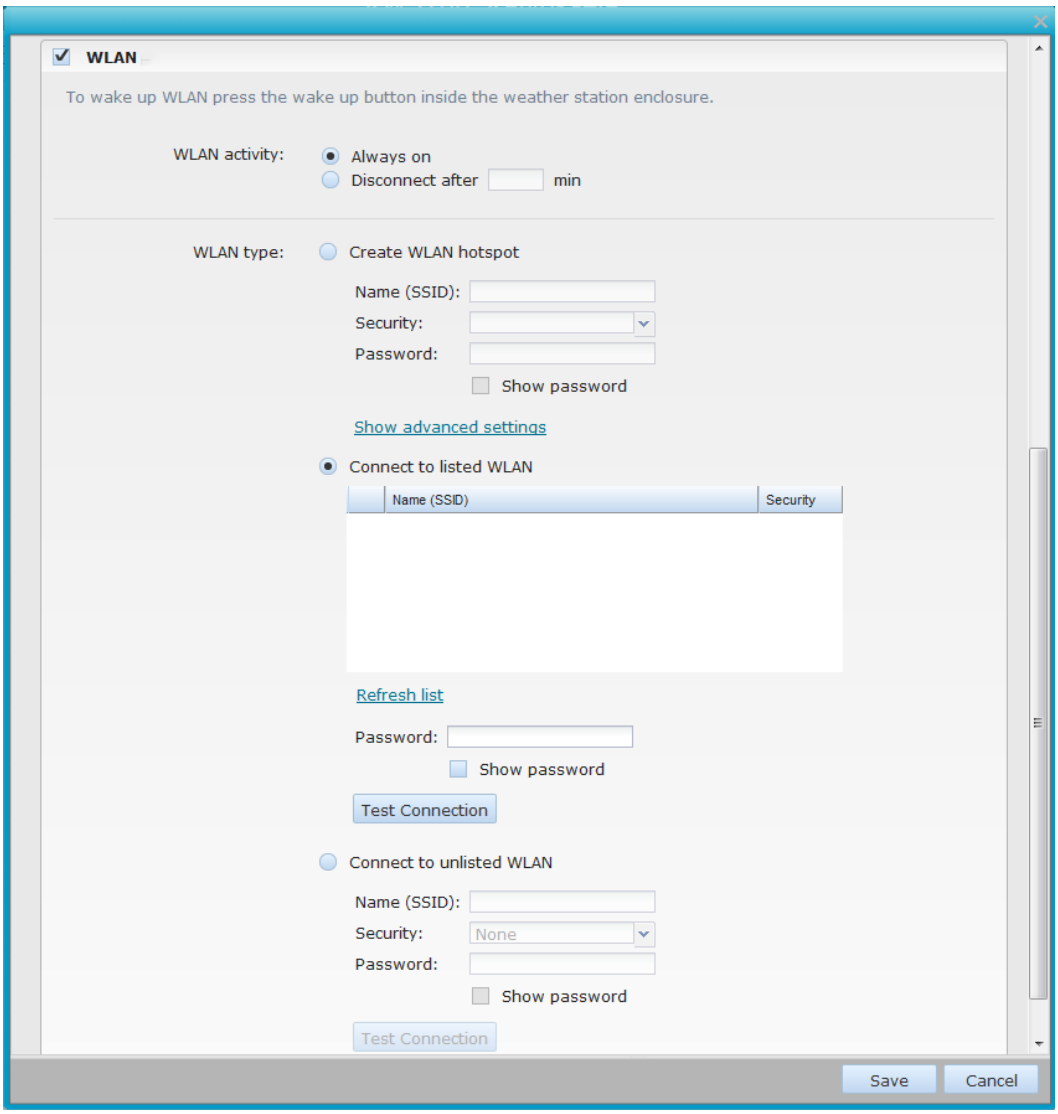
WLAN is not recommended for long-term data reporting. The network is not as reliable as cellular or Ethernet network.

1. Log in to the Web UI as an administrator, and go to the **Station Settings** page.
2. In the **Communications** component, select **Settings** .



3. To activate WLAN, select **WLAN**.

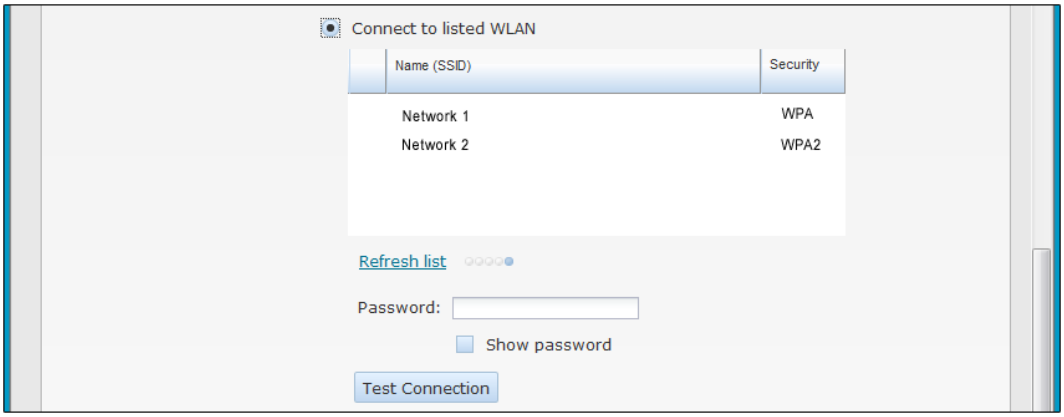
4. In **WLAN activity**, select **Always on**.



5. In **WLAN type**, select one of the following:

   - **Connect to Listed WLAN**
   - **Connect to Unlisted WLAN**

6. If you selected **Connect to Listed WLAN**, wait until the network is shown on the list.
   a. Open the network on the list.
   b. In the **Password** field, type the password for the network. To see the characters as you type, select **Show password**.



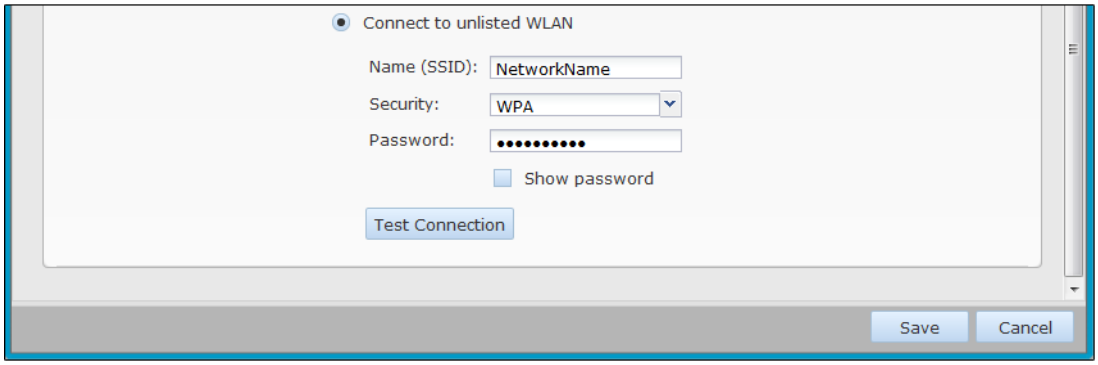
   If the network does not appear, select **Connect to Unlisted WLAN**, and continue from the next step.

7. If you selected **Connect to Unlisted WLAN**, set the following:

   Name (SSID)
   Name of the network.

   Security
   Type of security used to control access to the network: **WPA** or **WPA2**.

   Password
   Password for accessing the network. To see the characters as you type, select **Show password**.



8. To test the connection, select **Test connection**.
9. If the test succeeds, select **Save**. If the test fails, check the settings again.

7. Configuring data reporting

7.1 Data reporting settings

You can configure the station to send observation data reports to another system.

When setting up the station for the first time, configure each available data reporting interface separately. The settings for each interface depend on the receiving system.

When the station is operational, Vaisala recommends that you always export the current settings as a backup before making any changes to the configuration.

More information

- Exporting current station configuration (page 311)

7.2 Configuring MES 12, MES 14, and MES 16 data reporting

To configure MES 12, MES 14, or MES 16 data reporting, follow the relevant instructions:

1. Configuring serial port (page 124)
2. Configuring MES 14 and MES 16 data reporting over FTP (page 129)
3. Configuring TCP port (page 131)
4. Configuring combined MES 14 interface (page 338)

7.2.1 Configuring serial connection

You can push and poll Vaisala MES 14 and MES 16 messages, or poll Vaisala MES 12 messages, over an RS-232 or 2-wire/4-wire RS-485 serial connection.

If you are using both push and poll, use RS-232 or 4-wire RS-485 serial connection and configure one data reporting interface for each.

Before starting the configuration, make sure that you have connected the serial cable correctly to the PMU701 **K1** port (PMS701).

CAUTION! For cables longer than 15 m (50 ft), use RS-485 instead of RS-232 for the serial line connection. This ensures reliable connection.

If there are disturbances on the RS-232 line, try a lower baud rate.

More information

- Configuring serial port (page 124)
- Configuring MES 14 and MES 16 push over serial line (page 125)
- MES interface commands (page 185)

7.2.1.1 Configuring serial port

Configure the serial port to enable polling Vaisala MES 12, MES 14, and MES 16 messages.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **MES Interfaces** component, select **Settings** ⚙ for **COM 5**.



3. In the **COM 5** window, set the following:

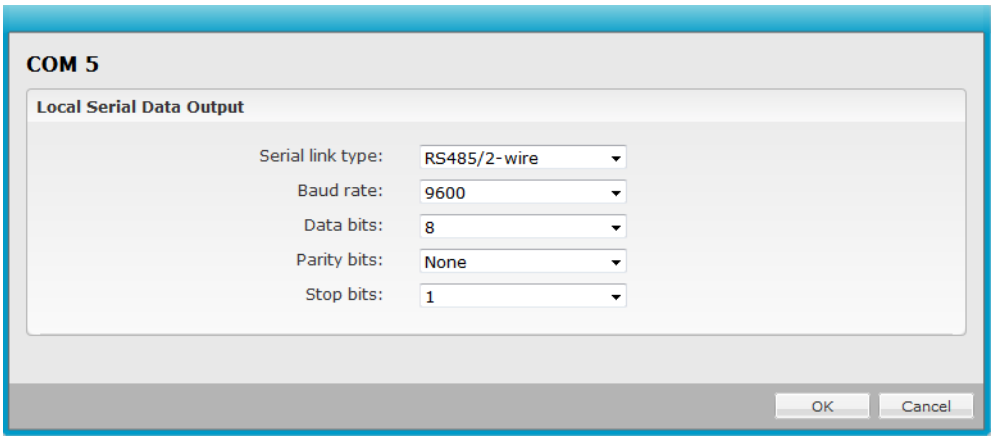
   Serial link type
   Type of serial link: **RS-232**, **RS-485/2-wire**, or **RS-485/4-wire**.

   Baud rate
   Connection speed (default = `9600`).

   Data bits
   Number of data bits used in characters (default = `8`).

   Parity bits
   Number of parity bits used (default = `None`).

   Stop bits
   Number of stop bits used (default = `1`).



The COM 5 settings are common for all configured serial data interfaces. If you change the settings, the previous settings are overwritten.

4. To save the changes, select **OK**.

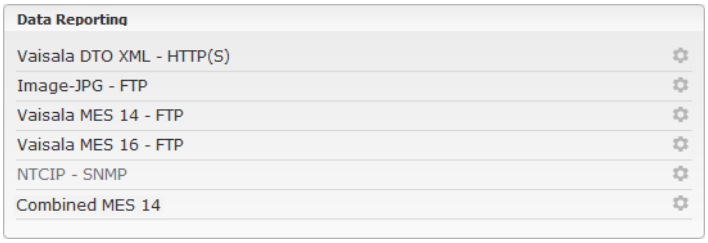
More information

- Configuring serial connection (page 123)

7.2.1.2 Configuring MES 14 and MES 16 push over serial line

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. In the **Data Reporting** component, select **Settings** ⚙ for **Vaisala MES 14** or **Vaisala MES 16**.



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3. In **Data Reporting**, set the following:

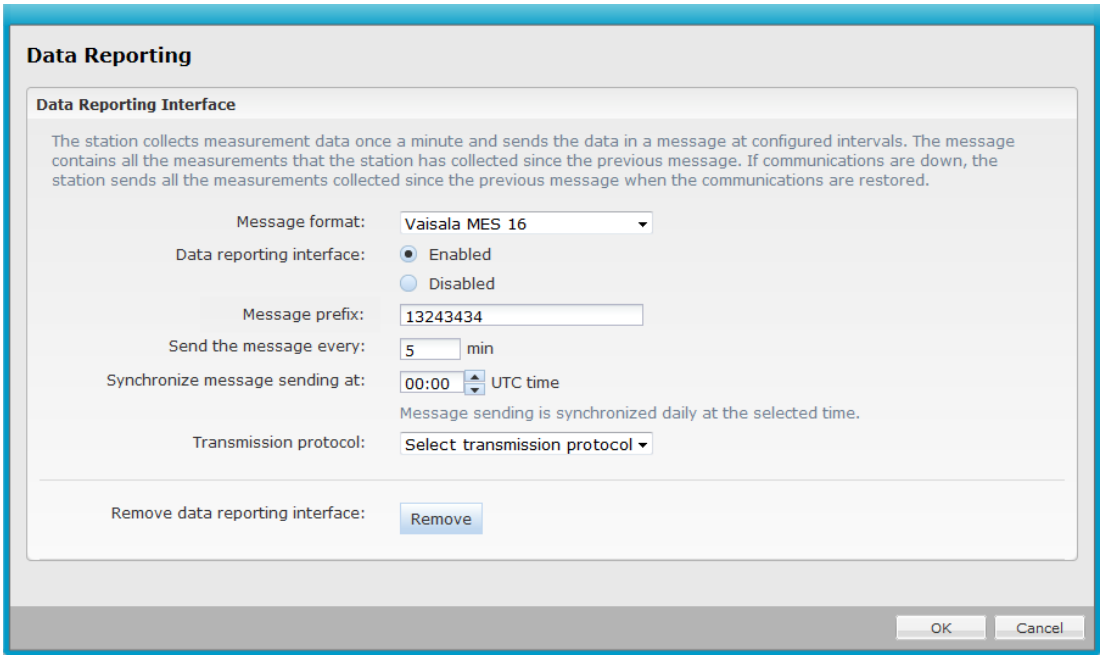
Message format
Select **Vaisala MES 14** or **Vaisala MES 16**.

Data reporting interface
Select **Enabled**.

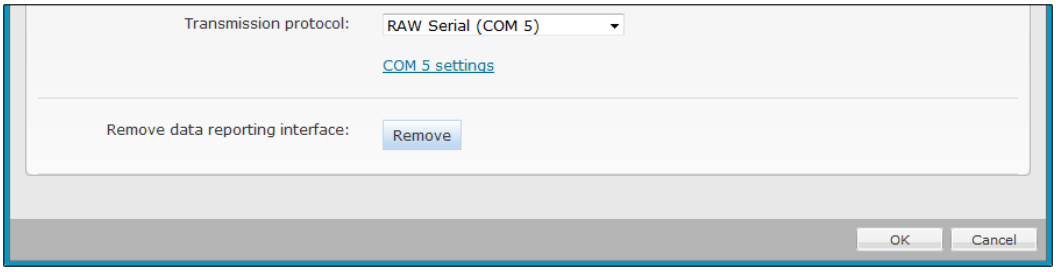
Message prefix
Identifier for data reports. To help to identify the station at the data collection system, define a prefix that is added to the message and the filename.

Send the message every
Message sending interval in minutes (recommended minimum = 1 minute). If you want to receive a message once a day, set the interval to **1440** minutes. The station always sends the latest data.

Synchronize message sending at
The time of day when message sending is synchronized. For example, with a **5**-minute interval and synchronization set to **00:02**, the station sends the data message at 00:07, 00:12, and so on.
If you have several stations, you can set the synchronization time to be the same for all stations. In this case, all stations send their messages at the same time and the messages have the same timestamp.
If this creates too much load on the data collection system, set different synchronization times for the stations (for example, **00:01**, **00:02**). In this case, the messages have different timestamps.



4. In **Transmission Protocol**, select **RAW Serial (COM 5)**.



5. Select **COM 5 settings**.
6. In the **COM 5** window, set the following:

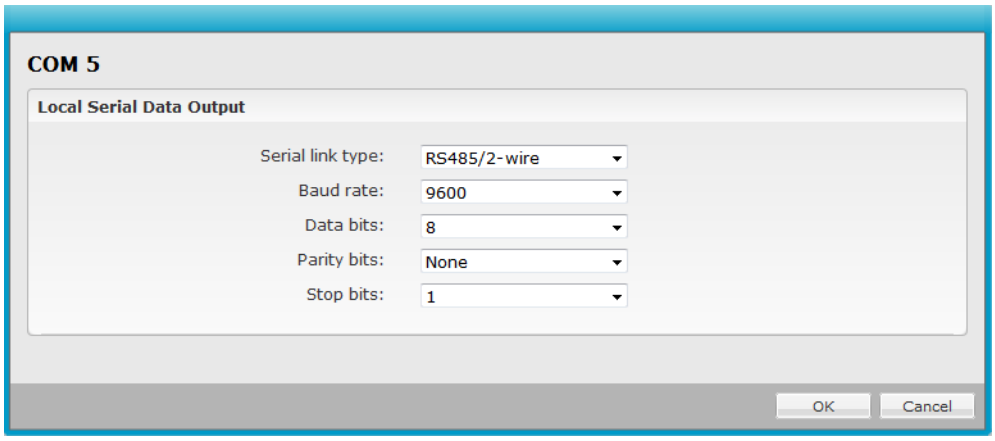
Serial link type
Type of serial link: **RS-232**, **RS-485/2-wire**, or **RS-485/4-wire**.

Baud rate
Connection speed (default = `9600`).

Data bits
Number of data bits used in characters (default = `8`).

Parity bits
Number of parity bits used (default = `None`).

Stop bits
Number of stop bits used (default = `1`).



The COM 5 settings are common for all configured serial data interfaces. If you change the settings, the previous settings are overwritten.

7. To save the changes, select **OK > OK**.

More information

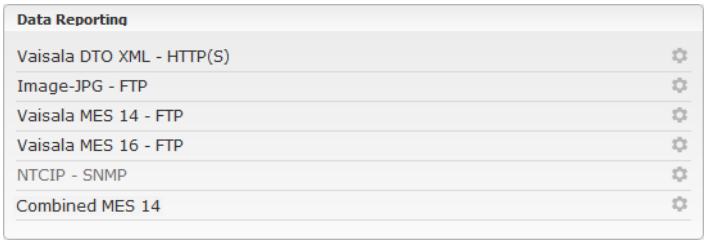
- Configuring serial connection (page 123)

7.2.2 Configuring MES 14 and MES 16 data reporting over FTP

You can configure Vaisala MES 14 and MES 16 data reports to be pushed over FTP to an external system.

To obtain the necessary information for configuration, contact the organization responsible for data collection.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Data Reporting** component, select **Settings** for **Vaisala MES 14** or **Vaisala MES 16**.



3. In the **Data Reporting** window, set the following:

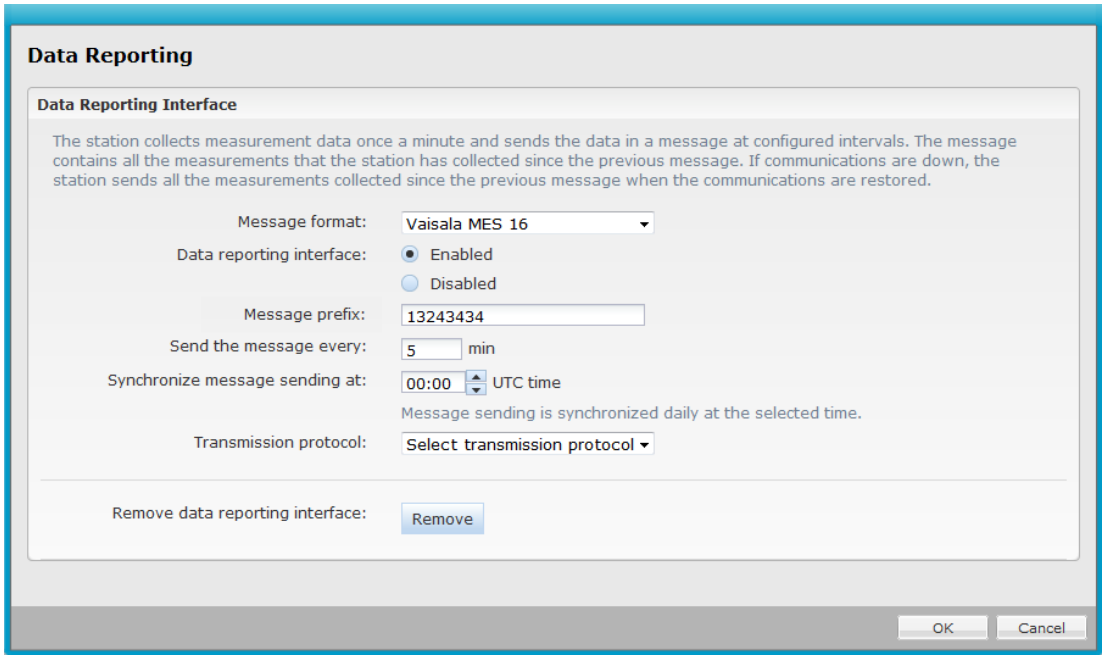
Message format
Select **Vaisala MES 14** or **Vaisala MES 16**.

Data reporting interface
Select **Enabled**.

Message prefix
Identifier for data reports. To help to identify the station at the data collection system, define a prefix that is added to the message and the filename.

Send the message every
Message sending interval in minutes (recommended minimum = 1 minute). If you want to receive a message once a day, set the interval to **1440** minutes. The station always sends the latest data.

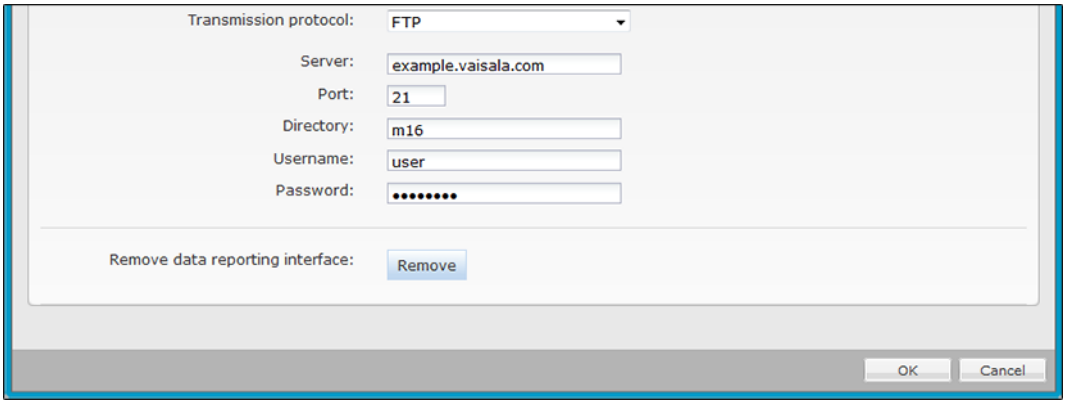
Synchronize message sending at
The time of day when message sending is synchronized. For example, with a **5**-minute interval and synchronization set to **00:02**, the station sends the data message at 00:07, 00:12, and so on.
If you have several stations, you can set the synchronization time to be the same for all stations. In this case, all stations send their messages at the same time and the messages have the same timestamp.
If this creates too much load on the data collection system, set different synchronization times for the stations (for example, **00:01**, **00:02**). In this case, the messages have different timestamps.



4. In the **Transmission Protocol** field, select **FTP**, and set the following:

   Server, **Port**, and **Directory**
   Server name, port number, and directory where to send the data reports.

   Username and **Password**
   Username and password for connecting to the server, if required.



5. To save the changes, select **OK**.

7.2.3 Configuring TCP port

You can configure Vaisala MES 12, MES 14, and MES 16 data reports to be polled from an external system over a TCP port.

To obtain the necessary information for configuration, contact the organization responsible for data collection.

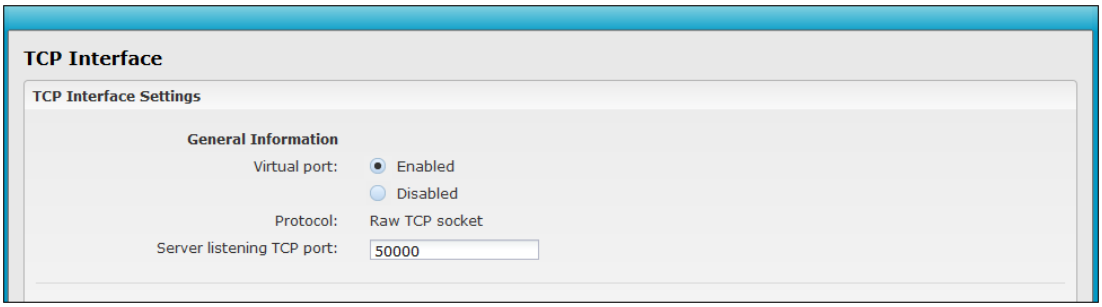
1. Open the server listening port for the connection in the cellular router or customer-provided Ethernet device. The default port is `50000`.
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **MES Interfaces** component, select **Settings** ⚙ for **TCP**.



4. In **General Information**, set the following:

   Virtual port
   Select **Enabled**.

   Server listening TCP port
   The port number to listen to (default = **`50000`**).

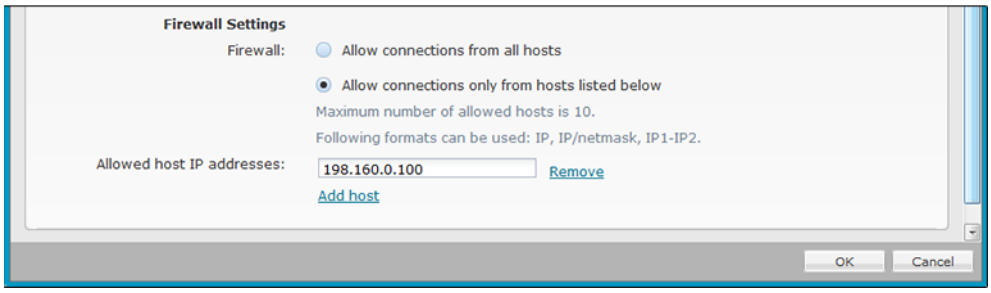


> If you change the default port here, change the port also in the IP forwarding settings.

5. In **Firewall Settings**, select one of the following:

   Allow connections from all hosts
   Anyone who knows the address can access the reports.

   Allow connections only from hosts listed below (recommended)
   Only requests from the listed IP addresses are allowed to access the reports.



6. If you selected **Allow connections only from hosts listed below**, select **Add host** to add the IP addresses.

   The following formats are allowed:
   - IP address (for example, **`10.1.2.3`**).
   - IP address/netmask (for example, **`10.1.2.3/255.255.255.0`**).
   - IP1-IP2 (for example, **`10.1.2.3-10.1.2.10`**).

7. To save the changes, select **OK**.

More information

- MES interface commands (page 185)

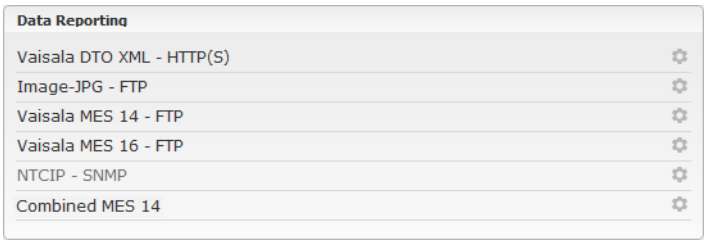
7.3 Configuring camera image data reporting

You can configure camera images to be pushed over FTP or HTTPS to an external system.

To obtain the necessary information for configuration, contact the organization responsible for data collection.

If you have 2 fixed cameras, you can configure a separate data reporting interface for each camera.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Data Reporting** component, select **Settings** for **Image-JPG**.



If the interface is not available, select **Add new**.

3. In the **Data Reporting** window, set the following:

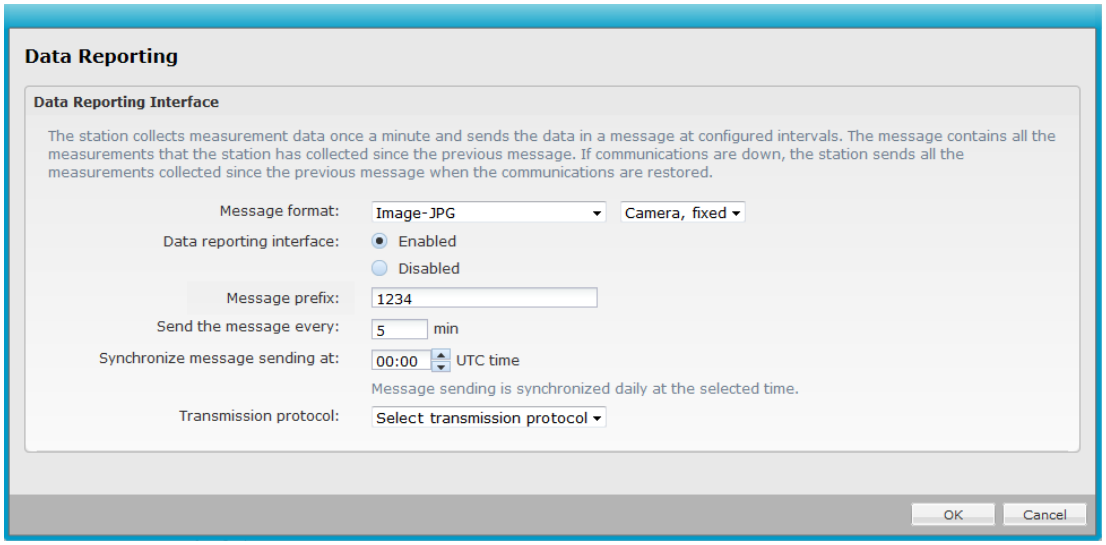
Message format
Select **Image-JPG**. If you have two fixed cameras, select also the camera from which images are sent.

Data reporting interface
Select **Enabled**.

Message prefix
Identifier for data reports. To help to identify the station at the data collection system, define a prefix that is added to the message and the filename. If the transmission protocol is HTTP(S), the prefix is also included in the request header `X-Message-Prefix`.

Send the message every
Message sending interval in minutes (recommended minimum = 1 minute). If you want to receive a message once a day, set the interval to **1440** minutes. The station always sends the latest data.

Synchronize message sending at
The time of day when message sending is synchronized. For example, with a **5**-minute interval and synchronization set to **00:02**, the station sends the data message at 00:07, 00:12, and so on.
If you have several stations, you can set the synchronization time to be the same for all stations. In this case, all stations send their messages at the same time and the messages have the same timestamp.
If this creates too much load on the data collection system, set different synchronization times for the stations (for example, **00:01**, **00:02**). In this case, the messages have different timestamps.

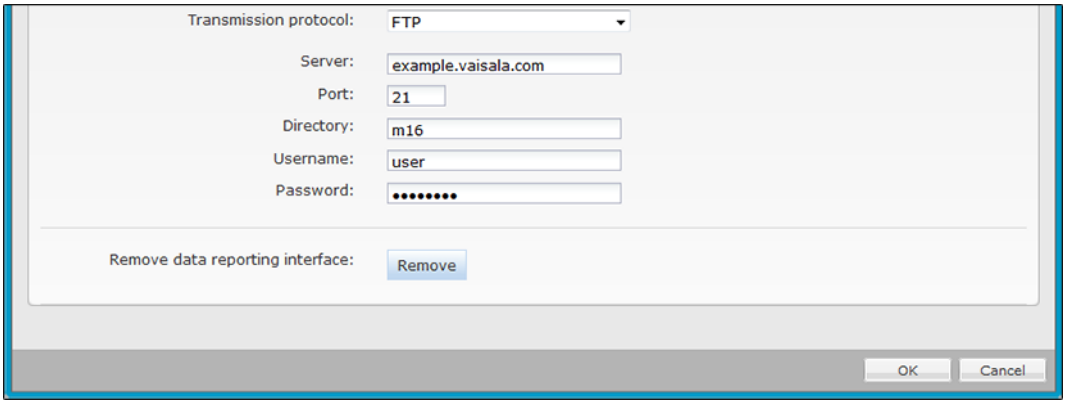


4. In the **Transmission Protocol** field, select the protocol to use.

5. If you selected **FTP**, set the following:

   Server, **Port**, and **Directory**
   Server name, port number, and directory where to send the data reports.

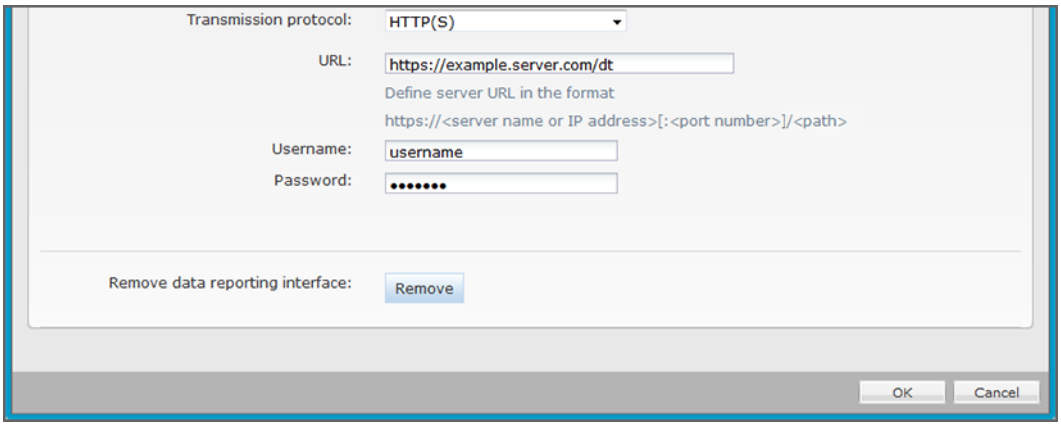
   Username and **Password**
   Username and password for connecting to the server, if required.



6. If you selected **HTTP(S)**, set the following:

   URL
   URL of the server where to send the data reports in the format:
   `<http/https>://<server name or IP address>[:<port>]/<path>`

   Username and **Password**
   Username and password for connecting to the server. The fields cannot be empty. If you are not using authentication, type any string in the fields.



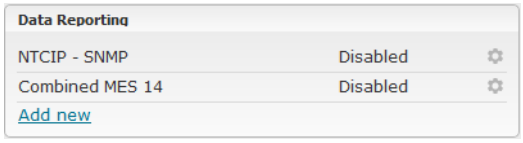
7. To save the changes, select **OK**.

7.4 Adding new data reporting interfaces

In addition to the fixed data reporting interfaces, you can add more data reporting interfaces to the weather station. The fixed interfaces are:

- NTCIP
- Combined MES 14

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Data Reporting** component, select **Add new**.



3. In the **Data Reporting** window, select the message format and configure the settings.
4. To save the changes, select **OK**.

More information

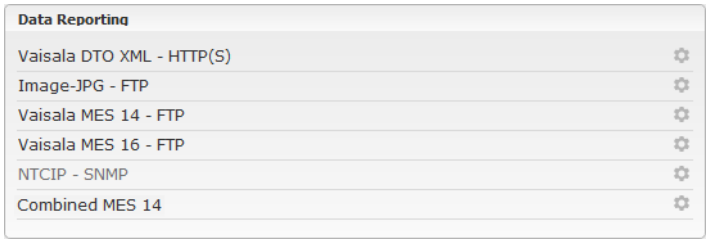
- Configuring MES 12, MES 14, and MES 16 data reporting (page 123)
- Configuring camera image data reporting (page 133)

7.5 Disabling data reporting interfaces

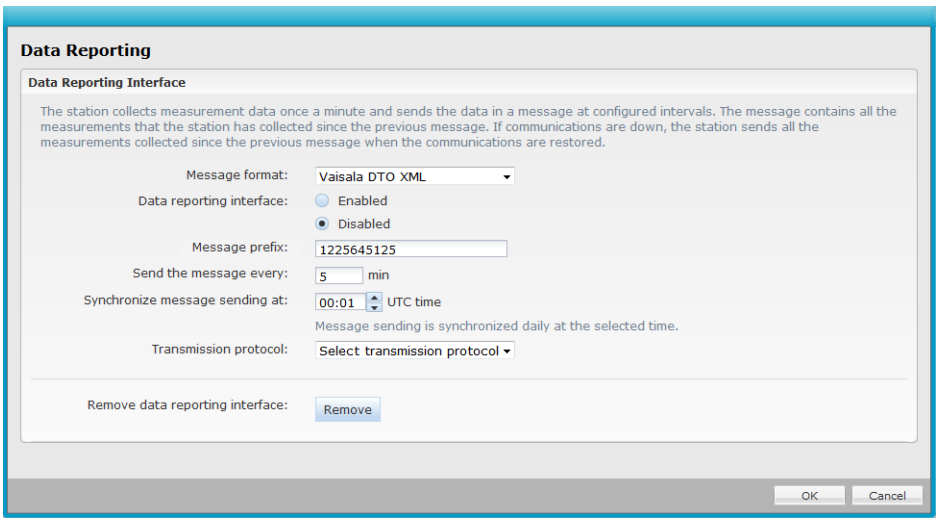
You can disable a data reporting interface without losing the settings.

If you are sure that you do not need the interface, you can remove it. For instructions, see Removing data reporting interfaces (page 137).

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Data Reporting** component, select **Settings** ⚙ for the reporting type that you want to disable.



3. In **Data reporting interface**, select **Disabled**.



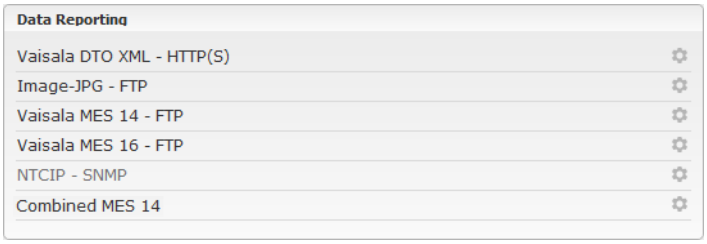
4. To save the changes, select **OK**.

7.6 Removing data reporting interfaces

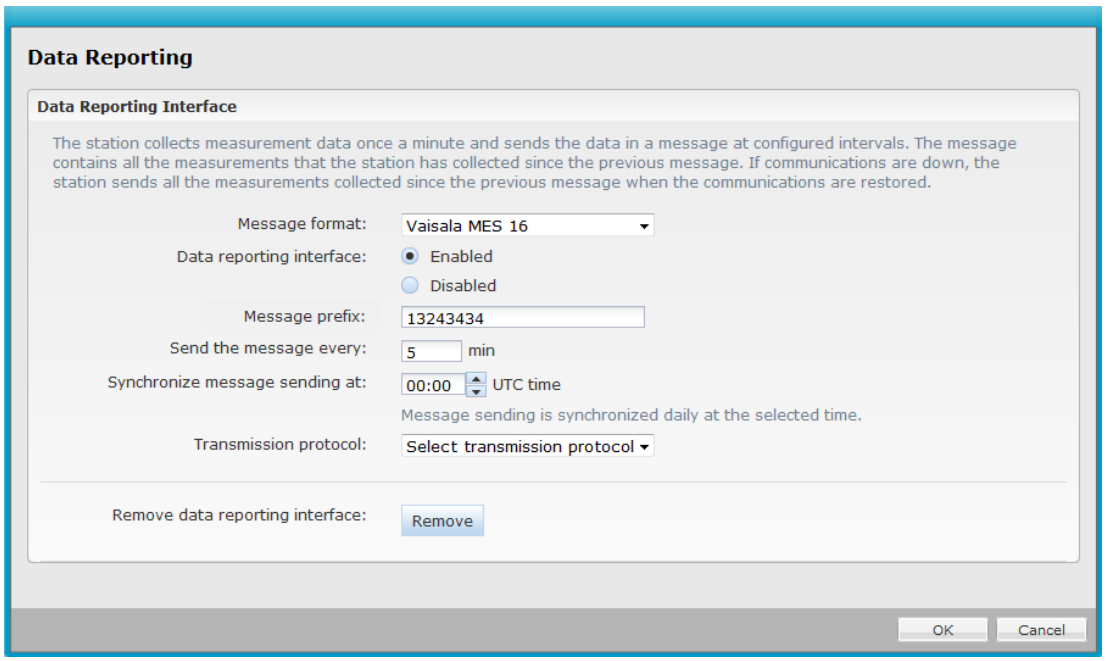
If you are sure that you do not need a data reporting interface, you can remove it. In that case, all the settings will be removed.

You cannot remove the NTCIP or Combined MES 14 interfaces. If you do not want the interface used, disable it. For instructions, see Disabling data reporting interfaces (page 136).

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Data Reporting** component, select **Settings** ⚙ for the reporting type that you want to remove.



3. In **Remove data reporting** interface, select **Remove > Remove**.



8. Configuring device control

8.1 Design principles for device control configuration

How to connect your device to the RWS200 device control relays and how to configure the functionality depends on the characteristics of your device.

- How does your device function? Does it activate when the relay contacts connect the circuit or when the relay contacts disconnect the circuit?
- What do you want to do at power failure? Do you need a failsafe relay?
- In which conditions do you want to activate and deactivate your device?
- What do you want to happen when a sensor is malfunctioning or reporting suspicious values?

8.1.1 Device control activation logic

You can configure each relay to function according to normal or inverted activation logic. When the device control rule changes to TRUE:

- With normal activation logic, the relay activates.
- With inverted activation logic, the relay deactivates. Inverted activation logic is typically used in error management.

More information

- Configuring activation logic and control (page 146)
- Configuring activation rule, deactivation delay, and deactivation rule (page 149)

8.1.2 Device control activation control

A change in the device control status activates or deactivates the relay. You can change the status manually or automatically.

- With manual control, you can change the device control status from the Web UI manually.
- With automatic control, the device control status changes when:
  - The status of the configured activation rule changes.
  - The deactivation delay has passed.
  - The status of the deactivation rule changes.

To determine whether to change the device control status, the system checks these steps every 30 seconds. Therefore, the status of the activation rule changes within 30 seconds of the actual change in conditions.

The deactivation delay is calculated from the last time that the activation rule was TRUE. If the deactivation rule is TRUE, deactivation happens in 30 seconds of the end of the deactivation delay.

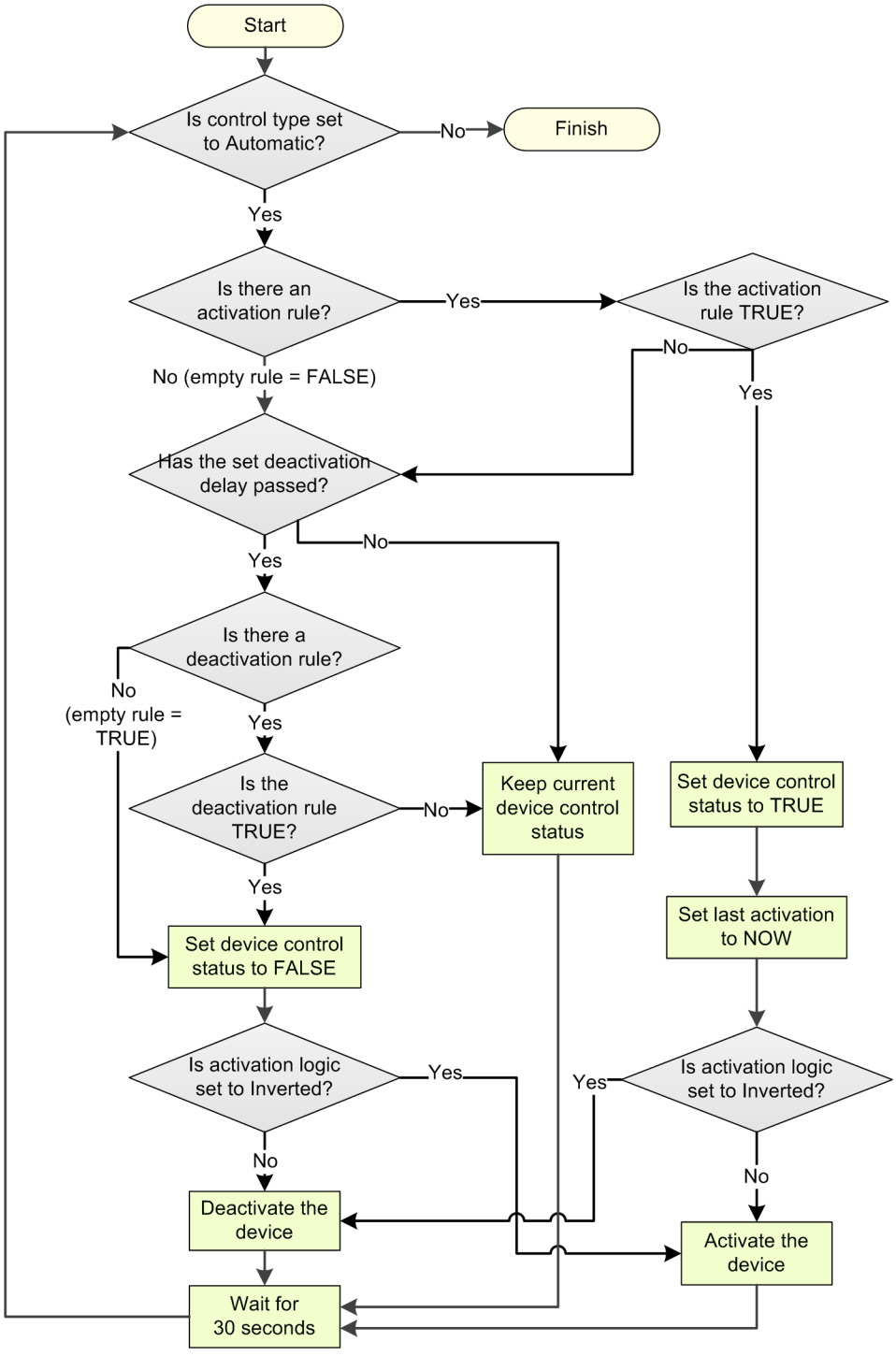


Figure 8 Automatic control flow in RWS200 device control

8.1.3 Device control activation rules

Activation rules trigger the changes in the device control status. The rules consist of one, two, or three conditions that are combined with logical operators (**AND**, **OR**).

Design the order and logic of the rules carefully. For example, you may want to activate the relay in the following conditions:

- In winter time, when the road surface is slippery (any DSC211 reports surface state to be frosty, snowy, icy, or slushy).
- In summer time, when there is a water film on the road (any DSC211 reports water depth to be more than 1 mm).

The system reads the rule conditions **from top to bottom**.

Table 9 Correct order of conditions in rule

Correct condition order	Interpretation
Water film > 1 mm	Is there a water film on the road?
AND	And
Temperature > 5 °C (41 °F)	Is air temperature > 5 °C (41 °F)?
OR	Or
Slippery road	Is the road slippery?

Table 10 Incorrect order of conditions in rule

Incorrect condition order	Interpretation
Slippery road	Is the road slippery?
OR	Or
Water film > 1 mm	Is there a water film on the road?
AND	And
Temperature > 5 °C (41 °F)	Is air temperature > 5 °C (41 °F)?

In the example of incorrect order, even when the road is slippery, the status of the activation rule remains FALSE unless air temperature rises above 5 °C (41 °F). In winter time, this is rare.

If you do not define an activation rule for the relay, the system ignores the activation rule and checks the deactivation rule.

8.1.4 Device control deactivation delay

To prevent the relay switching on and off in rapidly changing conditions, configure a deactivation delay for the device control status change. The delay time starts in 30 seconds from when the activation rule changes to FALSE, and ends in 30 seconds of the set delay time.

If the activation rule becomes TRUE during the delay, the counter restarts.

8.1.5 Device control deactivation rules

Deactivation rules complement activation rules. As long as the status of the activation rule remains TRUE, the system ignores the deactivation rule. When the status of the activation rule changes to FALSE, the system checks the status of the deactivation rule (after the configured deactivation delay):

- If the status of the deactivation rule is FALSE, the system keeps the current device control status.
- If the status of the deactivation rule is TRUE, the device control status changes to FALSE.

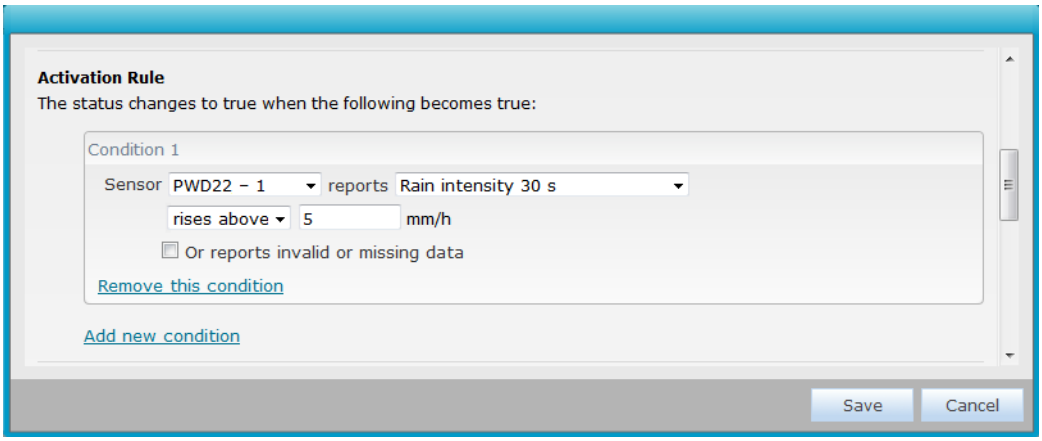
If you do not define a deactivation rule for the relay, the system considers the status of the deactivation rule to be always TRUE. In this case, when the status of the activation rule changes to FALSE, the device control status changes after the deactivation delay.

8.1.6 Invalid or missing sensor observations in device control

Decide how to handle error situations. For example, if you configure a rule that activates on a warning sign when the road is slippery, do you want to activate the warning sign also when:

- The sensor does not work?
- The sensor measurement data is suspicious?
- The sensor data is missing?

For each condition in an activation or deactivation rule, you have the option to select **Or reports invalid or missing data**.



More information

- Configuring activation rule, deactivation delay, and deactivation rule (page 149)

8.1.7 System or sensor faults in device control

To configure rules for system faults or sensor faults, select **System – 1** as the sensor. The possible observations and their values are:

- **System status Instant**:
  - **System fault**: The system has a power failure.
  - **OK**: The system is operating properly.
  - **Or reports invalid or missing data**: The system stops receiving information on system fault statuses.

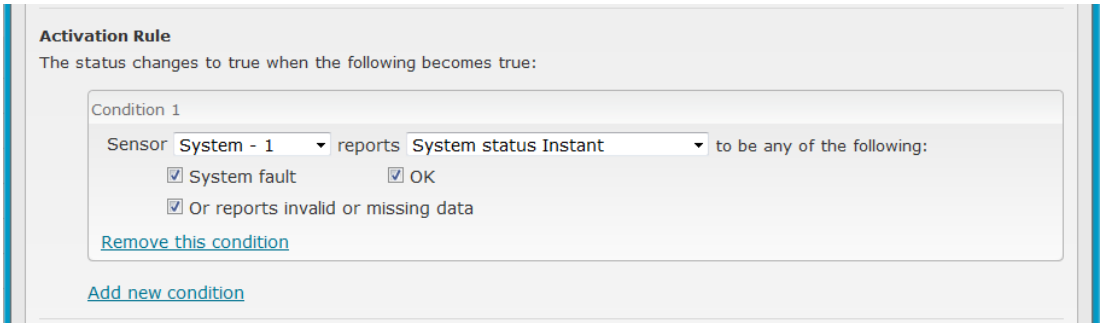


Figure 9 Activation rule for system fault

- **System sensor Instant**:
  - **Sensor fault**: One or more sensors are faulty.
  - **OK**: All sensors are operating properly.
  - **Or reports invalid or missing data**: The system stops receiving information on sensor fault statuses.

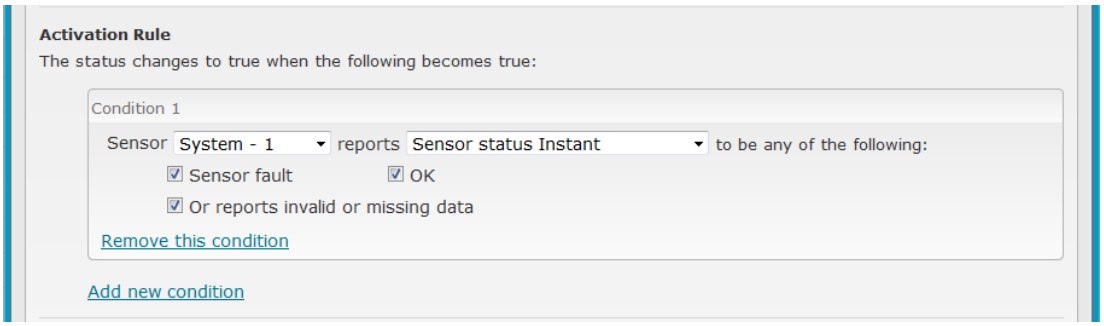


Figure 10 Activation rule for sensor fault

More information

‣ Configuring activation rule, deactivation delay, and deactivation rule (page 149)

8.2 Device control settings

To configure the device control settings, perform the following procedures in the order presented:

1. Adding device control components to Web UI (page 144)

2. Configuring activation logic and control (page 146)
3. Configuring activation rule, deactivation delay, and deactivation rule (page 149)

For an example configuration, see Example of configuring device control for slippery road due to icy conditions warning (page 153).

8.3 Adding device control components to Web UI

To configure the activation rules and to see the status of the device control rules, add the device control components to the Web UI. The rules and statuses are visible to all users, but only administrators and super users can modify the settings.

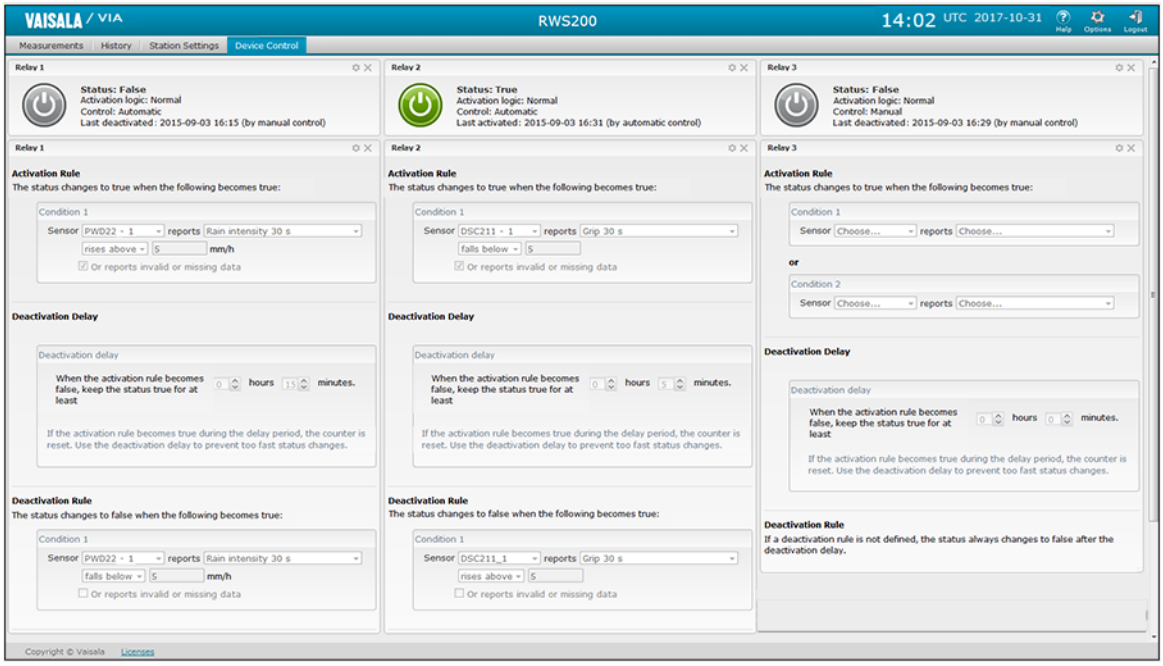


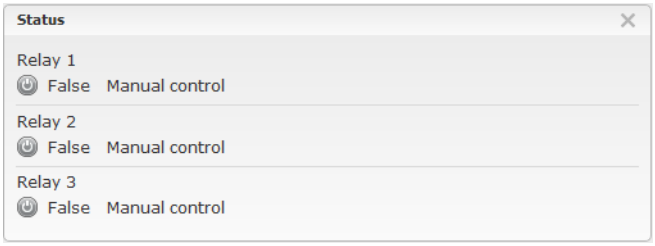
Figure 11 Example of device control page

Vaisala recommends that you create an own page for device control or an own page for each relay. You can also add components to the **Measurements** page.

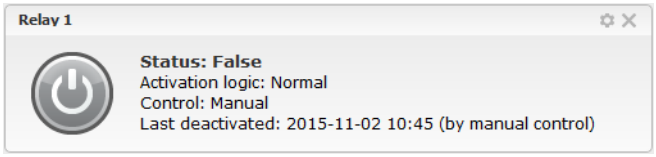
1. Log in to the Web UI as an administrator or super user, and create a new page or pages for device control.

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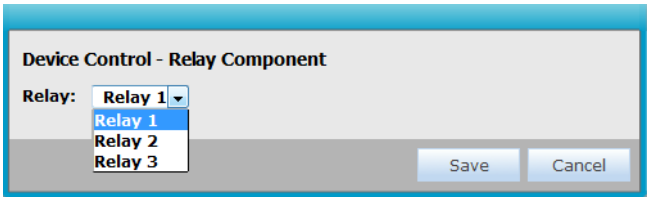
2. On the new page or pages, add a **Device Control Statuses** component.



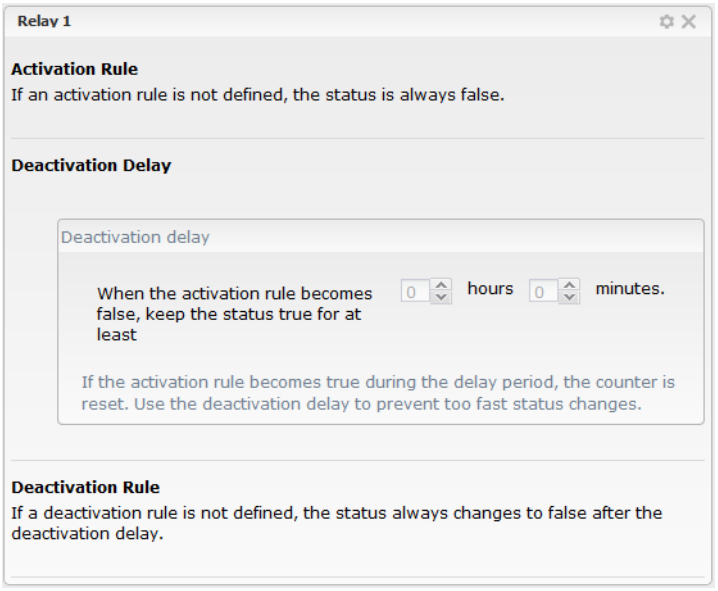
3. On the new page or pages, add a **Device Control Relay** component for each relay.



4. In each **Device Control Relay** component, select **Settings** ⚙, the relay (**Relay 1**, **Relay 2**, or **Relay 3**), and **Save**.



5. On the new page or pages, add a **Device Control Rule Viewer** component for each relay.



More information

- Adding new pages (page 174)
- Adding new components (page 176)

8.4 Configuring activation logic and control

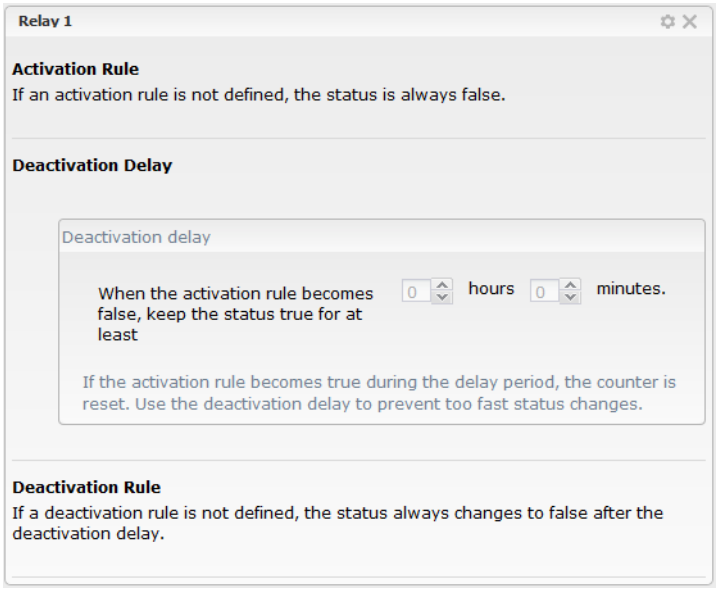
Activation logic determines whether the relay activates or deactivates when the device control status changes to TRUE.

Activation control determines whether the status change is automatic or manual.

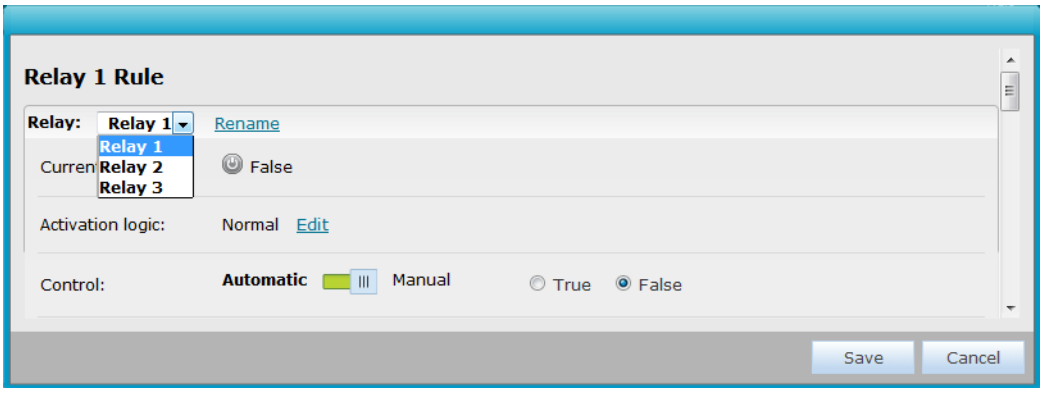
1. Log in to the Web UI as an administrator or super user, and go to the page where the device control components are located.

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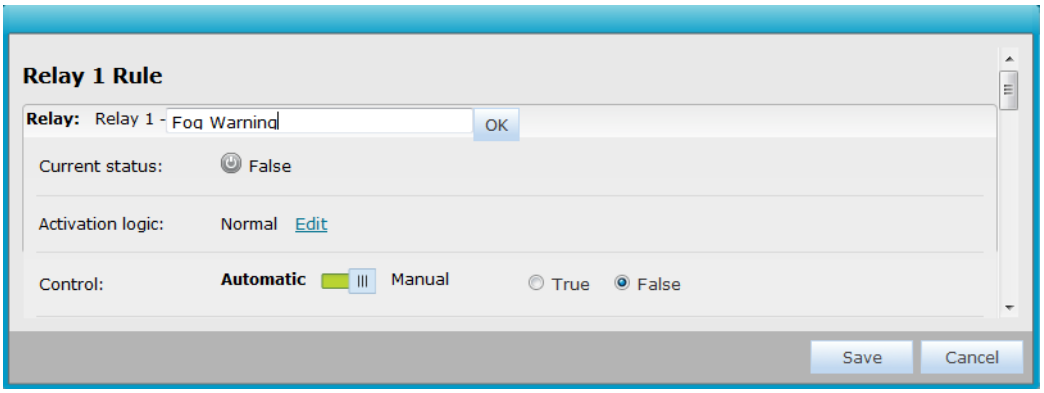
2. In the **Device Control Rule Viewer** component, select **Settings** ⚙ for **Relay 1**.



3. In **Relay**, select the relay that you want to configure.



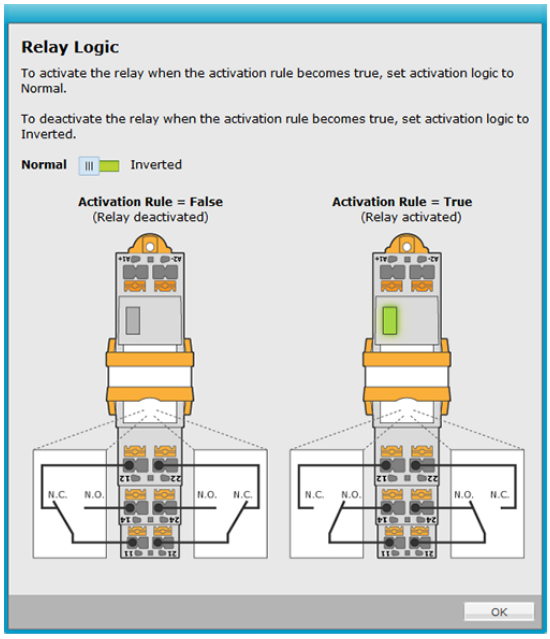
4. To name the relay, select **Rename**, type a descriptive name for the relay, for example, **`Fog warning`**, and select **OK**.

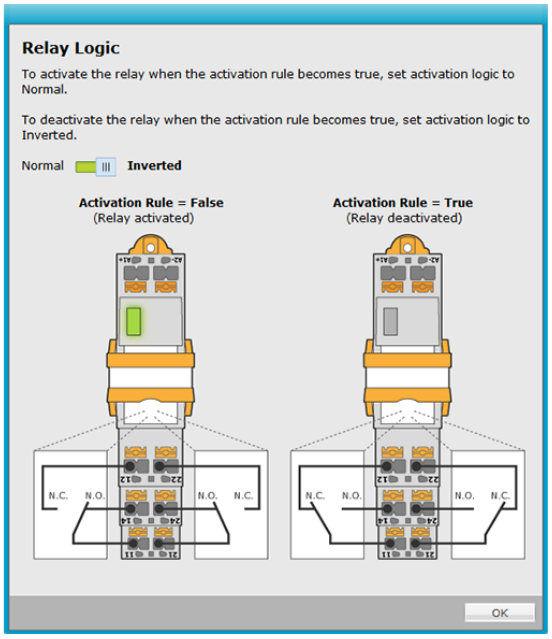


5. In **Activation logic**, select **Edit**.
6. In the **Activation logic** window, select the activation logic type according to the relay wiring:

   Normal
   Activates the relay when the device control status changes to TRUE.

   Inverted
   Deactivates the relay when the device control status changes to TRUE. Inverted logic is typically used in error situations. For example, when the station has a power failure, the relay activates a device that flashes a warning light.



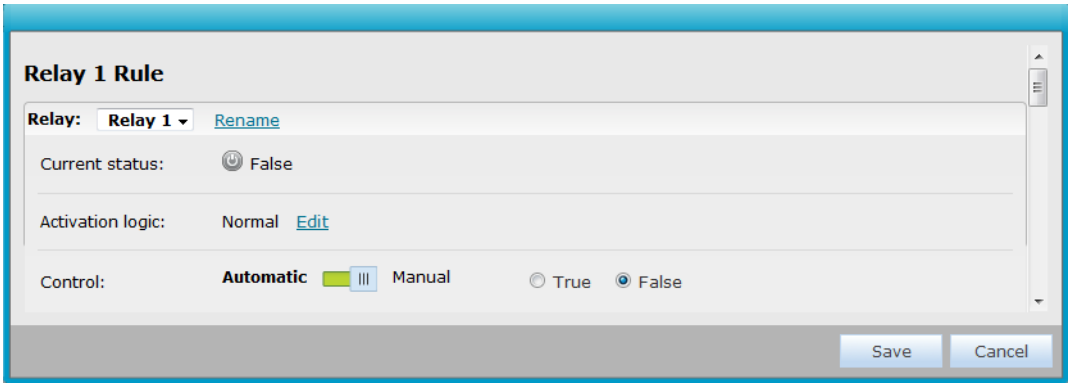


7. To save the changes, select **OK**.

8. In the **Device Control** window, in **Control**, select the activation control type:

   Automatic
   Rules control activation and deactivation automatically.

   Manual
   You can activate and deactivate the relay manually. This is useful especially when testing the wiring.



If you change the activation control type, the system updates the **Last Activated/ Deactivated** information in the **Device Control Relay** component, even though the actual device control status does not change.

9. If you selected manual control, select **Save** to save the changes and to activate the status change.
10. If you selected automatic control, configure the activation rule, deactivation delay, and deactivation rule.

More information

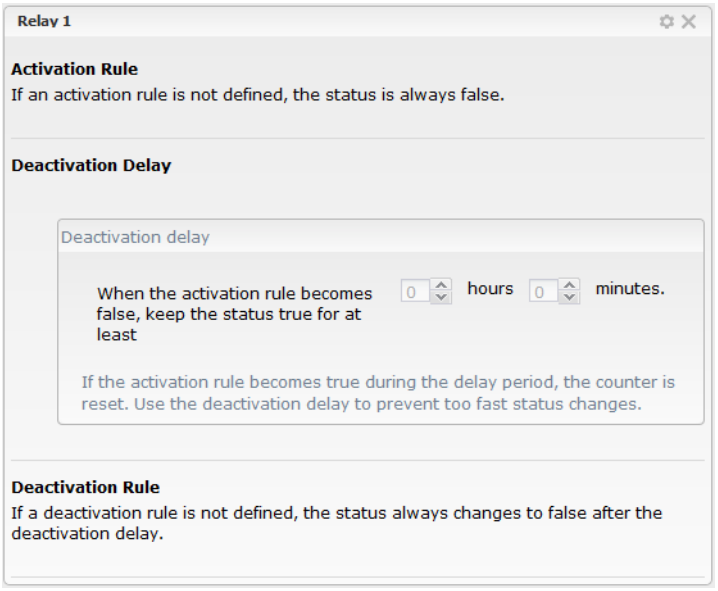
- Device control activation logic (page 139)
- Configuring activation rule, deactivation delay, and deactivation rule (page 149)
- Example of configuring device control for slippery road due to icy conditions warning (page 153)

8.5 Configuring activation rule, deactivation delay, and deactivation rule

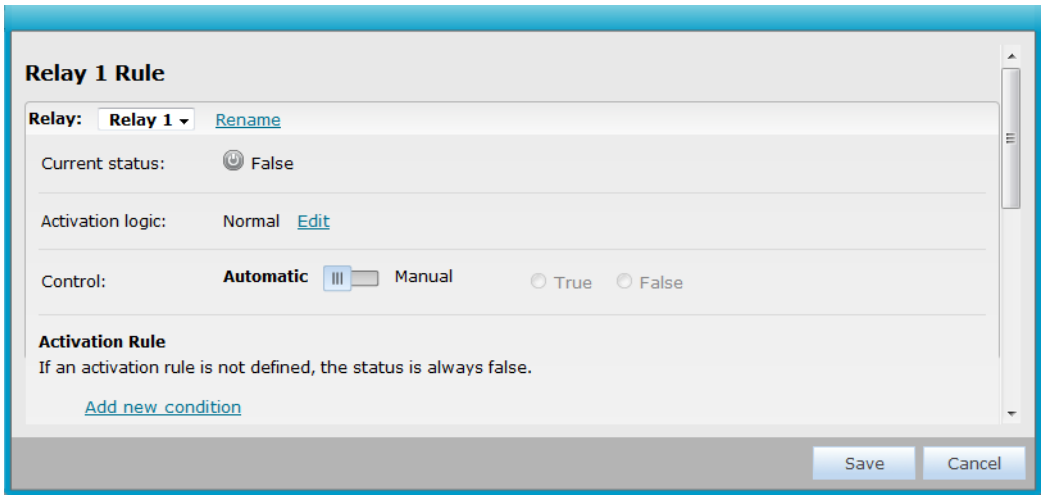
When using automatic control for a relay, configure the activation rule, deactivation delay, and deactivation rule for the relay.

1. Log in to the Web UI as an administrator or super user, and go to the page where the device control components are located.

2. In the **Device Control Rule Viewer** component, select **Settings** ⚙ for **Relay 1**.



3. In **Activation Rule**, select **Add new condition**.



4. In **Condition 1**, set the following:

Sensor

The sensor that provides the observation:

- A particular sensor: **Sensor – 1**, **Sensor – 2**, and so on
- Any one of these sensors: **Any Sensor**
- All of these sensors: **All Sensors**

Observation

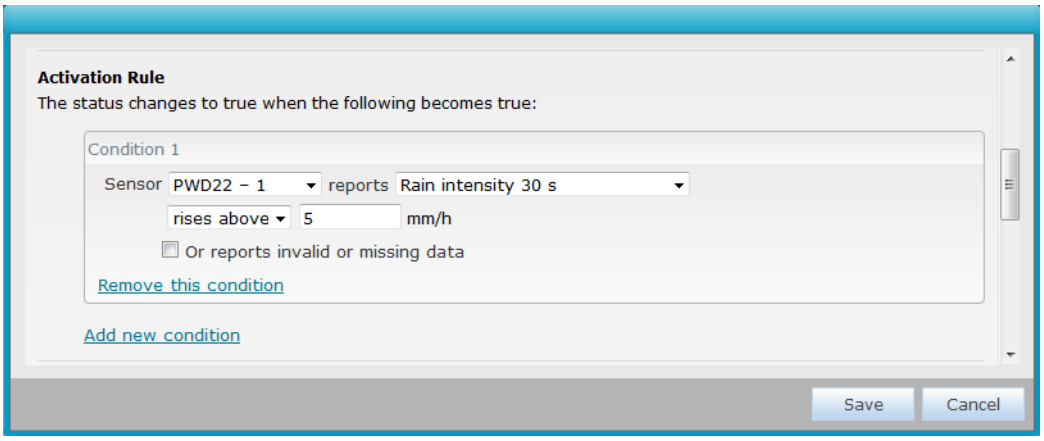
The observation used in the condition.

Operator and value

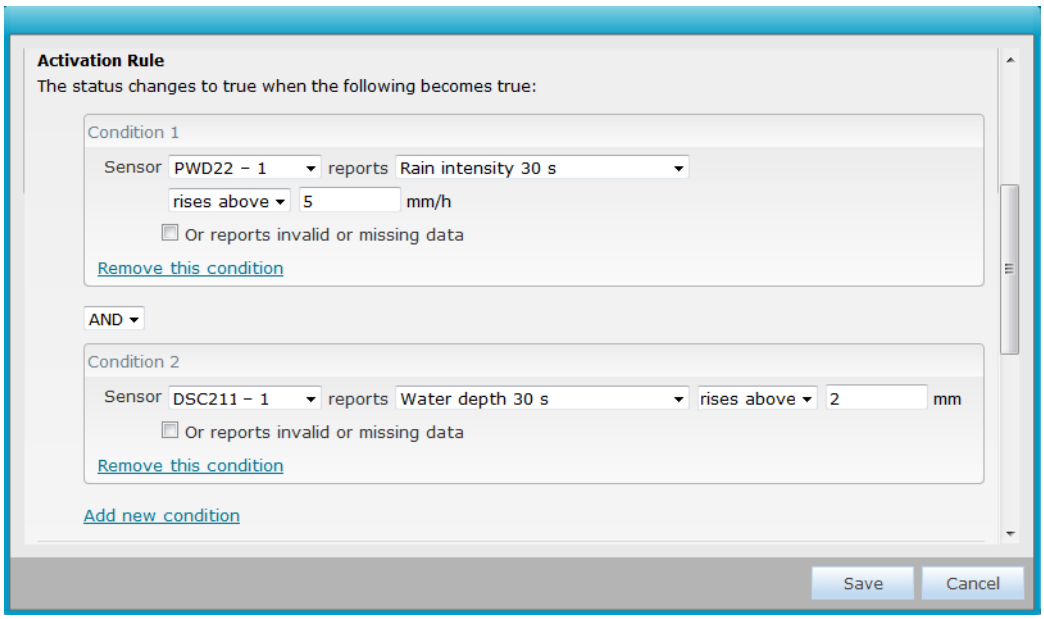
The threshold value for the observation.

Or reports invalid or missing data

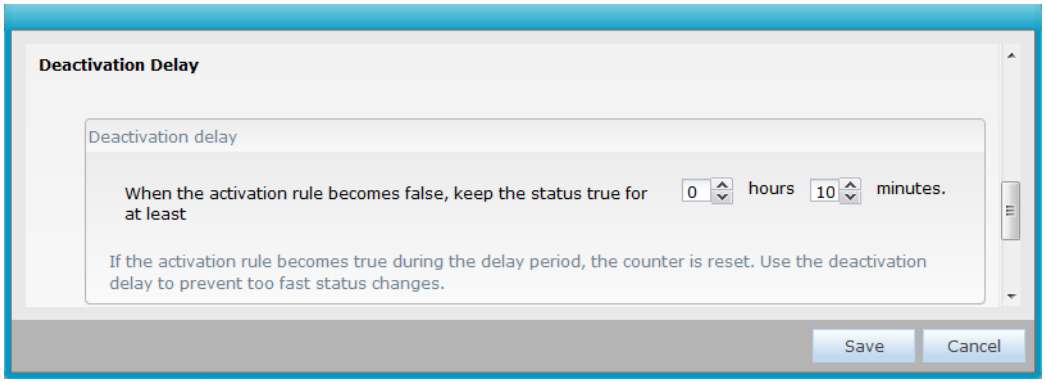
Select if you want to activate the rule when the sensor does not work, the sensor measurement data is suspicious, or when the data is missing.



5. If needed, add a second and a third condition to the rule. You can add a maximum of three conditions to one rule.
   a. In **Activation Rule**, select **Add new condition**.
   b. Select the operator between the conditions: **AND** or **OR**.
   c. Select the sensor and observation value for the condition.

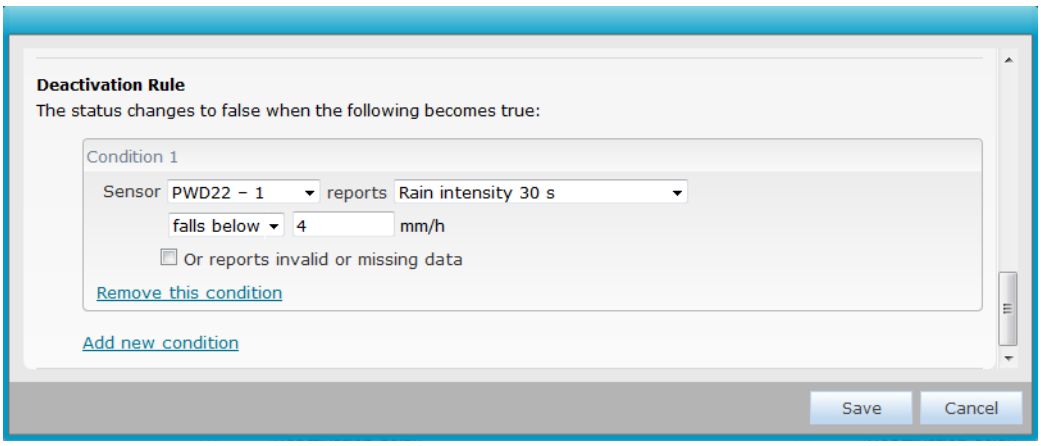


6. In **Deactivation Delay**, set the time delay for the deactivation rule.



   To enforce the deactivation rule with minimum delay, set the delay to `0` hours and `0` minutes.

7. In **Deactivation Rule**, set the deactivation rule similarly to the activation rule.



8. To save the changes and to activate the rule, select **Save**.

More information

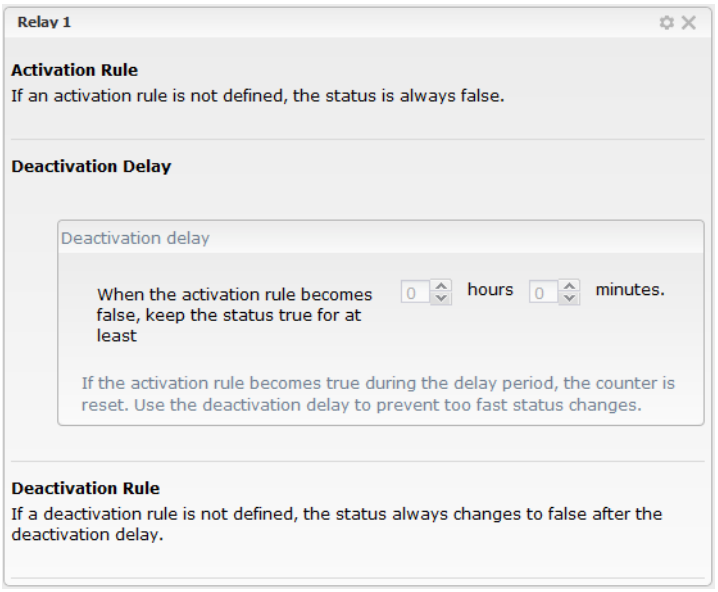
- Device control activation logic (page 139)
- Invalid or missing sensor observations in device control (page 142)
- System or sensor faults in device control (page 143)
- Configuring activation logic and control (page 146)
- Device control status changes when observation value stays the same (page 334)

8.6 Example of configuring device control for slippery road due to icy conditions warning

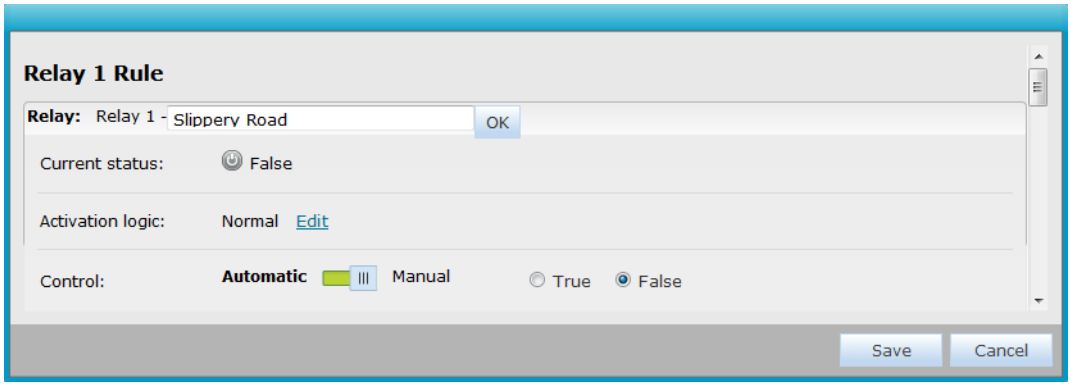
The **Slippery road due to icy conditions** warning sign turns on when:

- Any DSC211 sensor reports grip to fall below 0.55
- The first DST111 reports surface temperature to fall below 0 °C (32 °F)

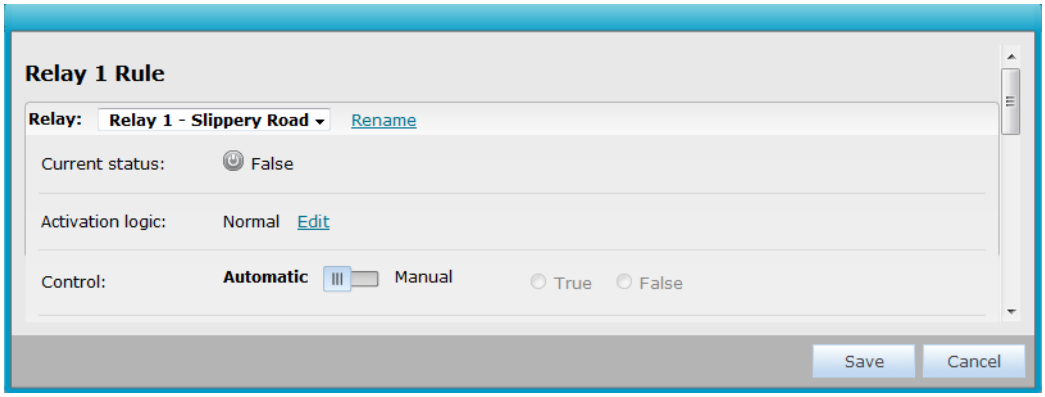
1. In the **Device Control Rule Viewer** component, select **Settings** for **Relay 1**.



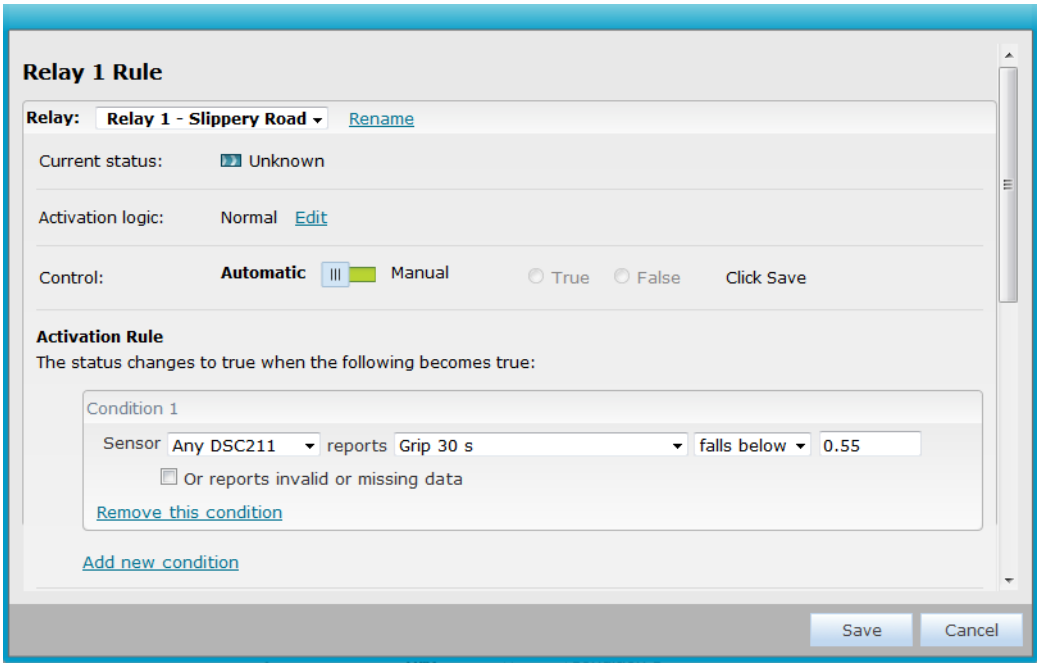
2. In the **Relay 1 Rule** window, select **Rename**, rename the relay as `Slippery Road`, and select **OK**.



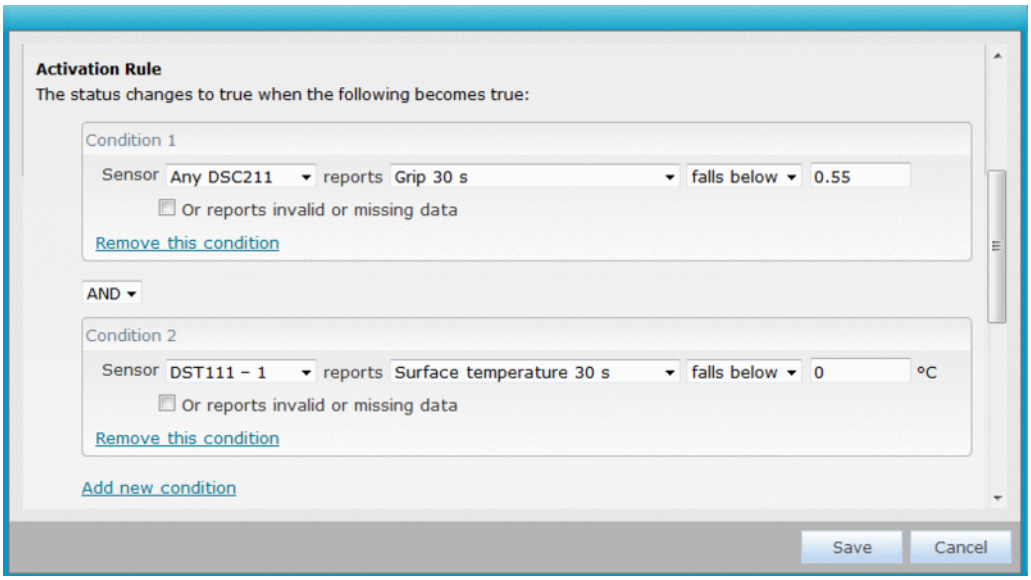
3. In **Control**, select **Automatic**.



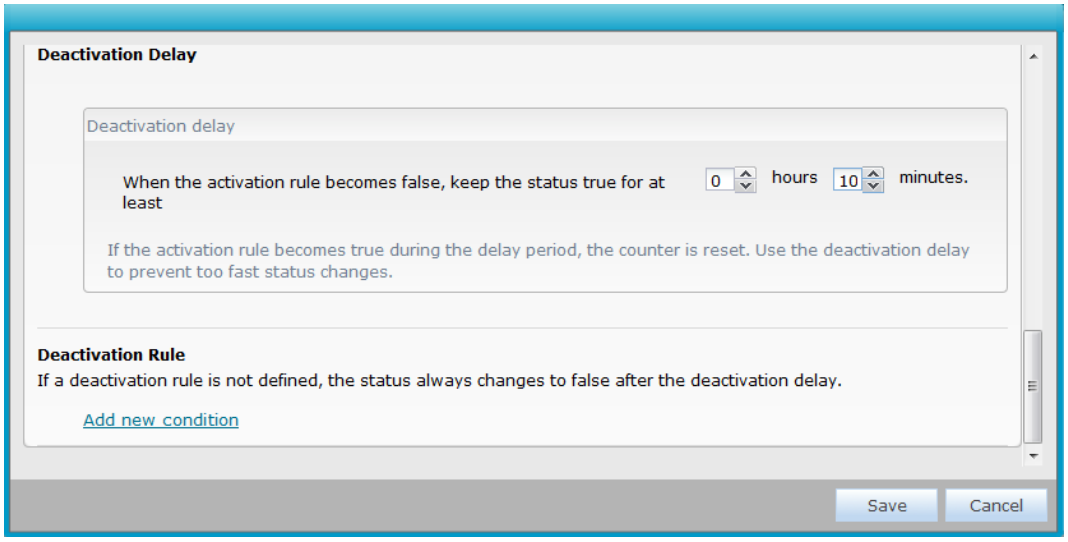
4. In **Activation Rule > Condition 1**, select that **Any DSC211** sensor reports that **Grip 30 s falls below** `0.55`.



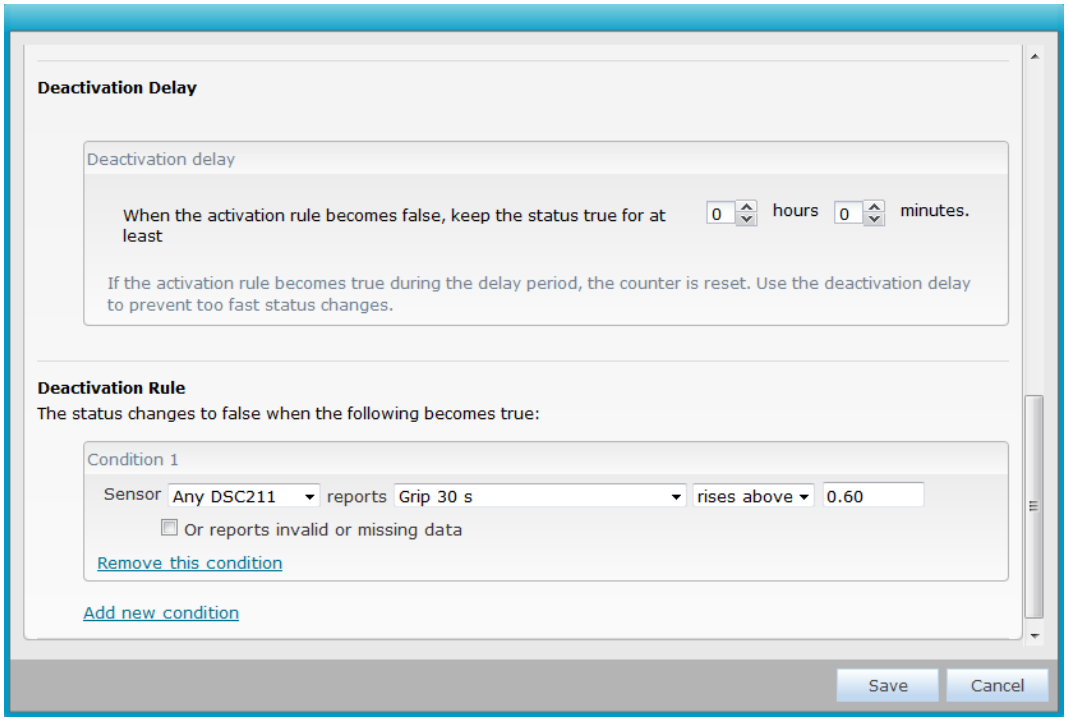
5. Select **Add new condition**, **AND**, and select that the first DST111 (**DST111 – 1**) reports that **Surface temperature 30 s falls below** `0` °C (32 °F).



6. To prevent too rapid changes in the device control status, you have two options:
   - Configure deactivation delay. Set the delay to **10** minutes.



   - Configure hysteresis with a deactivation rule.



7. To save the changes and to activate the rule, select **Save**.

More information

- Configuring activation logic and control (page 146)

9. Configuring digital inputs

9.1 Digital inputs

DMU703 **DIGITAL** inputs **DIN0** and **DIN1** can be used for alerting when the status of the connected item changes. For example, a door switch can be connected to the input to show when the door is open or closed. The digital input can be configured to create an event when the status changes.

If you ordered the station with a door switch, the digital input has been configured at the factory.

9.2 Configuring digital inputs

To see the status of a digital input, add the **Digital Input** component to the Web UI. The status is visible to all users, but only administrators and super users can modify the settings.

1. Log in to the Web UI as an administrator or super user, and go to the **Measurements** page.

   Alternatively, create a new page for the **Digital Input** component.

2. Add a new **Obs**: **Digital Input** component on the page.



3. In the **Digital Input** component, select **Settings** ⚙ for **DIN0** or **DIN1**.

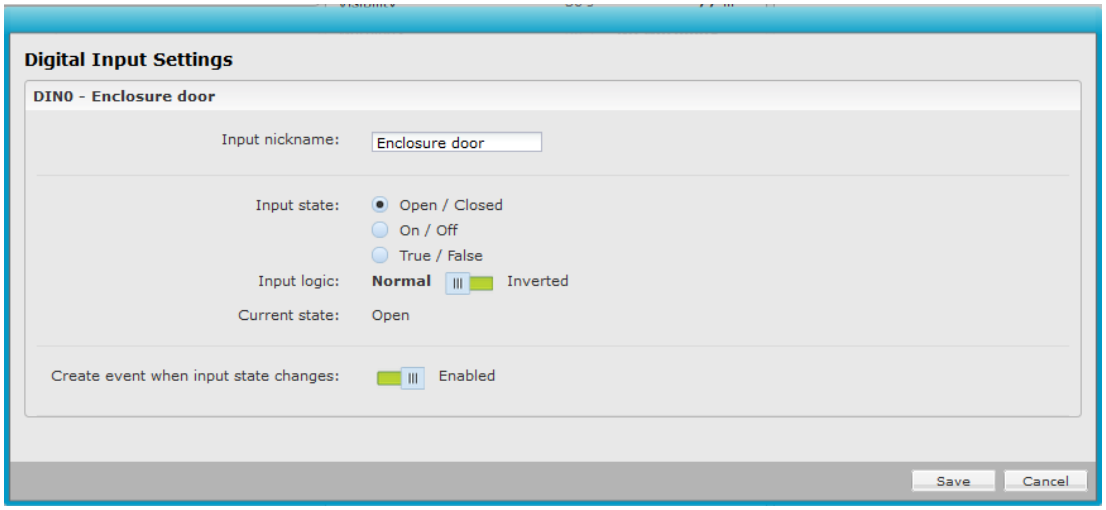
4. In the **Digital Input Settings** window, set the following:

   Input nickname
   Descriptive nickname for the digital input. For example, `Enclosure door`.

   Input state
   Select the status text that is best suited for the digital input: **Open** / **Closed**, **On** / **Off**, or **True** / **False**.

   Input logic
   Select the logic for the status text:
   - **Normal**: When the digital input is grounded, the status is **Open**, **On**, or **True**.
   - **Inverted**: When the digital input is grounded, the status is **Closed**, **Off**, or **False**.

   Create event when input state changes
   Enable this setting to create an event in the event log when the input state changes.



5. To save the changes, select **Save**.

10. Managing system security certificates

10.1 System security certificates

The system generates a self-signed security certificate for the station at the factory. This initial certificate may or may not be usable, depending on the required properties. For more information about certificates, see RWS200 System Description (M211607EN).

For a more secure and trusted connection, you can replace the self-signed certificate with a signed certificate. You have the following options:

- Using certificate signed by trusted certificate authority (page 159)
- Using certificate signed by organization certificate authority (page 165)

The certificate is specific to one station. If you change the station hostname or IP address in the station communication settings, you must create a new certificate and have it signed again or obtain a new signed certificate.

10.2 Using certificate signed by trusted certificate authority

If you want to use a certificate that is signed by a trusted certificate authority (CA), perform the following steps in the order presented:

1. Generating new self-signed certificate (page 159)
2. Creating certificate signing request (page 162)
3. Updating current certificate (page 163)

10.2.1 Generating new self-signed certificate

To generate the certificate, the IP address of the cellular router must be linked to a domain name server.

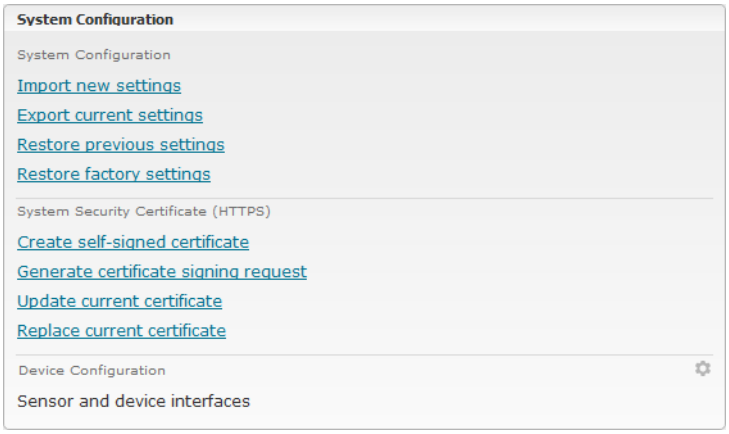
If you change the station hostname or IP address in the station communication settings, you must generate a new certificate.



The station does not take a backup of the certificate. When you generate a new certificate, you lose the current one.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. In the **System Configuration** component, select **Create self-signed certificate**.



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3. In the **System Security Certificate** window, set the following:

Domain name
Fully qualified domain name for the station. You can copy this value from the address bar of the web browser.

Include 'rws200.local'/Cellular Ethernet/WLAN/Wired Ethernet
Select the addresses that you want to include in the certificate. You can leave them unselected.

Other IP addresses
Any other IP addresses that you want to include. Separate the addresses with a comma (**,**).

Organization (O)
Legal incorporated name of your organization or company.

Organizational unit (OU)
Name of your organizational unit or department.

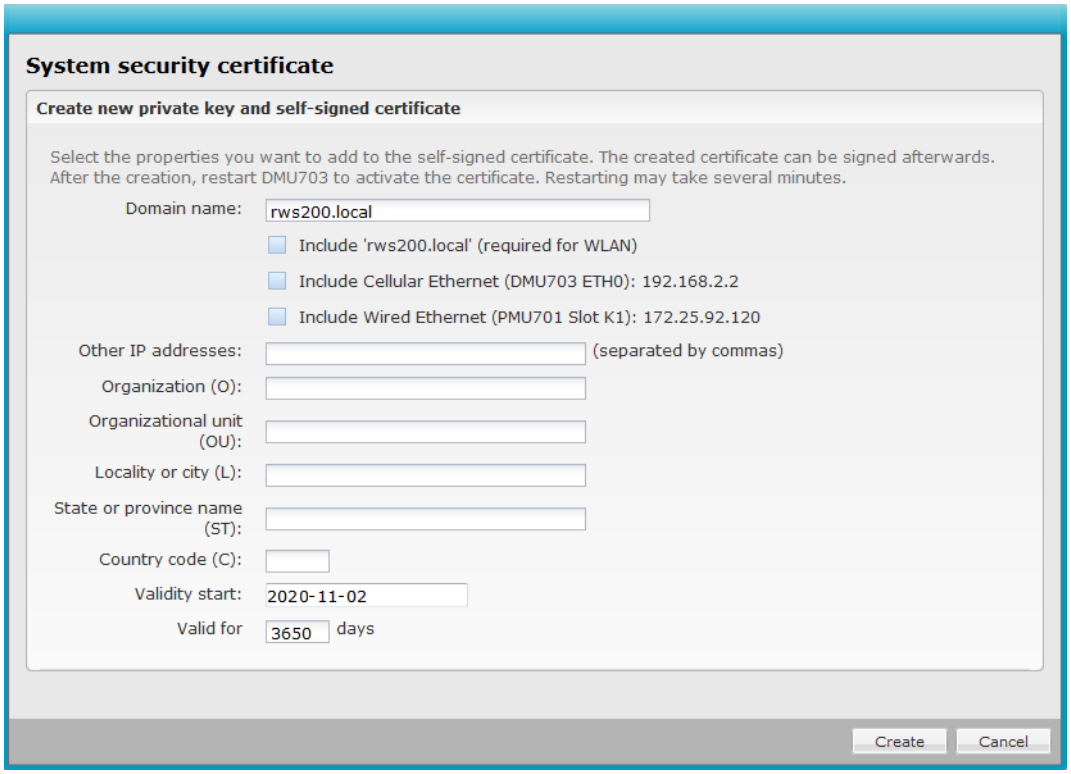
Locality or city (L)
Name of the locality or city where your organization is located.

State or province name (ST)
Full name of the state or province where your organization is located.

Country code (C)
2-letter ISO-3166 country code for the country where your organization is located.

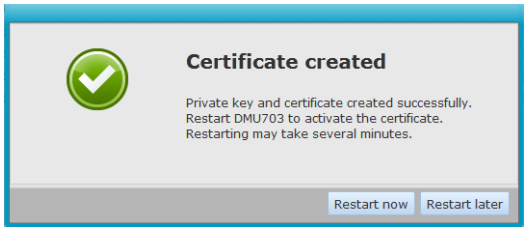
Validity start
Date from which the certificate is valid, in the same format as selected for the user interface in the station settings.

Valid for
Number of days for which the certificate is valid.



4. Select **Create**.

   The system creates the certificate.



5. To activate the new certificate immediately, select **Restart now**. To finish the configuration first, select **Restart later**.

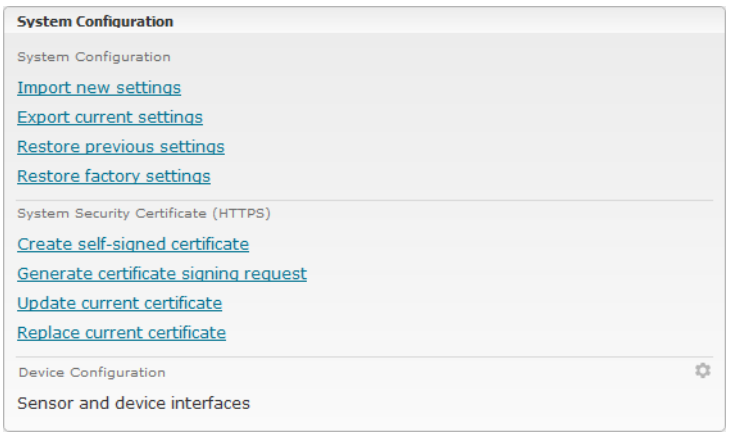
10.2.2 Creating certificate signing request

For a more secure and trusted connection, you can send the self-signed certificate to a certificate authority (CA) to be signed. You can generate the certificate signing request (CSR) in the station.

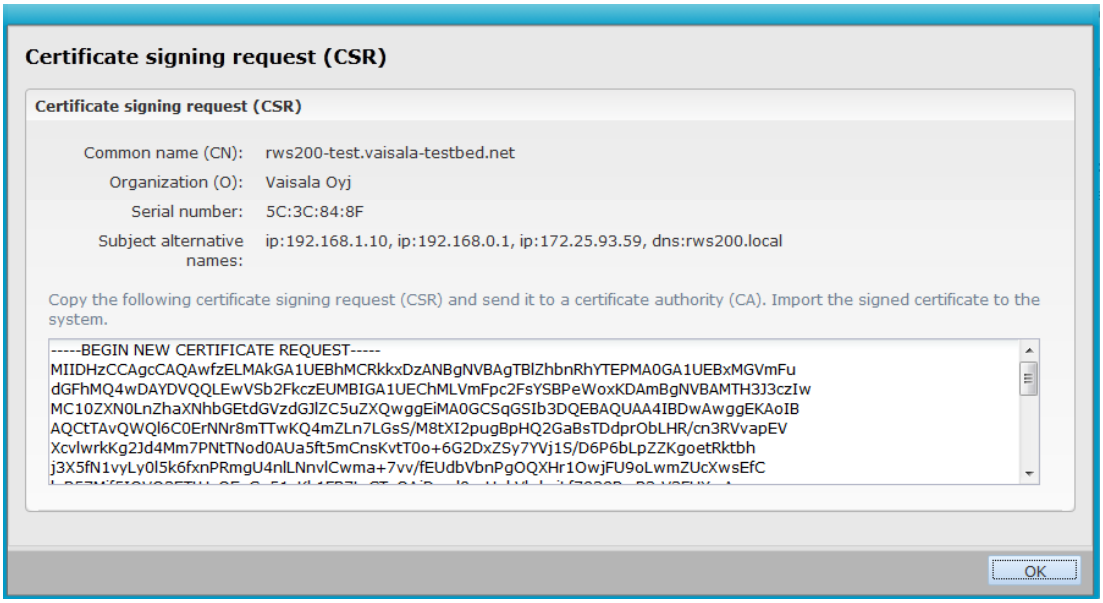
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

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2. In the **System Configuration** component, select **Generate certificate signing request**.



3. In the **Certificate Signing Request (CSR)** window, copy the text from the **CSR** field and send it to a certificate authority, such as Verisign, to be signed.



4. To close the window, select **OK**.

When you receive the certificate file, update the current system certificate.

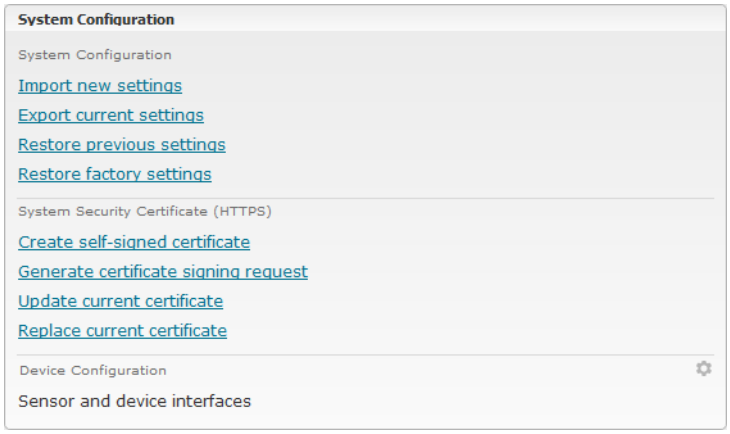
More information

- Updating current certificate (page 163)

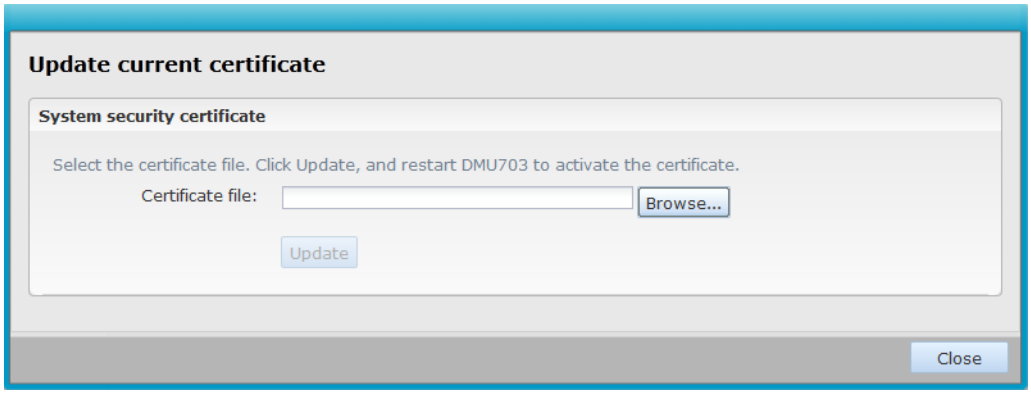
10.2.3 Updating current certificate

To import the certificate to the system after you have received the new signed certificate, update the current one.

1. If you are using a certificate chain (certification path), make sure that you have all the necessary certificate files in a ZIP file:
   - CA root file
   - CA intermediate certificate
   - Station certificate
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **System Configuration** component, select **Update current certificate**.

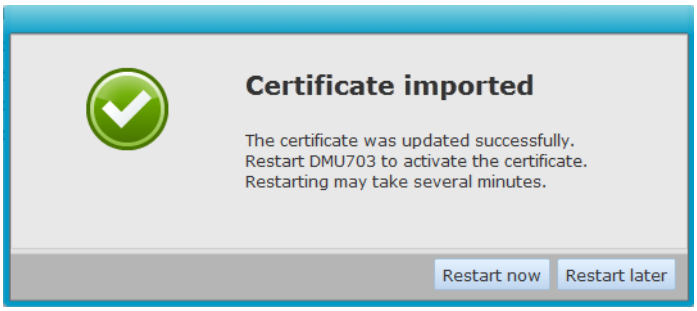


4. In the **Update current certificate** window, select **Browse**, locate the certificate file or ZIP file, and select **Open**.



5. Select **Update**.

   The system updates the current certificate.



6. To activate the new certificate immediately, select **Restart now**. To finish the configuration first, select **Restart later**.

After you have restarted DMU703, web browsers stop warning about an untrusted site when authorized users access the Web UI.

More information

- Creating certificate signing request (page 162)

10.3 Using certificate signed by organization certificate authority

If you want to use a certificate signed with your organization's certificate authority (CA), perform the following steps in the order presented:

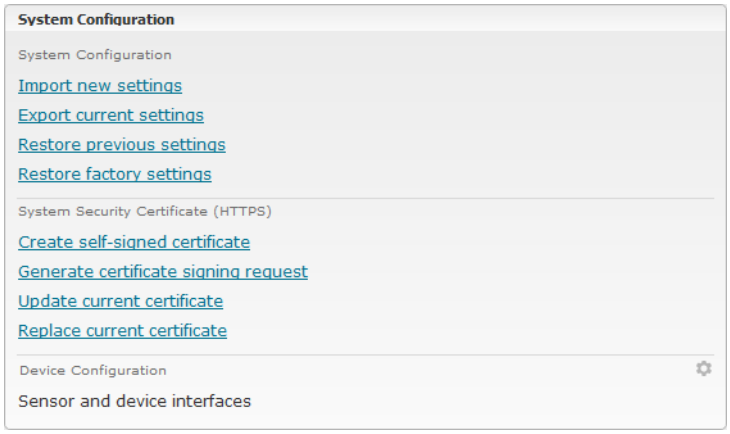
1. Generate a certificate outside of the station.
2. Sign the certificate with the organization's CA.
3. Replace the current certificate in the station with the new one. See Replacing current certificate (page 165).

10.3.1 Replacing current certificate

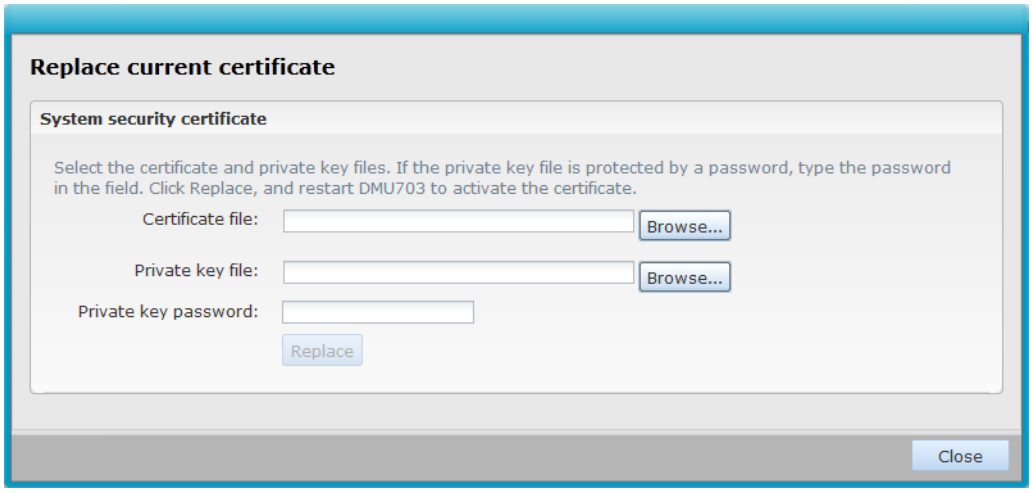
This option requires that your organization has its own public key infrastructure (PKI) and the possibility to sign certificates. RWS200 supports X.509 certificates and private key files in PEM (text) and DER (binary) format.

The station does not take a backup of the certificate. When you import a certificate created outside the system, you lose the current certificate.

1. If you are using a certificate chain (certification path), make sure that you have all the necessary certificate files in a ZIP file:
   - CA root file
   - CA intermediate certificate
   - Station certificate
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **System Configuration** component, select **Replace current certificate**.



4. In the **Replace current certificate** window, select **Browse** for **Certificate file**, locate the certificate file, and select **Open**.

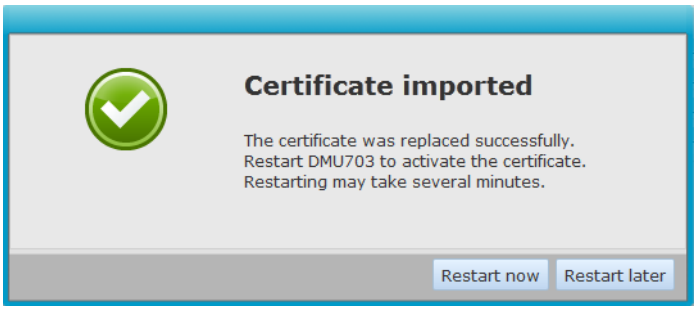


5. Select **Browse** for **Private key file**, locate the private key file, and select **Open**.

   If the private key is protected with a password, type the password in the **Private key password** field.

6. Select **Replace**.

   The system replaces the current certificate with the new one.



7. To activate the new certificate immediately, select **Restart now**. To finish the configuration first, select **Restart later**.

After you have restarted DMU703, web browsers stop warning about an untrusted site when authorized users access the Web UI.

11. Managing user accounts

11.1 User roles

User management is handled through user roles with different levels of access rights. Each person who accesses RWS200 Web UI should have a personal account on the RWS200 with the correct role. This helps prevent issues that can arise from shared accounts, such as leaked passwords. Make sure that users have the necessary access rights to perform their tasks without compromising security.

CAUTION! For security reasons, passwords cannot be retrieved from the system. If you forget a password, contact Vaisala.

Table 11 User roles and access rights

User role	Purpose
`administrator`	View the observations, create and modify user accounts and pages in the Web UI, modify component configuration, station settings, and WLAN settings.
`poweruser`	Not in use.
`superUser`	The same as administrator but does not have the rights to access user management or WLAN settings.
`user`	View the observations and generate event reports and station summary reports from the Web UI.
`webServiceAdmin`	Web service user for remote device management to Vaisala Observation Network Manager NM10. Set the password to be the same as in NM10.
`webServicePowerUser`	Web service user for remote device management over REST API.
`webServiceUser`	Web service user for data reporting interfaces.

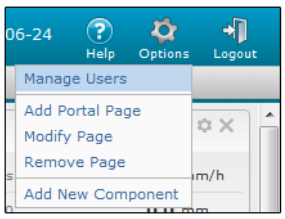
11.2 Adding new user accounts

Create a personal user account for each person who accesses the system. This helps prevent issues that can arise from shared accounts, such as leaked passwords.

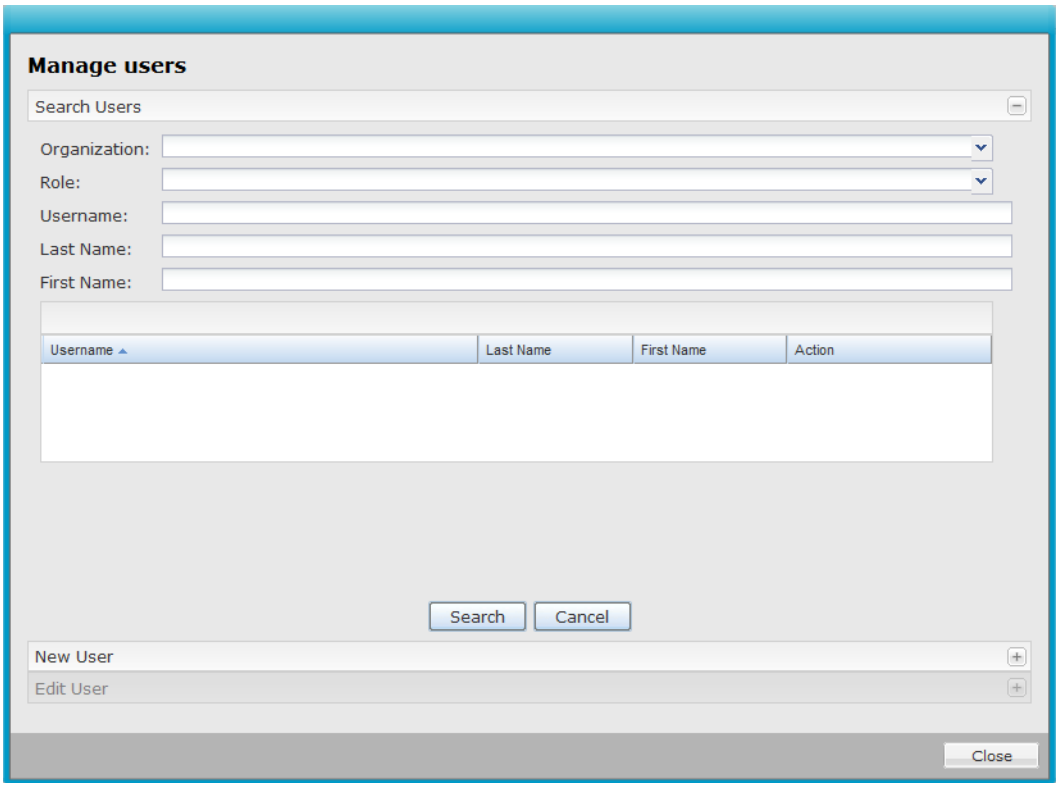
Set the appropriate permissions for each user based on their role and responsibilities. Make sure that they have the necessary access rights to perform their tasks without compromising security.

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1. Log in to the Web UI as an administrator, and select **Options > Manage Users**.



2. In the **Manage Users** window, select **New User**.



3. In **New User**, set the following:

   Username
   Username for the user. Length 4–21 characters.

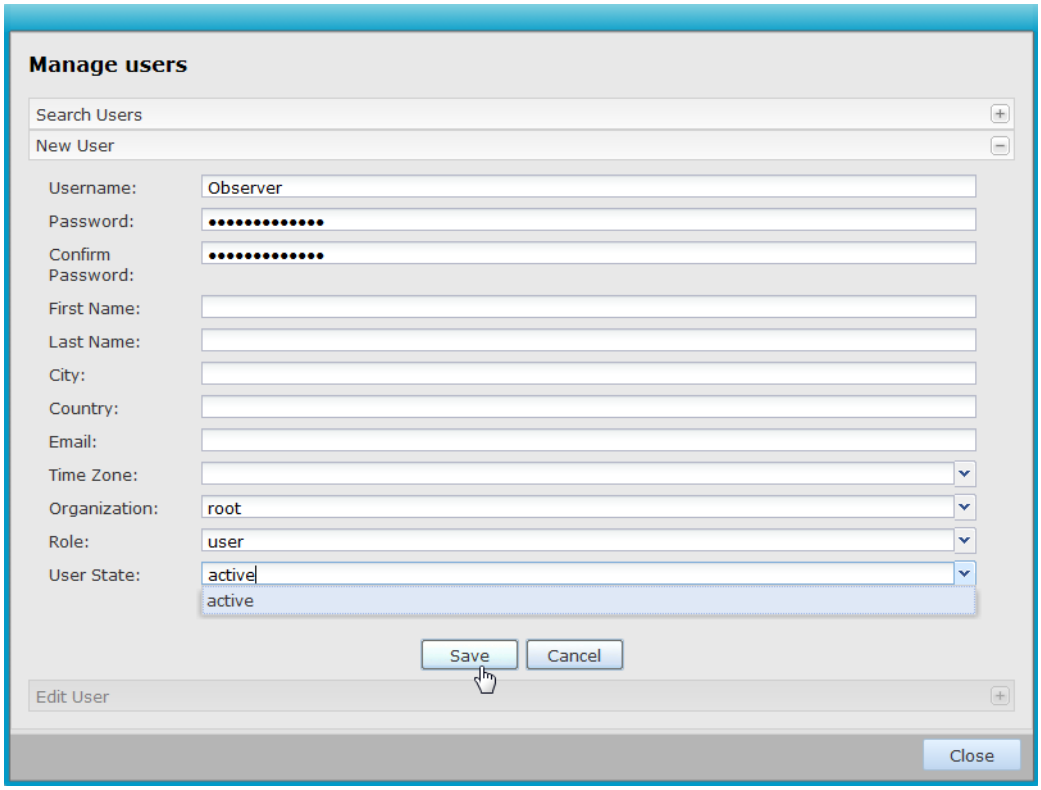
   Password
   Password for the user. Length 8–20 characters, including at least one digit.

   First name, **Last name**, **City**, **Country**, **Email**, **Time zone**
   Optional.

   Organization
   Always `root`.

   Role
   The role of the user.

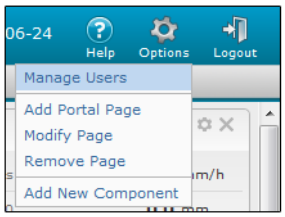
   User state
   Select `active`.



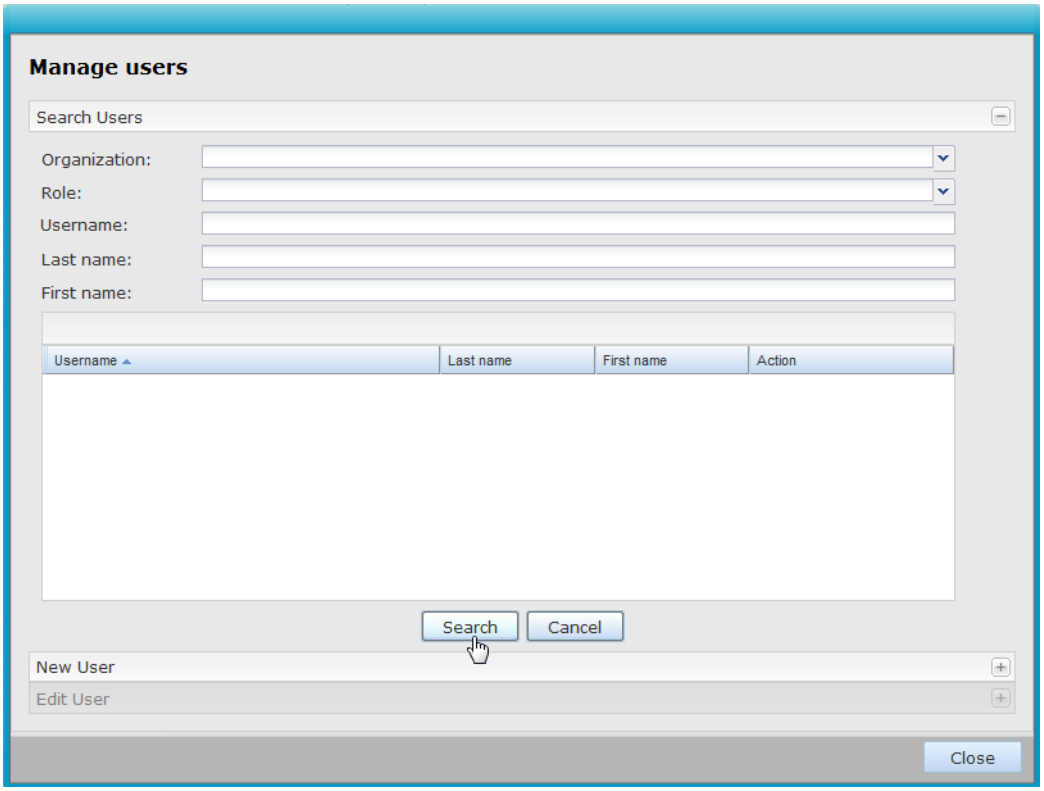
4. To save the changes, select **Save**.

11.3 Searching for user accounts

1. Log in to the Web UI as an administrator, and select **Options > Manage Users**.



2. To display the current user accounts, in the **Manage Users** window, select **Search**.

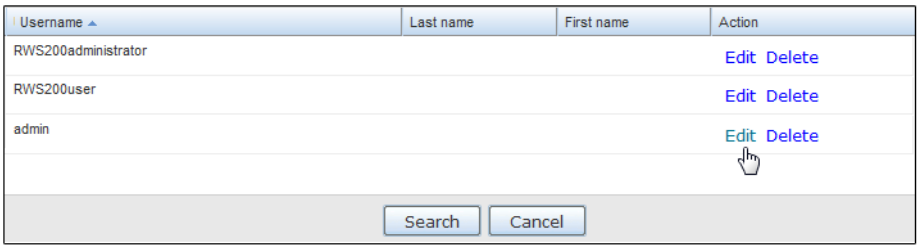


3. To refine your search, in **Search Users**, type the organization, role, user name, last name, or first name in the fields, and select **Search**.

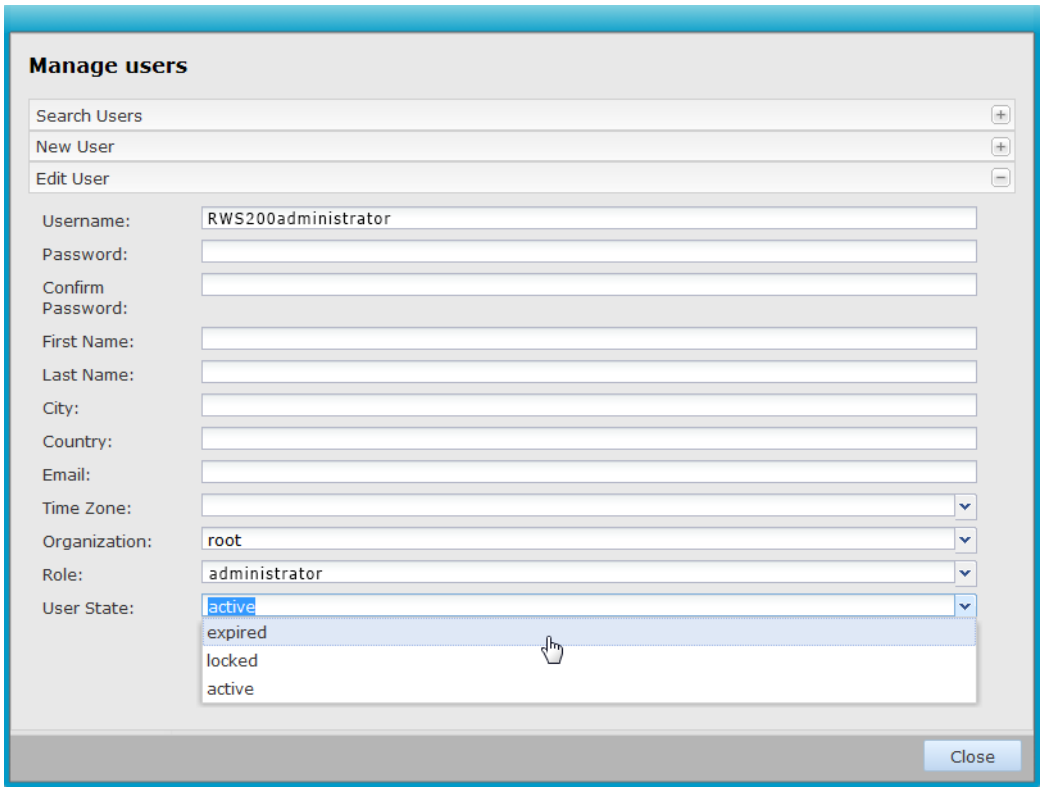
11.4 Modifying user accounts

CAUTION! For security reasons, passwords cannot be retrieved from the system. If you forget a password, contact Vaisala.

1. Search for the user account. See Searching for user accounts (page 171).
2. Select **Edit** next to the user name.



3. In **Edit User**, add or change the user account information.
   - To deny the user access to the UI, change **User state** to **Locked**.
   - To deactivate the user account, change **User state** to **Expired**.

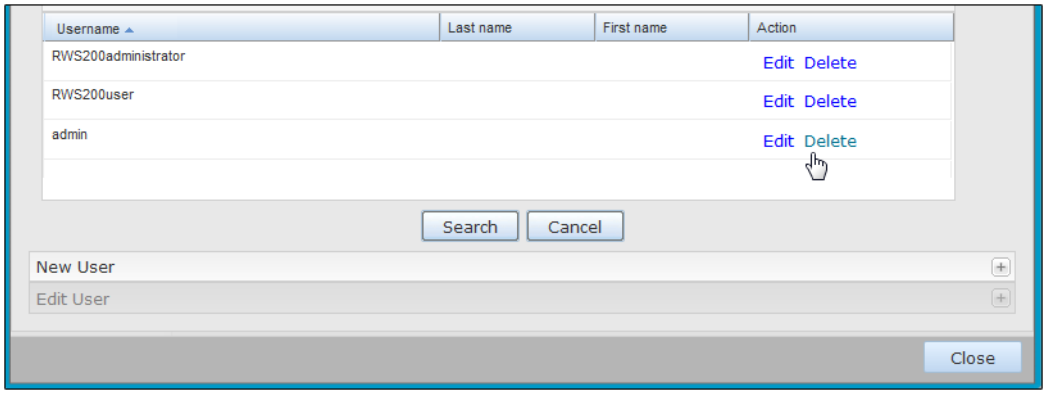


4. To save the changes, select **Save**.

11.5 Removing user accounts

1. Search for the user account. See Searching for user accounts (page 171).

2. Select **Delete** next to the user name.

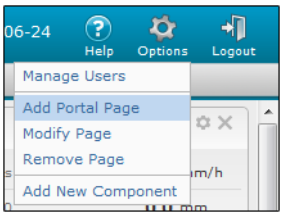


3. When prompted, confirm the removal.

12. Configuring user interface

12.1 Adding new pages

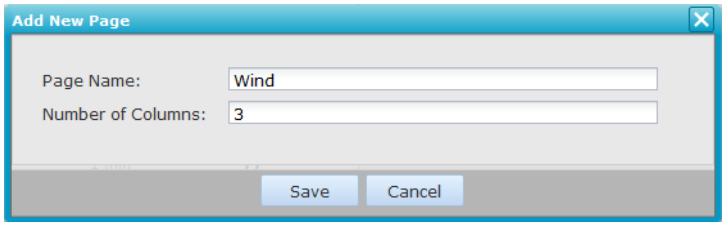
1. Log in to the Web UI as an administrator or super user, and select **Options > Add Portal Page**.



2. In the **Add New Page** window, set the following:

   Page name
   Descriptive name for the page. Keep the name short, because the name is shown on the page tab.

   Number of columns
   Number of columns on the page (maximum 3).



3. To save the changes, select **Save**.
4. Go to the new page, and add components to the page.

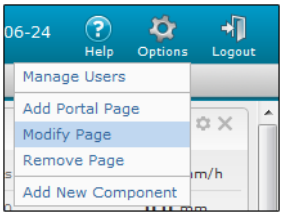
More information

- Adding device control components to Web UI (page 144)
- Adding new components (page 176)

12.2 Modifying pages

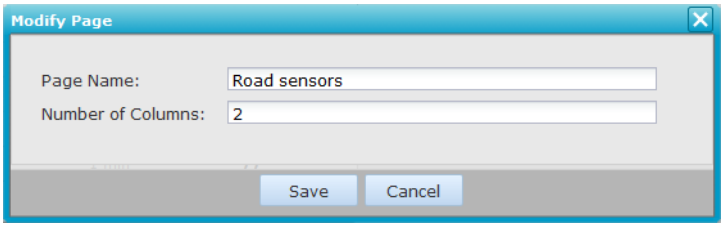
1. Log in to the Web UI as an administrator or super user, and go to the page that you want to modify.

2. Select **Options > Modify Page**.



The available options depend on the page you are on. You cannot modify the **History** or **Station Settings** pages.

3. In the **Modify Page** window, change the name of the page or the number of columns on the page.



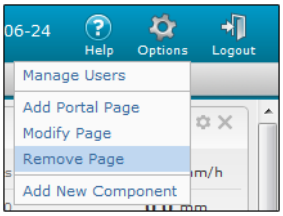
4. To save the changes, select **Save**.

12.3 Removing pages

You cannot undo page removal unless you have saved a backup of the latest system settings.

1. Log in to the Web UI as an administrator or super user, and go to the page that you want to remove.

2. Select **Options > Remove Page**.



The available options depend on the page you are on. You cannot remove the **History** or **Station Settings** pages.

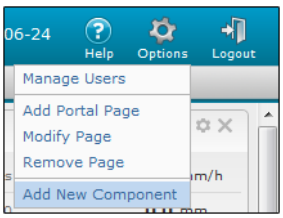
3. When prompted, confirm the removal.

12.4 Adding new components

You can add the same component to multiple pages or multiple times on the same page.

Adding components to the Web UI does not affect data reporting.

1. Log in to the Web UI as an administrator or super user, and go to the page where you want to add the component.
2. Select **Options > Add New Component**.

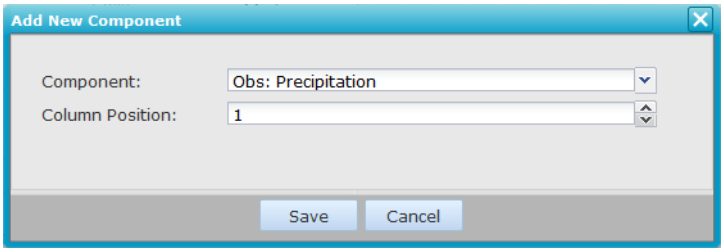


The available options depend on the page you are on. You cannot add new components to the **History** or **Station Settings** pages.

3. In the **Add New Component** window, set the following:

   Component
   The component to be added. **Obs** refers to observation components and **Sys** to system components.

   Column position
   The column where to add the new component. By default, the component is added to the bottom of the leftmost column.



4. To save the changes, select **Save**.

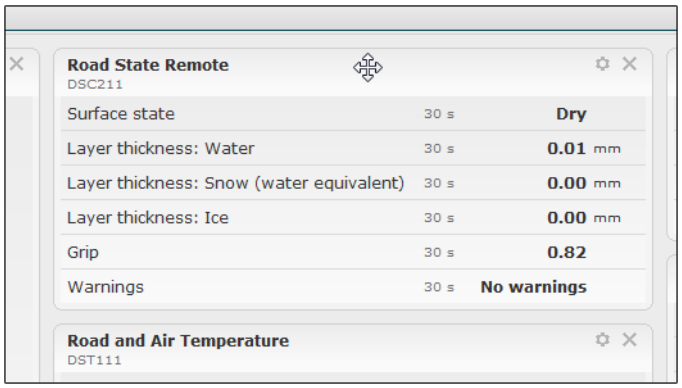
More information

- Adding device control components to Web UI (page 144)

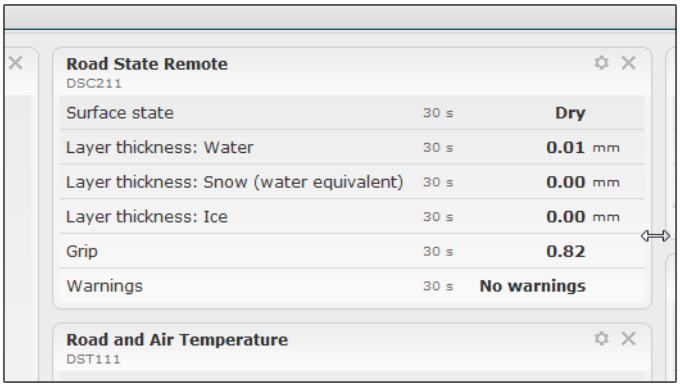
12.5 Modifying components

Modifying components in the Web UI does not affect data reporting.

1. Log in to the Web UI as an administrator or super user, and go to the page that has the components that you want to modify.
2. To change how the components are arranged on the page, drag and drop the components to the desired location.



3. To resize a component or column on the page, place your cursor on the edge of the component or column and drag the edge to resize the component.



4. To expand a component:
   a. To view a component full-screen, select **Full Screen** on the component.
   b. To return to normal view, close the window.



12.6 Removing components

Removing components from the Web UI does not affect data reporting.

1. Log in to the Web UI as an administrator or super user, and go to the page that has the component that you want to remove.
2. In the component, select **Close**.

You cannot remove components from the **History** and **Station Settings** pages.

12.7 Changing shown observations

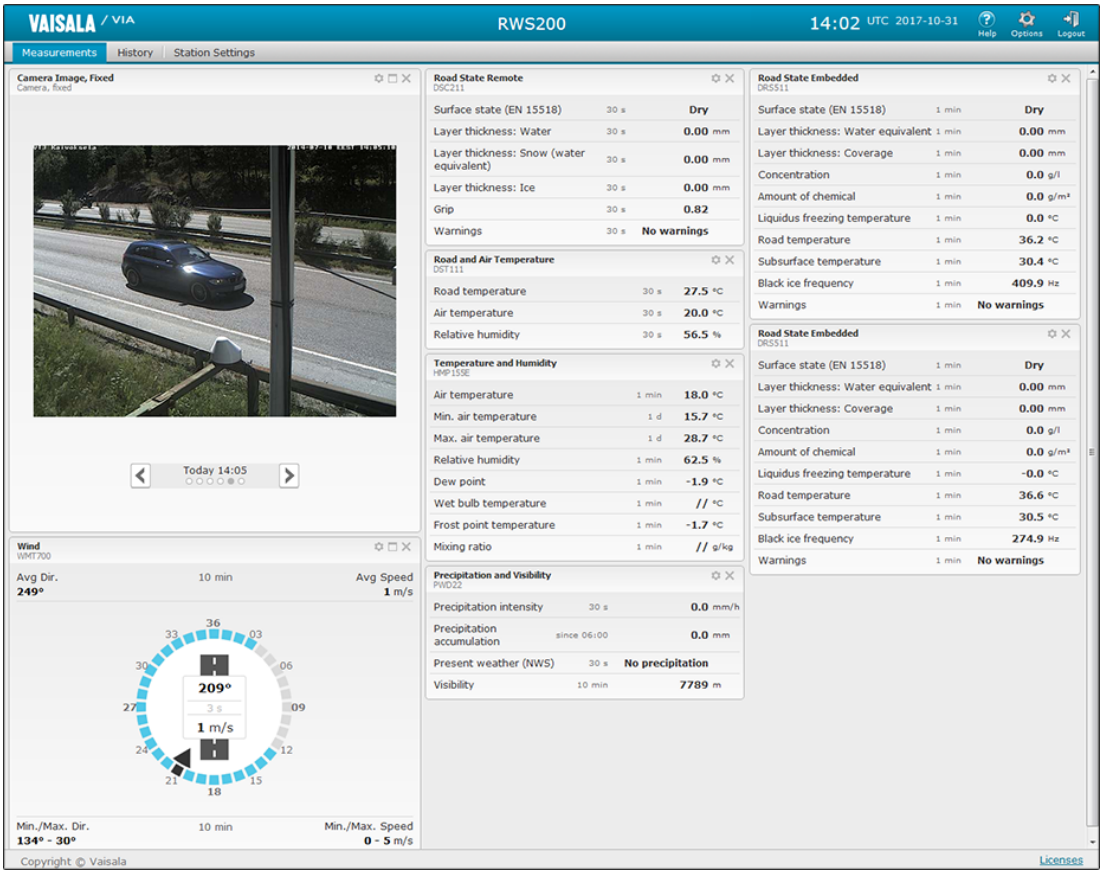
Administrators and super users can change the following:

- The name of an observation component on the **Measurements** page.
- The sensor that provides the observation data for the component.

- The observations that are shown in the component.

Changing the observations shown in the Web UI does not affect data reporting.

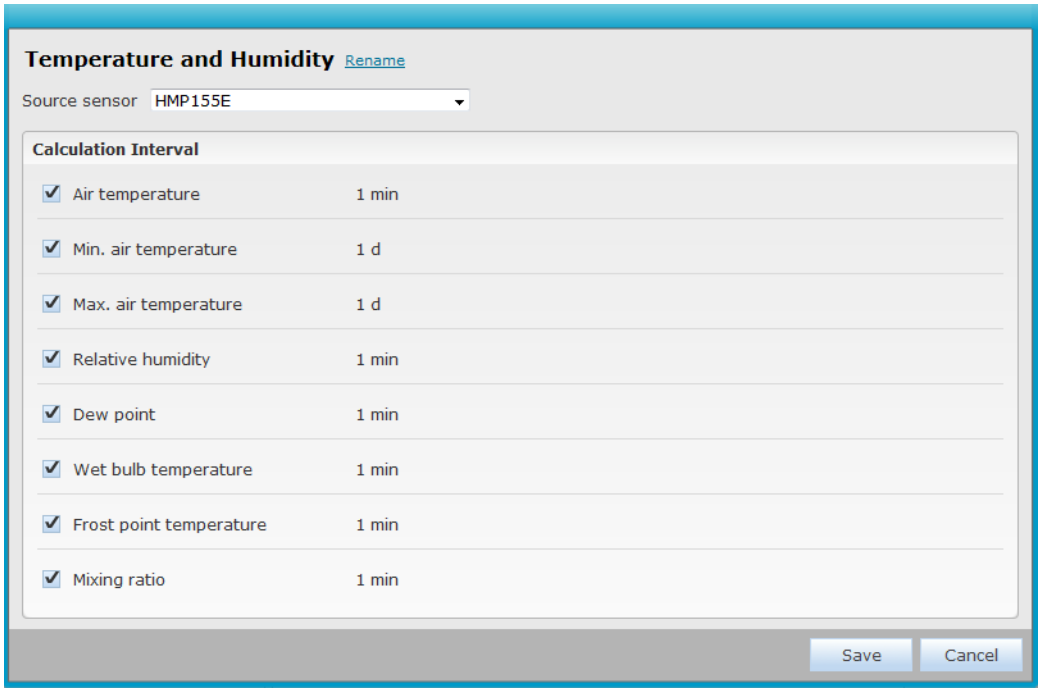
1. Log in to the Web UI as an administrator or super user, and go to the **Measurements** page.



2. In an observation component, select **Settings** ⚙.



3. Change the component as needed:
   - To rename the component, select **Rename**, type a new name in the field, and select **OK**.
   - To change the sensor that provides these observations, select another sensor from the **Source sensor** list.
   - To change the observations shown on the component, select the ones that you want to see.



4. To save the changes, select **Save**.

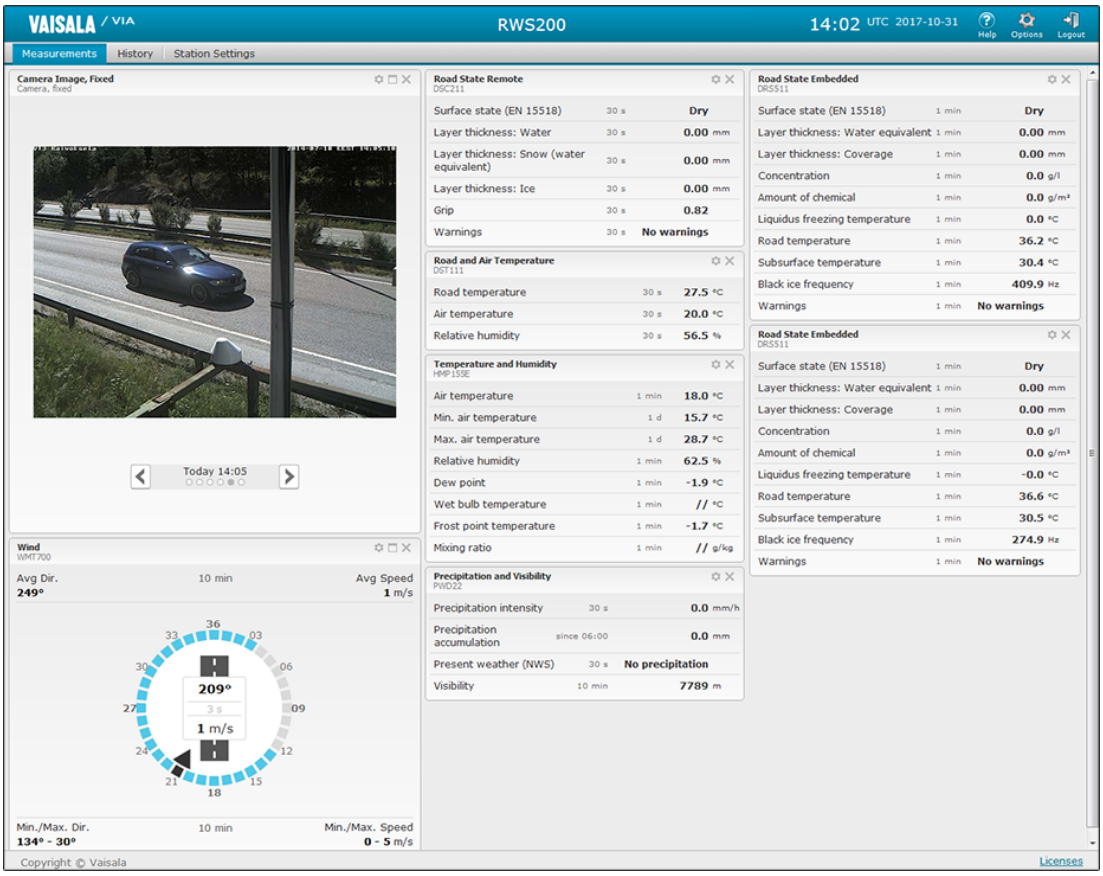
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13. Finalizing installation

13.1 Checking station setup

After installation, check that the station setup is correct.

1. In the sensor and device configuration, check that the station detects all the sensors and devices.
2. Go to the **Measurements** page and check that each sensor shows some observations.



Some observations take a longer time to show. For example, the first camera image takes up to 10 minutes to show.

3. To check that the sensors are working, check the event log for possible errors.

4. If you configured MES 14 or MES 16 data reporting over TCP or serial line, you can test if you can poll the messages.

More information

- Generating event history report (page 183)
- Command MES 14 (page 187)
- Command MES 16 (page 187)
- Changing sensor and device configuration for PMU701 (page 301)
- Changing sensor and device configuration for DRI701 (page 304)
- Configuring WLAN hotspot (page 117)

13.2 Recording station setup

To ease the maintenance in the future, generate a station summary report and take a backup of the configuration after installation and configuration.

1. To check the station configuration, generate a station summary report.
2. To take a backup of the configuration, export the current configuration to a file.
3. Change the WLAN timeout setting back to 60 minutes.
4. Take photos of the installation.
5. Store the station summary report, the exported current settings, and the installation photos to a safe location.
6. To log out from the Web UI, select **Logout**.
7. Close the weather station enclosure and lock the door.
8. Store the enclosure key in a safe place.

More information

- Generating station summary report (page 183)
- Exporting current station configuration (page 311)

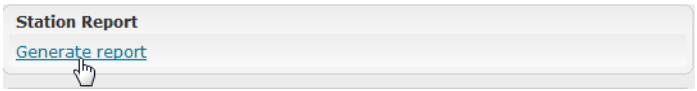
14. Status reporting

14.1 Generating station summary report

Administrators and super users can export the current station setup to an HTML file. The report contains the following information:

- Station and system component software versions and serial numbers
- Serial numbers, settings, and current calibration values for each sensor
- The name, location, and serial number of the station, contents of the site information field, and the current time setting
- Data reporting settings
- Device configuration information
- Observation configuration information (measured and calculated observations)
- Communication settings

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Station Report** component, select **Generate report**.



   The station creates the report and opens it in the browser. Depending on the station configuration, this may take several minutes. If the report is not ready in 5 minutes, there might be something wrong with a sensor or a device.
3. Save the file on your computer.

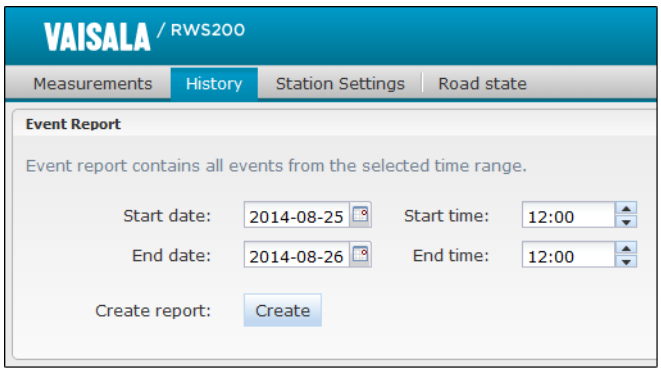
14.2 Generating event history report

Administrators and super users can create an event history report to view the events that have occurred at the station. The events are timestamped according to the time setting selected in the Web UI (local time or UTC time).

If you are experiencing problems with the station, to help with troubleshooting, send the event log to Vaisala helpdesk.

1. Log in to the Web UI as an administrator or super user, and go to the **History** page.

2. Select the start date and time and the end date and time.



3. Select **Create**.

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15. MES interface commands

15.1 MES interface commands

After configuring MES 14 or MES 16 data reporting interfaces or the TCP interface, you can perform the following tasks over the interface:

- Polling MES 12, MES 14, or MES 16 data messages:
  - Command MES 12 (page 186)
  - Command MES 14 (page 187)
  - Command MES 16 (page 187)
- Displaying history MES 14 data messages or changing the storage interval of those messages:
  - Command HIST (page 188)
  - Command CONF HIST (page 189)
- Changing the station date or UTC time:
  - Command DATE (page 190)
  - Command TIME (page 190)

To use the interface, open a connection to the COM 5 port or the TCP port from the external system. You can also use the **OPEN** command, see Commands OPEN and CLOSE (page 185).

More information

- Configuring serial connection (page 123)
- Configuring TCP port (page 131)

15.2 Commands OPEN and CLOSE

To open or close the MES interface, use the **OPEN** and **CLOSE** commands. This is only needed when the data collection system requires it.

```
<CR>@ OPEN <ID><CR>
<CR>@ OPEN ROSA <ID><CR>
```

Table 12 Parameters for OPEN command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1**. • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).

After giving the **OPEN** command, you can give the other supported MES commands without the @<ID> string.

If you do not give the **OPEN** command, the @<ID> string is mandatory for each command.

The command mode closes automatically approximately 2 minutes after the last character is given to the line. To close the command mode manually, give the **CLOSE** command.

15.3 Command MES 12

Polling MES 12 message requires RWS200 and DMU703 software version 5.2.0 or later.

To poll MES 12 data messages, use the **MES 12** command.

```
<CR>@<ID> MES 12<CR>
```

Table 13 Parameters for MES 12 command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: **1**.

Example of polling a MES 12 message:

```
<CR>@1 MES 12<CR>
```

The system responds with a MES 12 message. Example of response:

```
01
<SOH>2023-02-13  09:05,01,M12,RWS200
<STX>01    14.0;02     94;03   13.2;04    0;08  3.2;09  0.00;11  20000;
12  1000.3;13    0.3;14  13.33;15    1;16    0;21   0.5;23      0;
30    19.0;31   18.5;32    0.0;33  0.6;34  112;35   0.0;36     21;
37    19.5;38    1.6;39    0.0;40  0.0;41  0.0;42  0.00;43    0.0;
44     0.0;45   18.8;46   18.4;47  0.0;48  0.0;49   107;50    0.0;
51      21;52  /////;53    1.6;54  0.0;55  0.0;56   0.0;57   0.00;
58     0.0;59    0.0;90      0;91    0;92   23;
<ETX>
=
5CC4
```

If you have trouble receiving the message, disable the TCP interface in the Web UI, and enable it again. Sometimes the connection remains open even if you close it in the terminal program.

15.4 Command MES 14

To poll MES 14 data messages, use the **MES 14** command.

```
<CR>@<ID> MES 14<CR>
```

Table 14 Parameters for MES 14 command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1**. • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).

Example of polling a MES 14 message:

```
<CR>@1 MES 14<CR>
```

The system responds with a MES 14 message.

If you have trouble receiving the message, disable the TCP interface in the Web UI, and enable it again. Sometimes the connection remains open even if you close it in the terminal program.

More information

- Disabling data reporting interfaces (page 136)

15.5 Command MES 16

To poll MES 16 data messages, use the **MES 16** command.

```
<CR>@<ID> MES 16<CR>
```

Table 15 Parameters for MES 16 command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1** (the first DSC211/DST111 pair) or **2** (the second DSC211/DST111 pair). • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).

Example of polling a MES 16 message:

```
<CR>@1 MES 16<CR>
```

The system responds with a MES 16 message.

If you have trouble receiving the message, disable the TCP interface in the Web UI, and enable it again. Sometimes the connection remains open even if you close it in the terminal program.

More information

- Disabling data reporting interfaces (page 136)

15.6 Command HIST

To display the latest MES 14 data messages (history messages), use the **HIST** or **H** command.



MES 16 data messages are not saved as history messages.

```
<CR>@<ID> HIST [<blockcount>]<CR>
```

Table 16 Parameters for HIST command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1**. • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).
blockcount	Number	No	Sets the number of history messages to display. If you omit the parameter, the command displays the latest MES 14 data message.
	A	No	Displays all history messages (maximum 144).

Example of displaying the latest history message:

```
<CR>@1 HIST<CR>
```

Example of displaying all history messages:

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```
<CR>@1 HIST A<CR>
```

The system responds with the defined number of latest MES 14 messages, separated with the # character.

15.7 Command CONF HIST

To display or change the storage interval of the MES 14 message (history messages), use the **CONF HIST** command. The default storage interval is 10 minutes.



Synchronize the storage interval with the message sending interval. If the message sending interval is set to 10 minutes and the storage interval to 1 minute, the system stores the same message 10 times. See Configuring serial port (page 124) or Configuring TCP port (page 131).

```
<CR>@<ID> CONF HIST [<interval>]<CR>
```

Table 17 Parameters for CONF HIST command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1**. • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).
interval	The possible values are: • Minutes: **1M – 59M** • Hours: **1H – 24H** The default value is 10 minutes (**10M**).	No	Sets the storage interval for history messages in minutes or hours. If you omit the parameter, the command shows the current storage interval.

Example of displaying current history interval:

```
<CR>@1 CONF HIST<CR>
HISTORY INTERVAL: 10M
```

Example of changing history interval:

```
<CR>@1 CONF HIST 5 M<CR>
HISTORY INTERVAL: 5M
```

15.8 Command DATE

To display or change the station date, use the **DATE** command.

If the station is set to automatically synchronize the time from GPS and/or NTP, the synchronization overrides the time set with the **DATE** command. See Setting station time (page 92).

```
<CR>@<ID> DATE [<YYYY-MM-DD>]<CR>
```

Table 18 Parameters for DATE command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1**. • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).
YYYY-MM-DD	Year, month, and date	No	Sets the station date. If you omit the parameter, the command shows the current date and time.

Example of displaying the current date:

```
<CR>@1 DATE<CR>
2015-08-31=
```

Example of changing the date:

```
<CR>@1 DATE 2015-08-30<CR>
DATE IS SET=
```

15.9 Command TIME

To display or change the station UTC time, use the **TIME** command. The time shown in the Web UI then changes according to the time zone setting (relative to UTC time).

If the station is set to automatically synchronize the time from GPS and/or NTP, the synchronization overrides the time set with the **TIME** command. See Setting station time (page 92).

```
<CR>@<ID> TIME [<HH:MM:SS>]<CR>
```

Table 19 Parameters for TIME command

Parameter	Value	Mandatory	Description
ID	Number	Yes	The message ID: • In normal polling mode: **1**. • In combined MES 14 data polling mode: see Configuring combined MES 14 interface (page 338).
HH:MM:SS	Hours in the 24-hour format, minutes, and seconds	No	Sets the station UTC time. If you omit the parameter, the command displays the current UTC time.

Example of displaying the time:

```
<CR>@1 TIME<CR>
12:44:45=
```

Example of setting the time:

```
<CR>@1 TIME 13:45:00<CR>
TIME IS SET=
```

16. Preventive maintenance

16.1 Preventive maintenance



WARNING! When performing installation and maintenance procedures at the roadside, follow local and state legislation and regulations for road safety.

In general, the RWS200 system needs very little maintenance. However, it is essential to monitor system performance and battery condition regularly, to keep the sensors clean, and to check that all parts of the weather station are in good condition.

Regular site visits help to keep the station up and running. Do a basic check once a year before the winter season. Replace the backup battery at least every 5 years.

16.2 Maintenance tools and equipment

Tools

The following tools may be required for the maintenance, depending on your station setup:

- Set of Allen keys
- Ratchet wrench or socket wrench
- Torque wrench (recommended)
- Set of combination wrenches
- Crosshead screwdriver
- Flat head screwdriver
- Hammer
- Spirit level
- Shears and pruning tools for overgrown vegetation on the site
- During wintertime, a snow shovel for clearing snow from the site

Equipment

The following equipment may be required for the maintenance, depending on your station setup:

- Safety helmet, safety boots, safety glasses, gloves, high visibility clothing, and other appropriate safety equipment
- Laptop computer and admin rights to the Web UI
- Isopropyl alcohol
- Mild detergent
- Soft, lint-free cloth
- For DSC211 and DST111: Cleaning tool (DSCDSTCLEANINGTOOL)

- For DRS511:
  - Vaisala Installation Plate (210764) or spirit level
  - Calibrator kit DRC511
  - Belt grinding machine or similar
  - Sandpaper (roughness 800 recommended)
  - Water
  - Wet wipe
- For PWD: PWA12 calibration kit and cleaning tool (PWDCLEANINGTOOL)
- For testing WMT700 operation: WMT70VERIFIER

16.2.1 Tools and equipment needed when climbing to mast

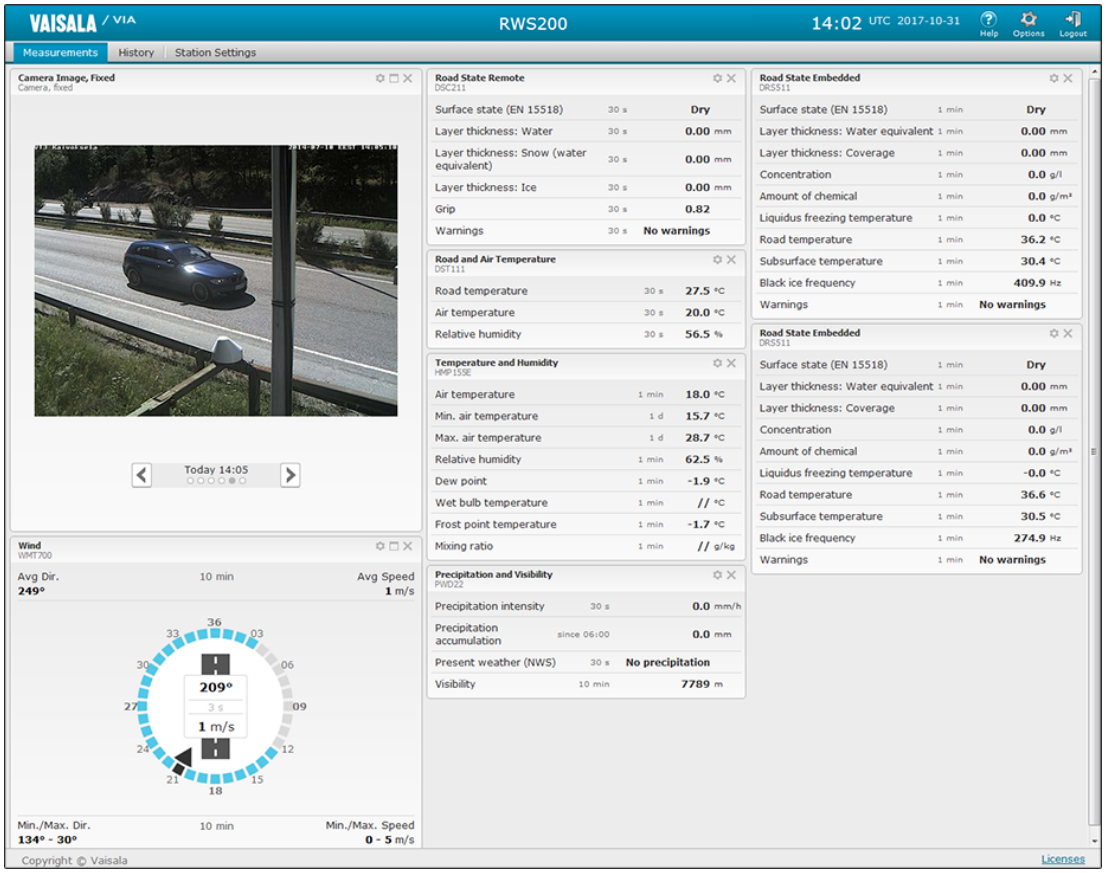
When climbing to the mast, take the following tools and equipment with you:

- Set of Allen keys. Check the specific sizes from the sensor installation instructions.
- Ratchet wrench or socket wrench. Check the specific sizes from the sensor installation instructions.
- Torque wrench
- Flat head screwdriver
- Spirit level
- 50 % isopropyl alcohol
- Mild detergent
- Soft, lint-free cloth
- For cleaning DSC211 and DST111: DSCDSTCLEANINGTOOL
- For cleaning PWD12 or PWD22: PWDCLEANINGTOOL
- For testing WMT700 operation: WMT70VERIFIER

16.2.2 Preparing for site visit

Before going to the site, check the current status of the station.

1. Log in to the Web UI as an administrator or super user, and go to the **Measurements** page.



2. Check that each sensor shows observation data.
3. On the **Station Settings** page, open the **Device Configuration** settings and check that all sensors and devices are detected.
4. On the **History** page, check the event log.

   The event log shows what kind of tasks are waiting at the site. Take the necessary tools and equipment with you.
5. On the **Station Settings** page, in the **Station Report** component, generate a station summary report.

   Print out or save the station summary report on your computer.

More information

- Generating event history report (page 183)
- Generating station summary report (page 183)
- Changing sensor and device configuration for PMU701 (page 301)
- Changing sensor and device configuration for DRI701 (page 304)

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16.3 Site maintenance

1. Check that the vegetation surrounding the station does not get too long or too close to equipment. Vaisala recommends regular clipping.
2. Check that there is no water leakage or other damage inside the enclosure.
3. Check that all components are powered up.
4. Check that the station grounding is in order.
5. Check that there are no outer damages to the sensors, cables, or connectors.
6. Check that the sensors are firmly mounted.
7. During wintertime, check that snow does not touch or cover the enclosure or the sensors. Keep the weather station clear of snow and ice build-up.



WARNING! If ice or snow accumulates on the mast, guy wires, or sensors, the ice or snow can fall and cause injury to persons below.

16.4 Cleaning and maintaining painted surfaces

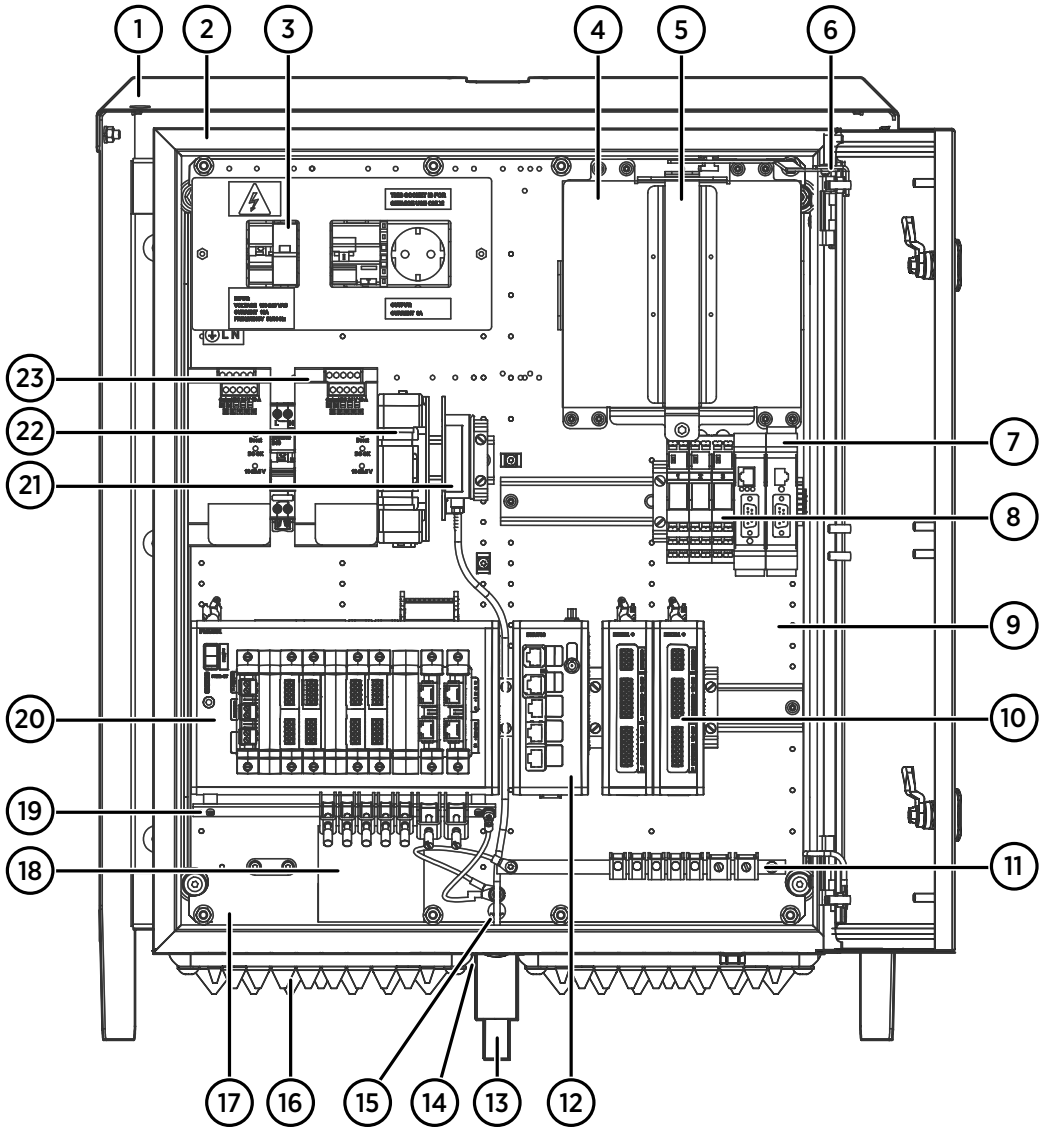
Vaisala recommends that you wash all the painted surfaces at least once a year. Use only warm water or warm, mildly soapy water. Wipe with soft cloth or sponge and rinse with clean water.



Do not use solvents or abrasive sponges when cleaning painted surfaces.

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16.5 Inside enclosure maintenance

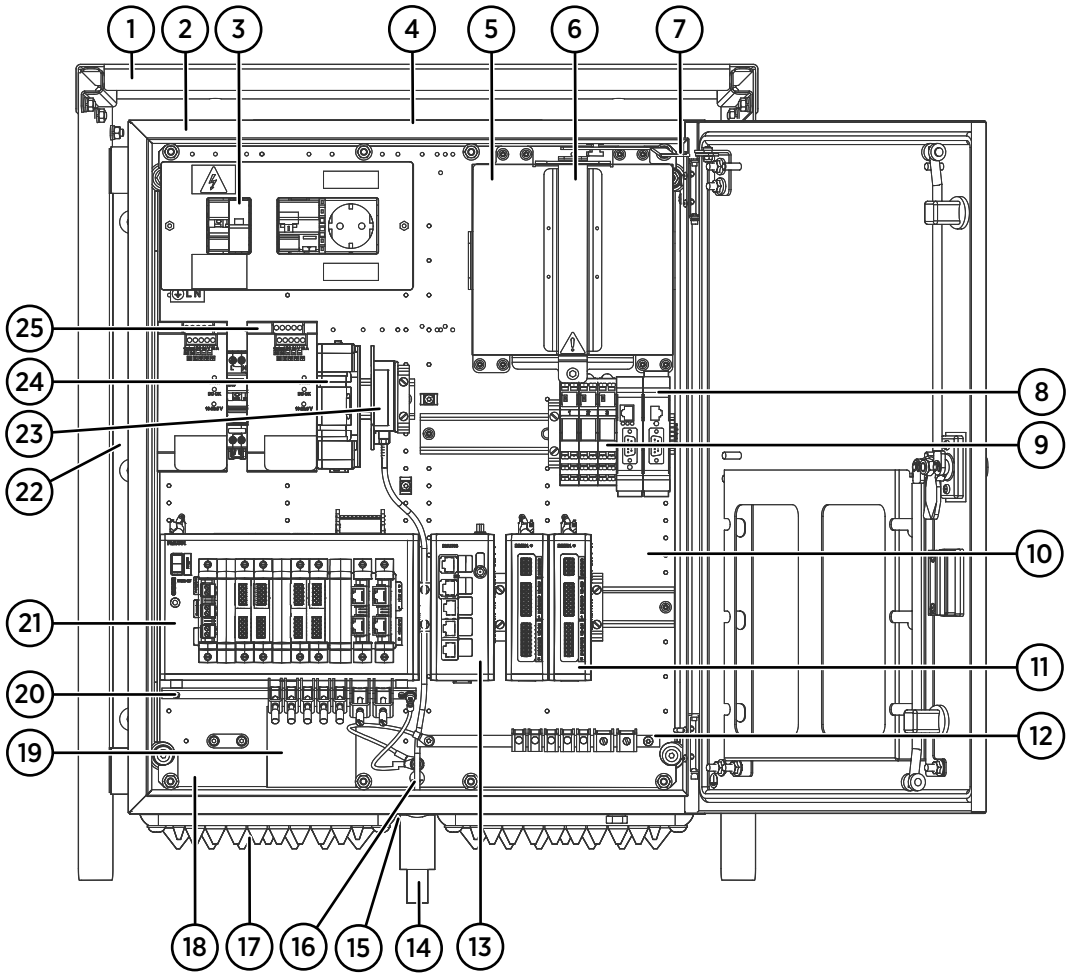


1) Internal cabling not shown

Figure 12 Standard backplate in ENC652

1 Radiation shield
2 Enclosure ENC652
3 AC (mains) input assembly
4 12 V backup battery
5 Battery mounting clamp
6 Wind lock
7 Traffic sensor modules
8 Device control relays
9 Standard backplate
10 DRI701

11 Enclosure grounding rail for sensor cables
12 DMU703
13 Pressure port
14 External ground connection
15 Internal ground connection
16 Rubber flanges
17 FCC label
18 Type label
19 PMU701 grounding rail for sensor cables
20 PMU701
21 PTB110
22 Cellular router
23 AC/DC power supply



1) Internal cabling not shown

Figure 13 Standard backplate in ENC653

1 Radiation shield
2 Enclosure ENC653
3 AC (mains) input assembly
4 LED lights
5 12 V backup battery
6 Battery mounting clamp
7 Wind lock
8 Traffic sensor modules
9 Device control relays
10 Standard backplate
11 DRI701
12 Enclosure grounding rail for sensor cables
13 DMU703
14 Pressure port
15 External ground connection
16 Internal ground connection
17 Rubber flanges
18 FCC label

19 Type label
20 PMU701 grounding rail for sensor cables
21 PMU701
22 Door switch
23 PTB110
24 Cellular router
25 AC/DC power supply

Preventive maintenance inside the enclosure includes checking that:

- The internal wiring inside the enclosure is in order.
- The rubber flanges at the bottom of the enclosure are intact.
- The sensor cables are firmly attached to the grounding rail and PMU701 or DRI701.
- The RWS200 network is working. Briefly press the WLAN **WAKE UP** button on the PMU701 front panel and check that you can connect to the RWS200 network with your computer.
- The cellular connectivity is working. Use a cellular data connection to connect to the station.
- GPS is working. See Setting station location (page 90).



If you do not want to change the station settings, select **Cancel** when the GPS starts locating satellites.

More information

- Enclosure spare parts and accessories (page 342)

16.5.1 IX20 cellular router maintenance

Vaisala recommends that you follow the cellular router manufacturer's communications about security issues, and that you update your router firmware regularly. For more information, see manufacturer documentation.

More information

- Resetting cellular router (page 330)

16.5.2 Checking PMU701 and backup battery condition remotely

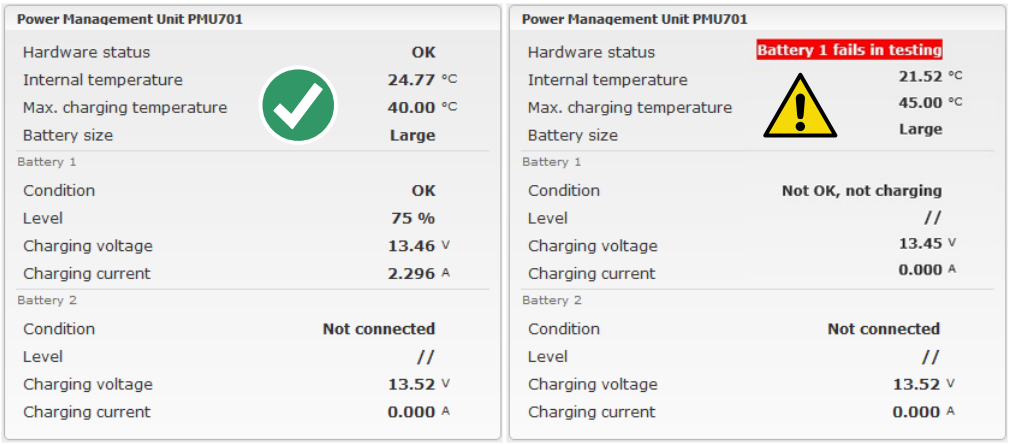
PMU701 software version 2.0.4 and later enables PMU701 to detect a faulty battery, stop charging the battery when the ambient temperature inside the enclosure exceeds the specified temperature limit or when it detects an internal failure, and adjust the charging current based on the battery capacity.

Station (DMU703) software version 4.4.0 and later show the PMU701 and backup battery condition in the station summary report and in the DTO XML data message.

Station (DMU703) software version 5.1.1 and later show the PMU701 and battery status on the **Station Settings** page, in the station summary report, and in the DTO XML data message.

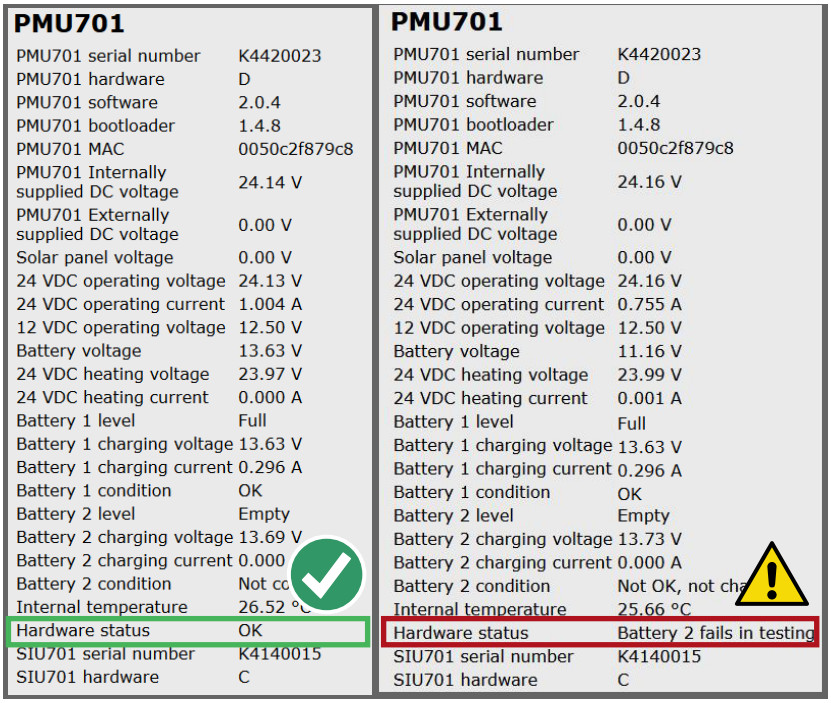
These instructions apply only if you have DMU703 software version 4.4.0 or later. If you have not updated the station software, check the battery condition onsite.

1. If you have DMU703 software version 5.1.1 or later, check the PMU701 and battery status from the **Power Management Unit PMU701** component on the **Station Settings** page.



Continue from step 3.

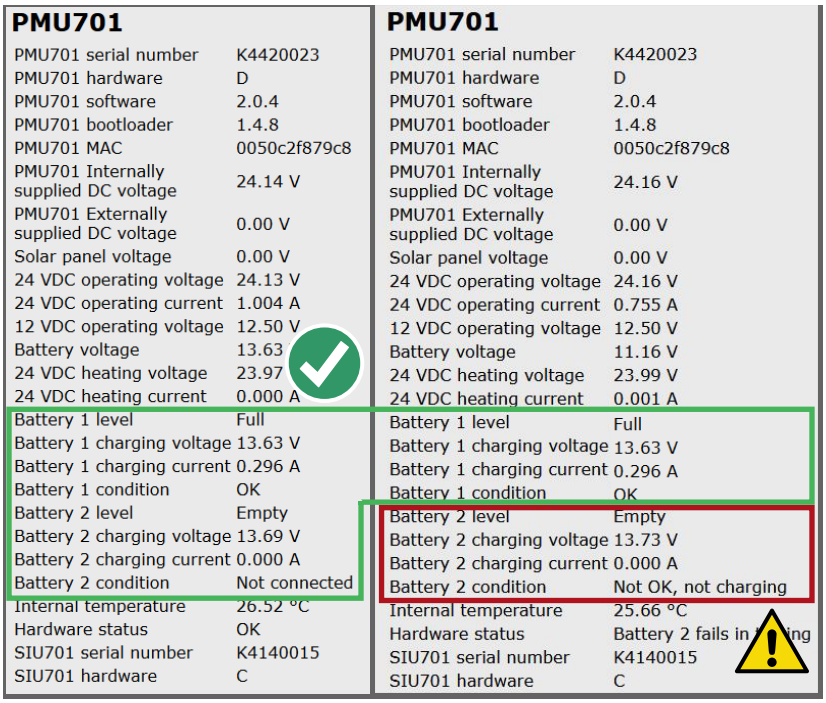
2. If you have DMU703 software version 4.4.0 to 5.0.1, check the PMU701 and battery status from the station summary report.
   a. Generate a station summary report.
   b. Check the PMU701 hardware status.



PMU701	
PMU701 serial number	K4420023
PMU701 hardware	D
PMU701 software	2.0.4
PMU701 bootloader	1.4.8
PMU701 MAC	0050c2f879c8
PMU701 Internally supplied DC voltage	24.14 V
PMU701 Externally supplied DC voltage	0.00 V
Solar panel voltage	0.00 V
24 VDC operating voltage	24.13 V
24 VDC operating current	1.004 A
12 VDC operating voltage	12.50 V
Battery voltage	13.63 V
24 VDC heating voltage	23.97 V
24 VDC heating current	0.000 A
Battery 1 level	Full
Battery 1 charging voltage	13.63 V
Battery 1 charging current	0.296 A
Battery 1 condition	OK
Battery 2 level	Empty
Battery 2 charging voltage	13.69 V
Battery 2 charging current	0.000
Battery 2 condition	Not cc
Internal temperature	26.52 °C
Hardware status	OK
SIU701 serial number	K4140015
SIU701 hardware	C

PMU701	
PMU701 serial number	K4420023
PMU701 hardware	D
PMU701 software	2.0.4
PMU701 bootloader	1.4.8
PMU701 MAC	0050c2f879c8
PMU701 Internally supplied DC voltage	24.16 V
PMU701 Externally supplied DC voltage	0.00 V
Solar panel voltage	0.00 V
24 VDC operating voltage	24.16 V
24 VDC operating current	0.755 A
12 VDC operating voltage	12.50 V
Battery voltage	11.16 V
24 VDC heating voltage	23.99 V
24 VDC heating current	0.001 A
Battery 1 level	Full
Battery 1 charging voltage	13.63 V
Battery 1 charging current	0.296 A
Battery 1 condition	OK
Battery 2 level	Empty
Battery 2 charging voltage	13.73 V
Battery 2 charging current	0.000 A
Battery 2 condition	Not OK, not ch
Internal temperature	25.66 °C
Hardware status	Battery 2 fails in testing
SIU701 serial number	K4140015
SIU701 hardware	C

   c. Check the battery condition.



PMU701	
PMU701 serial number	K4420023
PMU701 hardware	D
PMU701 software	2.0.4
PMU701 bootloader	1.4.8
PMU701 MAC	0050c2f879c8
PMU701 Internally supplied DC voltage	24.14 V
PMU701 Externally supplied DC voltage	0.00 V
Solar panel voltage	0.00 V
24 VDC operating voltage	24.13 V
24 VDC operating current	1.004 A
12 VDC operating voltage	12.50 V
Battery voltage	13.63
24 VDC heating voltage	23.97
24 VDC heating current	0.000 A
Battery 1 level	Full
Battery 1 charging voltage	13.63 V
Battery 1 charging current	0.296 A
Battery 1 condition	OK
Battery 2 level	Empty
Battery 2 charging voltage	13.69 V
Battery 2 charging current	0.000 A
Battery 2 condition	Not connected
Internal temperature	26.52 °C
Hardware status	OK
SIU701 serial number	K4140015
SIU701 hardware	C

PMU701	
PMU701 serial number	K4420023
PMU701 hardware	D
PMU701 software	2.0.4
PMU701 bootloader	1.4.8
PMU701 MAC	0050c2f879c8
PMU701 Internally supplied DC voltage	24.16 V
PMU701 Externally supplied DC voltage	0.00 V
Solar panel voltage	0.00 V
24 VDC operating voltage	24.16 V
24 VDC operating current	0.755 A
12 VDC operating voltage	12.50 V
Battery voltage	11.16 V
24 VDC heating voltage	23.99 V
24 VDC heating current	0.001 A
Battery 1 level	Full
Battery 1 charging voltage	13.63 V
Battery 1 charging current	0.296 A
Battery 1 condition	OK
Battery 2 level	Empty
Battery 2 charging voltage	13.73 V
Battery 2 charging current	0.000 A
Battery 2 condition	Not OK, not charging
Internal temperature	25.66 °C
Hardware status	Battery 2 fails in
SIU701 serial number	K4140015
SIU701 hardware	C

3. If the hardware status is other than **OK**, replace PMU701.
4. If the battery condition is other than **OK**, wait 48 hours and check the battery status again.

   The reason for errors may be that the battery is not full or that PMU701 has not yet tested the battery.

Battery condition value	Possible reason	Action
`OK`	The battery is full and PMU701 has tested it.	No action needed.
`Unknown`	PMU701 has not yet tested the backup battery.	Wait until PMU701 has tested the battery. The ambient temperature for battery testing must be above 0 °C (32 °F).
`Connected but not tested yet`		
`Suspicious, but still charging`	The battery is probably faulty.	Monitor the battery condition regularly.
`Not OK, not charging`	The battery is faulty.	Check the battery condition onsite.
`Not connected`	The battery is faulty or not connected.	If the battery should be connected, check the battery condition onsite.
`Not OK, not charged, internal temperature too high`	The battery is faulty.	Check the battery condition onsite.
`Not charged, internal temperature too high`	The ambient temperature is too high for internal temperature measurement.	Wait until the ambient temperature drops.
`Not charged, unable to measure internal temperature`	PMU701 is faulty.	Replace PMU701.
`Not OK, not charged, unable to measure internal temperature`	PMU701 and battery are faulty.	Replace PMU701 and the battery.

More information

- Replacing backup battery (page 263)
- Replacing PMU701 (page 279)

16.5.3 Checking PMU701 and backup battery condition onsite



Multimeter



Wear protective eyewear and gloves.

The backup battery is a valve-regulated lead-acid battery. Check the battery status at least once a year and whenever you suspect that the battery may be faulty. If you have 2 backup batteries, check both batteries at the same time.

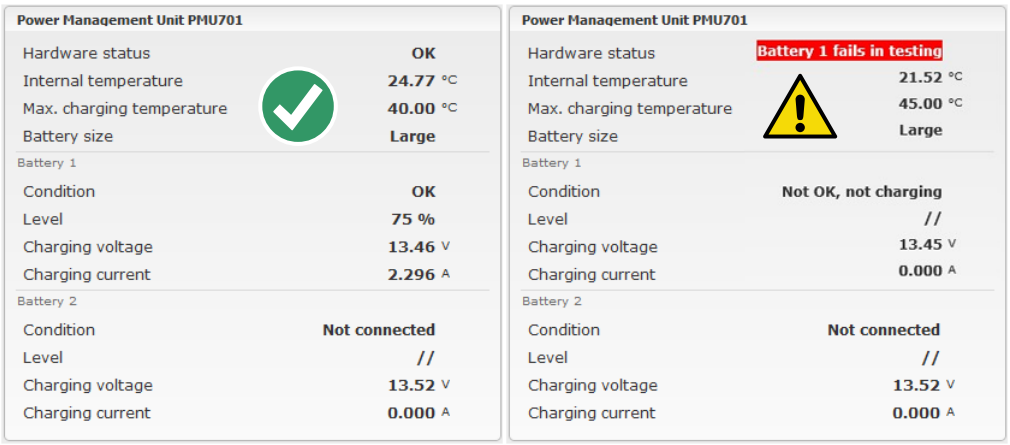
1. Check the battery condition.

   If the battery is hot, swollen, or leaking, disconnect power from the station or system immediately, disconnect the battery cables, and replace the battery.

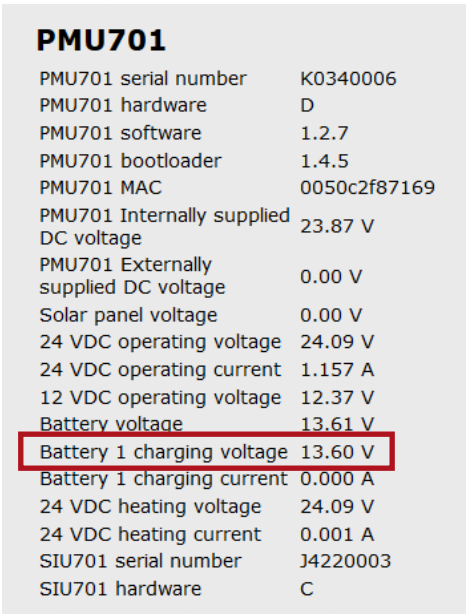


WARNING! Do not touch a hot, swollen battery or the sulfuric acid leaking from the battery without protective gloves and clothing. Sulfuric acid may cause burn upon skin contact and blindness upon eye contact.

2. Check the PMU701 condition.
   - If you have station (DMU703) software version 4.3.0 or earlier, you cannot check the PMU701 condition through the Web UI. Continue from step 3.
   - If you have station (DMU703) software version 5.1.1 or later, check the battery charging status from the **Power Management Unit PMU701** component on the **Station Settings** page.



   - If you have station (DMU703) software version 4.4.0 to 5.0.1, check the battery charging voltage from the station summary report.



     If the charging voltage is below 15 V, PMU701 is OK.
     If the charging voltage is over 15 V, replace PMU701. Because PMU701 has been overcharging the battery, also replace the battery.

3. Check the battery condition.
   a. Use a multimeter to measure the voltage between the battery terminals (**+** and **−**).
   b. Disconnect one of the battery cables, and wait for at least 1 minute.
   c. Measure the voltage again without connecting the cable.
      - If the voltage drops more than 1 V, replace the battery.
      - If the voltage does not drop more than 1 V, the backup battery is OK. Reconnect the battery cable.

More information

- Replacing backup battery (page 263)
- Replacing PMU701 (page 279)

16.6 DSC maintenance

Perform a basic check of DSC once a year before winter. Preventive maintenance includes:

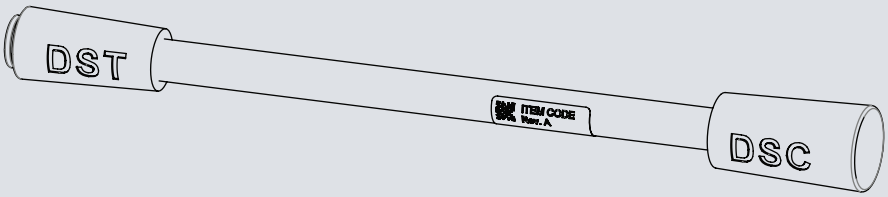
- Checking that there are no outer damages in the device, cables, or connectors.
- Checking that the sensor is aimed at the wheel track. The wheel track may change its place over the winter. To check that the sensor is aimed at the desired area on the road surface, look along the straight part of the edge of the weather shield.
- Cleaning the sensor. If the sensor gets easily dirty due to the installation location, regular cleaning is advised.
- Calibrating the sensor, if needed.
- If the sensor reports irregular values and calibration does not help, adjust sensor signal strength.

More information

- Configuring DSC211 settings (page 29)
- Cleaning DSC (page 206)
- Adjusting DSC211 signal strength (page 208)
- DSC dry calibration (page 209)
- Replacing DSC weather shield (page 211)
- DSC211 options, spare parts, and accessories (page 350)

16.6.1 Cleaning DSC

- Soft, lint-free cloth
- 50 % isopropyl alcohol
- DSC and DST cleaning tool (DSCDSTCLEANINGTOOL)



Whenever you visit the site, clean the windows and hoods of the receiver and transmitter.

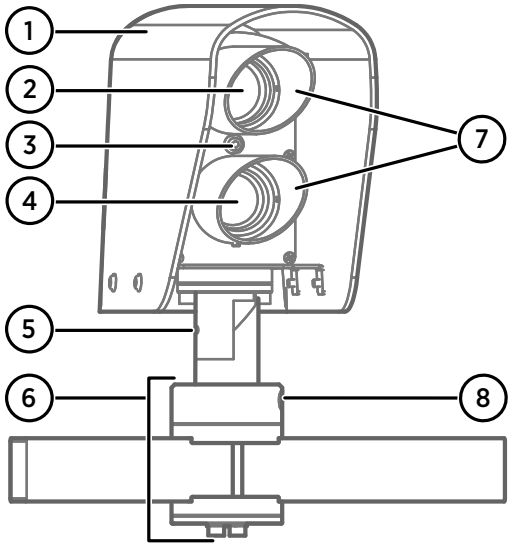


Figure 14 DSC hardware structure

1 Weather shield
2 Transmitter
3 Adjustment screw (measuring distance)
4 Receiver
5 Tilt screw (tilt angle)
6 Mounting bracket
7 Hoods
8 Installation bolt

The sensor automatically measures the contamination of the receiver window and warns of heavy contamination. In most cases, cleaning is unnecessary since the windows are well protected from dirt by the weather shield and the hoods.

1. First check if cleaning is needed.
2. Using low pressure, spray 50 % isopropyl alcohol on the transmitter and receiver windows. Spray enough solution to dissolve and loosen any dirt.
3. Wrap a soft, lint-free cloth around the DSC end of the cleaning tool.
4. Wipe the transmitter window until it is clean.
5. Take a new, clean cloth and wipe the receiver window until it is clean.

6. Wait until the windows are dry.
7. Set a new clean limit.

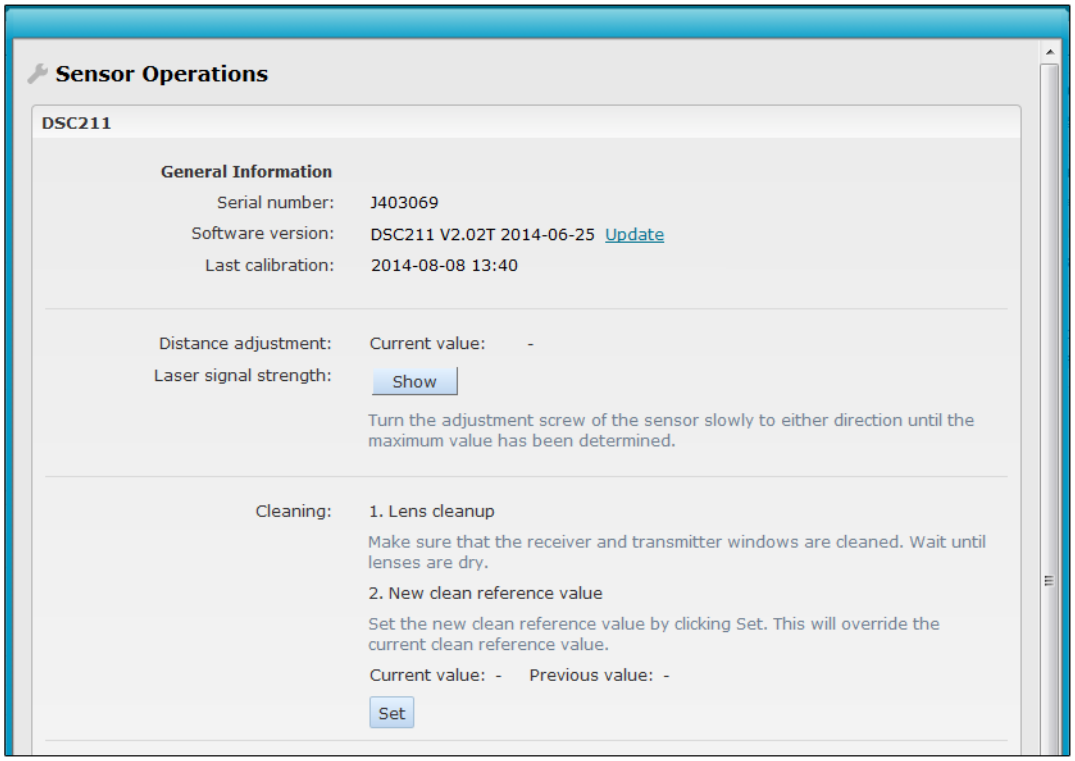
16.6.2 Setting DSC211 clean limit

After cleaning DSC211, set a new clean limit.

Cleaning limits are valid only if a clean value has been set after the previous window cleaning.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for DSC211.
3. In the **Sensor Operations** window, in **Cleaning**, select **Set**.

   The clean value is used as reference for an automatic warning of contaminated windows.



CAUTION! Never select **Set** when working over remote connection. This may give false values to observations.

16.6.3 Adjusting DSC211 signal strength

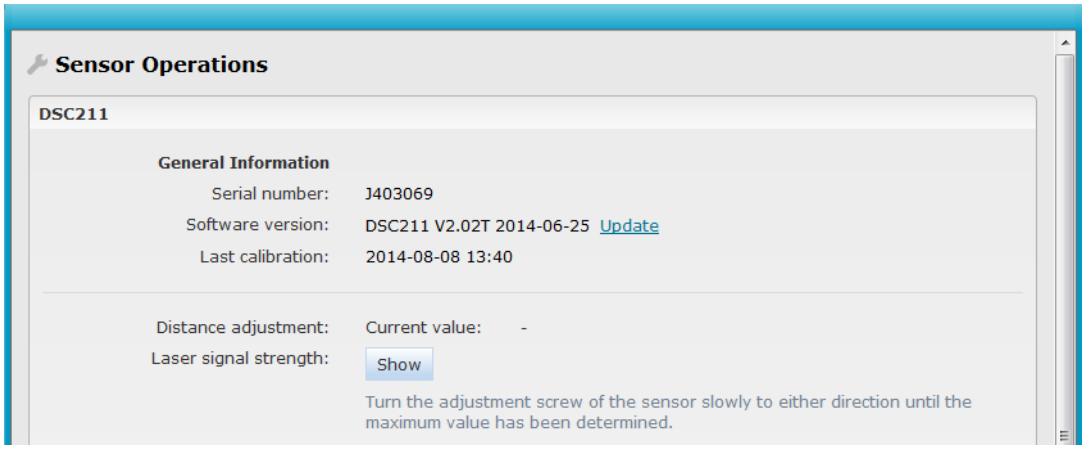
- 4-mm ball-end Allen key of 150 mm (6 in) in length (included)
- 5-mm Allen key (included)
- Laser distance meter with incline measurement capability (not included)

After installing and configuring DSC211, adjust the strength of the reflected optical signals and calibrate the sensor. Adjustment is needed to make sure that the measuring distance setting is correct.

You may need to adjust the signal strength if the sensor reports irregular values and calibration does not help. The optical signals increase if the installation angle increases, the distance of the sensor from the road shortens, or the road becomes whiter.

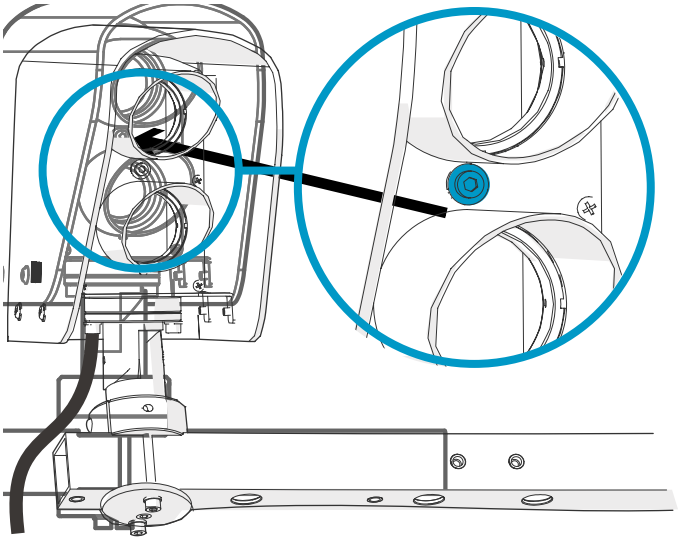
Make sure that nothing obstructs the sensor view to the road surface. Flowing traffic does not interfere with the calibration, but stationary vehicles do.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for DSC211.
3. In the **Sensor Operations** window, in **Laser signal strength**, select **Show**.



The distance adjustment value starts changing. Wait until the value stops increasing.

4. Turn the sensor adjustment screw slowly clockwise or anti-clockwise and check which direction increases the value. Continue in that direction until you find the maximum value for the signal strength.



5. When the value stops increasing, in **Laser signal strength**, select **Stop**.
6. To close the window, select **Close**.

After adjusting the signal strength, calibrate the sensor.

16.6.4 DSC dry calibration

DSC has been calibrated at the factory, but those values do not represent the actual properties of the road surface at the installation site. A dry calibration is needed after installation and asphalting.

The sensor measures road surface on 3 different optical wavelengths. The raw measurements of these signals depend on the sensor unit, installation, and characteristics of the road surface. For road state analysis to work properly, all these signals must be on the same level when the road surface is dry. Dry calibration sets these signal values to the same level.

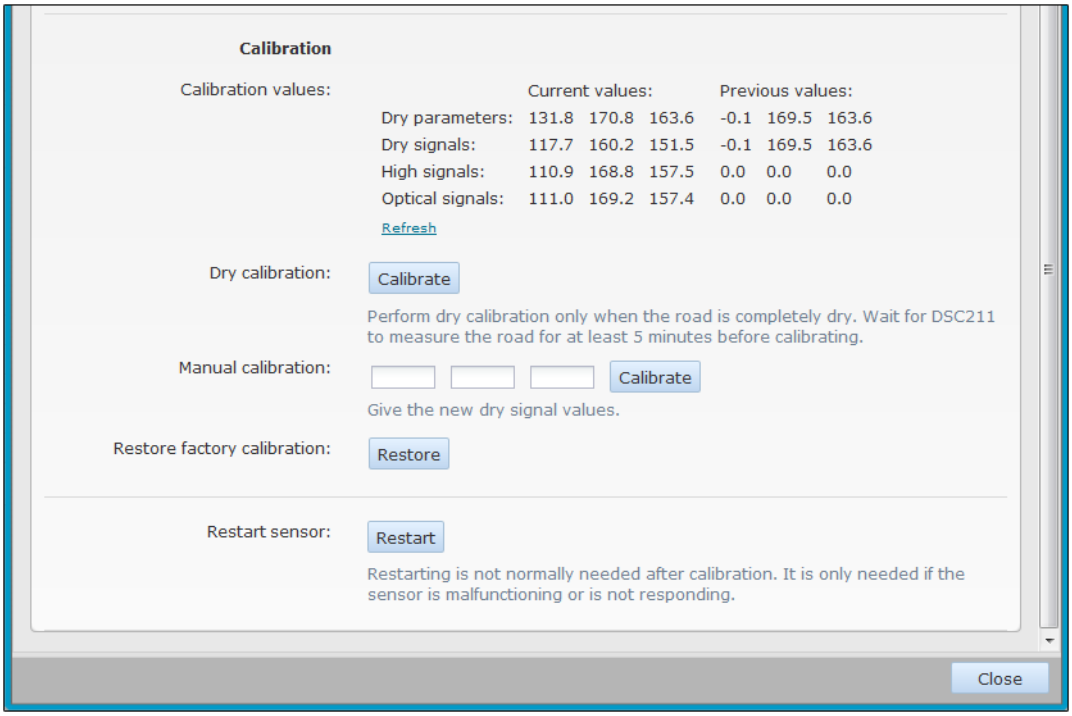
After mounting the sensor and powering up, let the sensor adjust at least 5 minutes before starting the dry calibration. During that time, do not make any adjustments or change the sensor settings.

The road surface must be totally dry for several hours before you start dry calibration. Calibrating the sensor against other than completely dry road surface causes incorrect observations.

Make sure that nothing obstructs the sensor view to the road surface. Flowing traffic does not interfere with the calibration, but stationary vehicles do.

16.6.5 Calibrating DSC211

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for DSC211.
3. In the **Sensor Operations** window, in **Dry calibration**, select **Calibrate**.



The calibration values are updated. If the values do not change, select **Refresh** to update them.

4. If dry calibration is not possible, Vaisala personnel can use manual calibration for troubleshooting.
5. If you want to restore the factory calibration settings, select **Restore**.

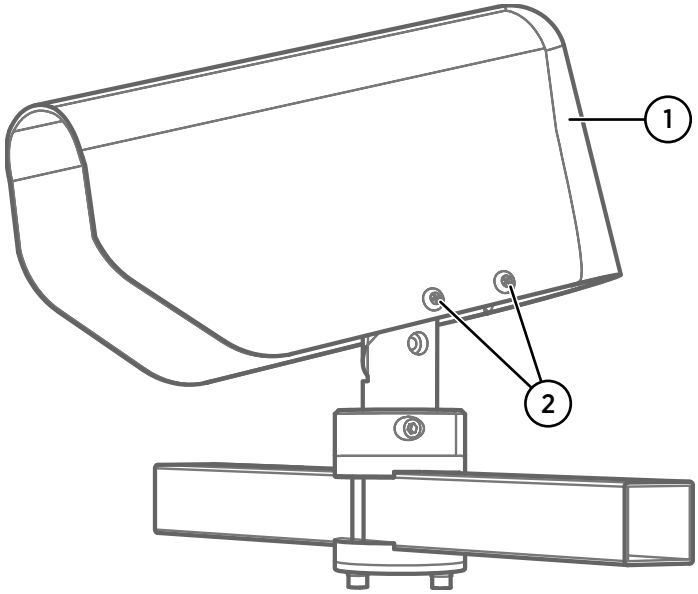
   This may be useful in troubleshooting situations.
6. To close the window, select **Close**.

16.6.6 Replacing DSC weather shield

Crosshead screwdriver

The DSC weather shield is available as a spare part (Vaisala item code DRW217593SP).

1. Remove the screws that attach the weather shield to the sensor.



1 Weather shield
2 Crosshead screw M5×10 A2 PH (4 pcs)

2. Lift the weather shield up to remove it from the sensor.
3. Attach the new weather shield in place.

16.7 DST111 maintenance

Preventive maintenance for DST111 includes:

- Checking that the sensor is aimed at the wheel track. The wheel track may change its place over the winter. To check that the sensor is aimed at the desired area on the road surface, look along the straight part of the edge of the weather shield.
- Cleaning the sensor.
- If you suspect that the humidity observation values are not accurate, change the humidity sensor and the filter.

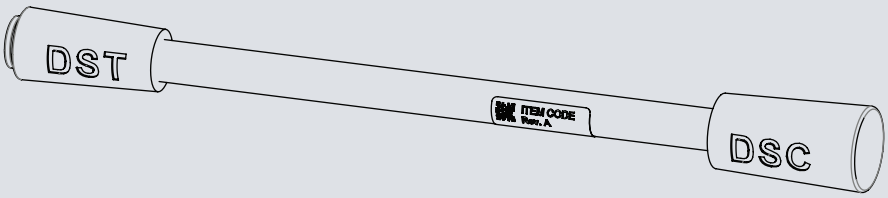
- If you suspect that the air temperature observation values are not accurate, contact Vaisala for instructions on how to replace the HMP60 probe.

More information

- Configuring DST111 settings (page 31)
- Cleaning DST111 (page 212)
- Replacing HMP60 filter and humidity sensor (page 212)
- DST111 options, spare parts, and accessories (page 350)

16.7.1 Cleaning DST111

- Soft, lint-free cloth
- 50 % isopropyl alcohol
- DSC and DST cleaning tool (DSCDSTCLEANINGTOOL)



Whenever you visit the site, clean the DST111 window.

1. Using low pressure, spray 50 % isopropyl alcohol on the window. Spray enough solution to dissolve and loosen any dirt.
2. Wrap a soft, lint-free cloth around the DST end of the cleaning tool.
3. Wipe the window until it is clean.
4. Take a new, clean cloth and wipe the receiver window until it is clean.
5. Wait until the windows are dry.

16.7.2 Replacing HMP60 filter and humidity sensor

- 1.5 and 5-mm Allen key
- Crosshead screwdriver

The INTERCAP humidity sensor of HMP60 and the membrane filter of the probe head are interchangeable.

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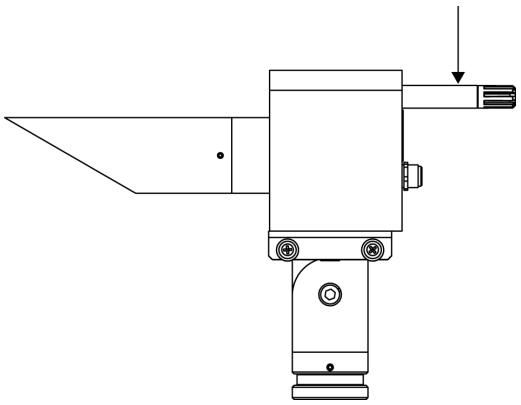
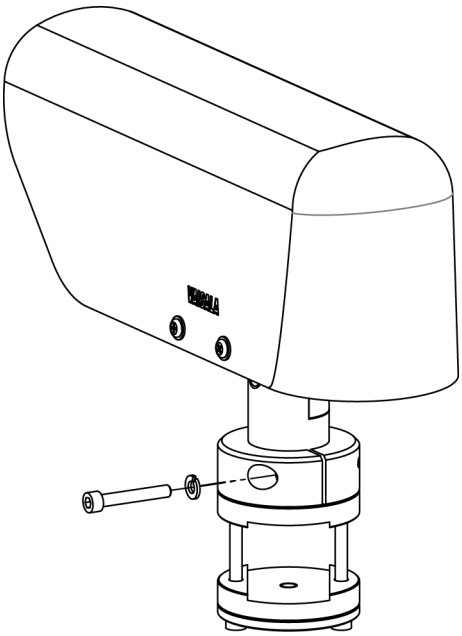
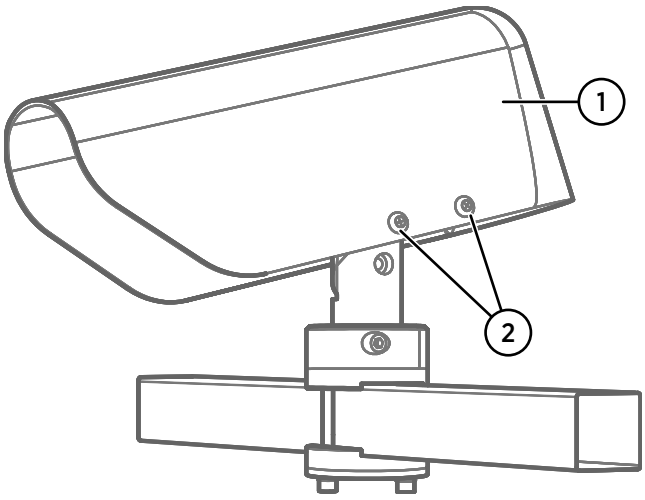


Figure 15 HMP60 inside DST111

1. Power down the station from the PMU701 power switch.
2. Disconnect the sensor cable from the sensor.
3. Remove the installation bolt and lift DST111 down from the mast.

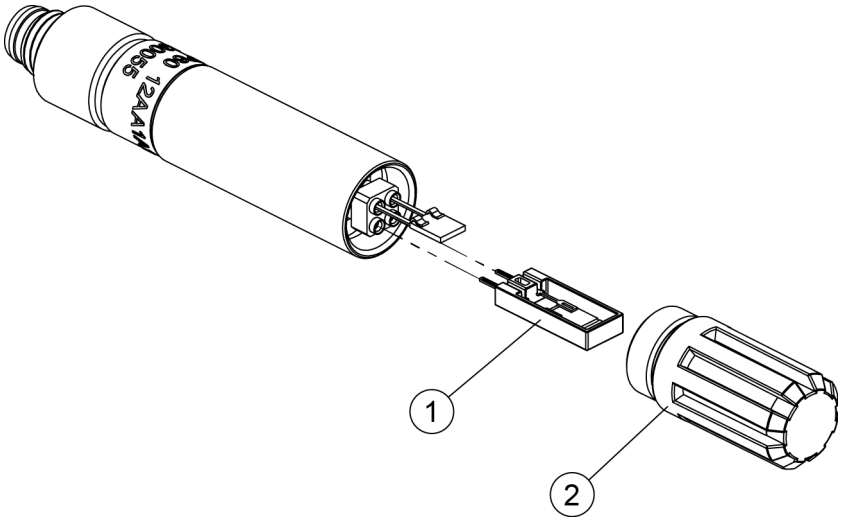


4. Remove the weather shield.



1 Weather shield
2 Shield screws (4 pcs)

5. To remove the filter, turn the filter counterclockwise.



1 Humidity sensor
2 Filter

6. Pull out the old humidity sensor and insert a new one. Handle the new sensor by its plastic frame.

CAUTION! Do not touch the sensor plate. It is fragile.

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7. Attach the new filter on the probe, and fasten the weather shield.
8. Reinstall the sensor on the mast and reconnect the sensor cable.
9. Power up the station. This may take a while.

More information

- DST111 options, spare parts, and accessories (page 350)

16.8 DRS511 maintenance



CAUTION! To avoid damage to the sensor:
- Do not use rubber-removing chemicals on the road surface.
- Do not use abrasive or rubber-removing brushes in winter maintenance vehicles.

Preventive maintenance for DRS511 includes:

- Checking the sensor position at least once a year before the wintertime.

There is no need to calibrate the optical measurement of DRS511 regularly. However, Vaisala recommends calibrating the sensor:

- If water thickness results are continuously false
- After grinding the sensor surface
- When the sensor is easily accessible due to other work

More information

- Configuring DRS511 settings (page 33)
- Checking DRS511 position (page 215)
- Lowering DRS511 (page 220)
- Calibrating DRS511 (page 222)
- DRS511 options and accessories (page 351)

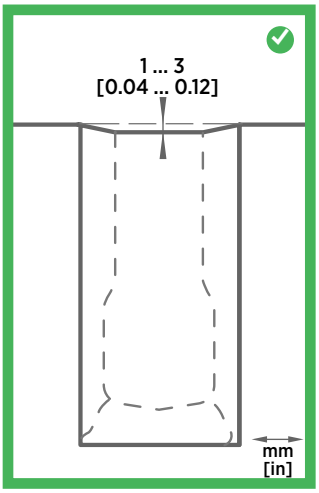
16.8.1 Checking DRS511 position



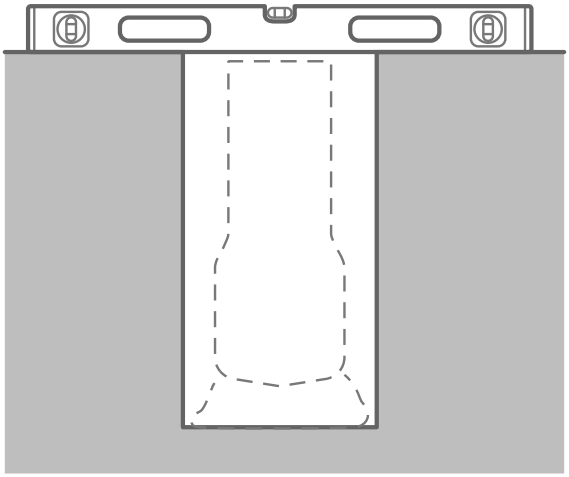
Spirit level

Check the sensor position before maintenance actions.

1. Check that the sensor lies 1 ... 3 mm (0.04 ... 0.12 in) below the road or runway surface.



2. Use a spirit level to check that the sensor is in horizontal position. This allows moisture to gather on the sensor surface.



3. If the sensor is above the road surface, grind the sensor surface to lower the sensor.

More information

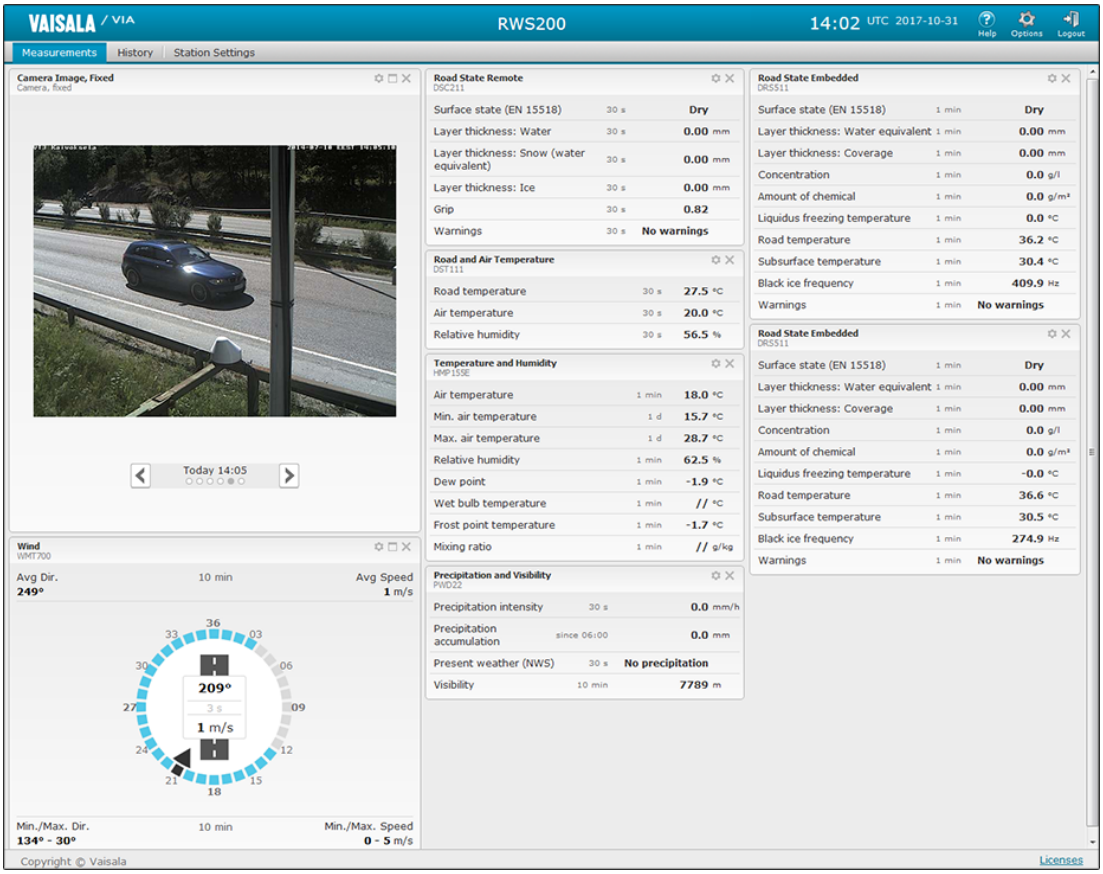
‣ Lowering DRS511 (page 220)

16.8.2 Testing DRS511 operation

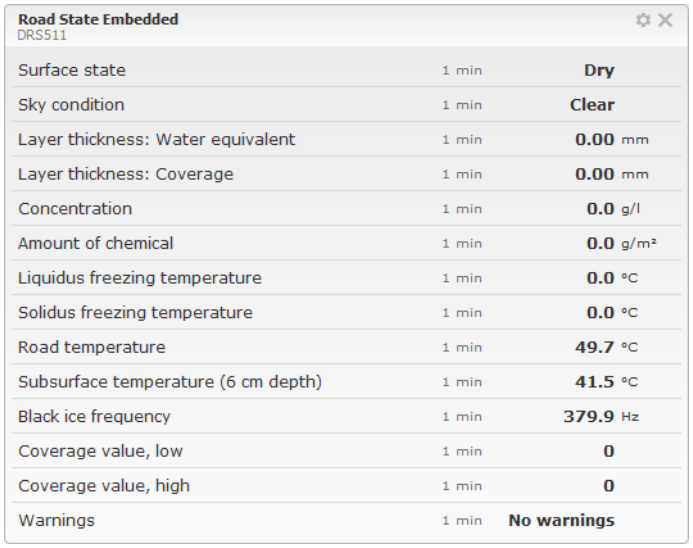
- De-icing chemical as high-concentration solution
- (Optional) Snow, crushed ice, or ice spray

You can test DRS511 operation even in the summer time to make sure that the sensor works properly.

1. Log in to the Web UI as an administrator or super user, and go to the **Measurements** page.



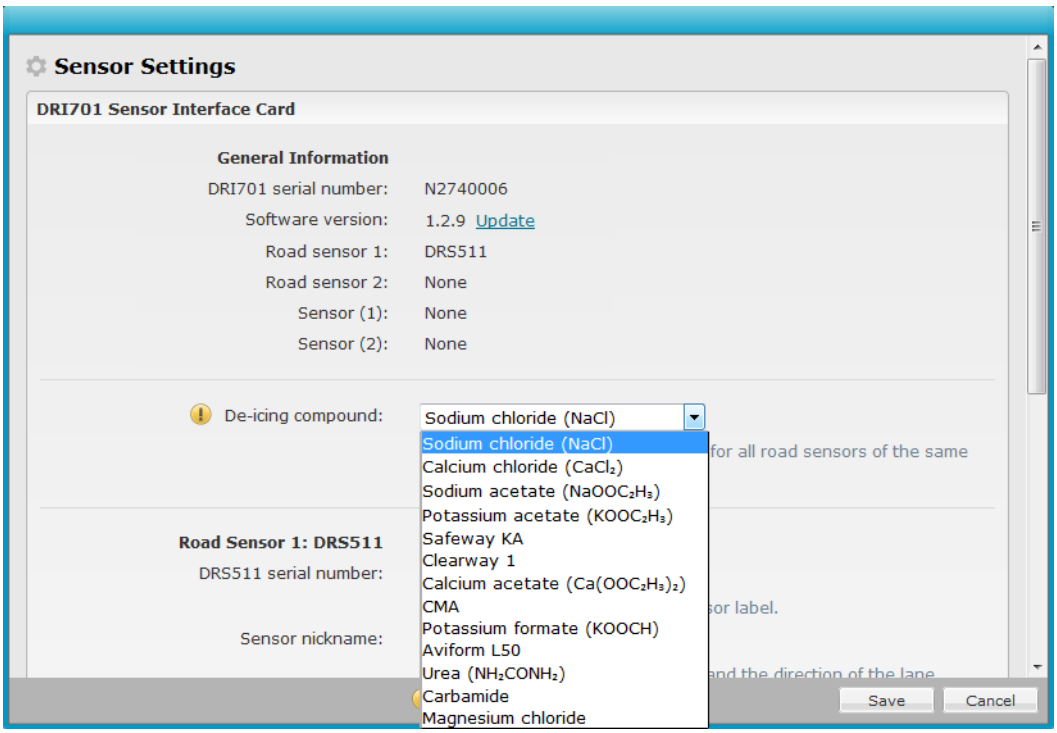
2. In the **Road State Embedded** component, make note of the following values:
   - Surface state
   - Concentration
   - Amount of chemical
   - Liquidus freezing point
   - Solidus freezing point



Road State Embedded
DRS511

Surface state	1 min	**Dry**
Sky condition	1 min	**Clear**
Layer thickness: Water equivalent	1 min	**0.00** mm
Layer thickness: Coverage	1 min	**0.00** mm
Concentration	1 min	**0.0** g/l
Amount of chemical	1 min	**0.0** g/m²
Liquidus freezing temperature	1 min	**0.0** °C
Solidus freezing temperature	1 min	**0.0** °C
Road temperature	1 min	**49.7** °C
Subsurface temperature (6 cm depth)	1 min	**41.5** °C
Black ice frequency	1 min	**379.9** Hz
Coverage value, low	1 min	**0**
Coverage value, high	1 min	**0**
Warnings	1 min	**No warnings**

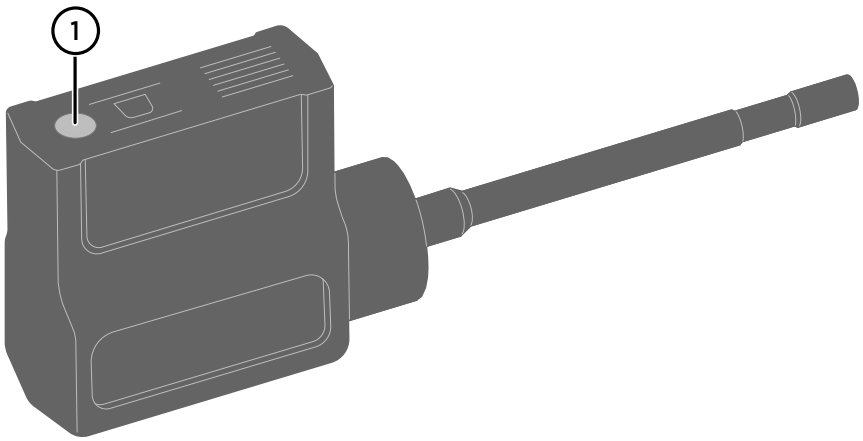
3. On the **Station Settings** page, open the DRS511 settings from the **Sensors** component, and check that the chemical selected for the de-icing component is the same that you have brought to the site.



If the chemical that you are using is not listed, contact Vaisala for instructions on which one to choose.

4. (Optional) Freeze the solution or the sensor.

   When road temperature exceeds +3 °C (+37 °F), the sensor always reports surface state as `Moist` or `Wet`, regardless of the amount of chemical on the road.
   If the temperature is higher and you want to test if the value changes to `Wet and chemical`, freeze the solution by mixing snow or crushed ice into it, or spray ice on the DRS511 surface temperature sensor.



1 Surface temperature sensor

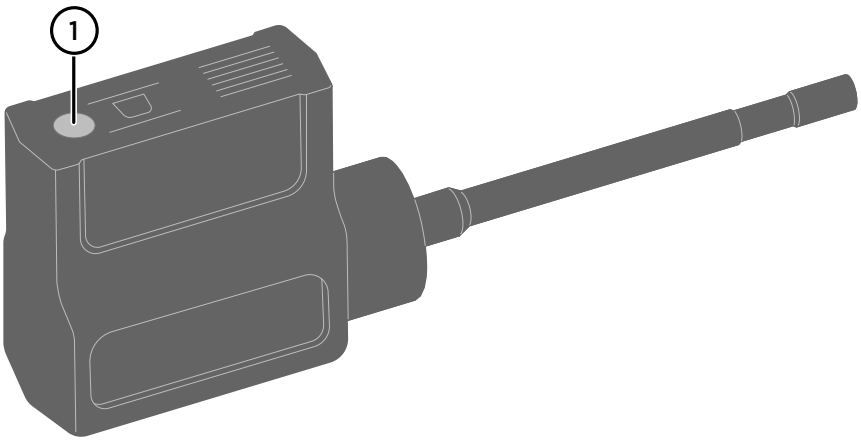
5. Pour the chemical on the sensor.
6. After a while, on the **Measurements** page, check that the reported values change.
   - Liquidus freezing temperature should fall significantly.
   - Solidus freezing temperature should fall significantly.
   - The concentration should rise significantly.
   - Amount of chemical should rise significantly.
   - Road state should change to `Wet`. If the solution or sensor was frozen, road state should change to `Wet and chemical`.

16.8.3 Lowering DRS511

- Screwdriver
- Hammer
- Belt grinding machine, angle grinder, or similar
- Sandpaper (roughness 800 recommended)
- Water
- Wet wipe

If the sensor surface is at too high a level, to lower the sensor, grind the surface. For instructions on how to check the sensor level, see Checking DRS511 position (page 215).

1. Check that the surface temperature sensor stays above the target level.



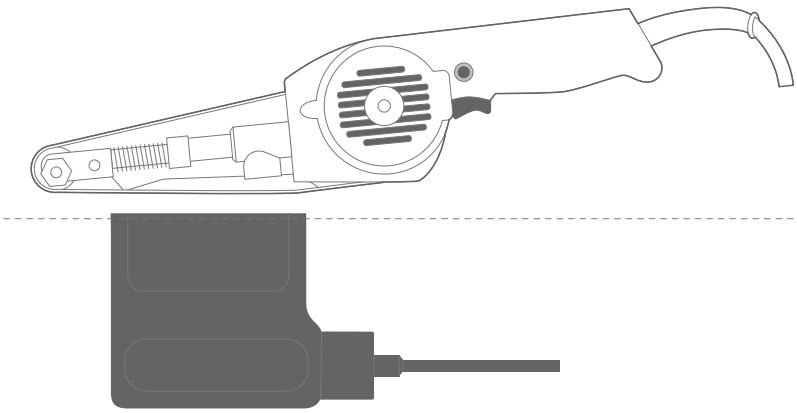
1 Surface temperature sensor

2. If the surface temperature sensor is too high, use a screwdriver to press the metal part of the surface temperature sensor downward.

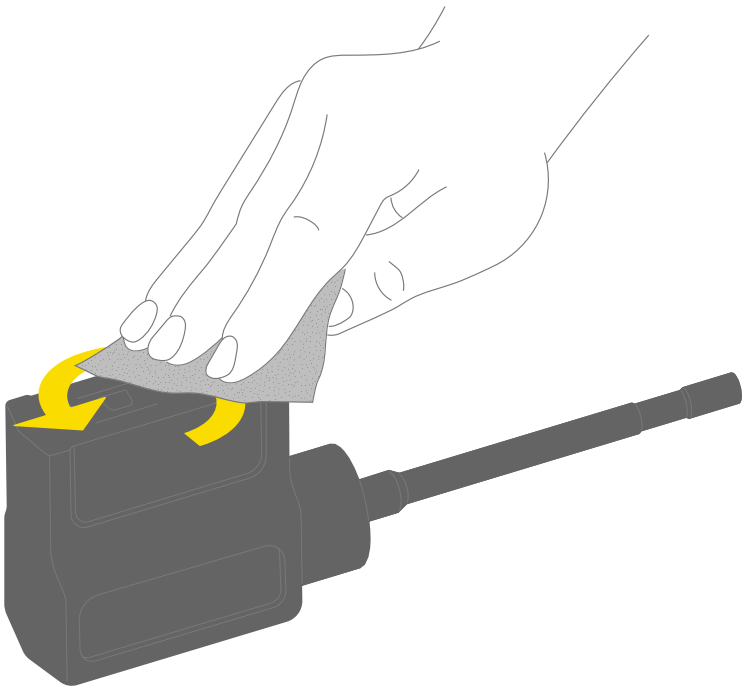
   Hammer the screwdriver handle gently until the sensor lies 1 ... 3 mm (0.04 ... 0.12 in) below the sensor surface.

3. Use a belt grinding machine, an angle grinder, or similar to lower DRS511.

> **CAUTION!** Do not grind the metal part of the temperature sensor.



4. To complete the grinding, smooth the sensor surface around the optical sensor with sandpaper (roughness 800 recommended) and water.



5. Clean the sensor head carefully with a wet wipe.

More information

- Checking DRS511 position (page 215)

16.8.4 Calibrating DRS511

If you are calibrating the sensor for maintenance purposes, grind the sensor surface first. See Lowering DRS511 (page 220).

DRC511 calibration kit

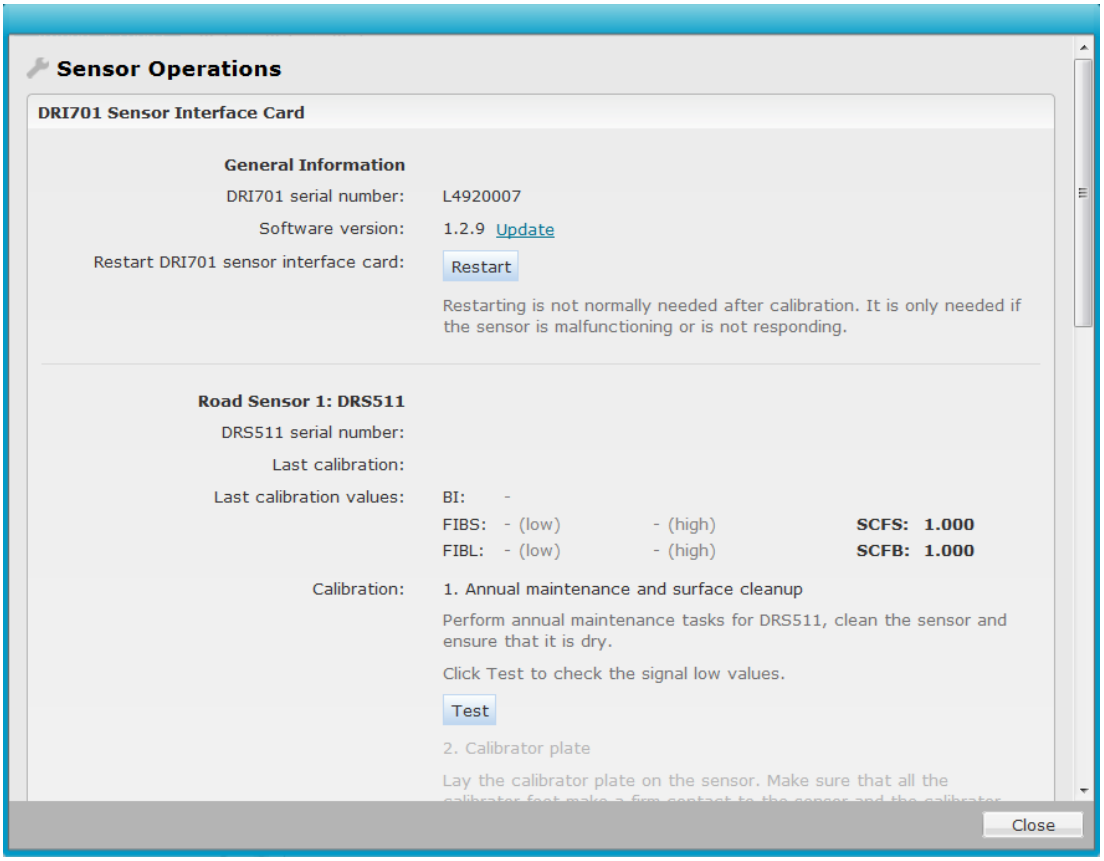
Calibrating the sensor improves the layer thickness measurement.

1. Clean the surface of the DRS511 sensor with water and the cleaning tissue provided in the calibration kit.

   Make sure that the sensor surface is dry.

2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **Sensors** component, select **Operations** for DRI701 sensor interface card.

4. In the **Sensor Operations** window, in **Last calibration values**, write down the current calibration values, if they exist.
   - **BI**: Black ice frequency
   - **FIBS**: Optical signal, small fiber, low and high value
   - **FIBL**: Optical signal, large fiber, low and high value
   - **SCFS**: Scaling factor
   - **SCFB**: Scaling factor

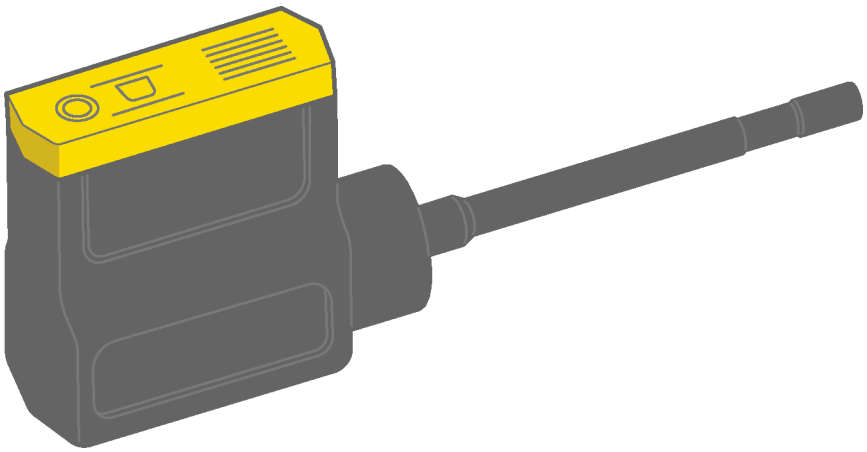


5. In **Calibration** step 1, select **Test**.

   The station starts checking the signal low values and shows them on the window. The test takes a few minutes.

6. Clean the calibrator plate and especially the white plate inside with a soft, lint-free cloth.

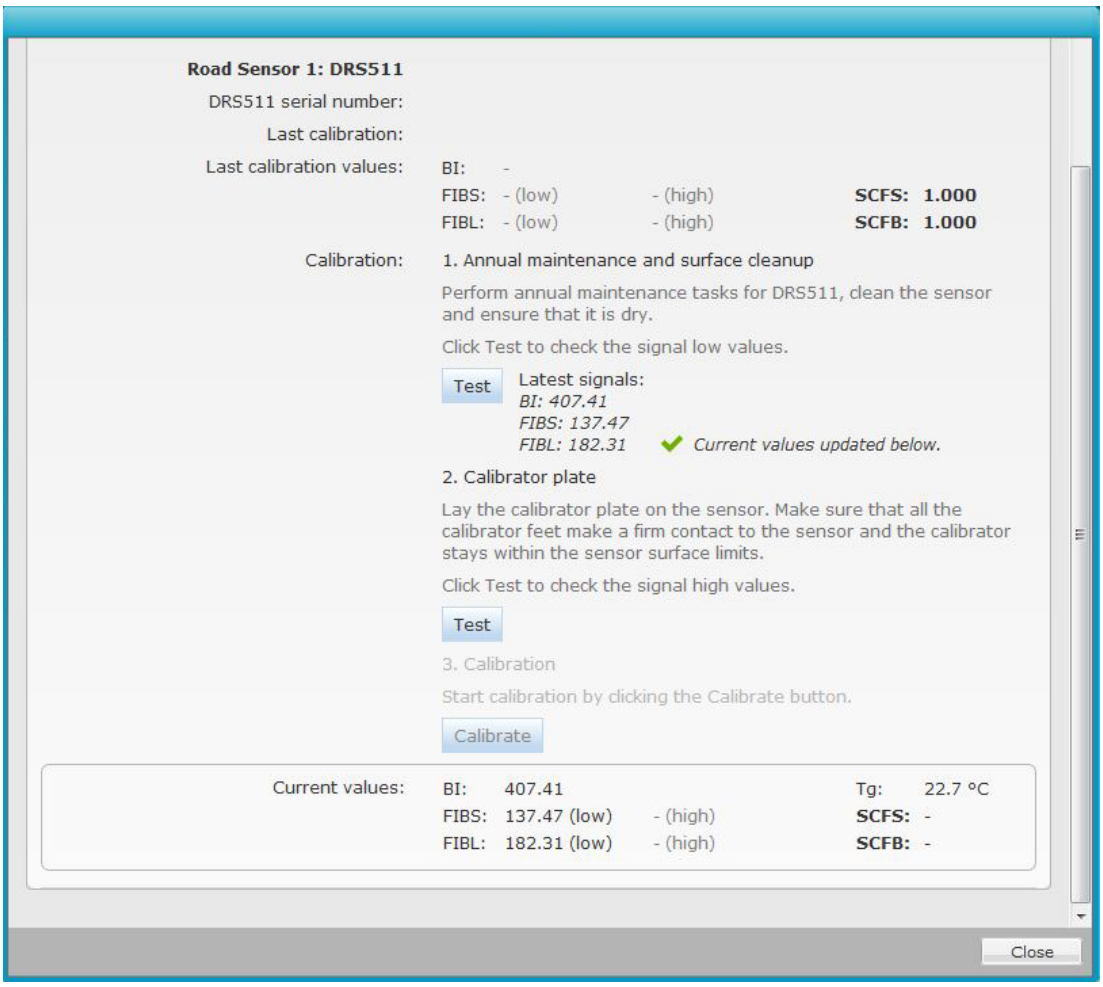
7. Lay the calibrator plate on the sensor. Match the calibrator patterns with the temperature sensor and the electrodes of DRS511.



Make sure that the calibrator feet make a firm contact to the sensor and that the calibrator stays within the sensor surface limits.

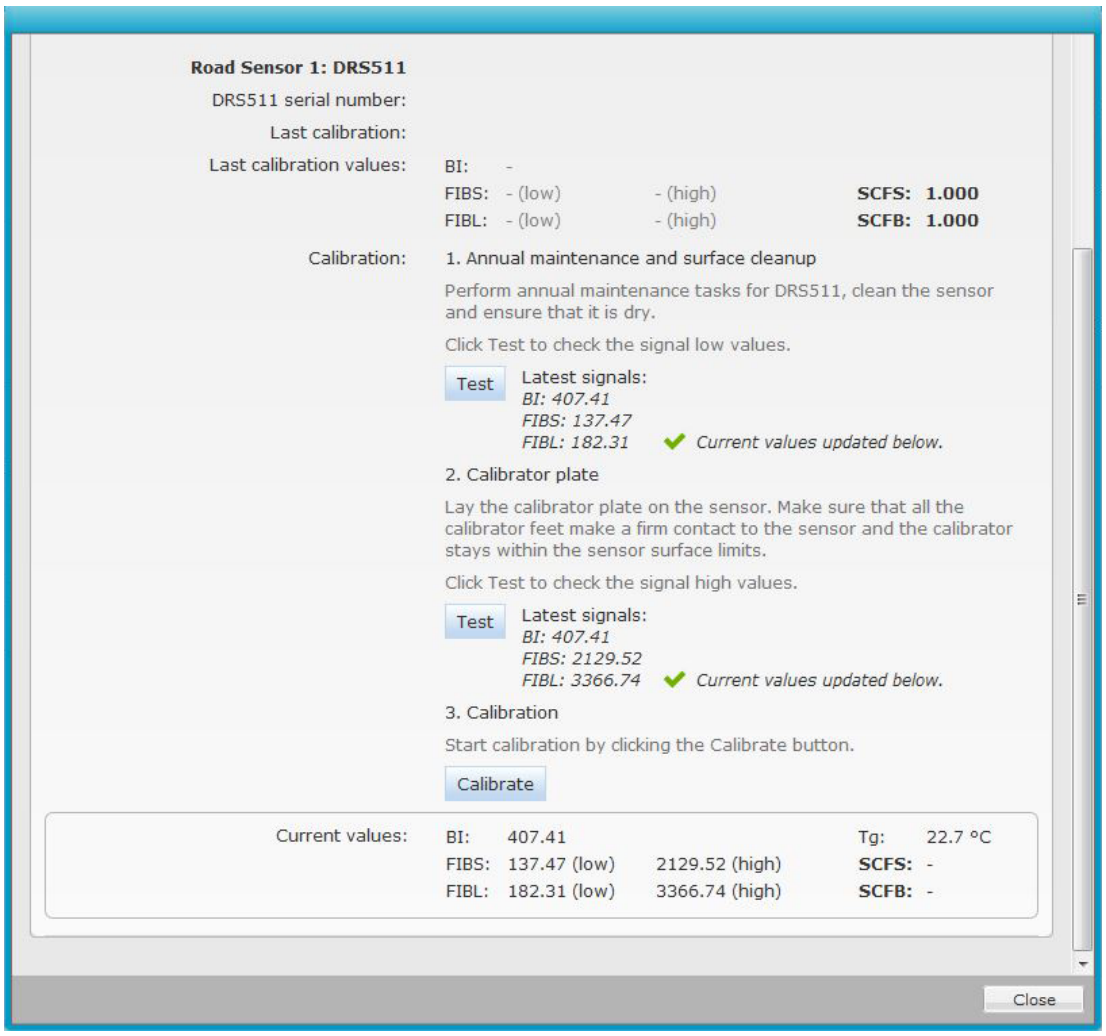
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8. In **Calibration** step 2, select **Test**.



The station starts checking the signal high values and shows them on the window. The test takes a few minutes.

9. Check the calibration result.



If high signals (**FIBS** and **FIBL** from calibration step 2) are lower than low signals (**FIBS** and **FIBL** from calibration step 1), the test fails. If the test fails:

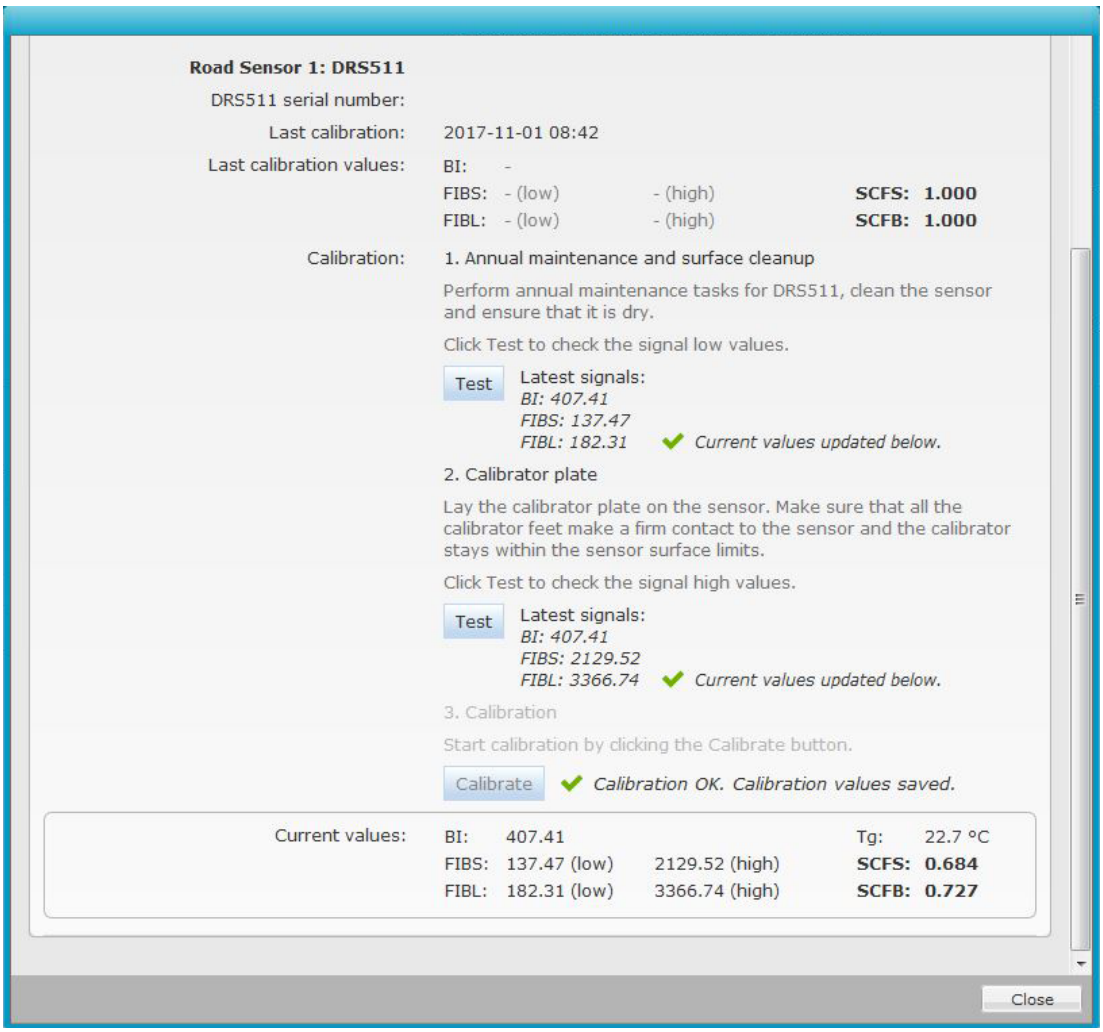
a. Check that the calibrator plate is correctly positioned.

b. Check that the sensor surface is clean and dry.

c. Repeat the test.

10. When both tests have succeeded, select **Calibrate**.

11. Wait until you see a confirmation message.



If calibration succeeds, the values of the optical calibration parameters **SCFS** and **SCFB** are updated. The previous calibration is not changed until the new one succeeds.

12. To close the window, select **Close**.

16.9 FP2000 maintenance

Preventive maintenance for FP2000 includes:

- Keeping the sensor surface clean from any oily residue that causes water to bead.
- Keeping the well (cup) clean from sand, cinder, and dirt build-up.
- Checking the wear level of the sensor. The sensor does not tolerate a lot of wear.

For an explanation of the raw measurements shown in the FP2000 **Sensor Operations** window, see RWS200 System Description (M211607EN).

More information

- Configuring FP2000 settings (page 38)

16.10 DTS12G maintenance

Subsurface sensor DTS12G does not require regular maintenance.

The sensor has no replaceable parts. If the sensor malfunctions, replace it.

More information

- Configuring DTS12G settings (page 42)
- DTS12G options and accessories (page 352)

16.11 DTS210 maintenance

Subsurface sensor DTS210 does not require regular maintenance.

The sensor has no replaceable parts. If the sensor malfunctions, replace it.

More information

- Configuring DTS210 settings (page 44)

16.12 TPS10 maintenance

Temperature profile sensor TPS10 does not require regular maintenance.

The sensor has no replaceable parts. If the sensor malfunctions, replace it.

More information

- Configuring TPS10 settings (page 45)
- Updating TPS10 settings (page 228)
- TPS10 options and accessories (page 352)

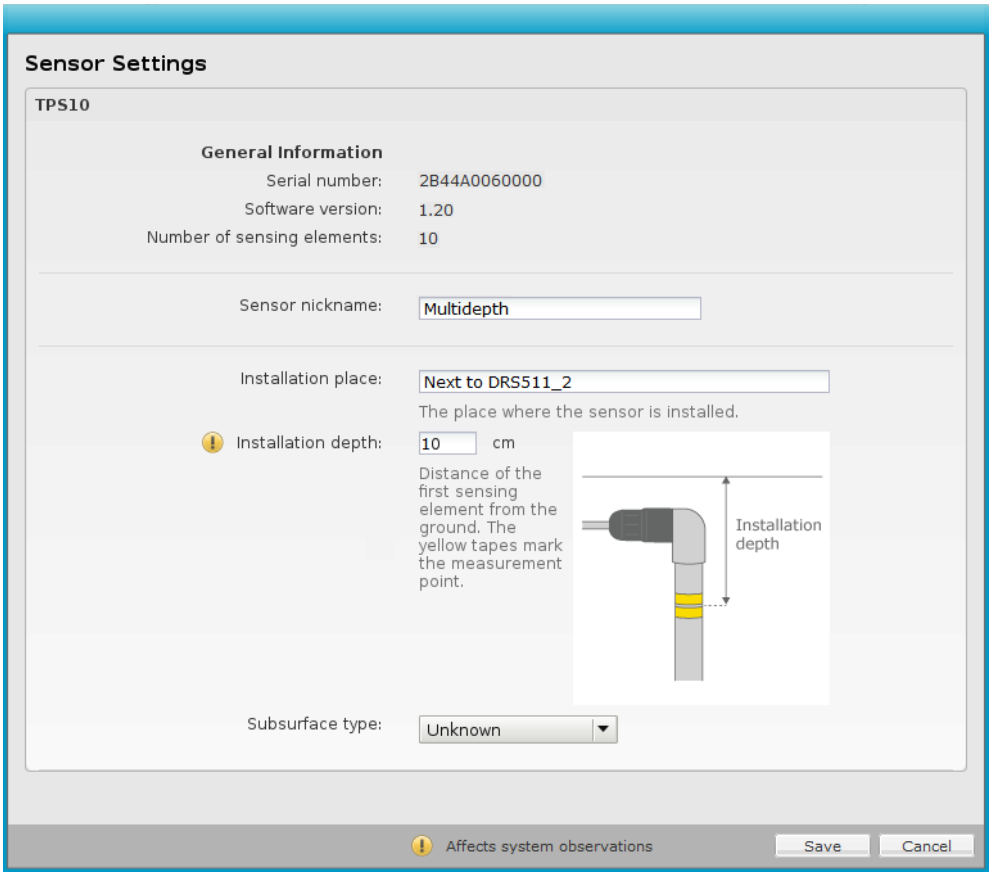
16.12.1 Updating TPS10 settings

After changing the installation depth of the sensor or replacing the sensor, update the TPS10 settings to ensure measurement accuracy.

Before updating the settings, make sure that you have powered PMU701 down and up again after changing the installation depth or the sensor.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. Update TPS10 settings.
   a. In the **Sensors** component, select **Settings** ⚙ for TPS10.
   b. Check that the installation depth is correct.

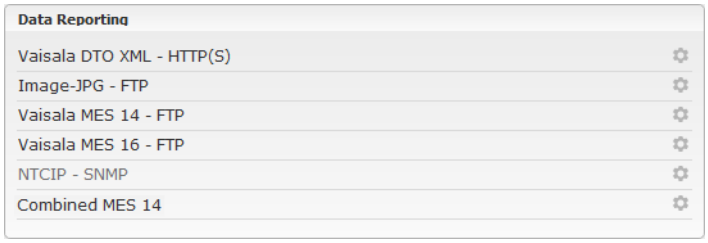


   c. Select **Save**.

> Select **Save** even if you do not change any settings.

3. Update observation components.
   a. Go to the **Measurements** page, and remove all existing **Subsurface Temperature Multidepth** components.
   b. Recreate the components.
   c. Check that the TPS10 observations are shown.

4. Update NTCIP configuration, if used.
   a. In the **Data Reporting** component, select **Settings** ⚙ for **NTCIP**.



   b. On the **NTCIP - SNMP** window, check that TPS10 is selected as the **Sub Surface Condition** sensor.
   c. To save the settings, select **OK**.
5. Delete and recreate all device control activation and deactivation rules that contain the TPS10 sensor.

More information

- Configuring activation rule, deactivation delay, and deactivation rule (page 149)
- Adding new components (page 176)
- Replacing sensors (page 259)

16.13 PWD maintenance

Preventive maintenance includes:

- Cleaning the transmitter and receiver windows and hoods and the RAINCAP rain sensor.
  Vaisala recommends cleaning the windows and the rain sensor once a year before winter season.
- Calibrating PWD yearly (Vaisala recommendation) and after replacing any of the optical units.

CAUTION! Do not bend the signal cable with less than 2 cm (0.8 inch) radius, and do not leave it unsupported to lean to the ground or table.

If any mechanical damage changes or weakens the receiver, the transmitter, or the tube supporting them, replace the sensor. If there is reason to suspect that sensor malfunction is caused by faults in the optical units or the rain sensor, contact Vaisala to replace the unit.

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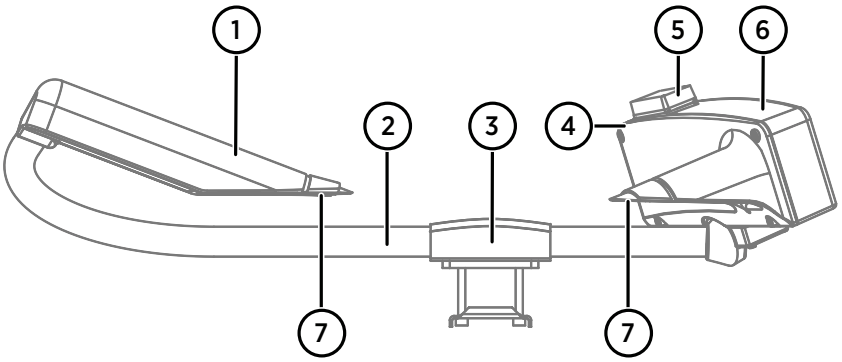


Figure 16 PWD12

1 Transmitter
2 Pt100 temperature sensor in the tube
3 Mounting clamp
4 Place for Vaisala Luminance Sensor PWL111 (optional)
5 Vaisala RAINCAP rain sensor PWR111
6 Controller/Receiver
7 Hood heaters (optional)

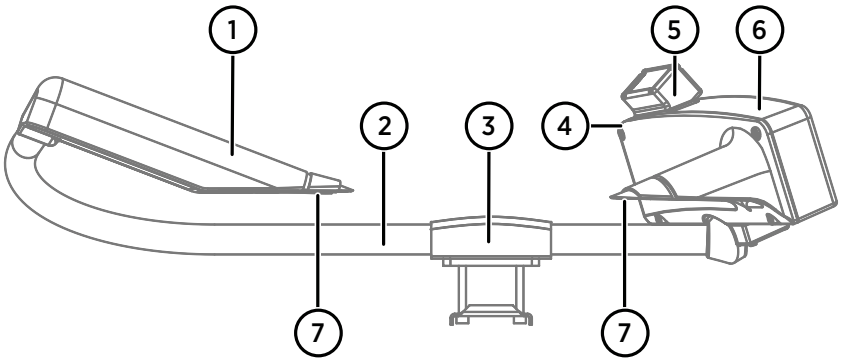


Figure 17 PWD22

1 Transmitter
2 Pt100 temperature sensor in the tube
3 Mounting clamp
4 Place for Vaisala Luminance Sensor PWL111 (optional)
5 Vaisala RAINCAP rain sensor PWR211
6 Controller/Receiver
7 Hood heaters (optional)

More information

- Configuring PWD settings (page 47)
- PWD cleaning flowchart (page 232)
- Calibrating PWD (page 235)
- Monitoring PWD window cleanliness remotely (page 237)
- PWD options, spare parts, and accessories (page 355)

16.13.1 PWD cleaning flowchart

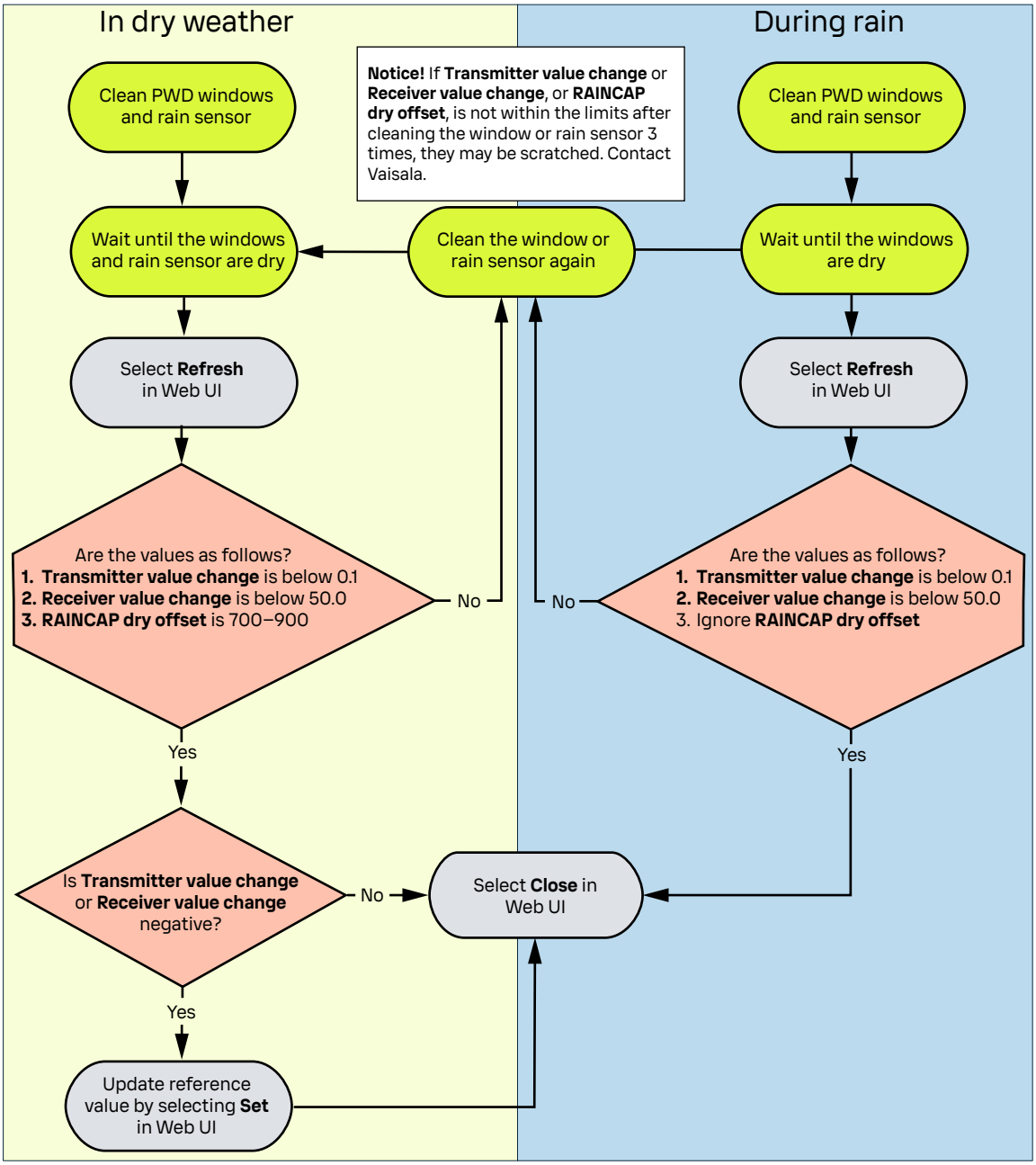


Figure 18 Workflow for PWD cleaning

More information

- PWD maintenance (page 230)
- Cleaning PWD (page 233)
- Setting new clean value for PWD (page 234)

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16.13.2 Cleaning PWD

- Soft, lint-free cloth
- 50 % isopropyl alcohol
- PWD cleaning tool (PWDCLEANINGTOOL)

To ensure reliable measurements, keep the windows of the transmitter and receiver units and the RAINCAP rain sensor clean. Dirty windows give too optimistic visibility reading and too pessimistic precipitation intensity reading.

Vaisala recommends cleaning the windows and the rain sensor once a year before winter season.

You can monitor the window cleanliness (transmitter backscatter change, **TXBSC**) value remotely through the DTO XML interface. The closer the value is to **0.0**, the cleaner the windows are. When the value is **0.3** or more, clean the windows as soon as possible.

During rain, clean the windows and the rain sensor but do not set a new clean reference value.

1. Check that the windows, hoods, and the rain sensor are free of condensed water, ice, or snow.
2. Before touching the rain sensor, remove excessive static charges from your body. Ground your hand first by touching grounded metallic parts of the installation.

   This step is required because the measuring principle does not allow for proper ESD protection of the rain sensor.

3. Using low pressure, spray 50 % isopropyl alcohol on the transmitter and receiver windows, the rain sensor, and the rest of the mechanics. Spray enough solution to dissolve and loosen any dirt.
4. Wrap a soft, lint-free cloth around the transmitter end of the cleaning tool.
5. Wipe the transmitter window until it is clean.
6. Take a new, clean cloth and wipe the receiver window until it is clean.
7. Take a new, clean cloth and wipe the rain sensor gently until it is clean.

   CAUTION! Be careful not to scratch the lens or rain sensor surfaces.

8. Wipe the rest of the mechanics as well.
9. Wait until the windows and the rain sensor are dry.

More information

- PWD cleaning flowchart (page 232)

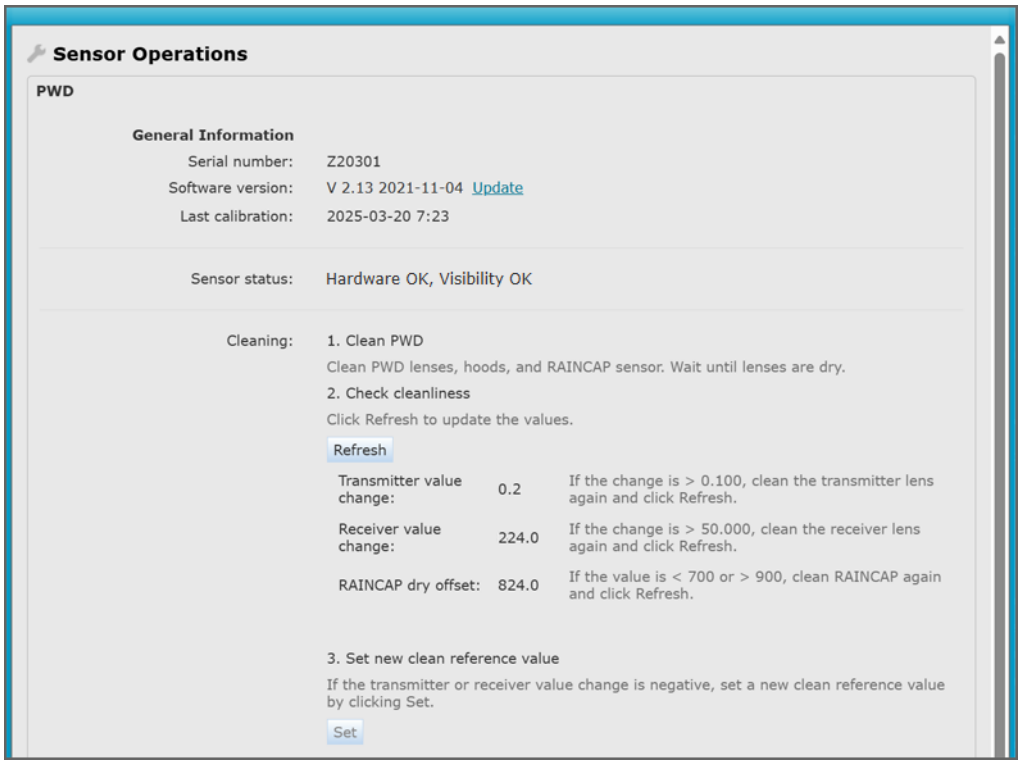
16.13.3 Setting new clean value for PWD

The clean value is used as reference for an automatic warning of contaminated windows.

1. After cleaning the windows and rain sensor, wait until they are dry.

> During rain, clean the windows and the rain sensor but do not set a new clean reference value.

2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **Sensors** component, select **Operations** for PWD12 or PWD22.
4. In the **Sensor Operations** window, in **Cleaning**, select **Refresh**.



5. Check the new clean reference values.
   - If the PWD transmitter value change is over `0.1`, clean the transmitter window again and select **Refresh**. Values between `0.0` and `0.1` mean that the transmitter window is clean. After cleaning, values over `0.2` mean that the window may be is scratched. Contact Vaisala.

     You can monitor the window cleanliness (transmitter backscatter change, `TXBSC`) value remotely through the DTO XML interface. The closer the value is to `0.0`, the cleaner the windows are. When the value is `0.3` or more, clean the windows as soon as possible.

   - If the PWD receiver backscatter value change is over `50.0`, clean the receiver window again and select **Refresh**. Values between `0.0` and `50.0` mean that the receiver window is clean. After cleaning, values over `50.0` mean that the window may be scratched. Contact Vaisala.
   - If the dry offset value for the RAINCAP rain sensor is below `700` or over `900`, clean RAINCAP again and select **Refresh**.
     If the value is below `700`, there is moisture on the rain sensor.
6. If either of the backscatter change values is negative, and it is not raining, select **Set**.

   The transmitter change value should change to `0` and receiver value change to close to `0` after a few minutes. If not, select **Refresh**.
   A negative value means that the window was dirty when the clean value was last set. **Set** overrides the previous value.

   Do not change the clean reference value when the windows or rain sensor are dirty or wet. Always clean the windows and rain sensor, and wait until they are dry before setting the new value. Do not set a new value when it is raining.

7. To close the window, select **Close**.

More information

▸ PWD cleaning flowchart (page 232)

16.13.4 Calibrating PWD

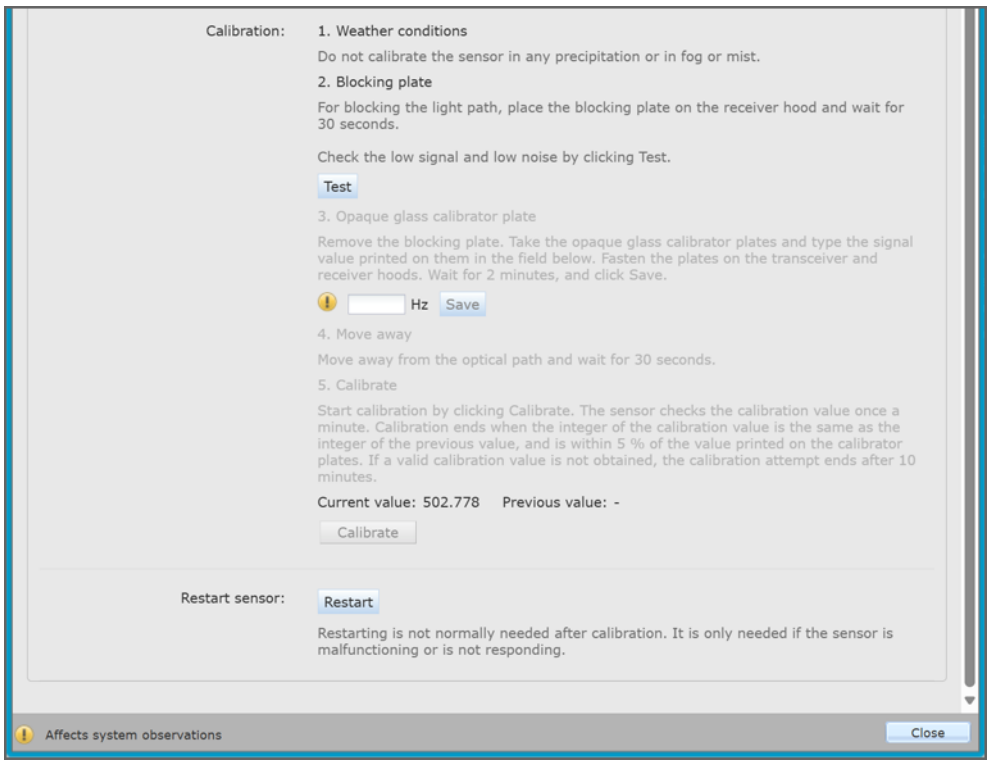
PWA12 calibration kit

Vaisala recommends calibrating PWD optical measurement once a year. Calibration is required after replacing any of the optical units.

Do not calibrate the sensor in any precipitation or in rain, fog, mist, or bright sunshine. Bright sunlight on the reference plates increases noise in the scatter measurement and makes the output less stable.

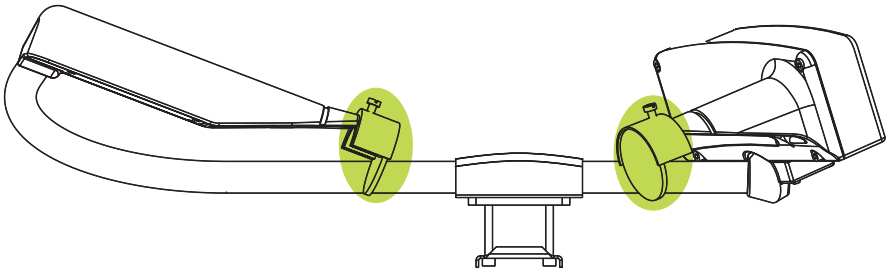
1. Before calibration, clean PWD and set a new clean reference value if needed.

   For instructions, see PWD cleaning flowchart (page 232).
2. Place the blocking plate on the receiver hood and wait for 30 seconds.
3. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
4. In the **Sensors** component, select **Operations** for PWD12 or PWD22.
5. In **Calibration** step 2, select **Test**.



   The system starts checking the low signal and low noise.
   If the test fails, replace the blocking plate and try again.
6. When the test passes, remove the blocking plate.
7. Take the calibrator plates (opaque glass plates) and check the signal value printed on the plates. Typically, the value is close to 500 Hz.

8. Fasten the calibrator plates to the hoods.



9. Wait for 2 minutes, type the signal value in the **Hz** field in the Web UI, and select **Save**.
10. Move away from the optical path of the sensor.
11. Wait for 30 seconds.
12. In **Calibration** step 5, select **Calibrate**.

    The sensor checks the calibration value once a minute. Calibration ends when the integer of the calibration value is the same as the integer of the previous value, and the calibration value is within 5 % of the value printed on the calibrator plates.

    You cannot interrupt the calibration process.

    If the sensor does not get a valid calibration value, it ends the calibration attempt after 10 minutes. Try calibrating the sensor again.
13. To close the window, select **Close**.
14. Remove the calibration plates from the hoods.

More information

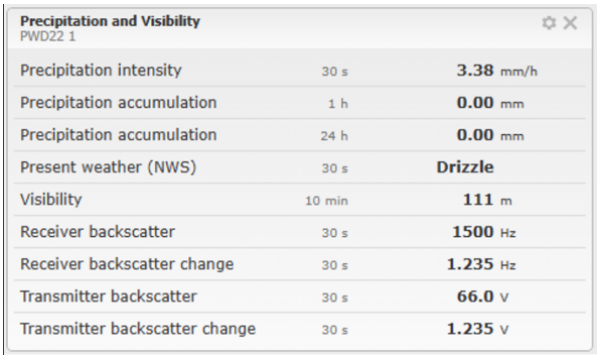
- Configuring PWD settings (page 47)
- PWD maintenance (page 230)
- Cleaning PWD (page 233)
- PWD options, spare parts, and accessories (page 355)

16.13.5 Monitoring PWD window cleanliness remotely

You can monitor the cleanliness of PWD windows in real time remotely, if your PWD12 or PWD22 fulfills the following requirements:

- PWD12 or PWD22 software version is 2.13 or later
- You have selected **Enhanced for road weather** as the message type in PWD settings

You can monitor the transmitter backscatter change value through the DTO XML interface or the Web UI. The value is reported in the DTO XML interface with a higher resolution than on the Web UI.



You can monitor the window cleanliness (transmitter backscatter change, **TXBSC**) value remotely through the DTO XML interface. The closer the value is to **0.0**, the cleaner the windows are. When the value is **0.3** or more, clean the windows as soon as possible.

16.14 DRD11A maintenance

Preventive maintenance of DRD11A includes cleaning the sensor plate at least once a year or more often, depending on the conditions.

The sensor has no replaceable parts. If the sensor malfunctions, replace it.

More information

- Configuring DRD11A settings (page 49)
- Cleaning RAINCAP rain sensor (page 238)
- Setting new clean value for DRD11A (page 239)
- DRD11A options and spare parts (page 356)

16.14.1 Cleaning RAINCAP rain sensor

- Soft, lint-free cloth
- 50 % isopropyl alcohol

Clean the RAINCAP rain sensor at least every 6 months, more often if required by local conditions.

CAUTION! Do not touch the sensor plate. It is fragile.

CAUTION! If you must touch the RAINCAP plate, for example during cleaning, first touch a metallic part of the present weather detector to discharge your body's electrostatic load.

1. To remove excessive static charges from your body, ground your hand first by touching grounded metallic parts of the installation.

   This step is required because the measuring principle does not allow for proper ESD protection of the rain sensor.

2. Check that the rain sensor is free of ice and snow.
3. Using low pressure, spray 50 % isopropyl alcohol on the rain sensor. Spray enough solution to dissolve and loosen any dirt.
4. Wipe the rain sensor gently with a soft, lint-free cloth.

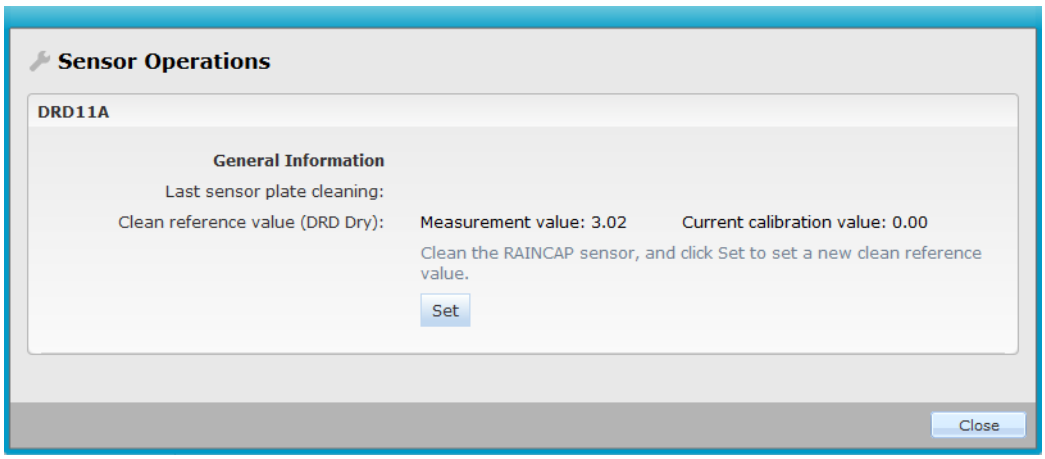
   CAUTION! Be careful not to scratch the rain sensor surface.

16.14.2 Setting new clean value for DRD11A

When you have cleaned DRD11A, set a new clean value. The clean value is used as reference for an automatic warning of contaminated sensor plate.

1. Clean the RAINCAP rain sensor.
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **Sensors** component, select **Operations** for DRD11A.

4. In the **Sensor Operations** window, select **Set** to set a new clean value.



More information

- Cleaning RAINCAP rain sensor (page 238)

16.15 RG13(H) maintenance

To ensure accurate operation, keep the sensor clean. Clean the sensor at least every 6 months. When leaves are falling and there is a lot of debris in circulation, check the sensor more often.

To avoid erroneous measurements, avoid tipping the cup assembly when the gauge is connected to the weather station and the station is operating.

To ensure reliable and accurate measurements, Vaisala recommends you to carry out the following checks at each visit to the rain gauge.

1. Inspect the funnel and filter for any damage or blockage.
2. Remove any obstacles from the funnel, such as leaves, debris, dirt, and dust.
3. Clean the filter by removing the end cap from the filter tube.
4. Carefully remove the filter material once a year, and clean and replace the filter and the cap.
5. To ensure accurate operation, clean the spoon of dust and dirt once or twice a year.
6. Remove and clean any dirt from the bucket.
7. Check that the gauge is still level.

   The gauge can become tilted as a result of small ground movements, such as frost, or vandalism.

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8. If the rain gauge is disconnected from the station or does not log data, check the balance arm of the bucket for stiffness.

   To perform the check, try to balance the bucket in its center position. If the bucket balances easily, examine the bucket closely for any dirt or wear on the pivot pin and bucket tubes.

More information

- Configuring tipping bucket settings (page 50)
- RG13(H) options, spare parts, and accessories (page 356)

16.16 HMP155 maintenance

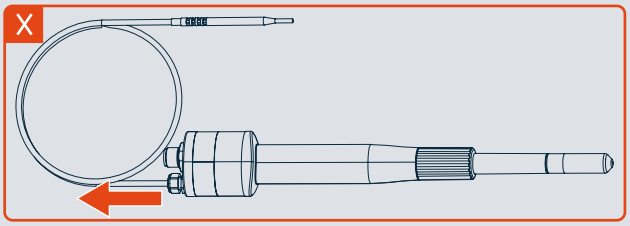
Preventive maintenance for HMP155 includes:

- Checking that the probe is securely mounted.
- Checking that the radiation shield and cable are intact.
- Cleaning the radiation shield using mild detergent and a soft, lint-free cloth.
- Changing the probe filter once a year.

If the measurement site is exposed to air pollution and dust, the probe filter may need to be changed more frequently.

- Sending the sensor to Vaisala for calibration once a year.
- Sending the sensor to Vaisala for calibration if the sensor readings seem inaccurate.

Do not pull the T-probe cable from HMP155. The cable is fixed to the circuit board.



More information

- Configuring HMP155E settings (page 52)
- Changing HMP155 probe filter (page 242)
- Sending HMP155 to calibration (page 243)
- HMP155 options, spare parts, and accessories (page 356)

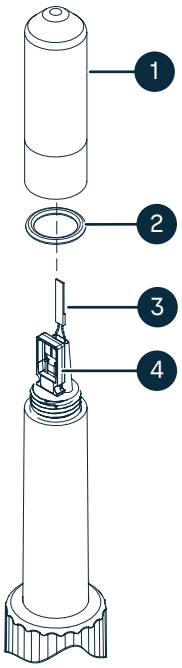
16.16.1 Changing HMP155 probe filter

Over time, the probe filter becomes contaminated with matter that you cannot remove by cleaning. When this happens, the response time becomes longer and measurement accuracy decreases.

CAUTION! The Pt100 temperature sensor is soldered to the probe. Do not try to remove it. The sensor does not require maintenance.

1. Remove the probe from inside the radiation shield.
2. Carefully remove the filter from the probe. Holding the filter by the plastic part, rotate the filter counterclockwise and pull it out.

CAUTION! Do not touch the sensor heads.



1 Filter
2 O-ring
3 Pt100 temperature sensor
4 HUMICAP humidity sensor

3. After removing the filter, check the O-ring and change it if necessary.
4. Install the new filter carefully without delay.
5. Install the probe back inside the radiation shield.

More information

- HMP155 options, spare parts, and accessories (page 356)

16.16.2 Sending HMP155 to calibration

Once a year, or if the sensor readings seem inaccurate, send HMP155 to Vaisala for calibration. Replace it with a calibrated spare probe if available, or wait until Vaisala sends the probe back from calibration.

1. Remove the probe from inside the radiation shield.
2. Send the probe to Vaisala for calibration.
3. Check the operation of the calibrated probe.
4. Place the calibrated probe inside the radiation shield.

After installing the calibrated probe, log in to the Web UI as an administrator or super user, and check that the observation values are shown. If you installed a new probe, also check that the sensor serial number was updated.

16.17 WMT700 maintenance

WMT700 is a very reliable and rugged sensor. Since no moving or consumable parts are used, only minimal maintenance is required.

Preventive maintenance for WMT700 includes:

- Checking that the transducers are not bent, twisted, or rotated. All transducers must be parallel to each other. A damaged array may cause inaccurate readings.
- Checking that the transducers have not been scraped or touched with sharp objects. The silicon rubber coating must be undamaged. If the transducers or the coating is damaged, send the sensor to Vaisala for repair.
- Verifying functionality by using the optional verifier to check the distance between the transducers.

WMT700 is calibrated at the factory and recalibration is not required.

If the sensor becomes contaminated, clean it carefully using mild detergent and a soft, lint-free cloth. Do not use solvents or a pressure washer to clean the sensor, since they may damage the silicon rubber transducer sleeve.



Touching a heated sensor may cause injury. Do not touch heated parts when heating is on. The sensor may detect touching as an ice blockage and start the high-power melting mode.



A heated sensor can be hot during normal operation. Wear protective gloves when working with WMT700.
Let WMT700 cool down for 20 minutes after disconnecting the heating power supply.



CAUTION! Do not clean the instrument or sensor unless it is clearly contaminated.

CAUTION! Handle with care. Any impact on the instrument or sensor array may cause damage and lead to incorrect measurements.

CAUTION! Any temporary object, such as snow, ice, or a bird, that blocks the observation path between the ultrasonic transducer heads may lead to inaccurate measurements.

CAUTION! Do not open the instrument or sensor. There are no user-serviceable parts inside.

More information

- Configuring WMT700 settings (page 53)
- Testing operation (page 244)
- WMT700 options, spare parts, and accessories (page 353)

16.17.1 Testing operation

Optional verifier (WMT70VERIFIER)

WMT700 measures the time it takes for an ultrasonic signal to travel from one transducer to another. Therefore, the accuracy of the sensor depends on the distance between the transducers and the time-of-flight measurement circuit, which uses a crystal oscillator for its time reference.

If necessary, you can verify the distance between the transducer arms with an optional verifier. You can order the verifier from Vaisala as an accessory.

Vaisala recommends that you test the proper operation once a year or if you suspect that the transducers may have been damaged. The sensor arms may be bent or the rubber on the transducers may be damaged. Make a visual check to verify if there is physical damage.

You can perform the test either in the field or in a laboratory.

CAUTION! Do not perform the test when the wind speed is more than 10 m/s (22 mph) or when there is a risk of thunderstorm in the area.

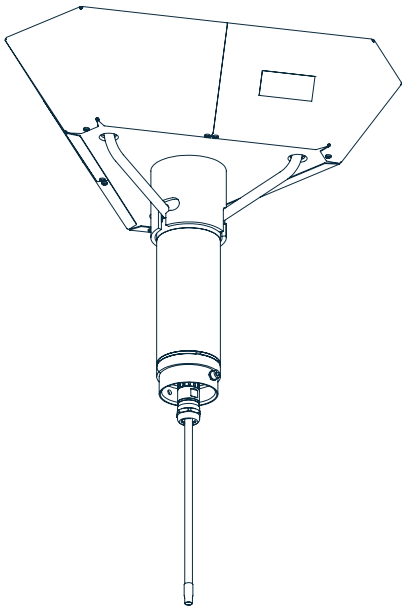
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Some individual data samples may be lost during the verifier test. This does not indicate that the sensor or instrument is faulty.

The verifier cannot be used to test the accuracy of wind direction measurement. During zero wind calibration, the wind direction data is missing. This does not indicate that the sensor is faulty.

Disable heating before performing the verifier test.

1. Slip the verifier over the 3 transducers.



2. Make sure that the reading does not exceed 0.22 m/s (0.5 mph) with the verifier in place.
3. Remove the verifier.

More information

- WMT700 options, spare parts, and accessories (page 353)

16.18 WA15 maintenance



2-mm Allen key

The wind set holds its accuracy in all conditions for one year. If the rains are mostly moderate and the atmospheric conditions on the site are not particularly corrosive, the sensor holds its accuracy for 2 years.

Preventive maintenance for the wind set includes:

- Checking the ball bearings once a year. To do this, remove the vane or cup-wheel assembly. To ensure proper operation, the shaft must spin smoothly without creating any detectable noise.
  If the shaft does not spin smoothly, or stops abruptly, the ball bearings must be replaced. Contact Vaisala helpdesk.
- Cleaning the wind vane when necessary. Heavy contamination, such as bird droppings or ice, deteriorate the accuracy of the wind vane.

More information

- Configuring WA15 settings (page 55)
- Updating WA15 maintenance information (page 246)
- WA15 spare parts and accessories (page 354)

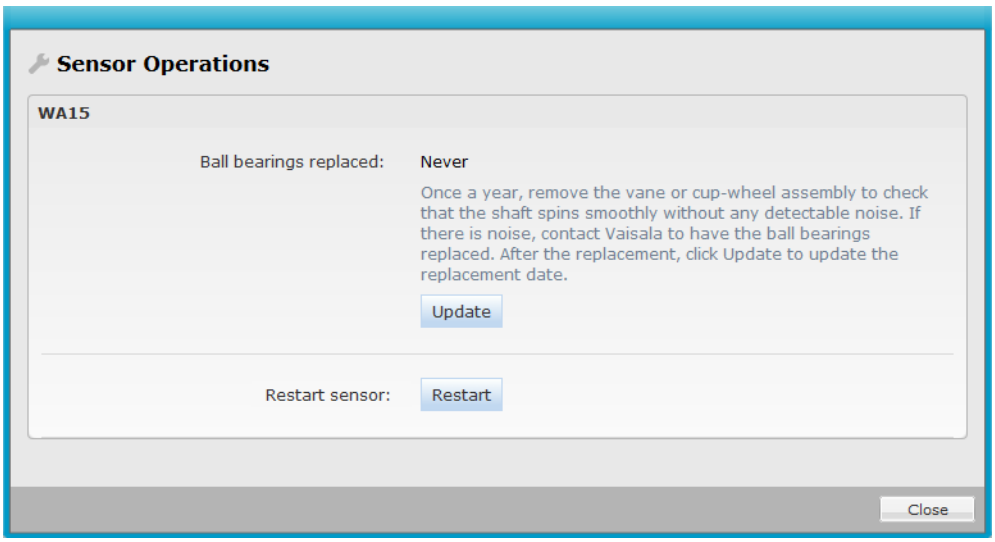
16.18.1 Updating WA15 maintenance information

After replacing the ball bearings, update the replacement date in the station.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for WA15.

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3. In the **Sensor Operations** window, select **Update** to update the replacement date.



4. To close the window, select **Close**.

16.19 R.M. Young Wind Monitor maintenance

Preventive maintenance for R.M. Young Wind Monitor includes:

- Checking the anemometer bearings and the potentiometer at least every second year. If the bearings are noisy or wind speed threshold increases above an acceptable level, replace the bearings.
  After replacing the bearings, update the maintenance information in the Web UI.
- If the sensor measurement data looks suspicious after the maintenance operation, recalibrate the sensor.

For detailed maintenance instructions, see the manufacturer documentation.

To ensure proper orientation when reinstalling the sensor, leave the orientation ring in place when you remove the sensor for maintenance,.

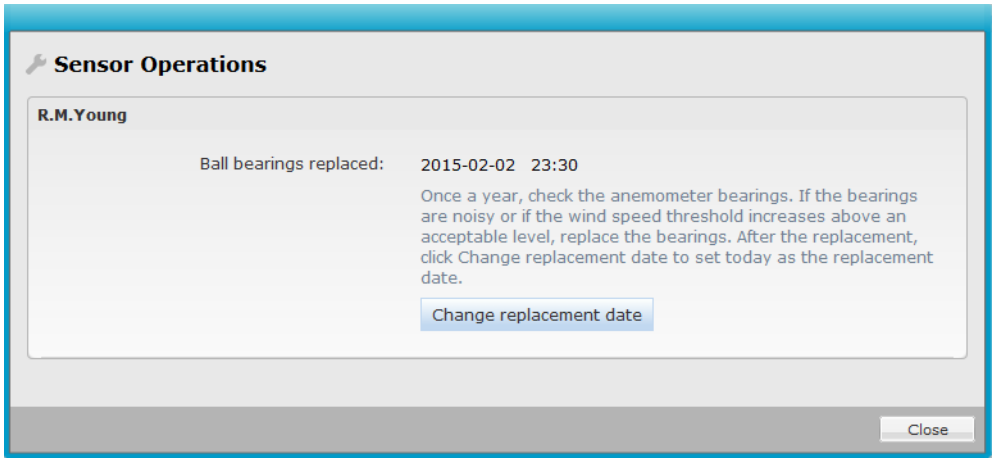
More information

- Configuring R.M. Young Wind Monitor settings (page 57)
- Updating R.M. Young Wind Monitor maintenance information (page 247)
- R.M. Young Wind Monitor options, spare parts, and accessories (page 354)

16.19.1 Updating R.M. Young Wind Monitor maintenance information

After replacing the anemometer bearings, update the replacement date in the station.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for R.M. Young Wind Monitor.
3. In the **Sensor Operations** window, select **Change replacement date** to update the replacement date.



4. To close the window, select **Close**.

16.20 PTB110 maintenance

PTB110 does not require regular maintenance.

The sensor has no replaceable parts. If the sensor malfunctions, replace it.

CAUTION! Do not pierce or disconnect the pressure hose.

More information

- Configuring PTB110 settings (page 59)
- PTB110 options, spare parts, and accessories (page 357)

16.21 Weather transmitter maintenance

Preventive maintenance includes:

- Removing leaves and other such particles from the sensor.
- Replacing the PTU module at least every 2 years.

- Cleaning the sensor carefully using mild detergent and a soft, lint-free cloth.



CAUTION! Do not use alcohol-based cleaning agents.



CAUTION! Handle with care. Any impact on the instrument or sensor array may cause damage and lead to incorrect measurements.

If the sensor readings are inaccurate, send the sensor to Vaisala for calibration.

More information

- Configuring WXT536 settings (page 60)
- Replacing PTU module (page 249)
- Updating weather transmitter maintenance information (page 251)
- WXT530 options, spare parts, and accessories (page 358)

16.21.1 Replacing PTU module



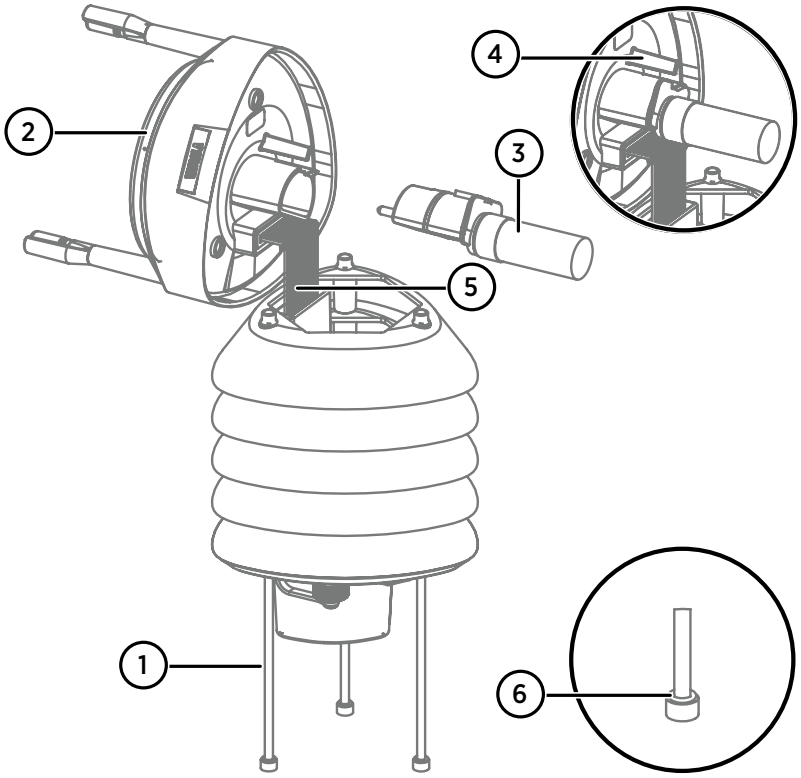
- 3-mm Allen key



In demanding applications, Vaisala recommends changing the PTU module every 2 years.

1. Turn off the power.

2. Loosen the 3 mounting screws at the bottom assembly of the transmitter and pull them out.



1 Fixing screws
2 Top of transmitter
3 PTU module
4 Latch
5 Flat cable
6 O-ring

3. Turn out the top of the transmitter.
4. Release the small white latch and remove the PTU module.
5. Remove the vacuum bag protecting the PTU module.
6. Connect the new PTU module.

CAUTION! Avoid touching the white filter cap.

7. Turn the top back in. Make sure the flat cable does not get stuck or squeezed between the top and the funnel for the flat cable and it is properly connected.
8. If the O-rings are damaged, replace them with new ones.

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9. Tighten the fixing screws.

> To make sure that the radiation shield stays straight, do not tighten the screws all the way in one go. Do not overtighten.

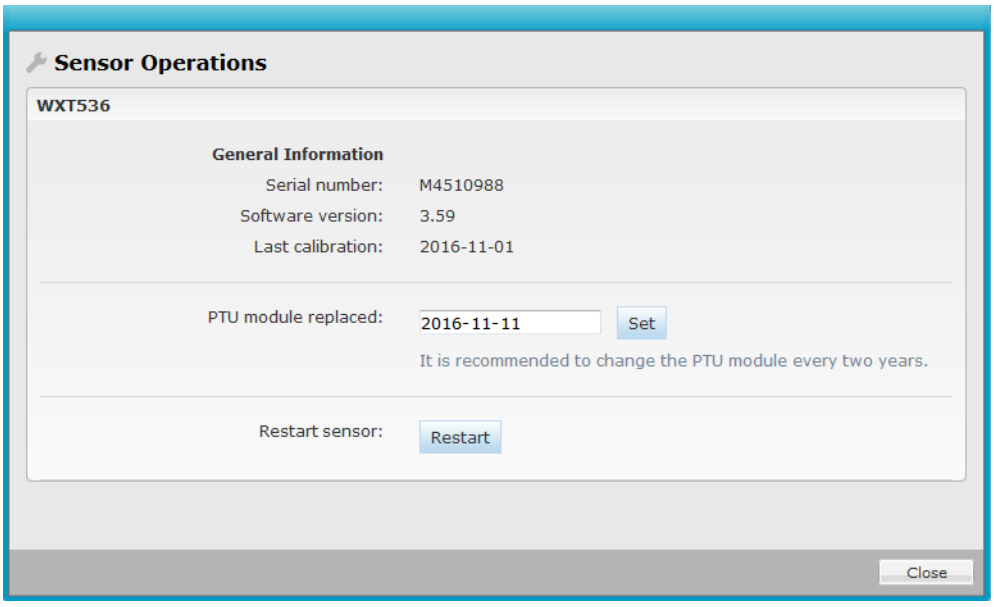
More information

- WXT530 options, spare parts, and accessories (page 358)

16.21.2 Updating weather transmitter maintenance information

After replacing the PTU module, update the weather transmitter maintenance information.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for WXT536.
3. In the **Sensor Operations** window, in the **PTU module replaced** field, select the date and **Set**.



4. To close the window, select **Close**.

16.22 SR50A maintenance

After installation, to calibrate SR50A, configure it for water level or snow depth measurement.

Preventive maintenance of SR50A includes checking and replacing the desiccant at the bottom of the sensor regularly. For detailed instructions, see the manufacturer documentation.

More information

- Setting up SR50A for water level measurement (page 252)
- Setting up SR50A for snow depth measurement (page 256)
- SR50A options, spare parts, and accessories (page 358)

16.22.1 Setting up SR50A for water level measurement

After installation, to calibrate the sensor, set the sensor installation height and the reference level. Both values are relative to a zero level, which you can decide based on the intended usage of the sensor measurements.

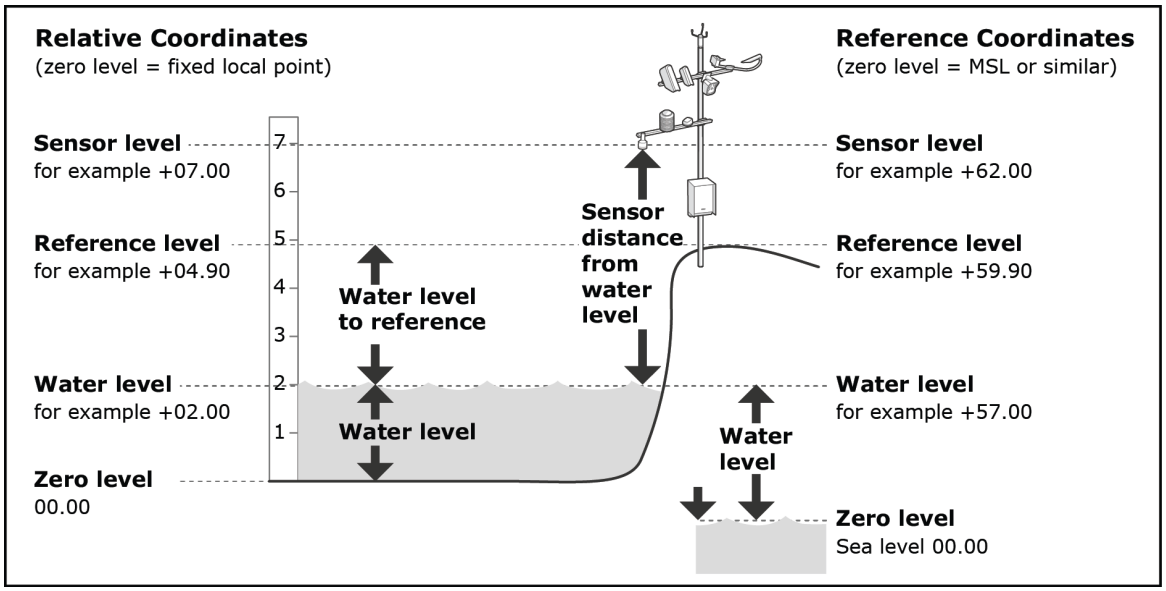


Figure 19 Water level measurement

Table 20 Examples of water level measurement settings

Setting	Example when using relative coordinates	Example when using reference coordinates
Zero level	The bottom of the river.	The mean sea level (MSL).
Sensor level	The distance from the sensor grill to the bottom of the river.	The sensor installation height from zero level.
Reference level	A point where water level becomes critical, such as the river bank.	A point where water level becomes critical, such as the lowest point of a building.

The distance to reference level observation indicates how much the water level needs to rise until the critical point is reached. When this happens, you can, for example, close the road for traffic.

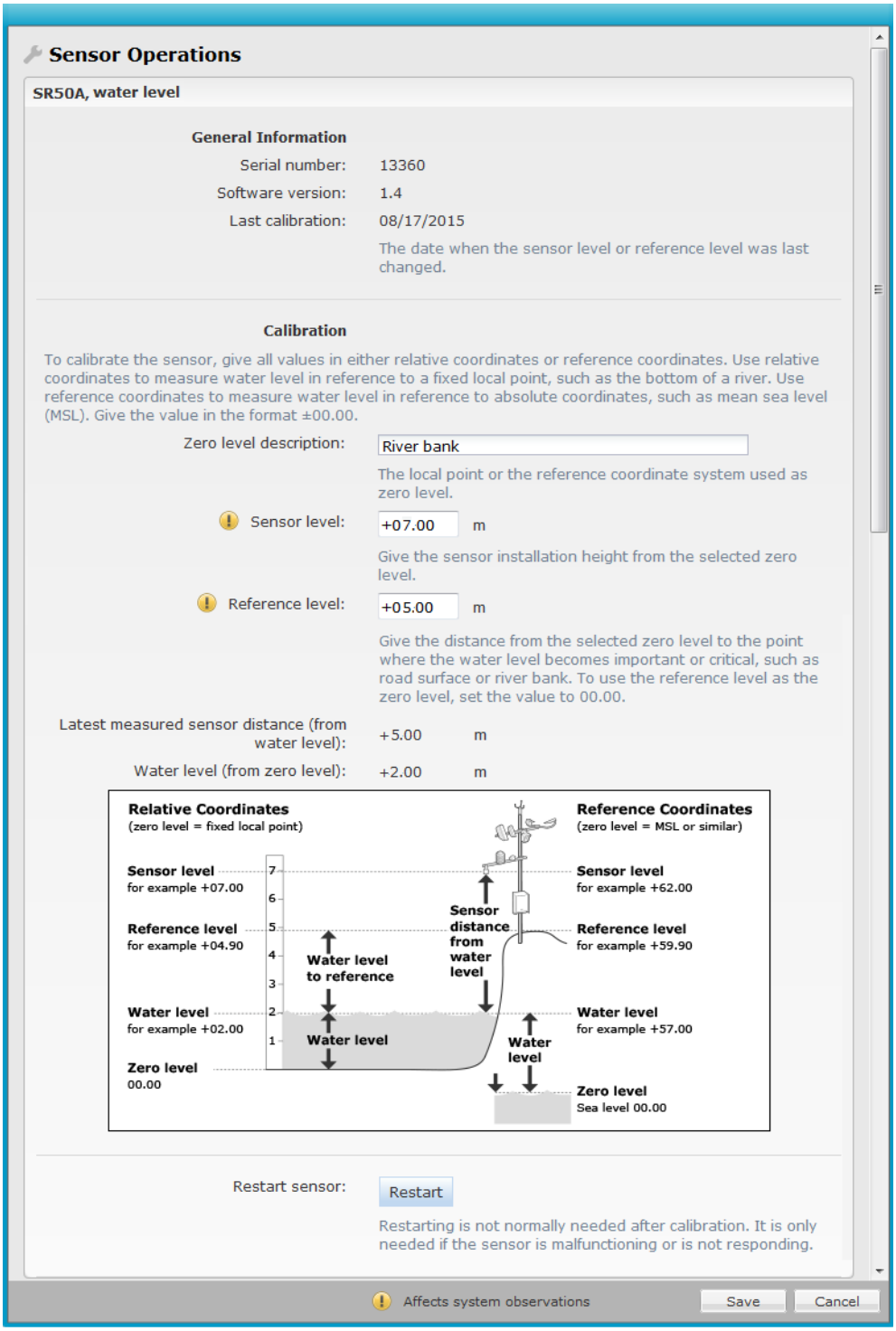
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for SR50A.

3. In the **Sensor Operations** window, set the following:

   Zero level description
   The selected zero level, for example, bottom of the river or MSL.

   Sensor level
   Vertical distance of the sensor from the zero level. Set the value to **≥00.00** meters. This setting affects system observations ❗.

   Reference level
   Vertical distance of the reference level from the zero level. Type the coordinates in the format **00.00** meters using the same coordinates as for the sensor level. This setting affects system observations ❗.



4. To save the changes, select **Save**.

More information

- Configuring SR50A settings (page 62)

16.22.2 Setting up SR50A for snow depth measurement

After installation, to calibrate the sensor, set the sensor installation height and the reference level. Both values are relative to a zero level, which is typically a fixed local point, such as ground level.

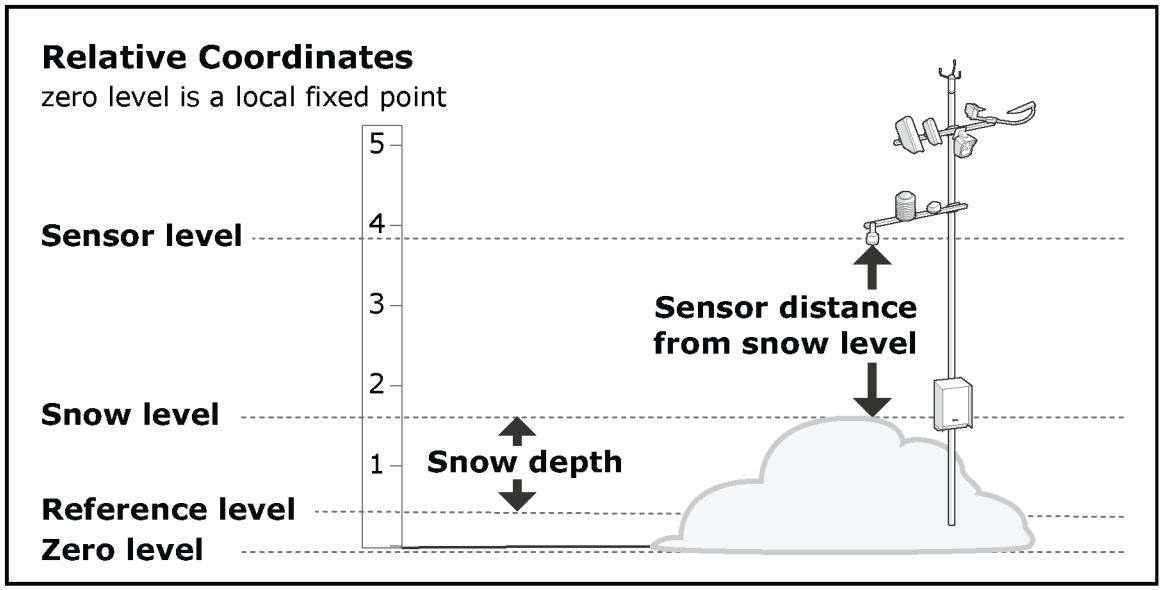


Figure 20 Snow depth measurement

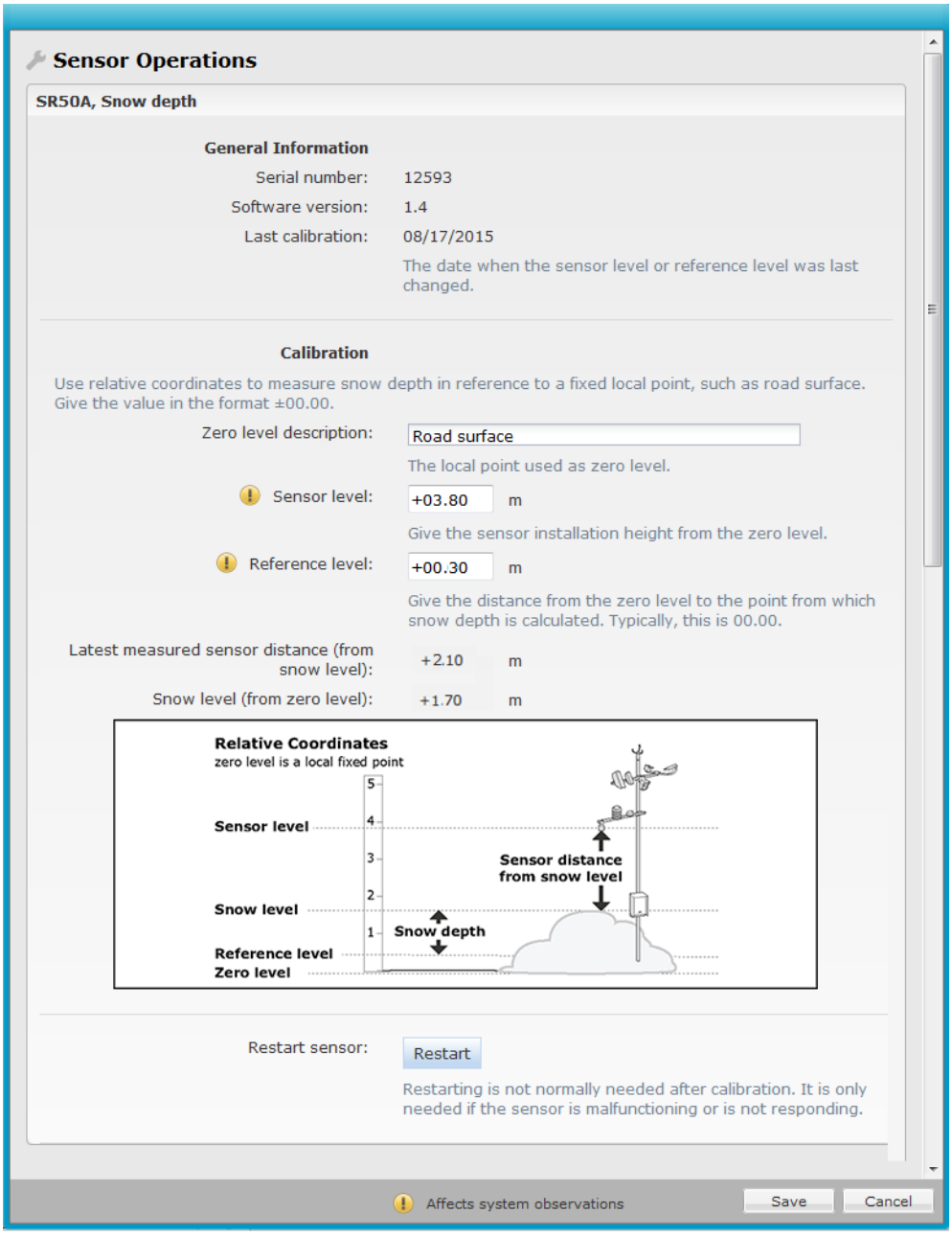
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for SR50A.

3. In the **Sensor Operations** window, set the following:

Zero level description
Description of the selected zero level.

Sensor level
Vertical distance of the sensor from the zero level. Set the value to **≥00.00** meters. This setting affects system observations ⚠.

Reference level
Vertical distance of the reference level from the zero level. To have the sensor report absolute snow depth, set the value to **00.00**. You can also set the value to the point where snow depth becomes critical. This setting affects system observations ⚠.



4. To save the changes, select **Save**.

More information

- Configuring SR50A settings (page 62)

16.23 SP Lite2 maintenance

Preventive maintenance for SP Lite2 includes:

- Cleaning the dome window using water or alcohol.
- Keeping the sensor levelled.

Kipp & Zonen recommends that you calibrate the sensor every 2 years. For instructions, see the manufacturer documentation.

More information

- Configuring global radiation sensor settings (page 64)
- SP Lite2 options, spare parts, and accessories (page 359)

16.24 Mobotix fixed camera maintenance

Preventive maintenance for the fixed camera includes cleaning the camera lens at least once a year or more often, depending on the conditions.

Clean the lens using a soft, lint-free cloth. Make sure that the lens is still in focus after cleaning. Adjust the focus if needed.

More information

- Configuring fixed camera settings (page 68)
- Mobotix options, spare parts, and accessories (page 359)

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17. Repair maintenance

17.1 Replacing sensors

Before starting, order the new sensor from Vaisala, and write down the serial number.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. To take a backup of the configuration, export the current configuration to a file.
3. To check the station configuration, generate a station summary report.
4. Power down the station from the PMU701 power switch.
5. Remove the old sensor and its cabling. Vaisala recommends that you also change the cable when changing the sensor.
6. Install the new sensor.

   See RWS200 Installation Manual (M211608EN).
7. Power up the station. This may take a while.
8. Wait until the DMU703 status LED turns green.
9. Log in to the Web UI, and check that the following is true:
   - The new sensor shows as enabled and detected in the **Device Configuration** window.
   - The new sensor is listed in the **Sensors** component on the **Station Settings** page.
   - The sensor shows observation data on the **Measurements** page.
   - The sensor settings show the new serial number.
10. Configure and calibrate the sensor.
11. If you are using NTCIP, open the NTCIP data reporting settings and select **OK** to update the sensor version information in NTCIP.
12. Take a backup of the new configuration.
13. Generate a station summary report.

More information

- Sensor settings (page 28)
- Generating station summary report (page 183)
- Changing sensor and device configuration for PMU701 (page 301)
- Changing sensor and device configuration for DRI701 (page 304)
- Exporting current station configuration (page 311)
- Updating TPS10 settings (page 228)

17.2 Replacing system components

In some overvoltage conditions, some protective components might get damaged and need replacement (for example, surge protectors in case of a lightning strike).

To replace components other than the ones instructed in the following sections, contact Vaisala.



CAUTION! Improper modification can damage the product or lead to malfunction. Any modification voids your warranty.

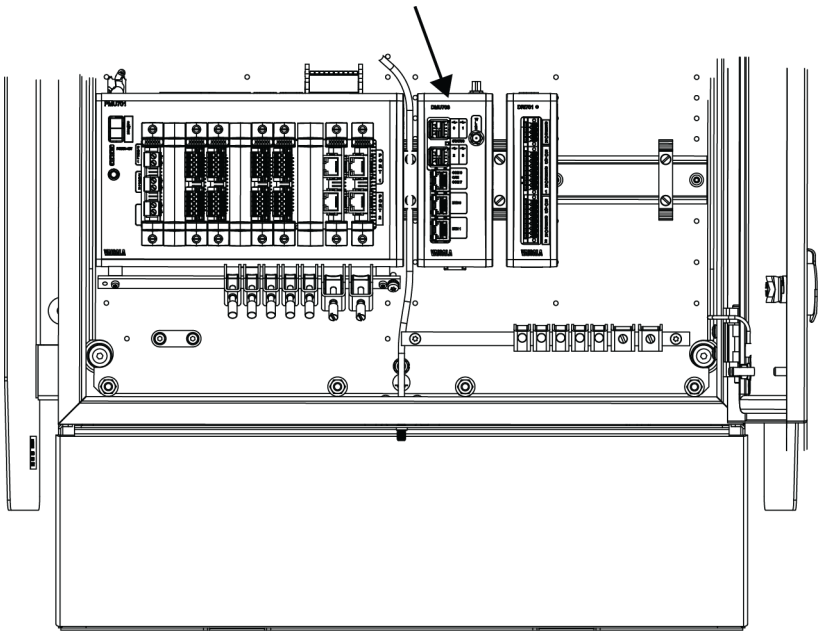
More information

- Replacing DMU703 (page 260)
- Replacing DMU703 lithium battery (page 262)
- Replacing backup battery (page 263)
- Replacing AC (mains) input assembly (page 266)
- Replacing surge protector (page 273)
- Replacing AC/DC power supply unit (page 273)
- Replacing WR21 cellular router with IX20 (page 275)
- Replacing PMU701 (page 279)
- Replacing PMU701 plug-in modules (page 281)
- Replacing DRI701 (page 282)

17.2.1 Replacing DMU703



Flat head screwdriver



1) Internal cabling not shown

Figure 21 DMU703 on standard backplate

The system settings are stored in DMU703. Vaisala recommends that you back up the settings before making any changes to the configuration and also after the changes, and that you send both files to Vaisala. If DMU703 must be replaced, you then have a copy of the settings.

If you do not have a backup copy and you have not sent the files to Vaisala, you can request the factory settings from Vaisala.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. To take a backup of the configuration, export the current configuration to a file.
3. Power down the station from the PMU701 power switch.
4. Disconnect cabling from DMU703.
5. Release the DIN rail locking piece and remove the unit.
6. Insert the new DMU703 onto the DIN rail and snap it into place.
7. Reconnect cabling.
8. Power up the station. This may take a while.
9. Check that the new DMU703 works properly.
10. Set the station serial number again.
11. Upload the system settings to the station.
12. Recreate the system certificate, if needed.

13. Check the calibration values for the sensors that can be calibrated on the field. If the values did not remain the same, calibrate the sensor.

More information

- Setting station serial number (page 88)
- System security certificates (page 159)
- Replacing DMU703 lithium battery (page 262)
- Importing new configuration to station (page 308)
- Exporting current station configuration (page 311)
- DMU703 spare parts and accessories (page 345)

17.2.2 Replacing DMU703 lithium battery

- Flat head screwdriver
- Torx T10 screwdriver

DMU703 contains a lithium real-time clock battery to keep the system clock running during power outages. The battery type depends on the DMU703 circuit board revision, which is shown in the station summary report.

- DMU703CB-E and earlier versions contain a CR1220 battery, which lasts for 6 months if DMU703 is powered down. When DMU703 is operating normally, the battery lasts for several years.
- DMU703CB-F and later contain a CR2032 battery, which lasts for several years even when DMU703 is powered down. This change was done in 2018.

Replace the battery before it runs out. If the battery is empty when DMU703 is powered down, the station date and time are lost when DMU703 is powered up again.

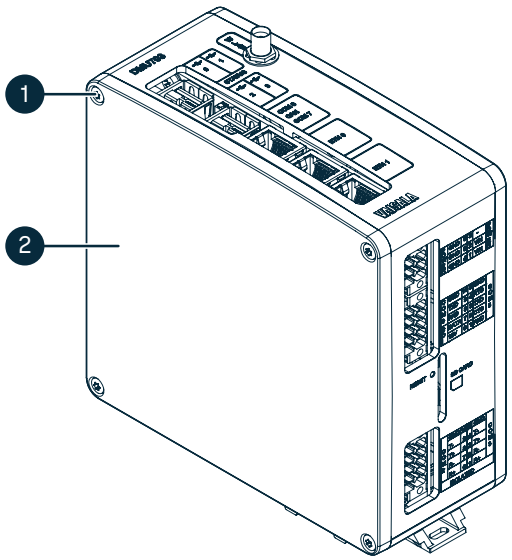
Vaisala recommends that you use Panasonic, Varta, or Renata battery.

WARNING! Do not replace the battery with a battery of an incorrect type. If you do, there is a risk of deflagration. Dispose of used batteries according to statutory regulations.

1. Power down the station from the PMU701 power switch.
2. To remove DMU703 from the DIN rail, slide down the locking piece with a flat head screwdriver, and lift DMU703.

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3. Remove the left side plate of DMU703.



1 Torx screw (4 pcs)
2 Side plate

4. Press the battery clip to spring the old battery from the holder.
5. Insert the new battery in the holder and press it down.

Make sure to place the battery text (**+**) side up.

6. Reattach the DMU703 side plate and insert DMU703 back on the DIN rail.
7. Power up the station. This may take a while.

17.2.3 Replacing backup battery

- Allen keys
- Crosshead screwdriver

These instructions apply to 12 V / 24 to 28 Ah batteries.

Replace lead-acid batteries every 5 years. When operating in an environment where the ambient temperature is regularly over +25 °C (+77 °F), the battery may need to be replaced more often.

If a solar-powered station powers off during the night, it means that the battery is not working and must be replaced.

WARNING! Do not replace the battery with a battery of an incorrect type. If you do, there is a risk of deflagration. Dispose of used batteries according to statutory regulations.

WARNING! Do not throw the battery into a hot oven or fire, or mechanically crush or cut the battery. Improper disposal can cause an explosion.

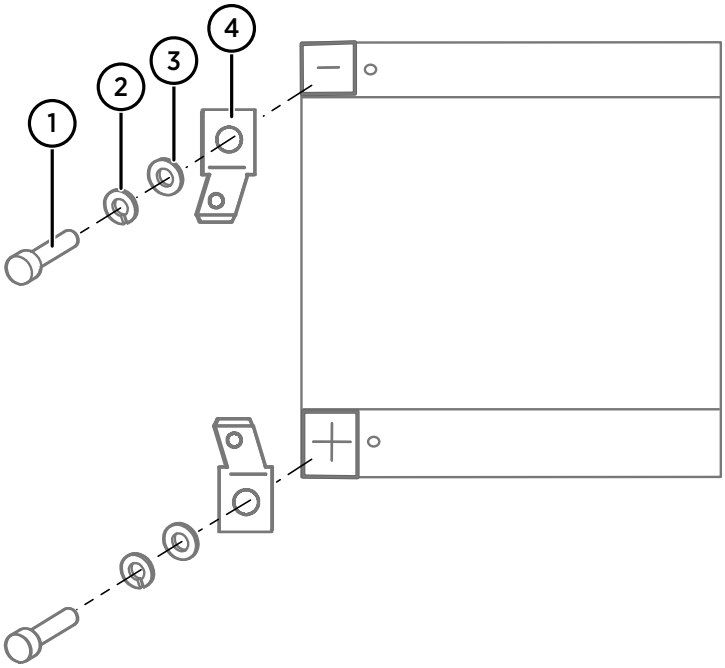
WARNING! Do not leave the battery in an environment surrounded by extremely high temperatures. Extremely high temperature can result in deflagration or leakage of flammable liquid or gas.

WARNING! Make sure that the battery is not subjected to an extremely low air pressure. Extremely low air pressure can result in deflagration or leakage of flammable liquid or gas.

1. Before replacing the battery, check the condition of the spare battery.
   a. If the spare battery has been stored without charging for over 4 months, use a multimeter to measure the voltage between the terminals.
   b. If the voltage is below 11.5 V, do not take the battery into use unless you are sure that it is operational.
2. Power down the station from the PMU701 power switch.

3. Disconnect the negative (black) cable from the battery.

> **WARNING!** Always disconnect the negative battery cable first. If the positive battery terminal contacts ground with the negative cable installed, the cables heat up and the battery can deflagrate, which could result in serious injury.



1 Screw (2 pcs)
2 Spring washer (2 pcs)
3 Flat washer (2 pcs)
4 Connector (2 pcs)

4. Disconnect the positive (red) cable from the battery.
5. Remove the mounting clamp and the battery from the battery holder.
6. Mount the new battery.
7. Reconnect the positive (red) cable and then the negative (black) cable.

   The terminals in the 28 Ah battery require M6 connectors in the cables. If the battery cables have M5 connectors, replace them with the M6 connectors delivered with the spare battery.
8. Reattach the mounting clamp.
9. Power up the station. This may take a while.
10. If PMU701 software version is 2.10 or 3.10 or later, reset the battery status by pressing the WLAN **WAKE UP** button on the PMU701 front panel for more than 5 seconds.

11. Wait for 2 minutes. If the battery status remains `Not OK, not charging`, check the battery condition.

More information

- Checking PMU701 and backup battery condition remotely (page 199)
- Checking PMU701 and backup battery condition onsite (page 202)
- Backup battery spare parts (page 348)

17.2.4 Replacing AC (mains) input assembly



- Flat head screwdriver
- T20 Torx screwdriver
- 7-mm socket wrench
- Multimeter



WARNING! Only licensed experts may install electrical components. They must adhere to local and state legislation and regulations.

1. Switch off incoming AC (mains) power and make sure that there is no mains power coming to the mains input assembly.
2. Remove the transparent protective cover in front of the AC (mains) power input assembly.

3. Disconnect the AC (mains) wires and the wires coming from the AC power supply unit and the optional second power supply unit.

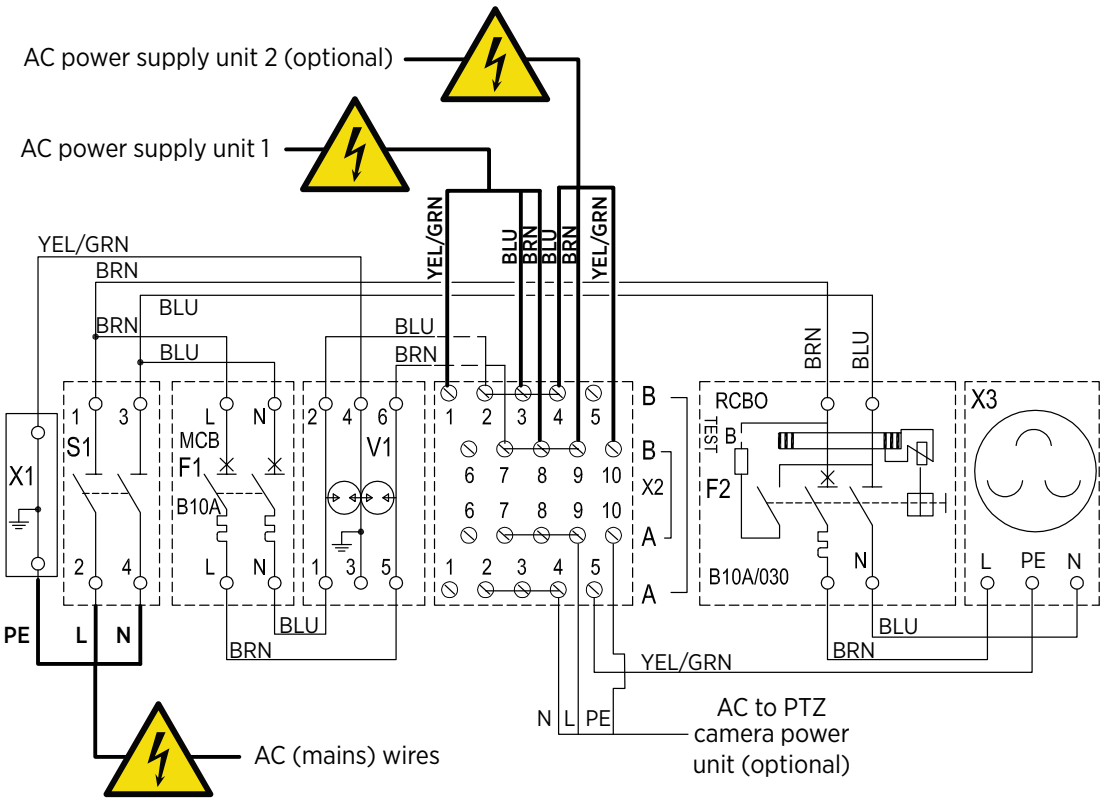


Figure 22 Old AC input assembly with other than Type B service socket

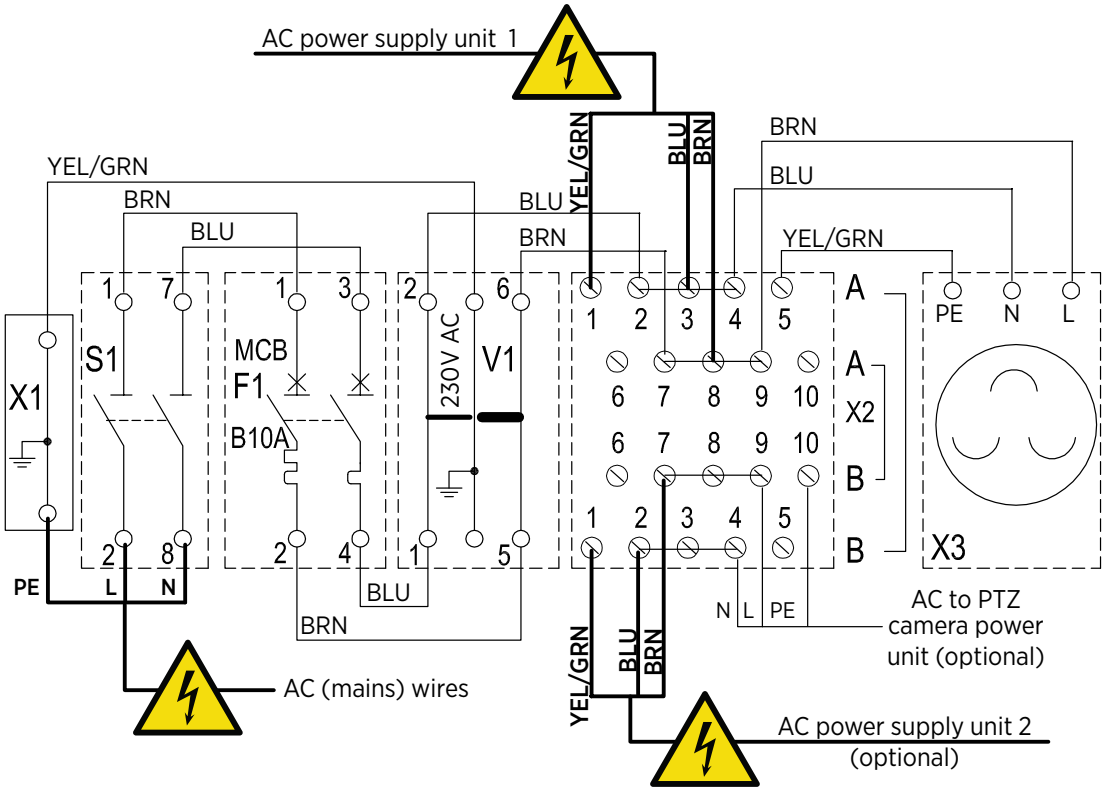


Figure 23 Old AC input assembly with Type B service socket

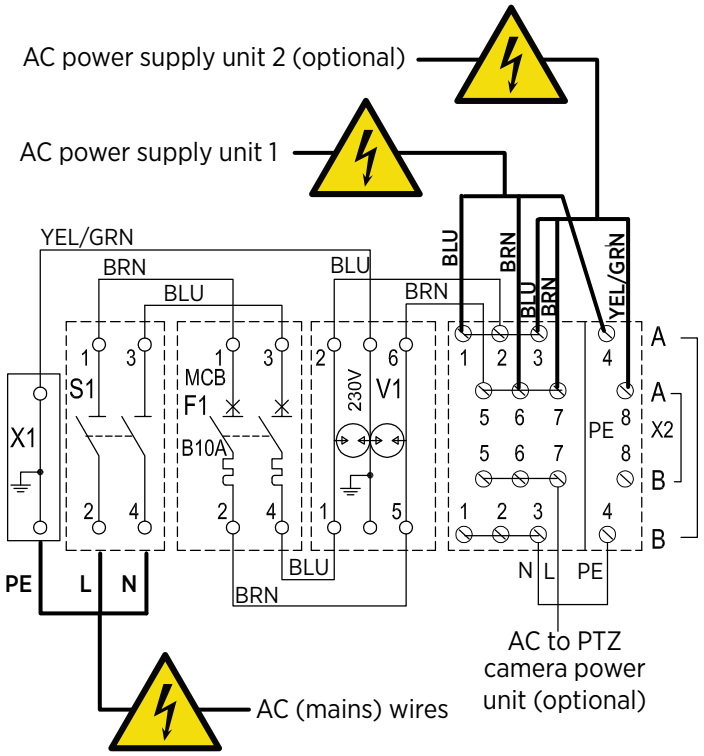


Figure 24 Old AC input assembly without service socket

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4. If the center Torx screw is not visible, loosen the end brackets and move the right-most components to reveal the screw.

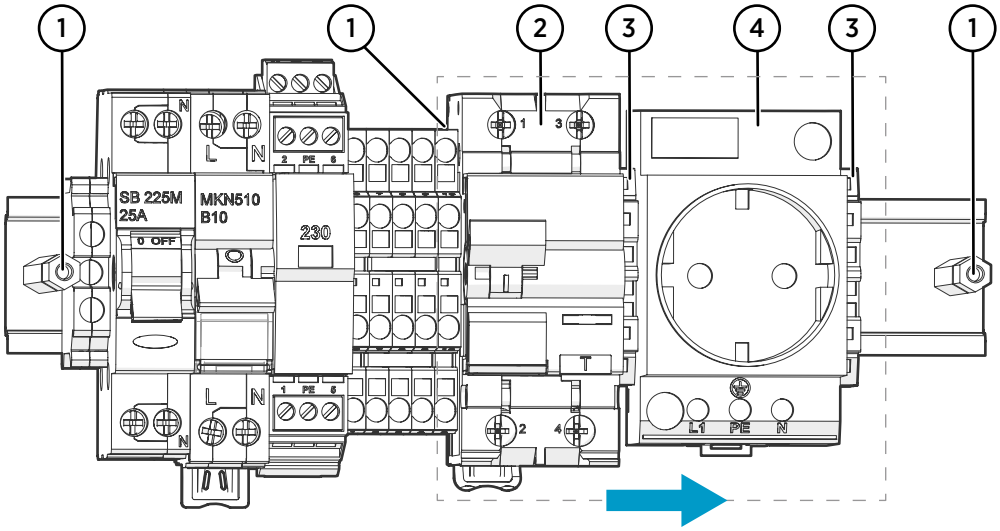


Figure 25 Locating center Torx screw in old AC input assembly

1 Torx screw (3 pcs)
2 Ground fault circuit interrupter (residual-current circuit breaker, RCBO)
3 End bracket
3 Service socket

5. Take a firm hold of the mains input assembly and unfasten the Torx screws to remove the DIN rail from the backplate.
6. Attach the new mains input assembly to the backplate.

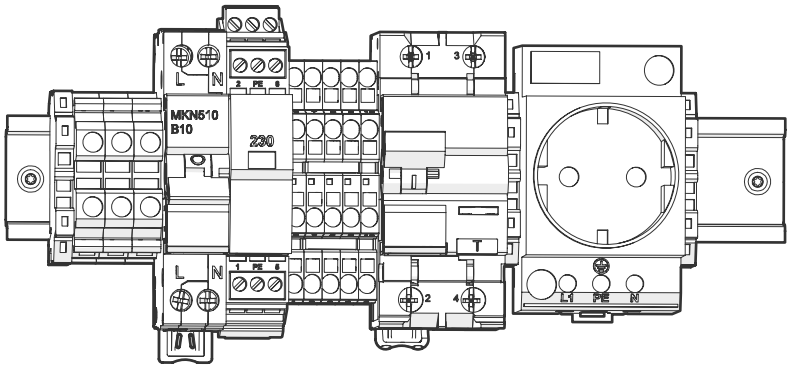


Figure 26 New AC input assembly

7. Reconnect the mains wires and the wires from the AC power supply unit.

The AC (mains) switch has been removed from the AC (mains) input assembly. Follow the wiring instructions below.

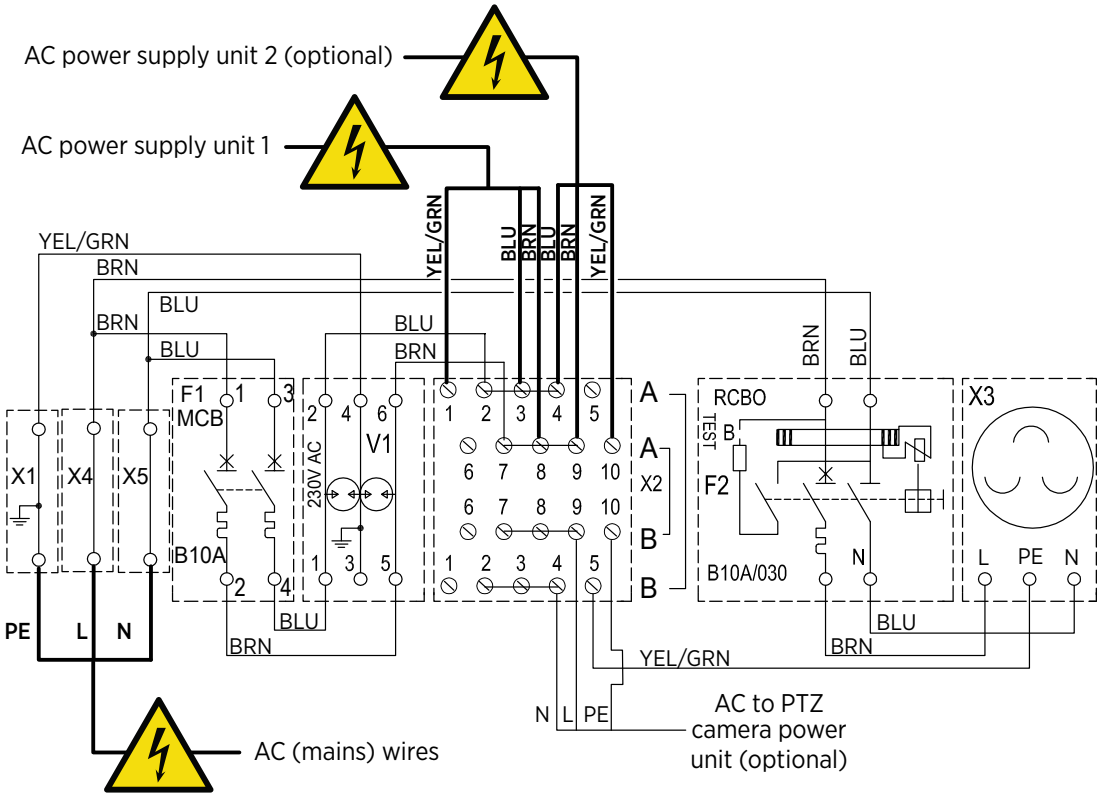


Figure 27 New AC input assembly without AC (mains) switch (other than Type B service socket)

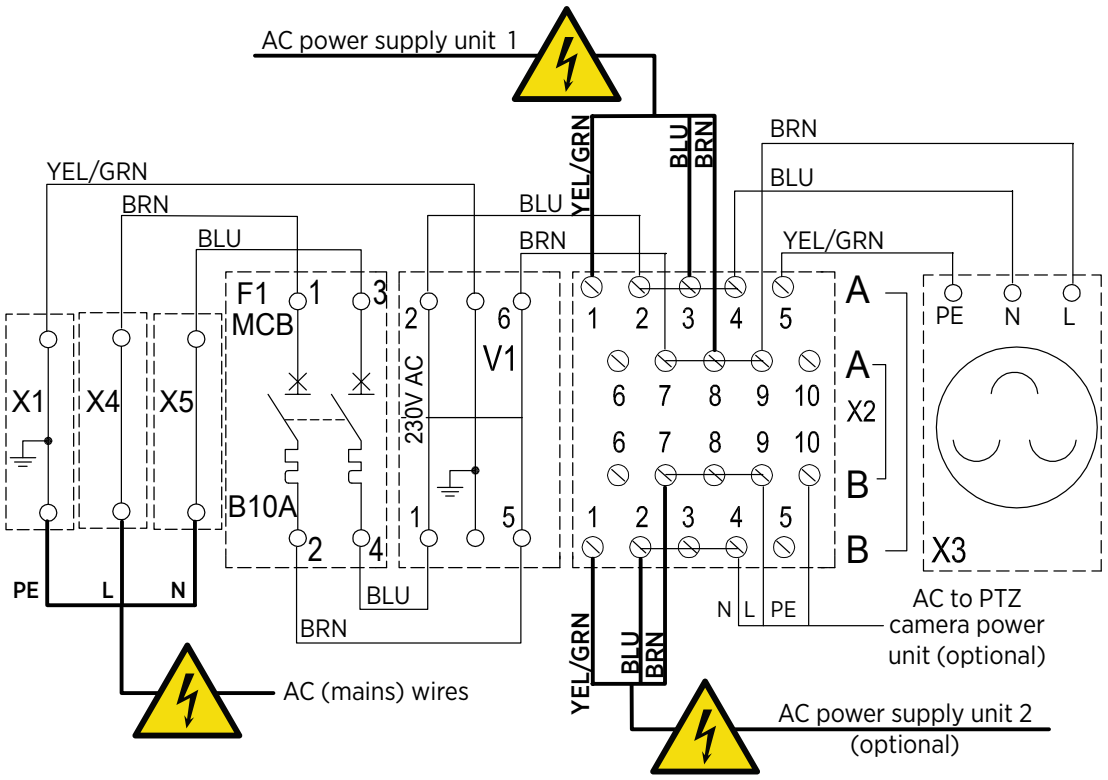


Figure 28 New AC input assembly without AC (mains) switch (Type B service socket)

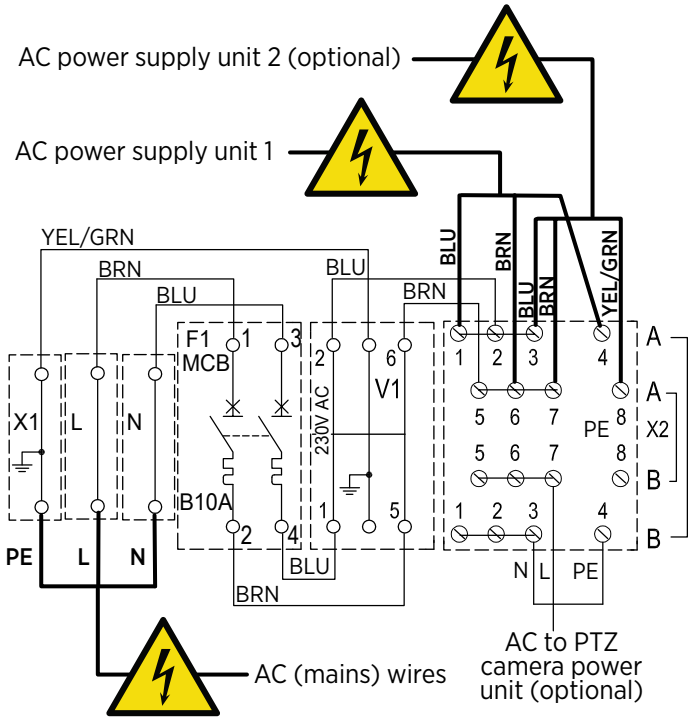
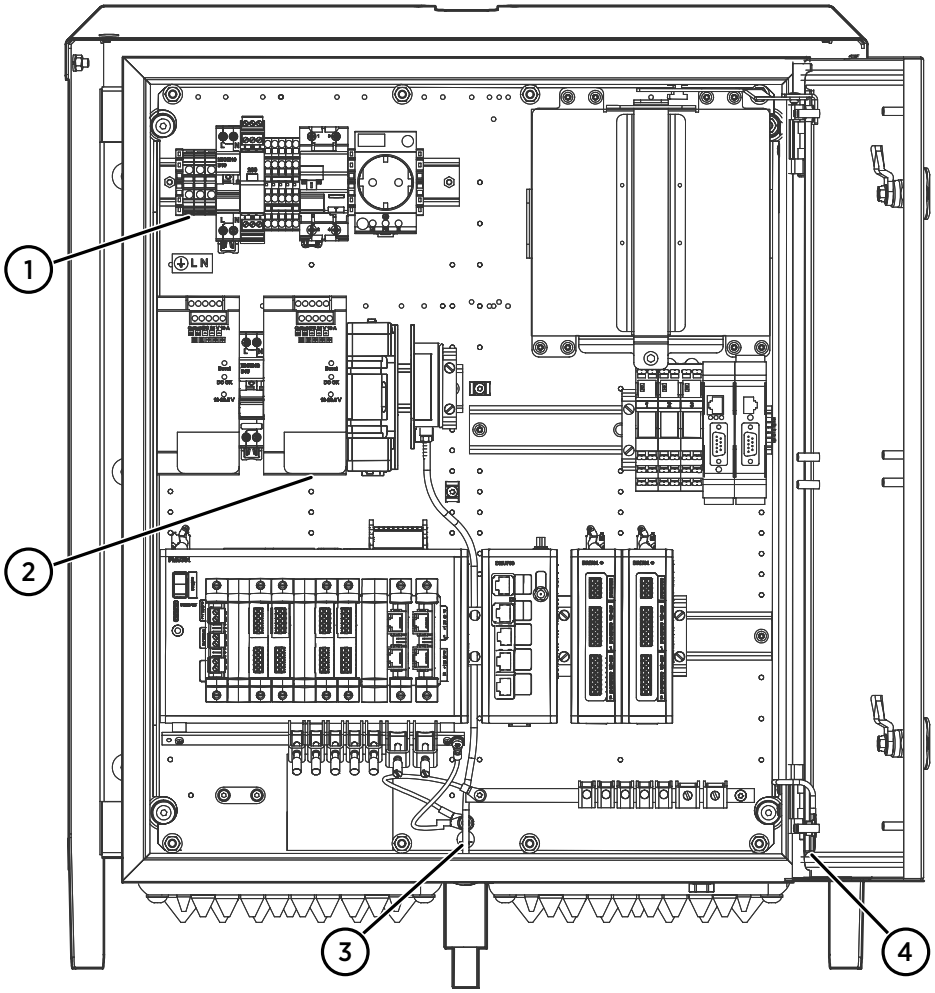


Figure 29 New AC input assembly without AC (mains) switch (no service socket)

8. Visually check that the wiring is correct. Check also that the wires are firmly attached to the terminals.
9. Use a multimeter to test ground continuity.

   Check that there is no resistance between the following points:



1 Protective ground terminal PE/GND in AC (mains) input assembly
2 AC power supply grounding point
3 Backplate grounding point
4 Enclosure grounding point

10. Switch on power.
11. Use a multimeter to test phase and neutral.
    a. Check the voltage between the enclosure and the phase terminal (L).

       The reading should be close to the AC (mains) voltage.

    b. Check the voltage between the enclosure and the neutral terminal (N).

       The reading should be close to 0 (zero).
12. Test the functionality of the ground fault circuit interrupter (RCBO).

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13. Reattach the transparent protective cover.

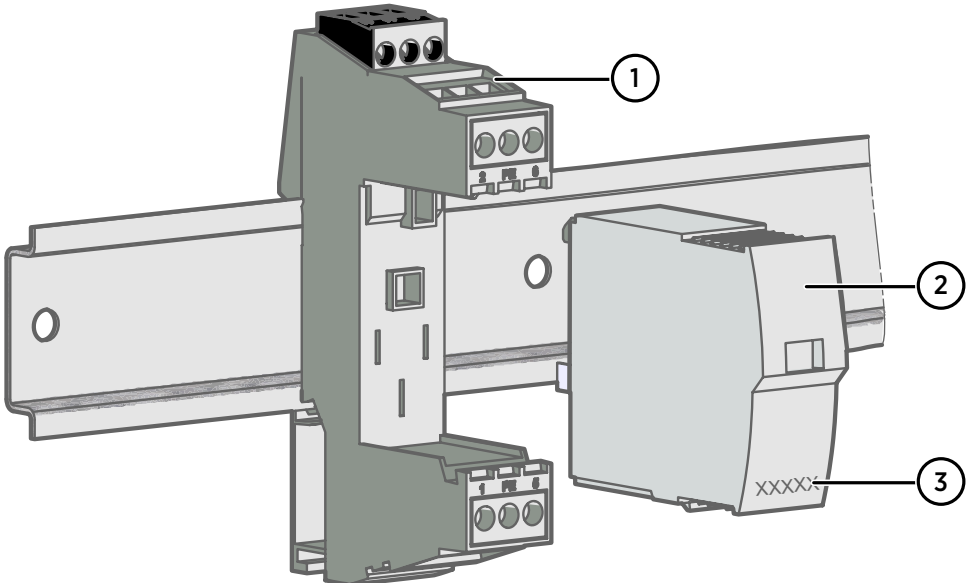
More information

- AC (mains) input spare parts (page 347)

17.2.5 Replacing surge protector

If the indicator on top of the surge protector plug is red, replace the unit.

1. Switch off AC (mains) power and make sure that there is no mains power available for the power supply unit.
2. Pull out the plug module, and replace the plug with a new one.



1 Surge protection socket
2 Surge protection plug
3 Manufacturer part number

3. Power up the station. This may take a while.

More information

- AC (mains) input spare parts (page 347)

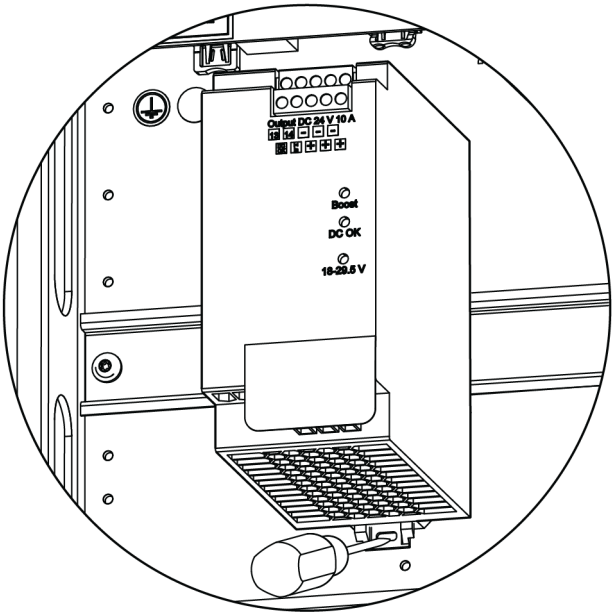
17.2.6 Replacing AC/DC power supply unit

Flat head screwdriver

WARNING! Electricity hazard
Incorrect electrical installation can cause serious injury or death. Only licensed experts may install electrical components.

Do not open the power supply unit. There are no user-serviceable parts inside the unit. If the power supply unit is faulty, replace it.

1. Switch off AC (mains) power and make sure that there is no mains power available for the power supply unit.
2. Disconnect cabling from the power supply unit.
3. Release the DIN rail locking piece and remove the unit.



4. Insert the new unit on the DIN rail and snap it to place.
5. Remove the new power supply unit connectors.
6. Connect the old unit connectors with wires to the new unit.
7. Power up the station. This may take a while.
8. Check that the new unit works properly.

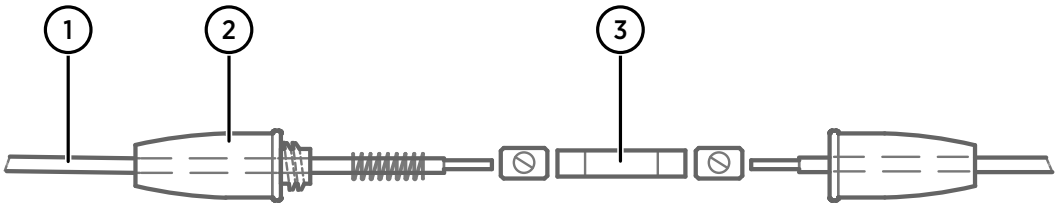
More information

- AC/DC power supply unit spare parts (page 348)

17.2.7 Replacing LED light fuse

The optional LEDs inside ENC653 have a 1 A fuse. Replace the LED fuse if the lights do not turn on when you open the enclosure door. The lights only turn on when the battery is connected.

1. Power down the station from the PMU701 power switch.
2. Rotate the fuse holder to open it.



1 Wire
2 Fuse holder
3 Fuse

3. Replace the fuse.
4. Rotate the fuse holder to close it.
5. Power up the station. This may take a while.
6. Check that the lights turn on.

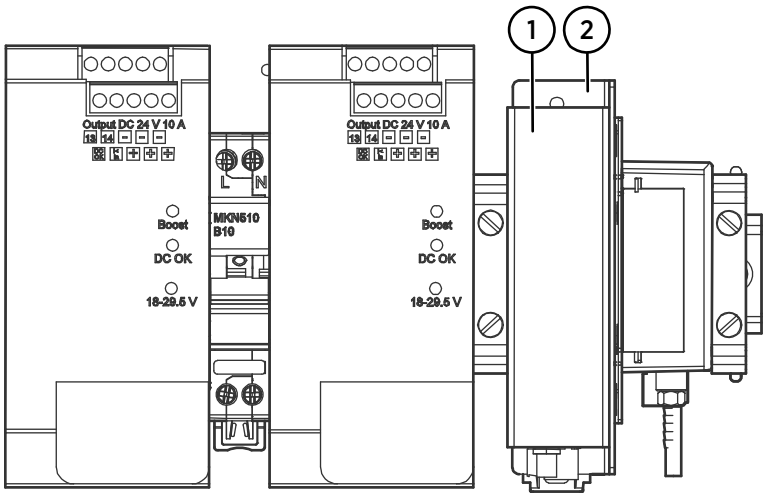
17.2.8 Replacing WR21 cellular router with IX20

The mounting bracket used with WR21 does not fit IX20. The power cable connector is also different. When replacing the WR21 with IX20, you must also replace the mounting bracket and the power cable. The IX20 mounting bracket is suitable for both IX20 and WR21.

1. Disconnect the cables from WR21.

   Disconnect the power cable also from PMU701.

2. Remove WR21 from the mounting bracket.

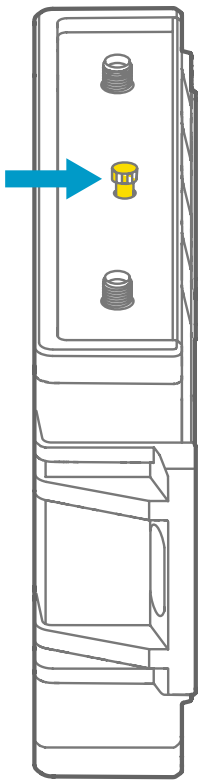


1 WR21 cellular router
2 WR21 mounting bracket

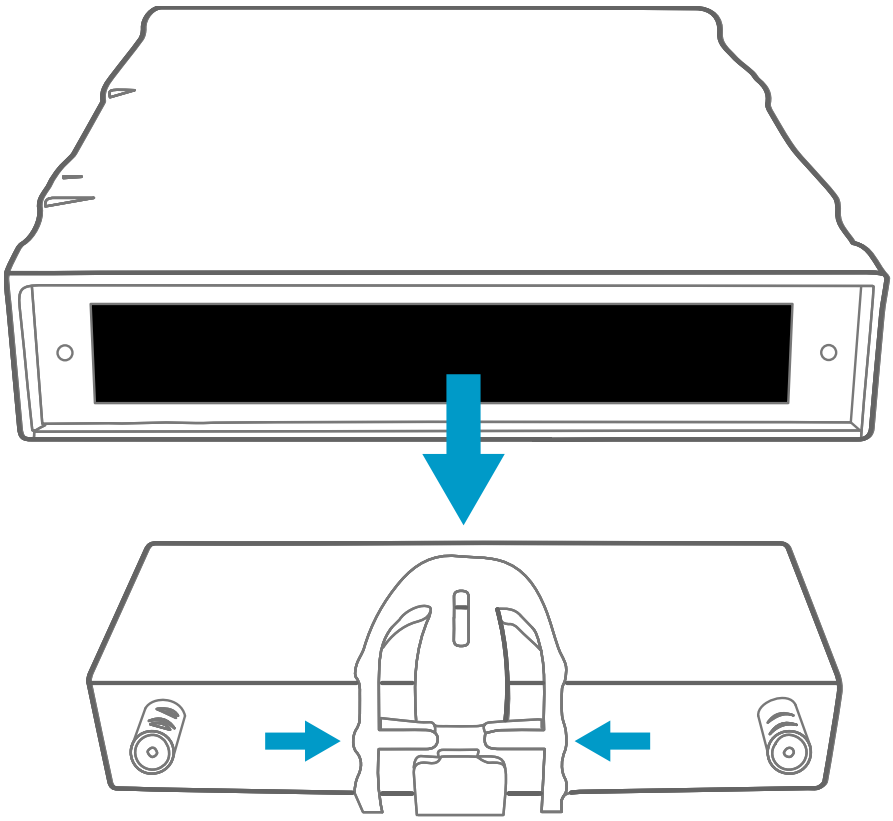
3. Remove the SIM card from WR21.
4. Remove the WR21 mounting bracket from the DIN rail.

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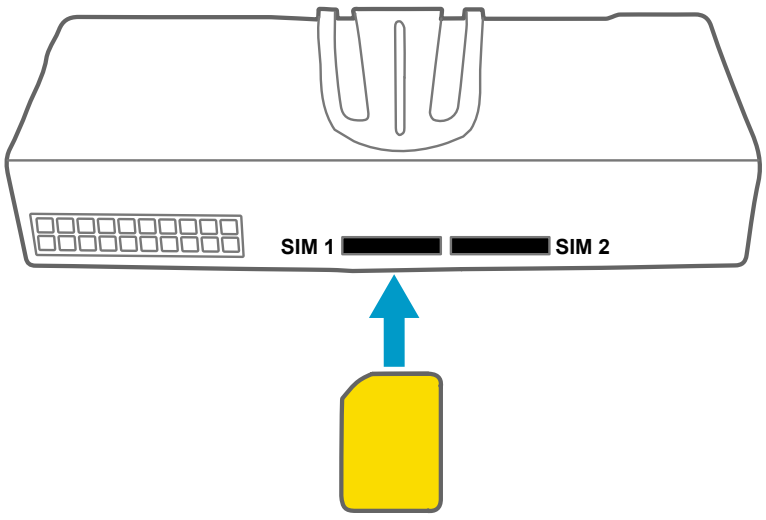
5. Insert the SIM card into IX20.
   a. On the top panel of the cellular router, loosen the thumb screw to remove the cover plate.



   b. Unfasten the anchor screw and pinch the sides of the white clip to slide out the modem.



c. Insert the SIM card to the **SIM1** slot so that the contacts are facing down.



d. Slide the modem back into the router until you hear a click.

e. Reattach the cover plate and tighten the thumb screw.

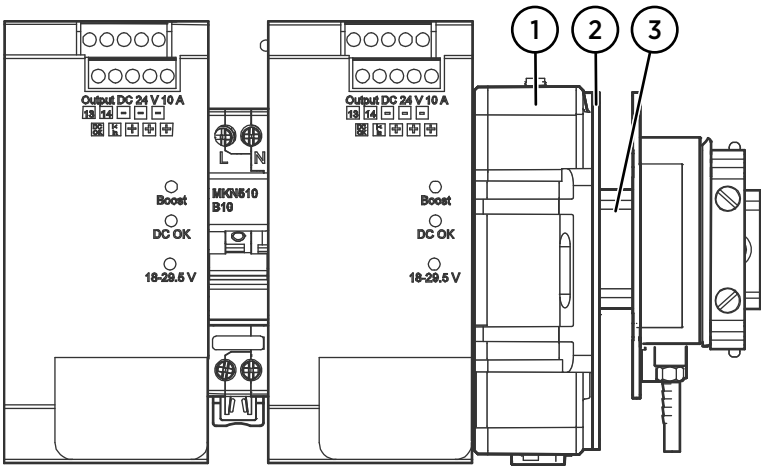
6. Attach IX20 to the IX20 mounting bracket.

   IX20 does not fit into the WR21 mounting bracket.

7. Connect the cables to IX20.

IX20 connector	Cable	Device and port
WWAN-1	**Cellular P**	Multiband antenna
WWAN-2	**Cellular S**	Multiband antenna
WAN/ETH1	Ethernet cable	DMU703 **ETH 0**
Power	IX20 power cable	PMU701 **TELECOM**

8. Attach IX20 with the mounting bracket to the DIN rail.



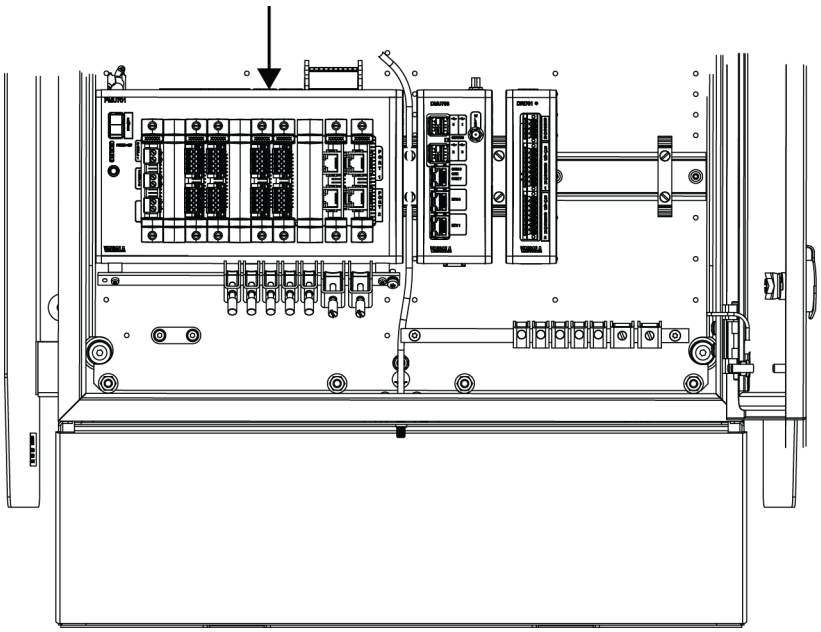
1 IX20 cellular router
2 IX20 mounting bracket
3 DIN rail

More information

- Configuring IX20 cellular router (page 100)
- Cellular router spare parts and accessories (page 348)

17.2.9 Replacing PMU701

Flat head screwdriver



1) Internal cabling not shown

Figure 30 PMU701 on standard backplate

PMU701 does not have any replaceable parts, except the plug-in modules.

1. Power down the station from the PMU701 power switch.
2. Disconnect cabling from PMU701.
3. Release the DIN rail locking piece and remove the unit.
4. Insert the new PMU701 onto the DIN rail and snap it into place.
5. Remove the plug-in modules from the old PMU701 and insert them to the new PMU701.
6. Reconnect cabling. Remember to reconnect the grounding cable.
7. Power up the station. This may take a while.
8. On the **Measurements** page, check that the observations are shown. This may take a while.

More information

- Checking PMU701 and backup battery condition remotely (page 199)
- Checking PMU701 and backup battery condition onsite (page 202)
- PMU701 spare parts and accessories (page 345)

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17.2.10 Replacing PMU701 plug-in modules

Flat head screwdriver

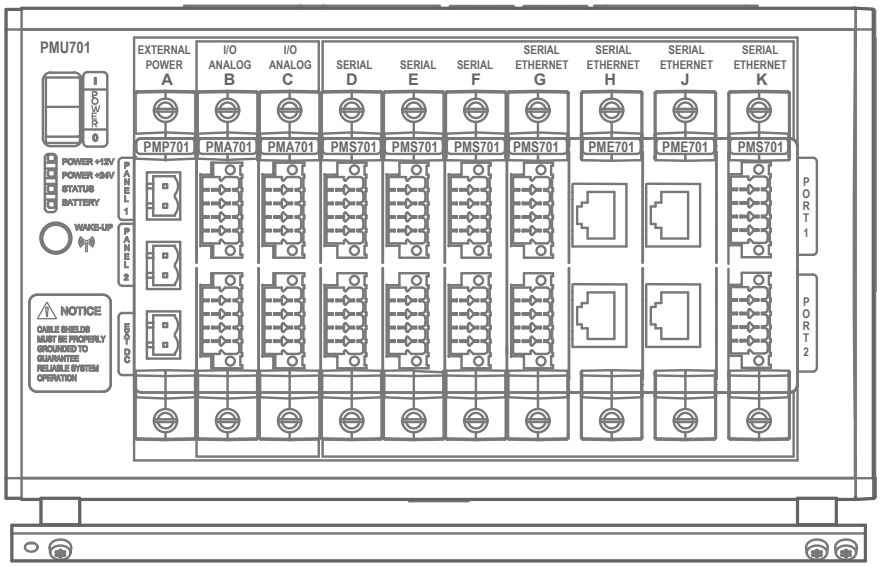


Figure 31 PMU701 with plug-in modules

You can replace the PMU701 plug-in modules. If you remove a plug-in module without replacing it, insert a cover plate from the installation accessories bag to cover the empty slot.

1. Power down the station from the PMU701 power switch.
2. Remove the existing plug-in module, if necessary.
   a. Remove all connectors from the plug-in module.
   b. To remove the plug-in module, detach the handles from PMU701 frame.
3. The new plug-in module has screws attached to the handles. Loosen the screws before inserting the new plug-in module into place.

   This ensures that the new plug-in module reaches the PMU701 base.
4. Insert the new plug-in module into place. Make sure that the plug-in module is firmly attached to the PMU701 base. Fasten the screws in the handles.
5. Insert and lock the connectors to the new plug-in module.
6. Repeat the steps from step 2 to step 5 for all plug-in modules that you want to replace.
7. Power up the station. This may take a while.

8. Check that the new plug-in modules work properly.

More information

- PMU701 spare parts and accessories (page 345)

17.2.11 Replacing DRI701

To replace DRI701, perform the following procedures in the order presented:

1. Replacing DRI701 card (page 282)
2. Updating DRI701 configuration (page 283)

More information

- DRI701 spare parts and accessories (page 347)

17.2.11.1 Replacing DRI701 card

Flat head screwdriver

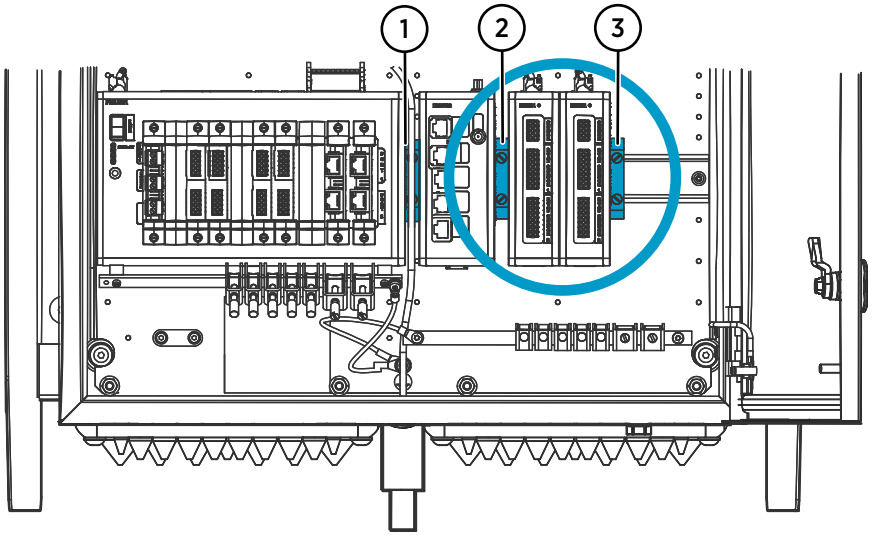


Figure 32 DRI701 cards on standard backplate

DRI701 does not have any replaceable parts.

1. Check which DRI701 is not working.

   If there are several DRI701 cards that are not working, check the leftmost card first. If that card is faulty, the cards to its right do not work either.

2. Power down the station from the PMU701 power switch.
3. Disconnect cables from the faulty DRI701.
4. Release the DIN rail locking piece and remove the unit.
5. Insert the new DRI701 on the DIN rail and snap it into place.

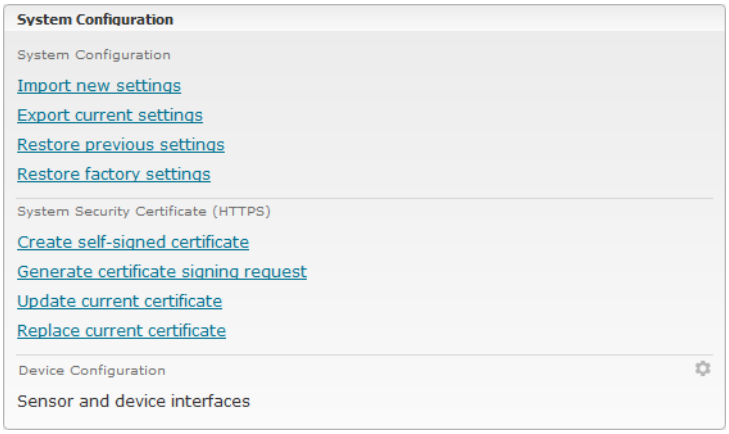
   If you have trouble fitting the new DRI701 on the DIN rail, loosen the end bracket to create more room.

6. Connect the cables to the new DRI701.
7. Power up the station. This may take a while.

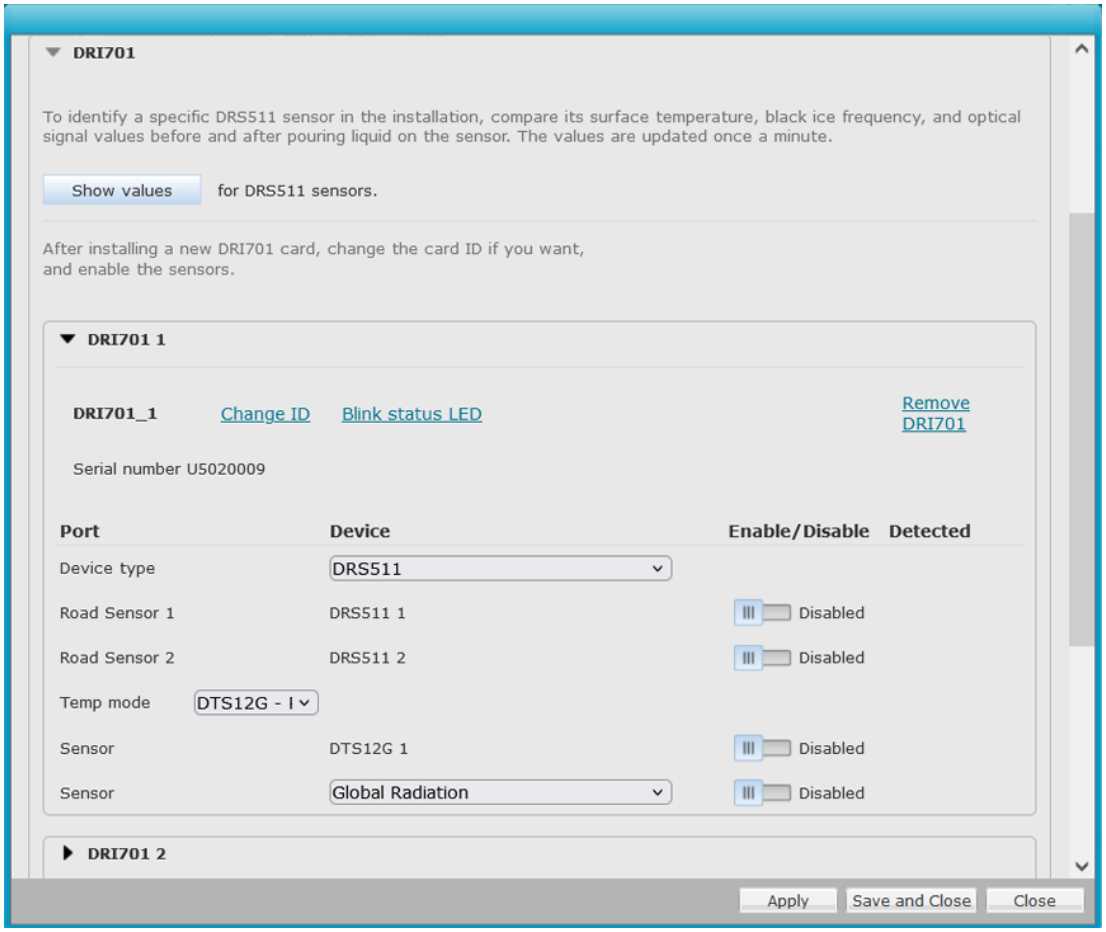
17.2.11.2 Updating DRI701 configuration

After replacing the DRI701 card, update the device configuration to match the new unit.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Configuration** component, select **Settings** ⚙ for **Sensor and device interfaces**.



3. To display all DRI701 cards in the system, in the **Device Configuration** window, select **DRI701**.

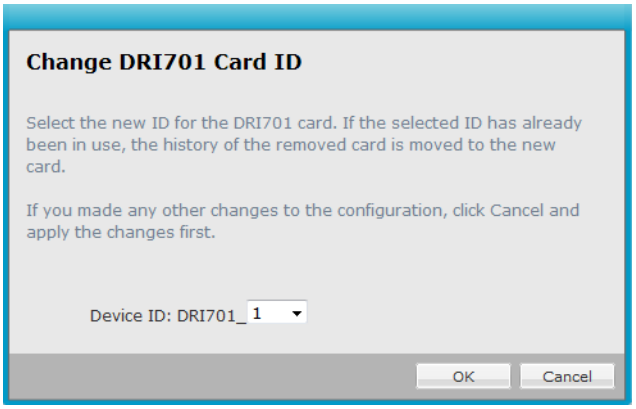


The serial number of the removed card is shown for approximately half an hour. After that, the serial number changes to the following text: **No DRI701 card detected**. You do not need to wait for this to happen.

4. The new card was given the first available ID. Change the ID of the new card to be the same as the ID of the removed card.

   If you are not sure which DRI701 card is the new one, select **Blink status LED** for a unit that shows a serial number.

   a. Select **Change ID** for the new card with the serial number.
   b. In the **Change DRI701 Card ID** window, select the correct ID and **OK**.

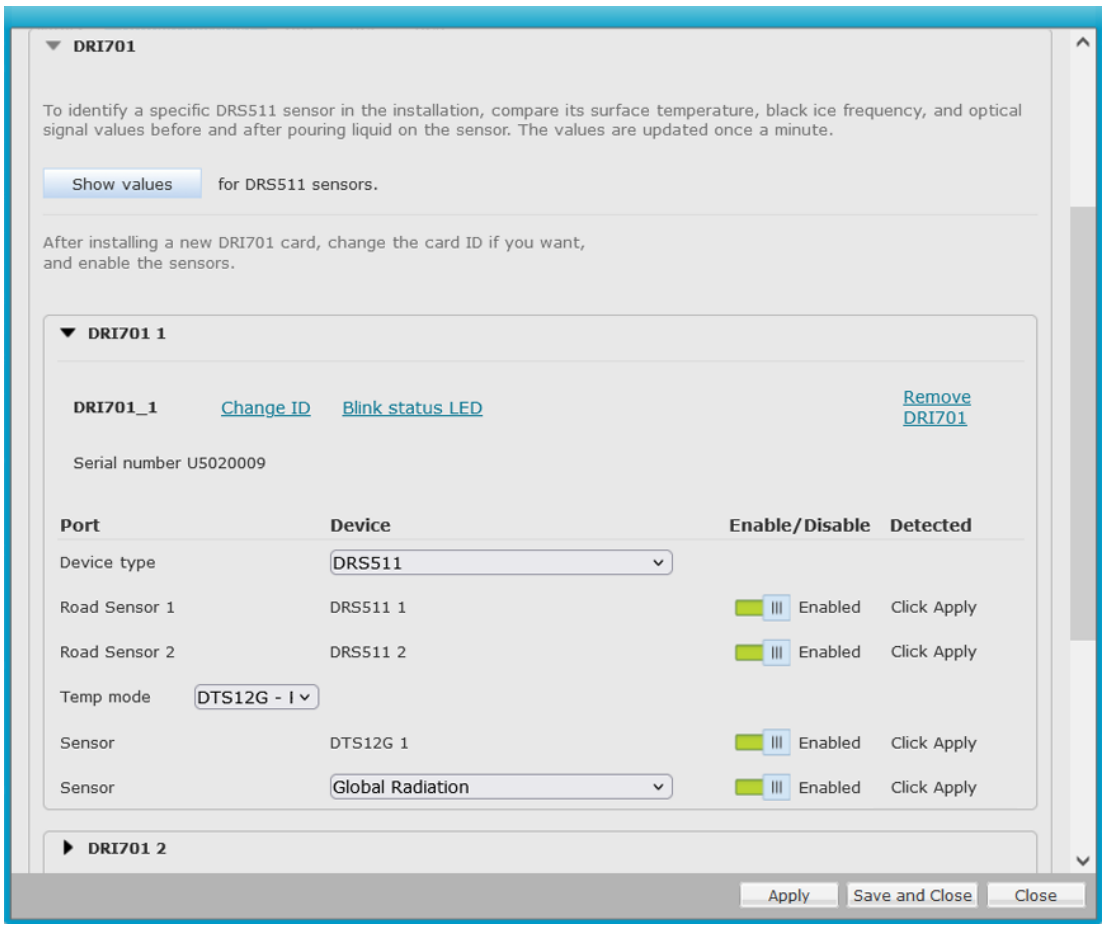


   The ID change takes a few minutes.

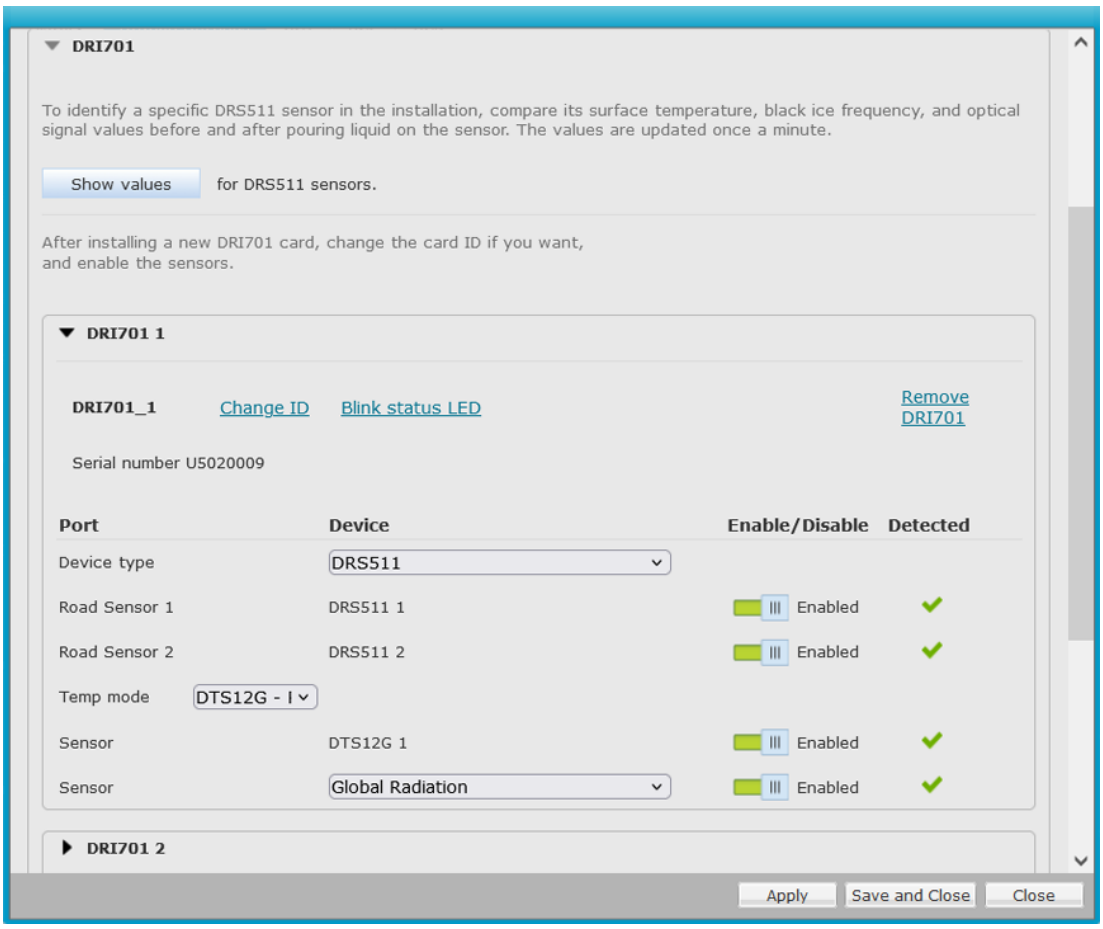
   c. Wait until the window closes, or select **OK**.

   If the **Device Configuration** window does not refresh, close the window and open it again.

5. In the **Device Configuration** window, enable the sensors connected to the new DRI701.



6. To check that the sensor configuration is correct, select **Apply**.

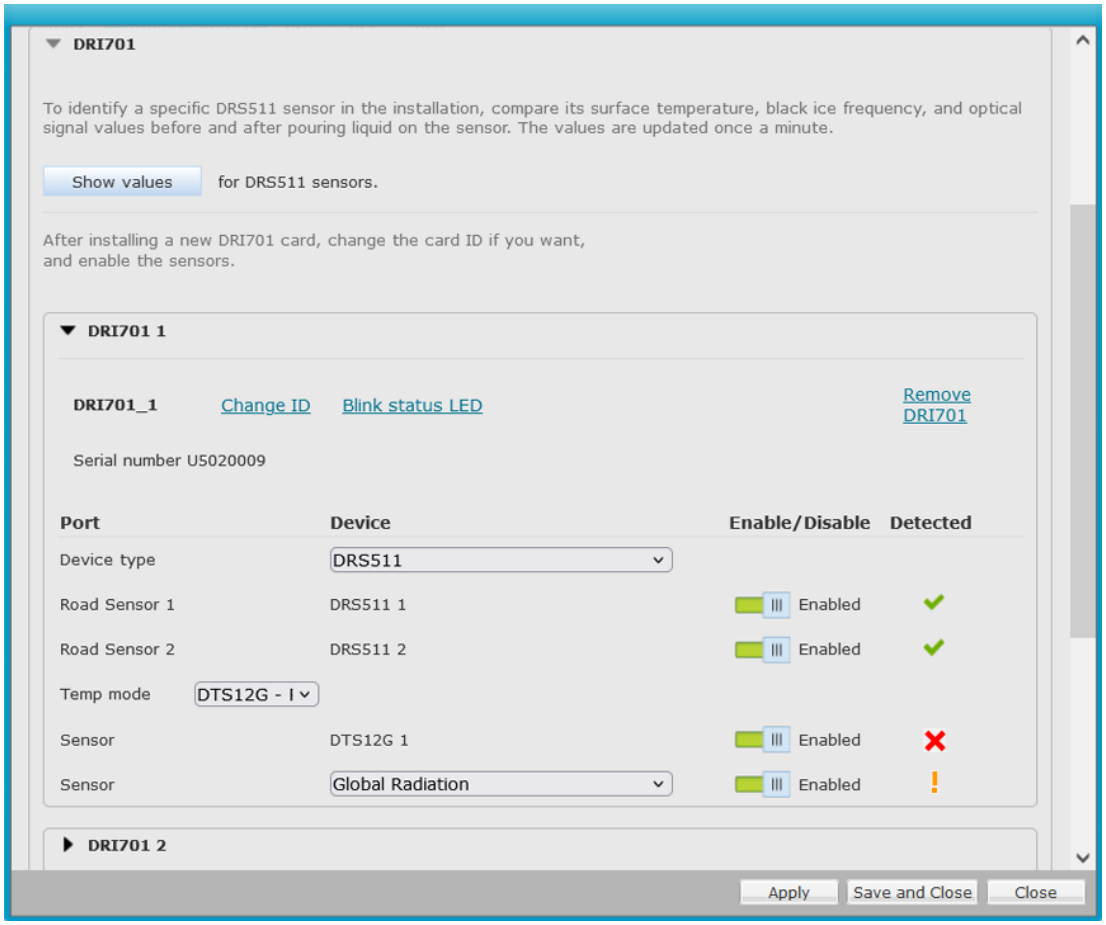


The configuration update takes a few minutes.

7. Wait until the confirmation window opens.

> If the **Device Configuration** window does not refresh, close the window and open it again.

If the **Device Configuration** window shows errors, correct them before continuing.



8. When you changed the ID of the new DRI701 card, the station assigned a new ID to the removed card. Remove the card from the Web UI.
   a. In the **Device Configuration** window, select **Remove DRI701** for that card.

> If you are replacing both DRI701 cards at the same time, the system gives an `Update Failed` error message when removing the first card. You can ignore the message and continue with the removal.

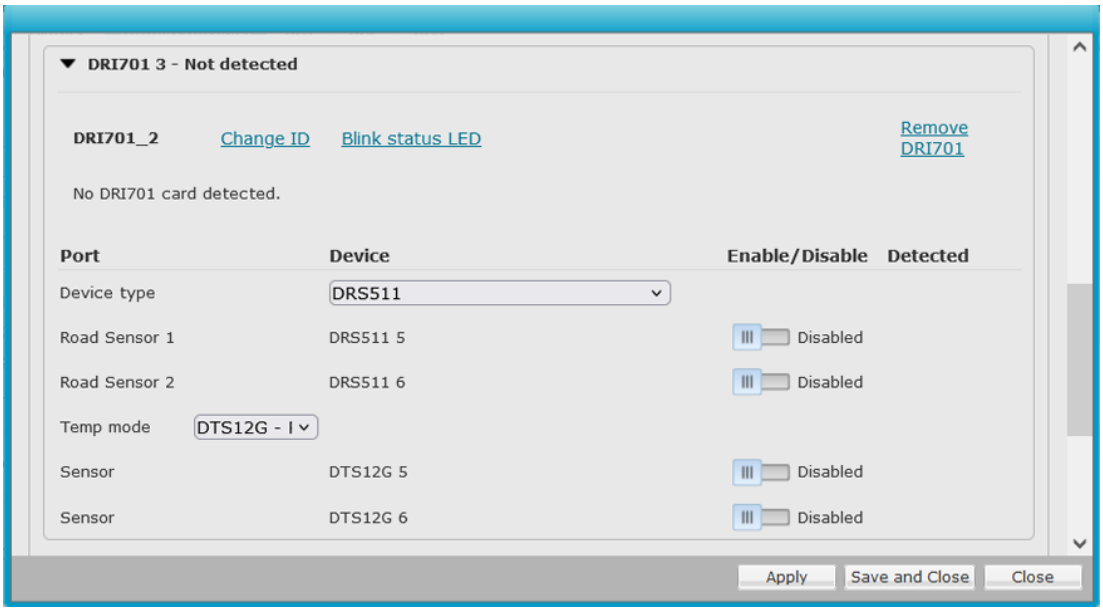
   b. When prompted, select **Remove** to confirm.

      The removal takes a few minutes.

   c. Wait until the **DRI701 Removed** window closes, or select **OK**.

> If the **Device Configuration** window does not refresh, close the window and open it again.

   d. When the UI shows that the DRI701 was removed successfully, select **Close** to close the window.



9. To save the changes, select **Save and Close**.

More information

- Device configuration errors (page 331)

18. System upgrades

18.1 Adding new sensors to RWS200

To add new sensors to the weather station, order the sensors from Vaisala. In addition, you may need a new DRI701 card.

For instructions on how to install and connect the sensors, see RWS200 Installation Manual (M211608EN).

More information

- Adding new sensors to PMU701 (page 290)
- Adding new sensors to DRI701 (page 293)
- Adding new DRI701 cards (page 294)

18.1.1 Adding new sensors to PMU701

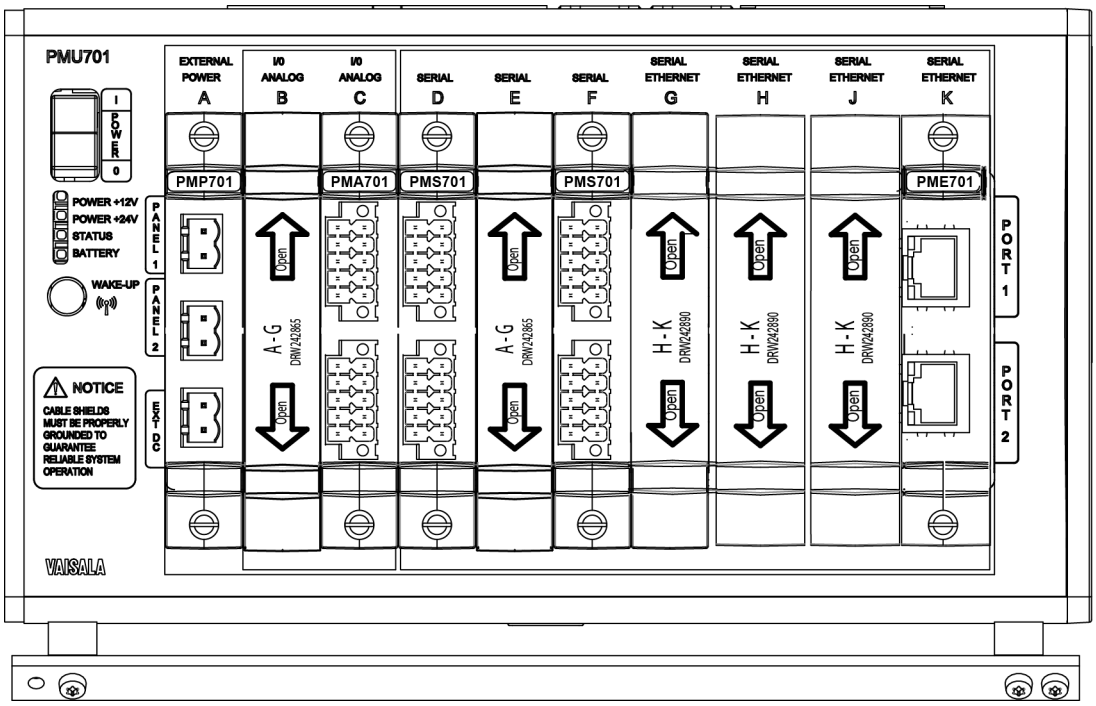


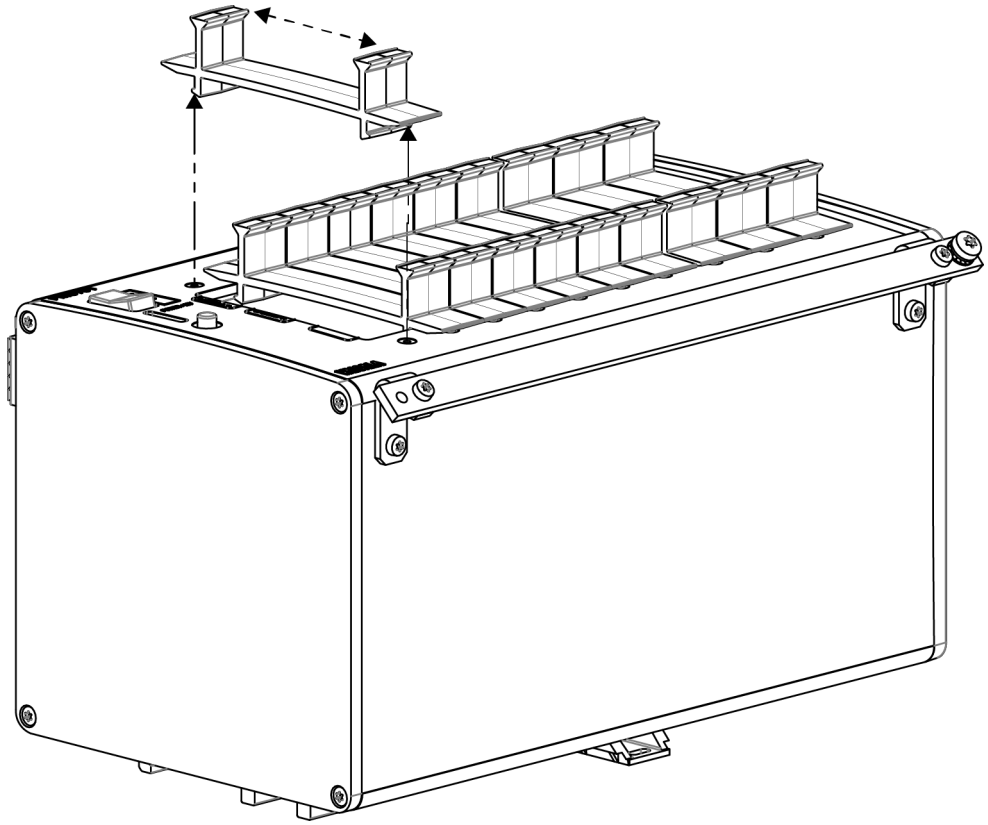
Figure 33 PMU701 plug-in module slots

Table 21 PMU701 sensor connections

Slot name	Module type	Port name	Connector	Purpose
EXTERNAL POWER	PMP701	**PANEL 1**	Phoenix Contact MVSTBR 2,5HC/2-ST-5.08	First solar panel
		PANEL 2		Second solar panel
		EXT DC		External DC power supply
I/O ANALOG	PMA701	**B1**	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	Reserved
		B2		Reserved
	PMA701	**C1**	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	DRD11A
		C2		R.M. Young Wind Monitor or tipping bucket
SERIAL	PMS701	**D1**	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	TPS10 or DST111_1
		D2		DSC211_1
	PMS701	**E1**	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	DST111_2 or SR50A_1
		E2		DSC211_2 or SR50A_2
	PMS701	**F1**	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	WMT700_2
		F2		WMT700_1, WA15_1, WXT520_1, or WXT536_1
SERIAL/ ETHERNET [1)]	PMS701	**G1**	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	PWD
		G2		HMP155 and AQT560
		H1	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	Reserved
		H2		Reserved
		J1	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	Reserved
		J2		Reserved
		K1	Phoenix Contact DFMC 1,5/5-ST-3,5-LR	Customer serial interface
		K2		Reserved
	PME701	**G1**	RJ45	Reserved
		G2		Reserved
		H1	RJ45	Traffic sensor
		H2		Reserved
		J1	RJ45	PTZ camera or first fixed camera
		J2		Second fixed camera
		K1	RJ45	Customer Ethernet interface
		K2		Reserved

1) ***SERIAL/ETHERNET*** *slots can house PME701 or PMS701 modules.*

1. Order the new sensors or components from Vaisala. You may also need a new plug-in module for PMU701.
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. To take a backup of the configuration, export the current configuration to a file.
4. Power down the station from the PMU701 power switch.
5. Check the correct PMU701 slot. If the PMU701 plug-in module is not yet installed, to remove the cover plate from the correct slot, push the plate handles away from each other.



6. Hold the new plug-in module gently by the sides, and make sure that the components are on the left side of the plug-in module. Insert the new plug-in module carefully into the slot, and fasten the plug-in module to the frame.
7. Install the sensor and connect it to the station.

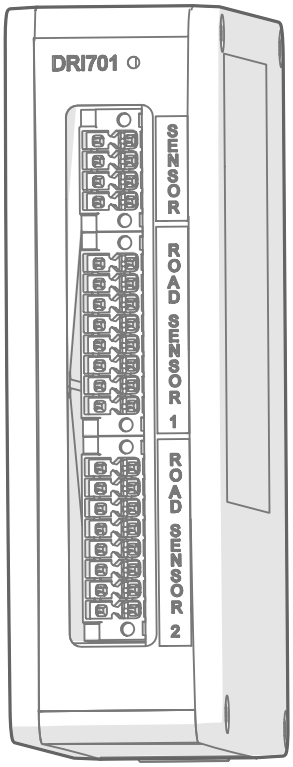
   See RWS200 Installation Manual (M211608EN).
8. Power up the station. This may take a while.

More information

- Sensor settings (page 28)
- Changing sensor and device configuration for PMU701 (page 301)
- Exporting current station configuration (page 311)

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18.1.2 Adding new sensors to DRI701



You may also need a new road sensor interface card DRI701.

Figure 34 DRI701

Table 22 DRI701 sensor ports

Port name	Purpose
SENSOR	One or two DTS12G sensors One or two DTS210 sensors One global radiation sensor and one DTS12G or DTS210 sensor
ROAD SENSOR 1	First DRS511 or FP2000
ROAD SENSOR 2	Second DRS511 or FP2000

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. To take a backup of the configuration, export the current configuration to a file.
3. Install the sensor and connect it to the DRI701 card.

   See RWS200 Installation Manual (M211608EN).
4. Log in to the Web UI, and update the device configuration.

5. Configure the sensor.

More information

- Sensor settings (page 28)
- Adding new DRI701 cards (page 294)
- Changing sensor and device configuration for DRI701 (page 304)
- Exporting current station configuration (page 311)

18.2 Adding new DRI701 cards

- Flat head screwdriver
- Torx T20 screwdriver

If you already have DRI701 cards installed, update their software first to the latest compatible version.

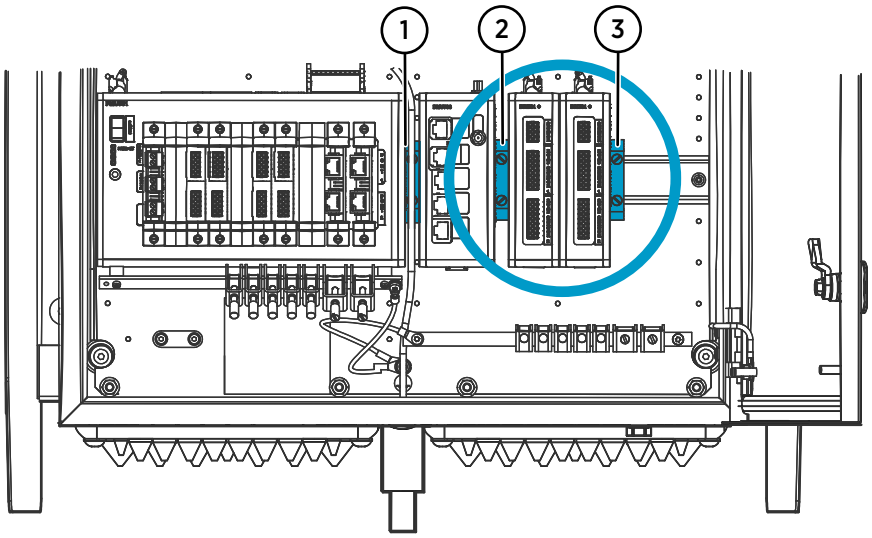


Figure 35 Two DRI701 cards on DIN rail: 3 end brackets

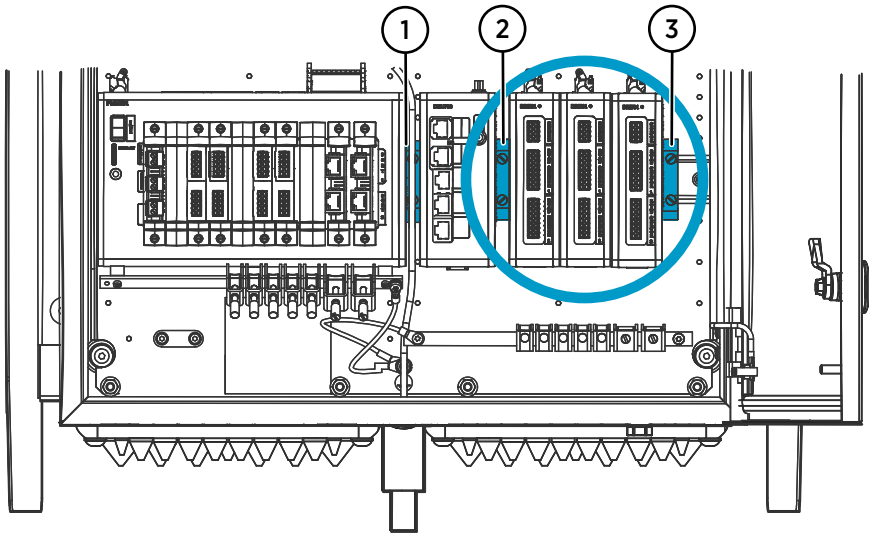


Figure 36 3 DRI701 cards on DIN rail: 3 end brackets

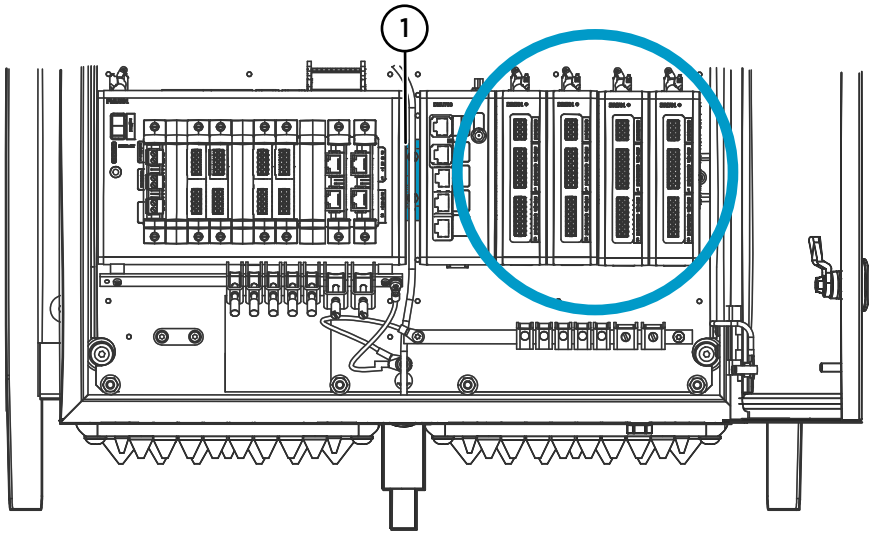


Figure 37 Four DRI701 cards on DIN rail: 1 end bracket

Three or four DRI701 cards require DMU703 software version 6.0.0 or later.

1. Power down the station from the PMU701 power switch.

2. Move or remove the end brackets to make way for the new card or cards.
   a. Loosen the screws on the end brackets that you need to move or remove and lift them off from the DIN rail.

      If the end bracket does not come off, you must first remove the DIN rail from the backplate. See the next step.



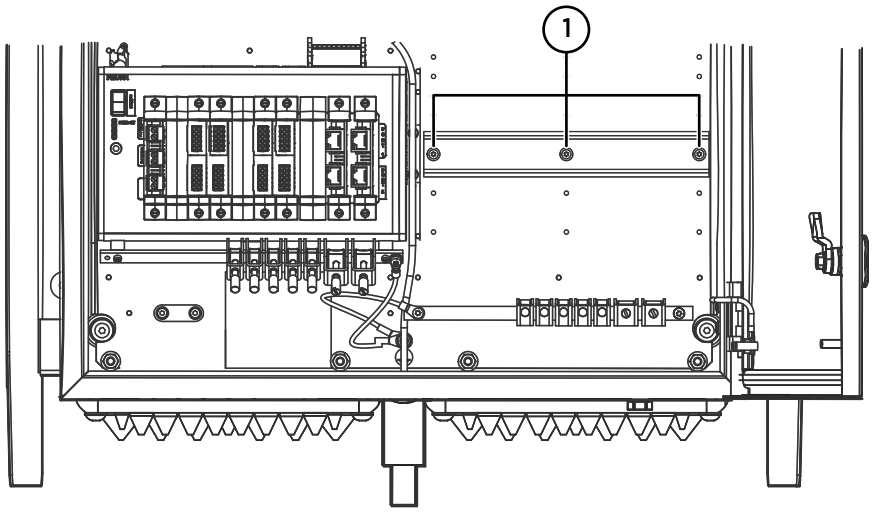
Do not remove the end bracket between PMU701 and DMU703.

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3. If the end brackets do not come off the DIN rail, remove the DIN rail from the backplate to move the end brackets.
   a. If there are already DRI701 cards installed, remove the cards from the DIN rail.

> To make sure that the cards are mounted in the same order, disconnect cabling only from the first DRI701.

   b. Remove DMU703 from the DIN rail.
   c. Remove the DIN rail from the backplate.



1 DIN rail screws (3 pcs)

   d. Loosen the screws and slide the end brackets off the DIN rail or to the desired position.
   e. Reattach the DIN rail to the backplate.
   f. Reattach DMU703 on the DIN rail.
   g. Attach all DRI701 cards and the necessary end brackets on the DIN rail.

> You can also replace the end brackets with ones that do not require removing the DIN rail.

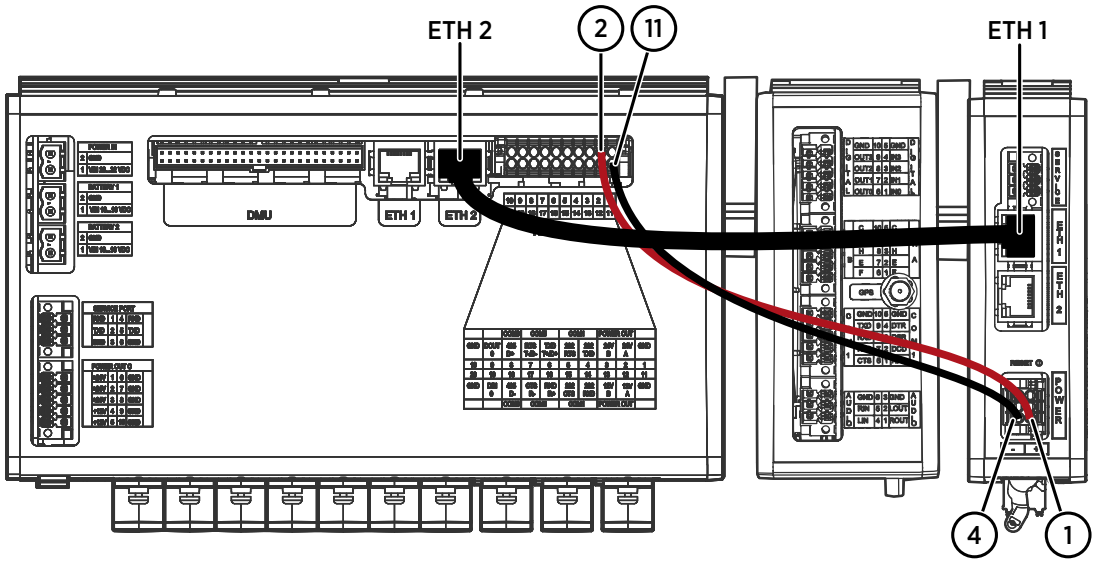
4. Attach the new cards to the DIN rail next to each other.

> Make sure that you reattach the existing DRI701 cards in the same order.

5. Reconnect cabling to the first removed DRI701 card, if needed.
6. Attach the end brackets to the DIN rail and tighten them if you have not done that yet.
7. Connect the first DRI701 card to PMU701.

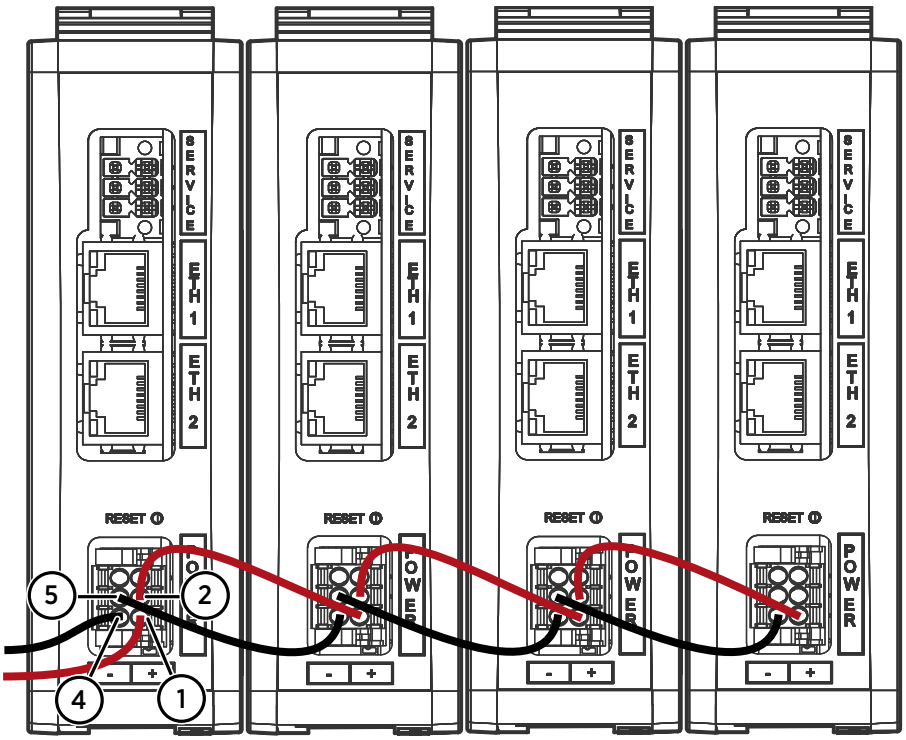
> You can skip this step if you already have the first DRI701 card installed and connected.

Cable	PMU701 connector and pin	Signal	DRI701 connector and pin
Ethernet	**ETH 2**	Data	**ETH 1**
Power	**TELECOM** pin **2**	+24 V	**POWER** pin **1**
	TELECOM pin **11**	Ground	**POWER** pin **4**



2 PMU701 **TELECOM** pin **2** (+24 V)
11 PMU701 **TELECOM** pin **11** (GND)
4 DRI701 **POWER** pin **4** (GND)
1 DRI701 **POWER** pin **1** (+24 V)

8. Connect the power cables to the DRI701 cards.



5 DRI701 **POWER** pin **5** (GND)
4 DRI701 **POWER** pin **4** (GND)
2 DRI701 **POWER** pin **2** (+24 V)
1 DRI701 **POWER** pin **1** (+24 V)

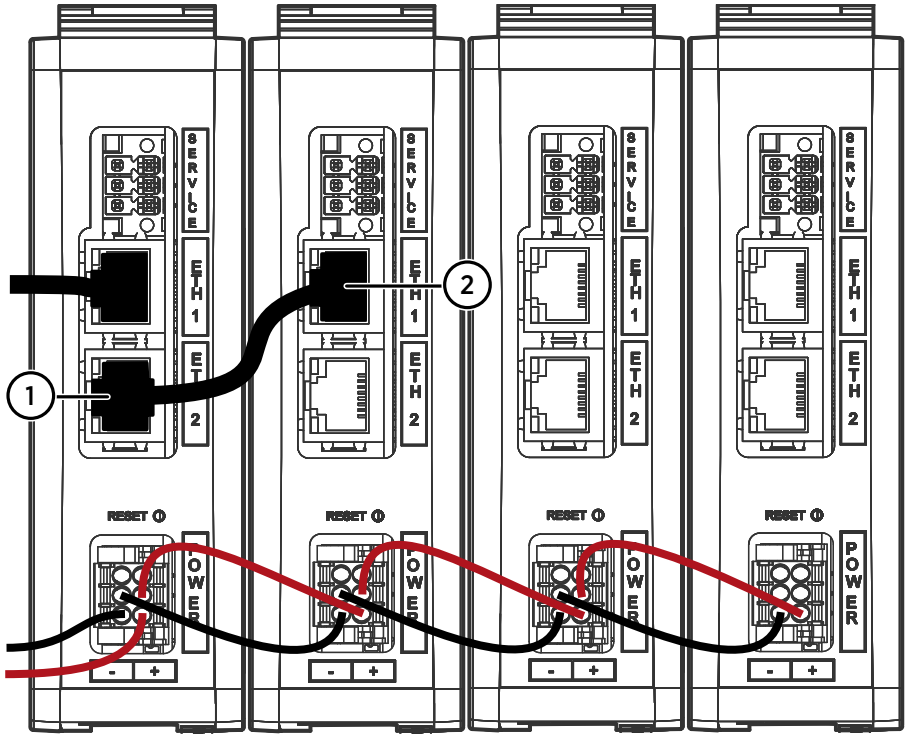
9. Power up the station. This may take a while.
10. Log in to the Web UI and check that the first DRI701 card is shown in the device configuration.

    If you had two DRI701 cards already installed, check that the second card is also shown. Check also that their IDs correspond to their physical location (the card on the left is DRI701_1 and card on the right DRI701_2).

11. Connect the Ethernet cable to the first new DRI701 card.

> Connect the Ethernet cables to the new DRI701 cards one by one. When you connect the cable, DMU703 assigns the next available ID to the card. If you connect all the cards at the same time, the IDs may not match the physical location of the cards.

a. Connect the Ethernet cable to the **ETH 2** port of the DRI701 on the left and to the **ETH 1** port of the DRI701 on the right.



1 DRI701 **ETH 2** port
2 DRI701 **ETH 1** port

b. In the Web UI, check that the new DRI701 card is shown in the device configuration. This takes approximately 2 minutes.

c. Repeat the procedure for all the rest of the DRI701 cards.

12. Check that the DRI701 card numbering corresponds to the location: the leftmost is `DRI701_1`, the next `DRI701_2`, and so on. In case of problems, this helps in troubleshooting.

    If you need to change the IDs, change them one by one.

13. To take a backup of the configuration, export the current configuration to a file.

More information

- Adding new sensors to RWS200 (page 290)
- Adding new sensors to DRI701 (page 293)
- Updating DRI701 configuration (page 283)

18.3 Changing system settings

Each station is configured at the factory according to the order. The system configuration contains all the configuration information necessary, including system setup, sensor and device configuration, and UI settings.

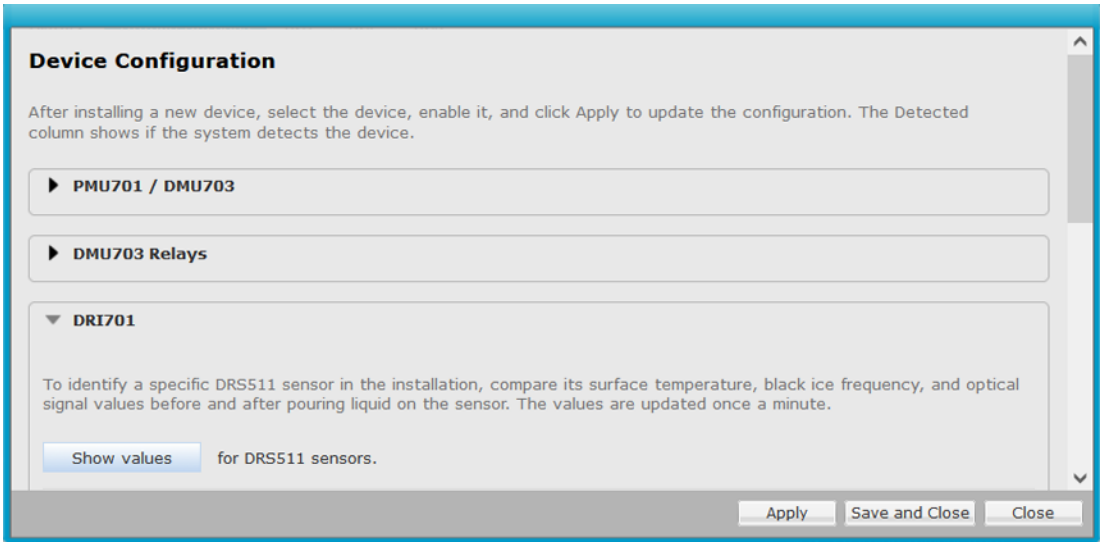
You can change the settings through the Web UI or by importing the configuration from another station or a backup file to the system.

CAUTION! Do not edit the settings file manually.

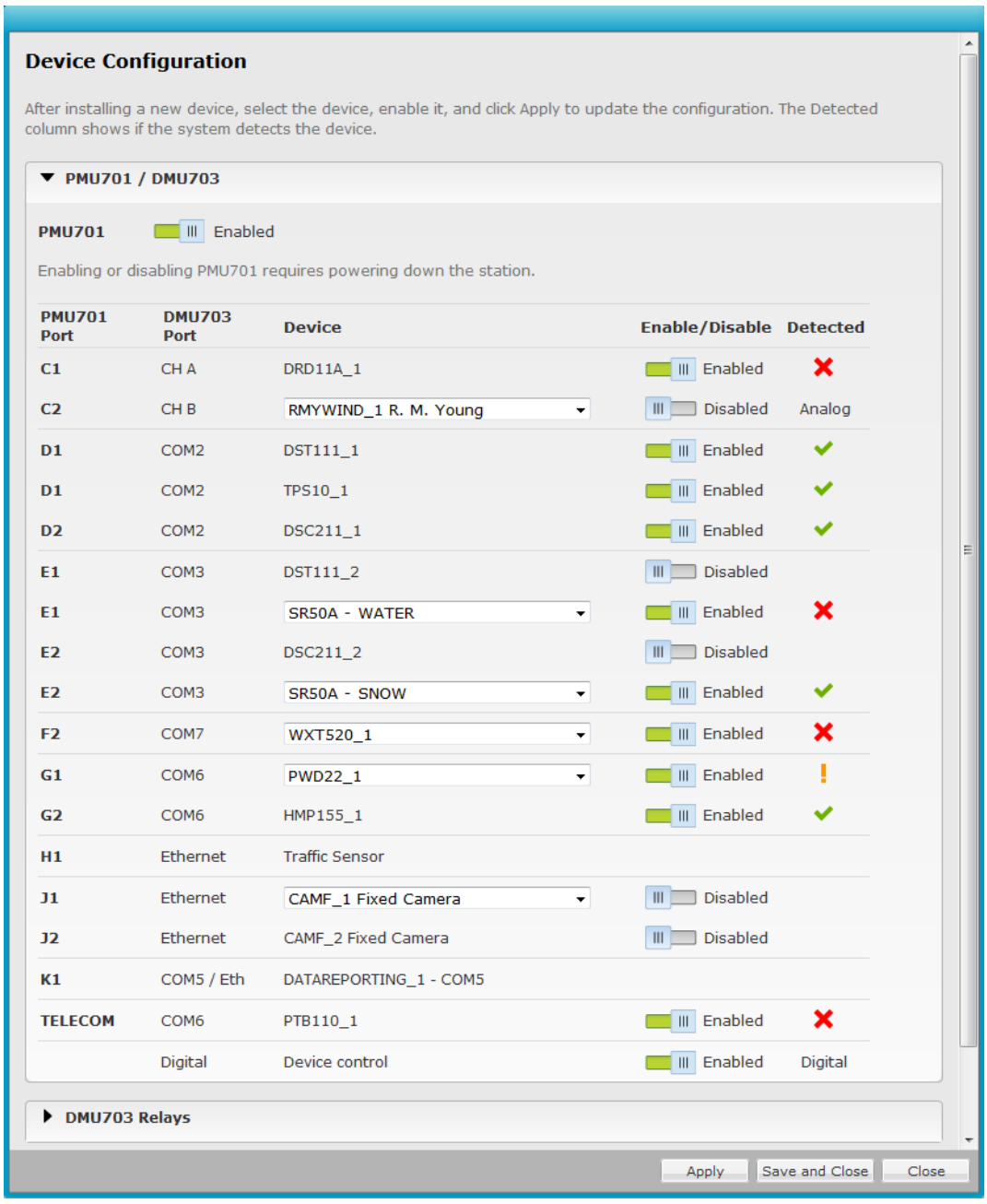
18.3.1 Changing sensor and device configuration for PMU701

Administrators and super users can add, remove, enable, and disable sensors and devices, and check their status, through the Web UI.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Device Configuration** window, to display the sensors and devices, select **PMU701 / DMU703**.

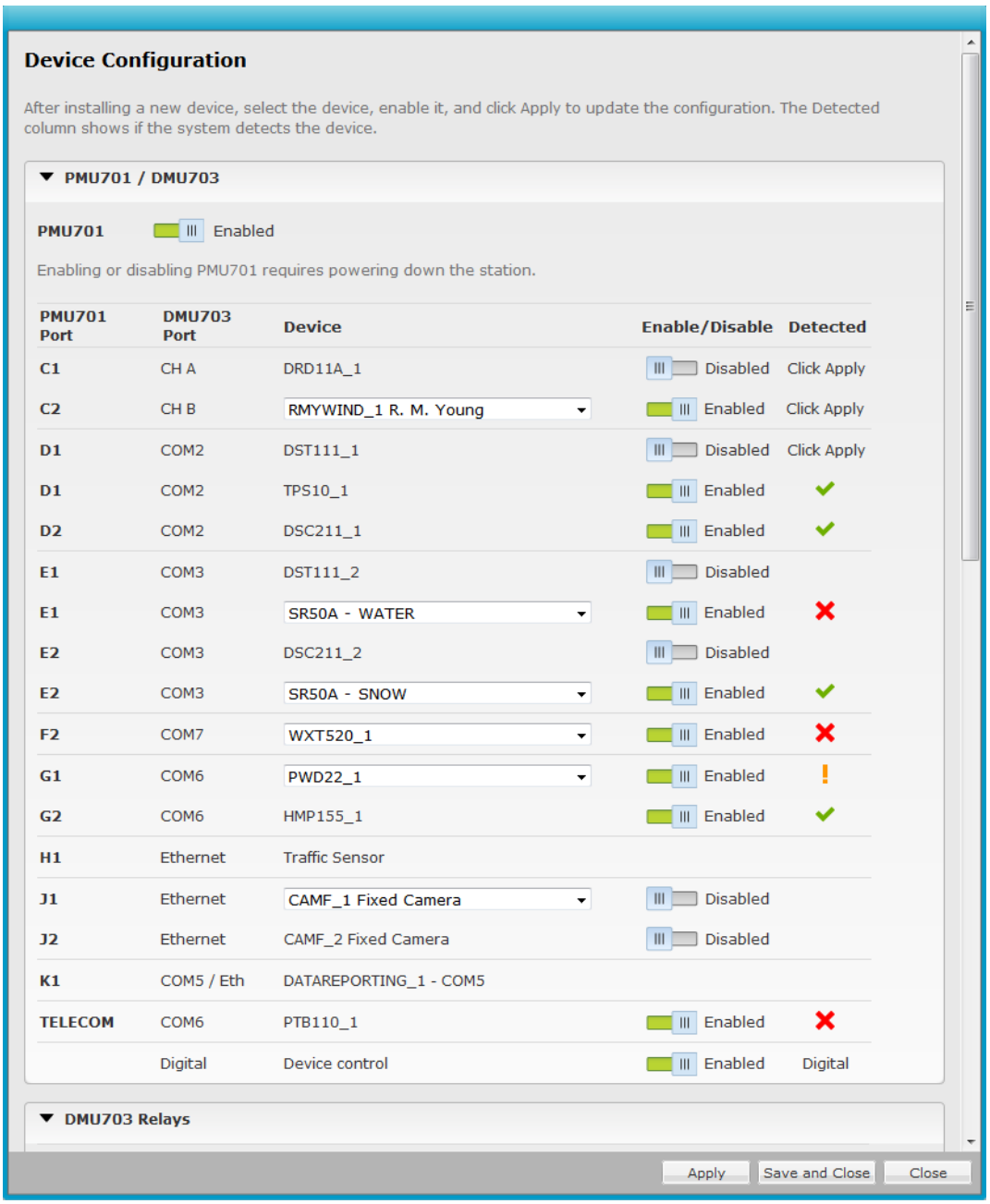


3. In **PMU701 / DMU703**, locate the sensor or device you want to change.



4. To change the sensor or device connected to a particular port, select the correct sensor from the list.

5. Enable the sensor or device, and select **Apply** to apply the changes.



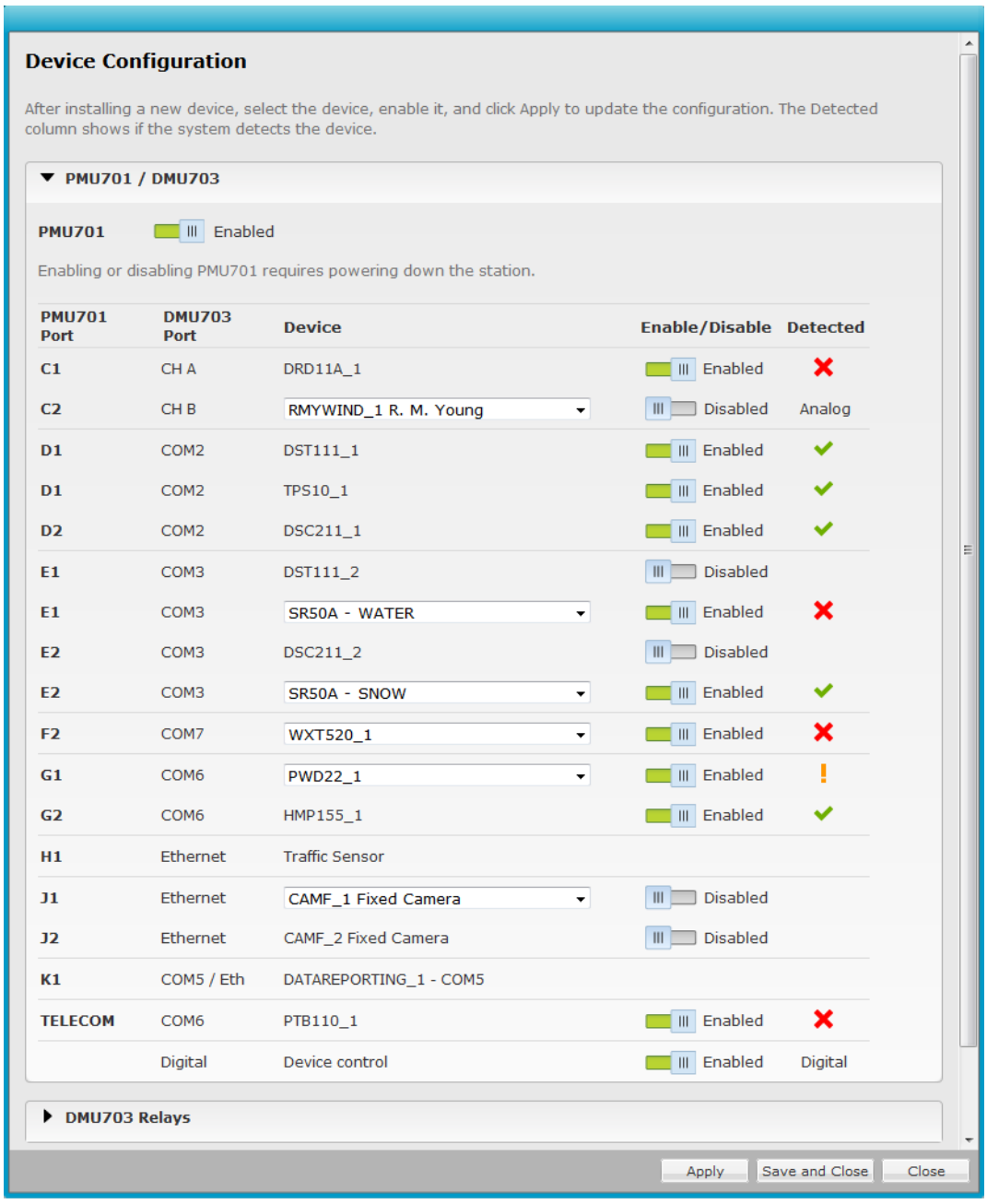
The update takes a few minutes.

6. Wait until the confirmation window opens.



If the **Device Configuration** window does not refresh, close the window and open it again.

7. If the **Device Configuration** window shows errors, correct them before continuing.

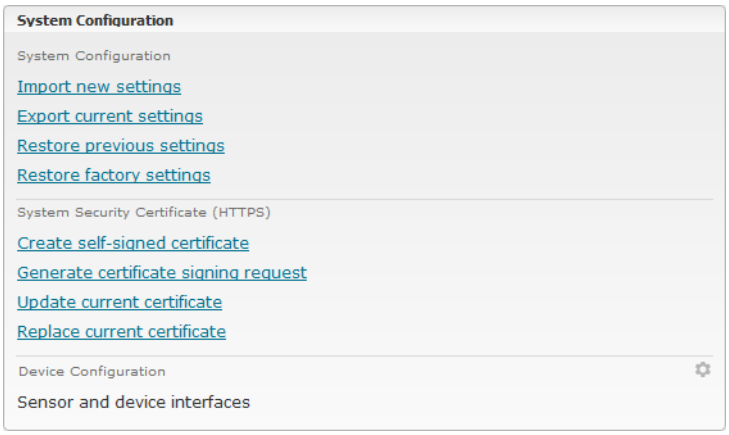


8. To take a backup of the configuration, export the current configuration to a file.

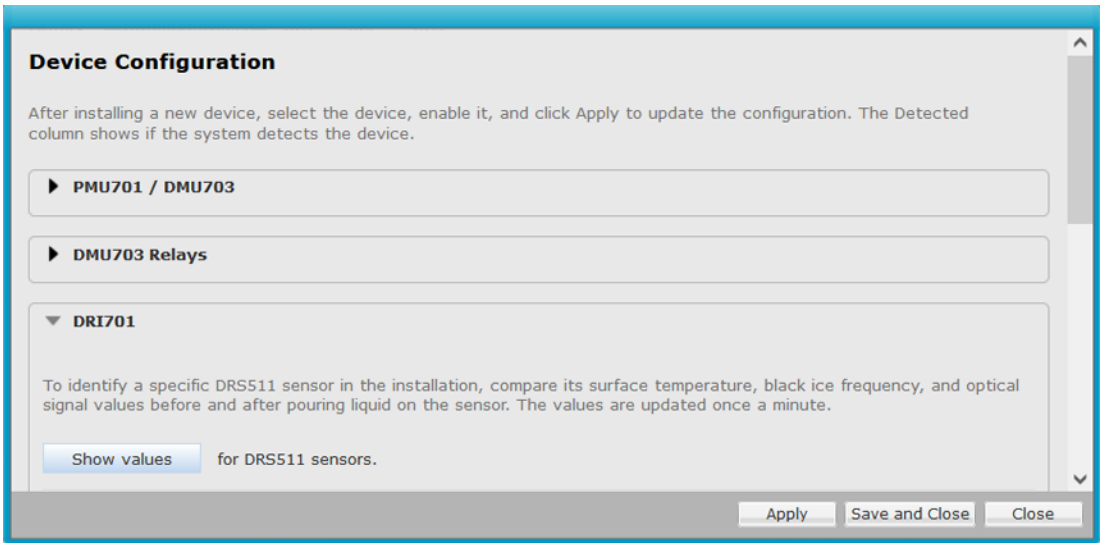
18.3.2 Changing sensor and device configuration for DRI701

Administrators and super users can add, remove, enable, and disable sensors and devices, and check their status through the Web UI.

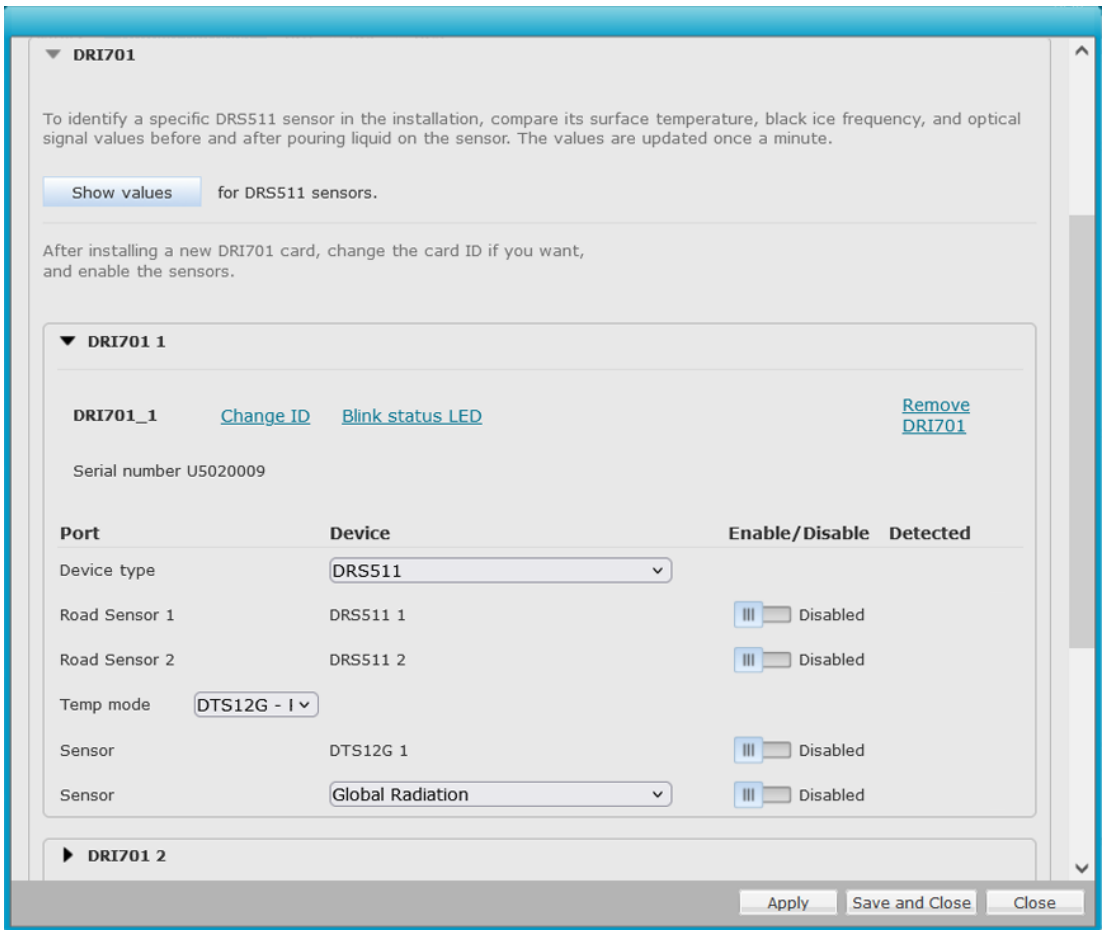
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Configuration** component, select **Settings** ⚙ for **Sensor and device interfaces**.



3. In the **Device Configuration** window, to display the sensors and devices, select **DRI701**.



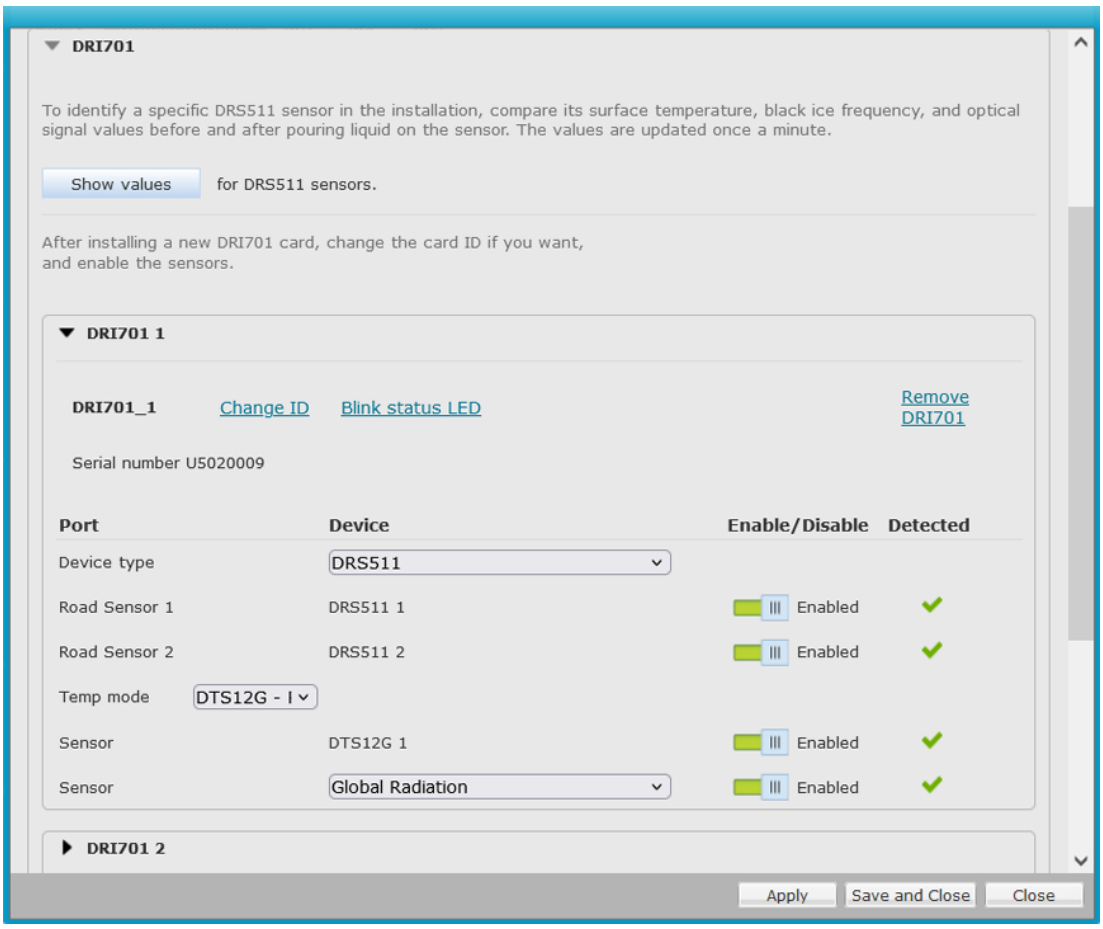
4. In **DRI701**, locate the sensor or device you want to change.



If you are not sure which DRI701 you are configuring, select **Blink status LED** and check which DRI701 blinks its status LED.

5. To change the sensor or device connected to a particular port, select the correct sensor from the list.

6. Enable the sensor or device, and select **Apply** to apply the changes.

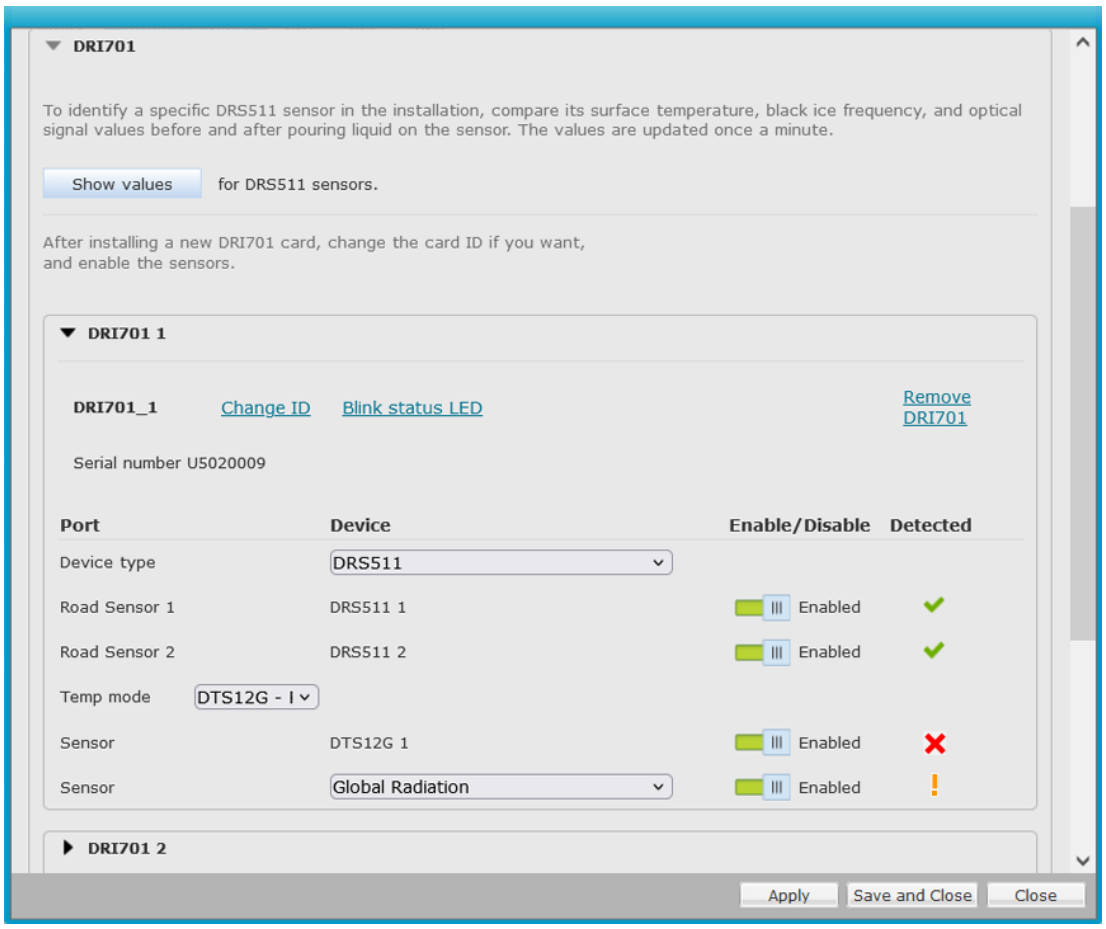


The update takes a few minutes.
The **Sensors** component on the **Station Settings** page only shows those DRI701 cards that have a sensor enabled.

7. Wait until the confirmation window opens.

If the **Device Configuration** window does not refresh, close the window and open it again.

8. If the **Device Configuration** window shows errors, correct them before continuing.



9. To take a backup of the configuration, export the current configuration to a file.

18.3.3 Importing new configuration to station

Administrators and super users can import configuration and user interface settings from a new configuration file or a backup file to the station.

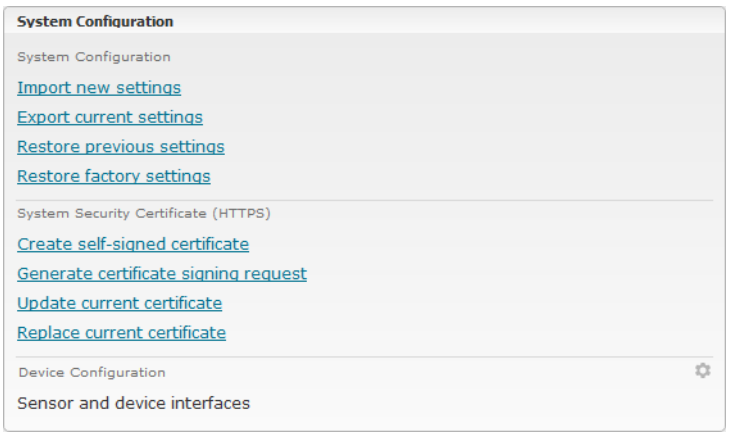
If you are replacing DMU703, import the previous configuration from a backup file to the new DMU703.

During the import, the system takes a backup of the current configuration. If something goes wrong with the import, to restore the backup, select **Restore Previous Settings**.

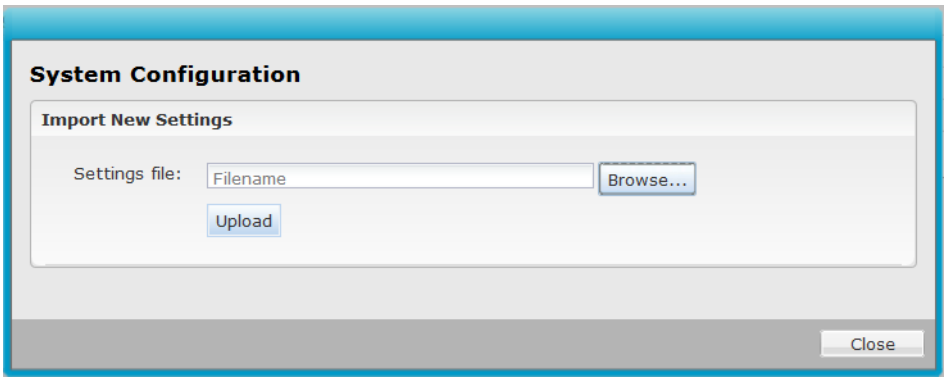
Certificates cannot be imported.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

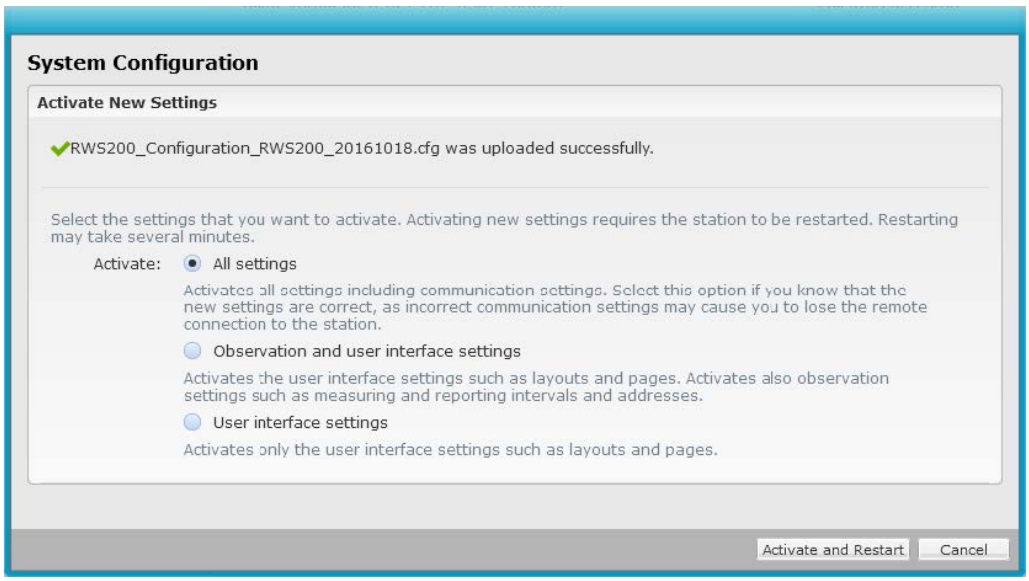
2. In the **System Configuration** component, select **Import new settings**.



3. In the **System Configuration** window, select **Browse**, locate the file that contains the new configuration, and select **Open**.
4. Check that the filename in the **Settings file** field is correct, and select **Upload**.



5. In the **Activate New Settings** window, select the settings that you want to import from the file.



The following table explains which settings each option replaces.

Settings to be replaced	All settings	Observation and UI settings	UI settings
Sensor settings [1)]	✔	✖	✖
Sensor serial numbers and nicknames			
Installation information (installation angle, height, place, and depth, distance to road)			
Pavement type, elevation, and exposure, subsurface type			
Cable length			
DRS511 scaling factor SCFS, FP2000 alignment data			
DRI701 de-icing compound			
HMP155E radiation shield			
Last ball bearing change date, last calibration date			
Previous and current calibration values			
Previous and current clean reference values			
Station settings	✔	✖	✖
Station name, location, and site information			
Time settings			
Unit settings			

Settings to be replaced	All settings	Observation and UI settings	UI settings
Communication settings	✔	✖	✖
All communication settings			
Data reporting settings	✔	✔	✖
All data reporting settings			
User interface settings	✔	✔	✔
All the pages and components on the UI, including their names, location, and shown observations			
User accounts	✔	✖	✖
All current user accounts			

1) Only for those sensors that have that information in the settings.

CAUTION! When importing communication settings, make sure that they are correct. Incorrect settings may cause you to lose the remote connection to the station.

6. To take the new settings into use, select **Activate and Restart**.

   The import takes several minutes. If the import was successful, the station restarts automatically. The restart takes several minutes.
7. If the import failed, try restarting DMU703.
8. Refresh the page. If the **Login** page is not shown, the process is still ongoing. When the page is shown, log in again.
9. Recreate the system certificate, if used.
10. To check the station configuration, generate a station summary report.
11. Check that the configuration is correct.

More information

- System security certificates (page 159)
- Generating station summary report (page 183)
- Resetting DMU703 to factory settings (page 326)
- Restarting DMU703 or system remotely (page 327)

18.3.4 Exporting current station configuration

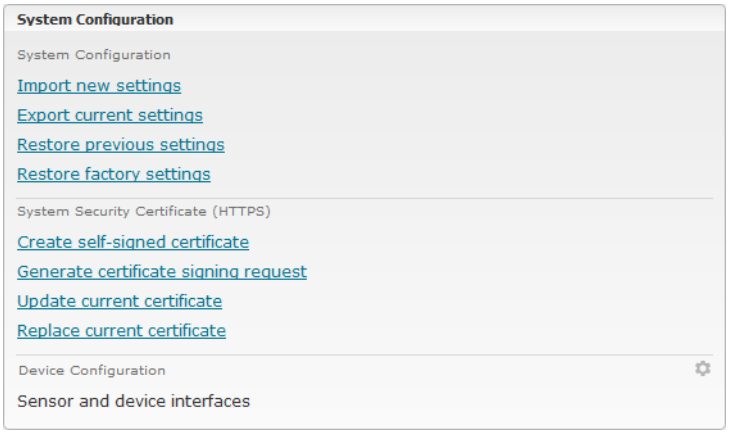
Administrators and super users can export the current station settings to:

- Use the same station configuration on another station.
- Take a backup copy of the current settings.

The backup copy is the only way to restore any manual changes made through the Web UI after the last system settings import. You can take a backup copy anytime.

When the station is operational, Vaisala recommends that you always export the current settings as a backup before making any changes to the configuration.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Configuration** component, select **Export current settings**.



3. When prompted, select **Export**.

   Exporting the settings takes several minutes.
4. In the **Save As** window, save the CFG file to a safe location.

Certificates are not included in the exported system settings. If you lose the certificate, for example when replacing DMU703, create a new one.

More information

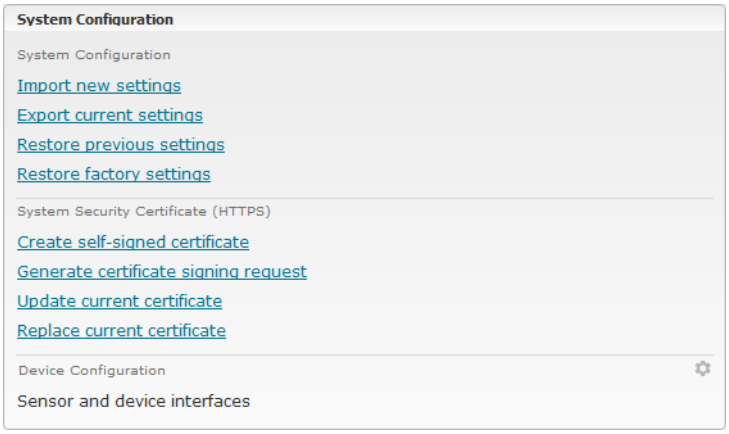
- System security certificates (page 159)

18.3.5 Restoring previous settings

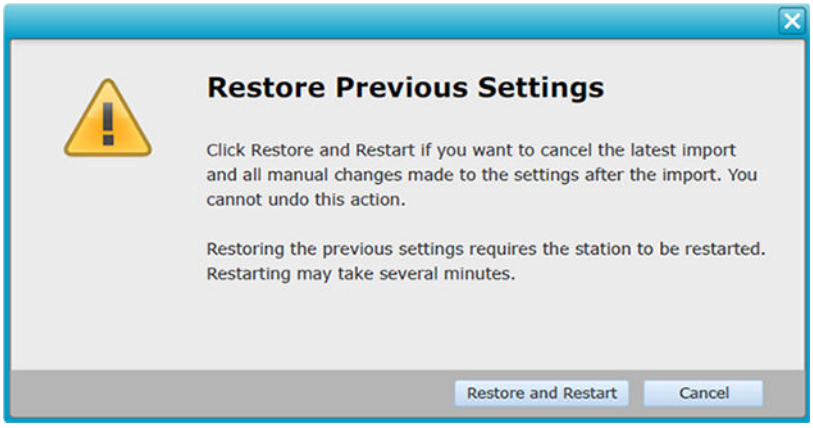
The system keeps a copy of the factory settings and the last settings that you exported. You can restore these settings whenever you want to. The latest settings are useful if, for example, something went wrong when importing new settings.

CAUTION! You cannot undo this change.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Configuration** component, select **Restore Previous Settings**.



3. In the **Restore Previous Settings** window, select **Restore and Restart**.



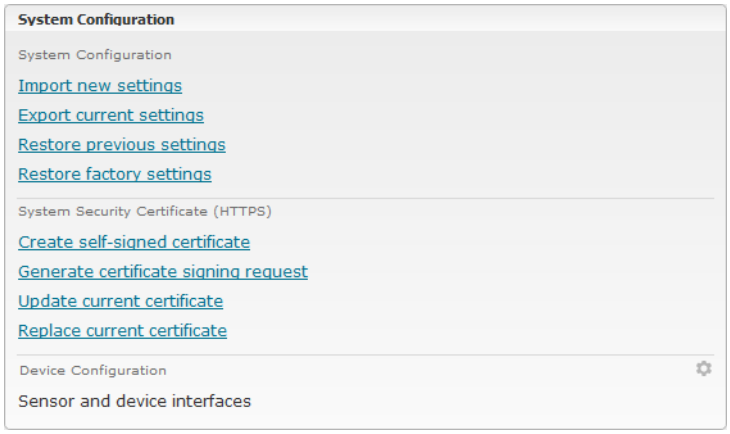
   The restart takes several minutes.
4. Refresh the page. If the **Login** page is not shown, the process is still ongoing. When the page is shown, log in again.

18.3.6 Restoring factory settings

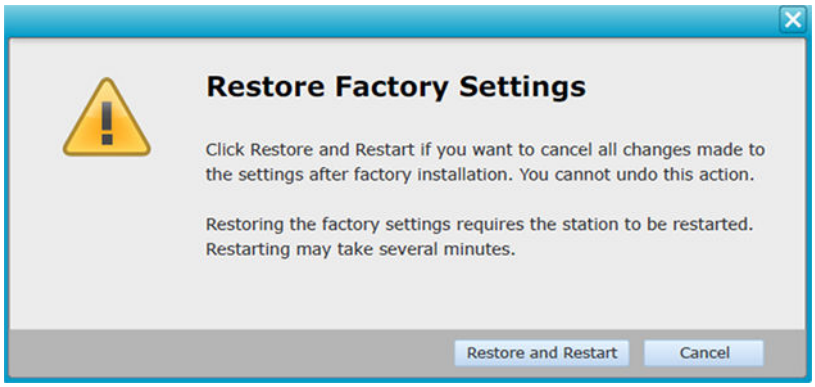
To cancel all changes made to the configuration, administrators and super users can restore factory settings.

CAUTION! You cannot undo this change.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Configuration** component, select **Restore factory settings**.



3. In the **Restore factory settings** window, select **Restore and Restart**.



   The restart takes several minutes.
4. Refresh the page. If the **Login** page is not shown, the process is still ongoing. When the page is shown, log in again.

18.4 Updating software

Vaisala recommends that you update the software regularly. Administrators and super users can update the system software through the Web UI. To receive the software update files, contact Vaisala.

CAUTION! Before updating the software, read the release notes carefully. If you have an older than previous version of the software, contact Vaisala helpdesk for further instructions. Updating too old software may render the system inoperable.

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CAUTION! Never upload an older version of the software than what you are currently using. Uploading an older version of software may render the system inoperable.

When the station is operational, Vaisala recommends that you always export the current settings as a backup before making any changes to the configuration.

If you are updating the software of several components, update the components in the following order:

1. DMU703 (station software)
2. PMU701
3. DRI701
4. Sensors

More information

- Exporting current station configuration (page 311)
- Updating DMU703 (station) software (page 315)
- PMU701 hardware and software compatibility (page 317)
- DRI701 hardware and software compatibility (page 319)
- Updating sensor software (page 322)
- Reverting station software to previous version (page 329)

18.4.1 Updating DMU703 (station) software

A new version of DMU703 (station) software is delivered in a ZIP file. The ZIP file contains the following file:

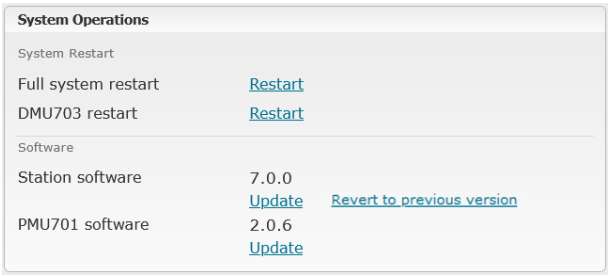
*RWS200_release_*<version>_<date>_<information>

Check that the filename does not contain extra characters.

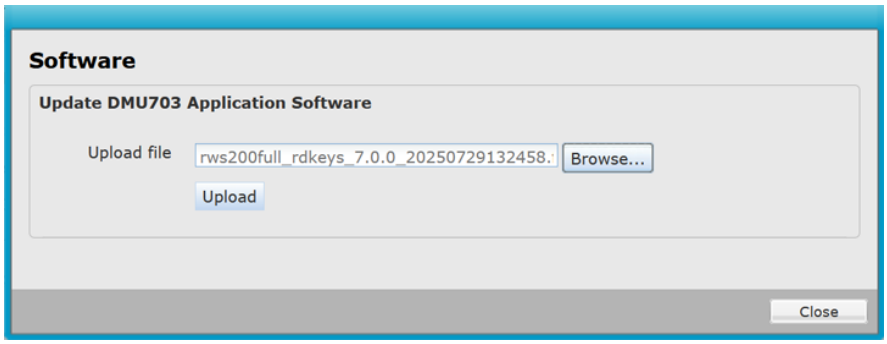
When you update the DMU703 (station) software, the station restarts.

1. Extract the ZIP file to your computer.
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

3. In the **System Operations** component, under **Software**, select **Update** for **Station software**.



4. In the **Software** window, select **Browse** and the file that contains the new software file.



5. Select **Upload**.

   The system imports the file and updates DMU703. After the update, the station restarts, and the update continues. The procedure takes up to 25 minutes.

6. Refresh the page. If the **Login** page is not shown, the process is still ongoing. When the page is shown, log in again.
7. If the software update file contains new NTCIP settings, the system asks if you want to update the current settings.
   - If you have not recently changed the station setup, for example, by adding a new sensor, select **Yes, update**.
   - If you have recently changed the station setup, select **No**, and configure the NTCIP data interface settings.
8. Check that all settings are correct.
9. If you are using NTCIP, open the NTCIP data reporting settings and select **OK** to update the sensor version information in NTCIP.
10. To take a backup of the configuration, export the current configuration to a file.

More information

‣ Updating software (page 314)

18.4.2 PMU701 hardware and software compatibility

To check the hardware revision of the PMU701 circuit board, generate a station summary report.

The station summary report shows the hardware revision of the PMU701 circuit board as **PMU701 hardware**. It is not the same as the revision of the PMU701 unit that is shown in the type label.

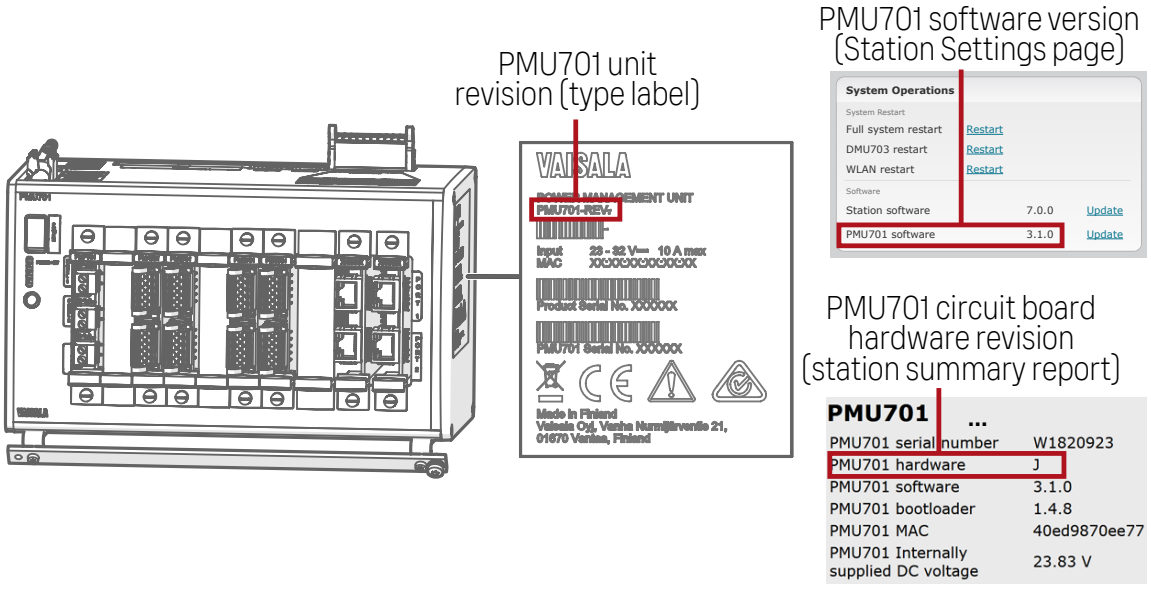


Figure 38 PMU701 unit revision, circuit board hardware revision, and PMU701 software version

Table 23 Compatibility matrix of PMU701 unit revision, circuit board hardware revision, and software version

PMU701 unit revision (type label)	PMU701 circuit board hardware revision (station summary report)	PMU701 software version 2.0.4/2.0.6/2.1.0 [1)]	PMU701 software version 3.0.0/3.0.1/3.1.0
PMU701-P	PMU701CB-K	✗	✓
PMU701-N	PMU701CB-J	✗	✓
PMU701-M	PMU701CB-J	✗	✓
PMU701-L	PMU701CB-G	✓	✗
PMU701-K	PMU701CB-G	✓	✗
PMU701-J	PMU701CB-G	✓	✗

PMU701 unit revision (type label)	PMU701 circuit board hardware revision (station summary report)	PMU701 software version 2.0.4/2.0.6/2.1.0 [1]	PMU701 software version 3.0.0/3.0.1/3.1.0
PMU701-H	PMU701CB-F	✓	✗
PMU701-G	PMU701CB-F	✓	✗
PMU701-F	PMU701CB-D.1	✓	✗
PMU701-E	PMU701CB-D.1	✓	✗
PMU701-D	PMU701CB-D.1	✓	✗
PMU701-C	PMU701CB-D.1	✓	✗
PMU701-B	PMU701CB-D	✓	✗
PMU701-A	PMU701CB-B.1	✗	✗

1) *Vaisala strongly recommends that you upgrade all compatible PMU701 units to software version 2.1.0 or 3.1.0.*

More information

- Updating software (page 314)

18.4.2.1 Updating PMU701 software

A new version of PMU701 software is delivered in a ZIP file. The software filename is as follows:

PMU701_release_*<version>_<date>_<information>.fw*

Check that the software version in the filename is compatible with your PMU701 unit revision.

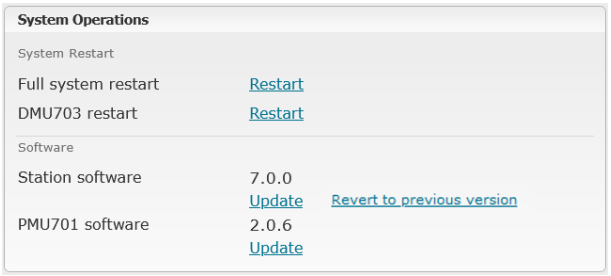
Check that the filename does not contain extra characters.

When you update PMU701 software, the station restarts.

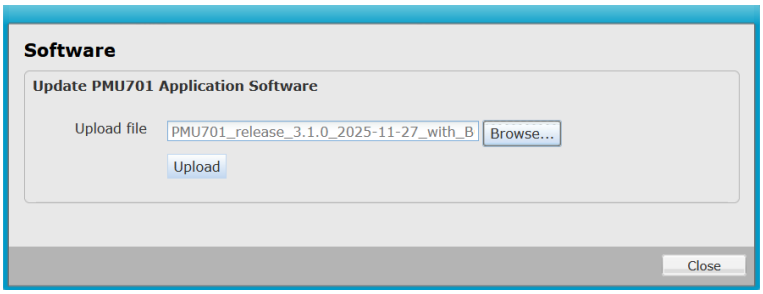
1. Extract the ZIP file to your computer.
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

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3. In the **System Operations** component, under **Software**, select **Update** for **PMU701 software**.



4. In the **Software** window, select **Browse** and the file that contains the new software file.



5. Select **Update**.

   The system imports the file and updates PMU701. After the update, the station restarts. Restarting takes over 5 minutes.

6. Refresh the page. If the **Login** page is not shown, the process is still ongoing. When the page is shown, log in again.
7. Check from the **System Operations** component that the software was updated.

   If the software version did not change, the software version that you tried to upload may be incompatible with the PMU701 unit revision.

18.4.3 DRI701 hardware and software compatibility

To check the revision of the DRI701 circuit board, generate a station report.

The DRI701 circuit board revision is listed in the station report as **DRI701 hardware revision**. The DRI701 type label shows the revision of the DRI701 unit, not of the circuit board.

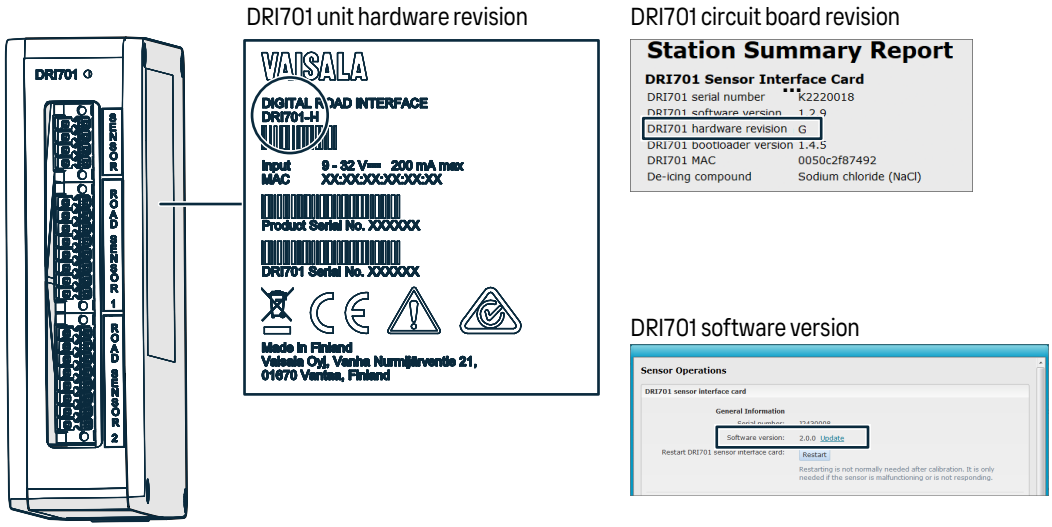


Figure 39 DRI701 unit revision, circuit board revision, and software version

Table 24 Compatibility matrix of DRI701 unit revision, circuit board revision, and software version

DRI701 unit revision (type label)	DRI701 circuit board revision (station summary report)	DRI701 software version 1.2.0	1.2.3	1.2.5	1.2.9	2.0.0	3.1.2
DRI701-J	DRI701CB-M	✗	✗	✗	✗	✗	✓
DRI701-H	DRI701CB-G	✗	✗	✗	✗	✓	✗
DRI701-G DRI701-F DRI701-E	DRI701CB-F	✗	✗	✗	✓	✓	✗
DRI701-D DRI701-C	DRI701CB-E	✗	✗	✓	✓	✓	✗
DRI701-C	DRI701CB-D	✗	✓	✓	✓	✓	✗
DRI701-C	DRI701CB-C	✓	✓	✓	✓	✓	✗
DRI701-B	DRI701CB-B	✓	✓	✓	✓	✗ 1)	✗

1) Contact Vaisala helpdesk.

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Do not install an earlier software version than 3.1.2 on DRI701 circuit board DRI701CB-M. Older software versions do not work correctly with the new hardware.

More information

- Updating software (page 314)

18.4.3.1 Updating DRI701 software

A new version of DRI701 software is delivered in a ZIP file. The ZIP file contains the following file:

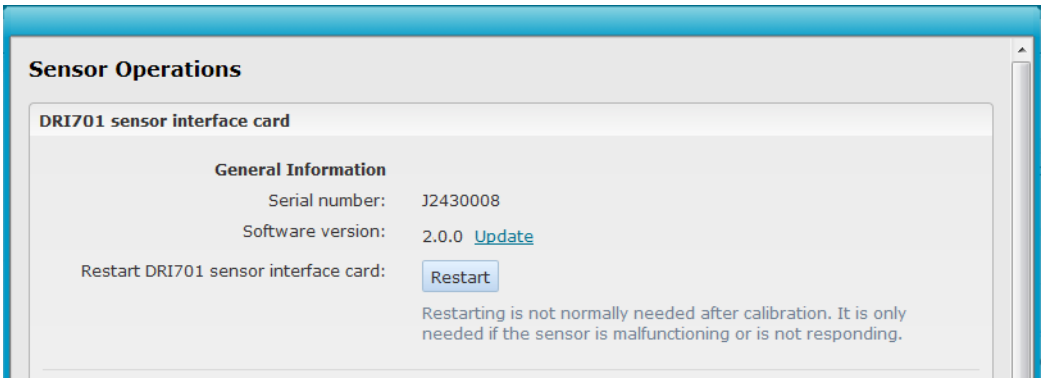
*DRI701_release_*<version>_<date>_<information>.*fw*

Check that the software version in the filename is compatible with your DRI701 unit revision.

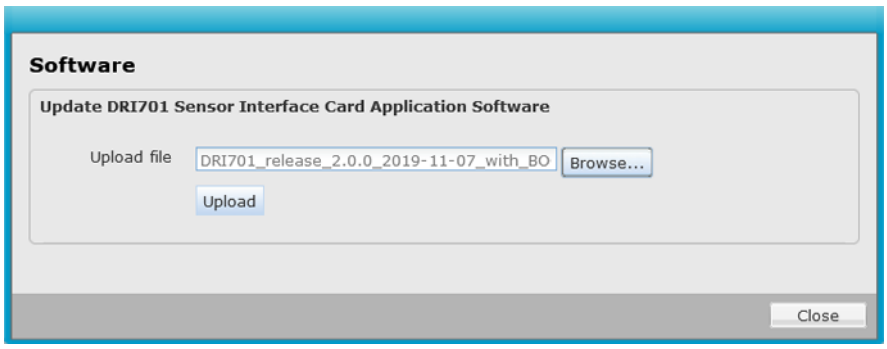
Check that the filename does not contain extra characters.

When you update DRI701 software, DRI701 restarts.

1. Extract the ZIP file to your computer.
2. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
3. In the **Sensors** component, select **Operations** for DRI701 sensor interface card.
4. In the **Sensor Operations** window, select **Update**.



5. In the **Software** window, select **Browse** and the file that contains the new software file.



6. Select **Update**.

   The system imports the file and updates DRI701. After the update, DRI701 restarts.

7. Check from the **Sensor Operations** window that the software was updated.

   If the software version did not change, the software version that you tried to upload may be incompatible with the DRI701 card revision.

18.4.4 Updating sensor software

You can update the software of the following sensors through the Web UI:

- DSC211, software update file *DSC211V*`<version>`*.hex*
- DST111, software update file *DST111V*`<version>`*.hex*
- PWD12, software update file *PWD12H.*`<version>`
- PWD22, software update file *PWD22H.*`<version>`

Check that the filename does not contain extra characters.

The following table shows which PWD12 and PWD22 software versions are compatible with each other. The sensors have different software.

Table 25 PWD12 and PWD22 software compatibility

Current software version in PWD12 or PWD22	New software version	
	1.x	2.x
1.x	✓	✗ 1)
2.x	✗ 1)	✓

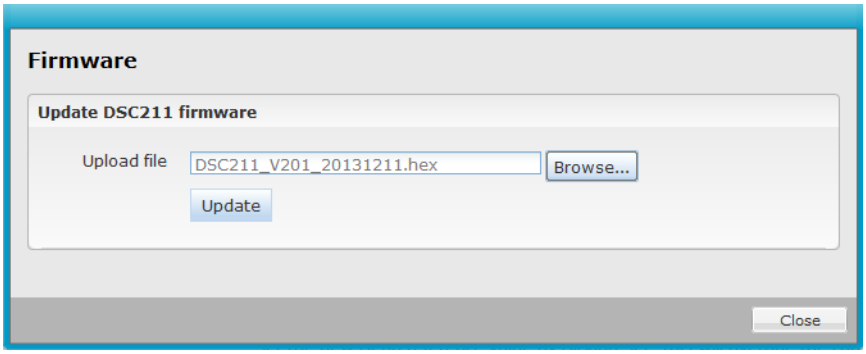
1) *PWD12 or PWD22 hardware upgrade needed. Contact Vaisala.*

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.

2. In the **Sensors** component, select **Operations** for the sensor that you want to update.
3. In the **Sensor Operations** window, select **Update** next to the software version.



4. In the **Firmware** window, select **Browse** and the file that contains the new software.



5. Select **Update**.

   The system imports the file and updates the sensor. After the update, the sensor restarts. The entire process takes several minutes.

More information

- Updating software (page 314)

19. Troubleshooting

19.1 Troubleshooting checklist

When troubleshooting, check the questions listed in Technical support (page 373) before contacting Vaisala technical support.

19.2 General troubleshooting procedure

When troubleshooting the station, follow the instructions in the general troubleshooting procedure. You can also restart sensors, DMU703, or the system remotely. If nothing else helps, generate an event log and send it to Vaisala helpdesk.

For sensor and device mapping in RWS200, see RWS200 system device map (page 340).

1. Check the cabling and mechanical structure visually for indications of the problem, such as vandalism, dirt, or lightning strike damage. Also check that all the connectors are properly attached.
2. If the system appears to be completely down, check powering.
   a. Check that there is sufficient voltage (23–32 V DC) present in the system.
   b. Check that the AC circuit breakers are functioning and that PMU701 is powered up.
   c. Check the battery status.
3. Check the color of the status LED of each system component:

   Constant green
   The component is restarting. Wait until the green LED starts blinking. If the LED does not start blinking, restart the component.

   Blinking green
   The component is operating properly.

   Constant red
   Restart the system by powering down the station from the PMU701 power switch and then powering up the station again.

   Blinking red
   Log in to the Web UI, and generate an event history report to see the problem. If you cannot find out or fix the problem, restart the station from the PMU701 power switch.
4. If the status LED remains red even after the restart, contact Vaisala technical support.

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5. If the system does not show or send any observation data, check the system setup.
   a. After the system has been without power, check the time and date settings in the **Station** component.

      If the station clock is incorrect, timed operations do not work as expected.

   b. Check the battery status.
   c. Check the cellular router settings and the communication settings in the **Communications** component.
   d. Check the sensor and device configuration in the **Device Configuration** component.
   e. If the system starts up normally but sends error messages during the startup, reload the system settings by importing them through the **System Configuration** component.
6. If connecting to the station fails, check the connection settings.
   a. Check that the WLAN connection works.
   b. Restart the station from the PMU701 power switch.
   c. Connect your computer directly to the DMU703 **ETH 0** port and check the system setup.
7. If the cellular router stops working or is reset, restore the router settings.

   If you do not have a backup of the settings, restore the previous station settings from the **System Configuration** component.

   CAUTION! Pressing the router reset button deletes all configurations made by Vaisala or the customer. Only reset the router if nothing else works. You can order the default factory settings configuration from Vaisala.

8. Has someone made software or hardware changes to the station prior to malfunction? If so, could those changes affect the operation?
   - If you imported a new settings file, restore the previous settings from the **System Configuration** component.
   - If you installed new hardware:
     1. Disconnect the new hardware.
     2. Restore the previous settings.
     3. Verify that the system restarts.
     4. Connect the new hardware.
     5. Update the device configuration.
     6. Verify that the system starts and runs properly.

9. If sensors are not working properly, check the system setup.
   a. Are there one or multiple malfunctioning sensors? Multiple simultaneous sensor malfunctions often indicate a damaged system setup.
   b. Is the installation site causing measurement problems? Check that the installation site matches the requirements. Check that snow, ice, or some other object is not blocking the measurement path. Check also the sensor alignment.
   c. Check that the plug-in modules, cabling, and connectors are in order.
   d. Check that unconnected wires do not touch each other and cause the malfunction.
   e. Restart the sensor.
   f. If the sensor can be calibrated on the field, calibrate the sensor.
   g. If the malfunctioning sensor is connected through RS-485 or Ethernet, use the sensor's own diagnostic features for further troubleshooting. See the sensor documentation.
   h. If the sensor is broken, replace it.
10. If communication is not working properly, use an external device to verify that the communication infrastructure is working properly.

    For example, verify with a cellular phone that the signal strength in the site is sufficient and that the cellular router has access to the network.

19.3 Resetting DMU703 to factory settings

Reset DMU703 to factory settings only in the following situations:

- You have restarted the weather station from the PMU701 power switch but you still cannot log in to the Web UI.
- You have forgotten your administrator username or password to the Web UI.
- You have replaced the DMU703 unit in the weather station and want to remove the configuration from the removed unit.



Pressing the **RESET** button briefly reboots DMU703.
Pressing and holding the **RESET** button down for at least 2 seconds resets DMU703. Reset removes all certificates and all changes made to communication settings, station settings, sensor settings, and usernames and passwords after factory installation. You can restore all settings except the certificates by importing the backup file to the station.

1. Press and hold down the **RESET** button at the bottom of DMU703 for at least 2 seconds.

   The reset takes up to 15 minutes.
2. When the green status LED in DMU703 starts blinking, log in to the Web UI with the default credentials.

3. If you have a backup of the configuration, import it through the Web UI.

   If you do not have a backup, configure all the settings again.

More information

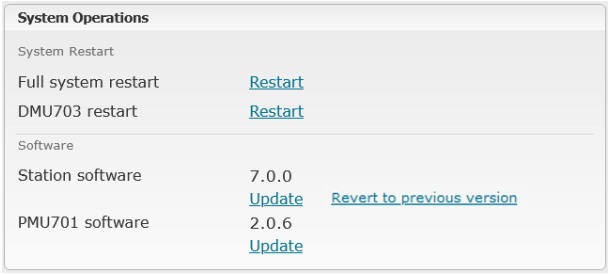
- Overview of configuration (page 21)
- Importing new configuration to station (page 308)

19.4 Restarting DMU703 or system remotely

When the system configuration is not operating properly, restarting DMU703 may help. If restarting DMU703 does not help, restart the whole system.

CAUTION! Do not restart DMU703 or the system while uploading software, exporting or importing settings, calibrating sensors, or generating a station summary report.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Operations** component, under **System Restart**, select **Restart** next to **DMU703 restart**.



3. When prompted, select **Restart**.

   The restart takes several minutes.
4. Refresh the page. If the **Login** page is not shown, the process is still ongoing. When the page is shown, log in again.
5. If that does not help, try restarting the whole system. Select **Restart** next to **Full system restart**.

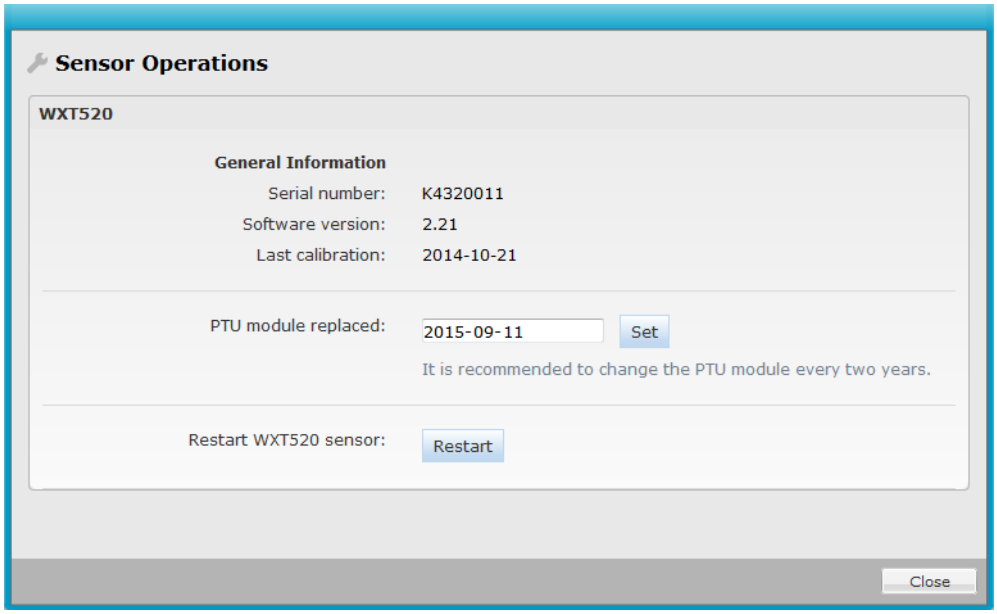
19.5 Restarting sensors

To help troubleshoot a sensor, restart it.

If the sensor is DRS511, FP2000, DTS12G, DTS210, or the global radiation sensor, see Restarting DRI701 (page 328).

You cannot restart sensors that are connected through an analog interface.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for the sensor that you want to restart.
3. In the **Sensor Operations** window, select **Restart**.



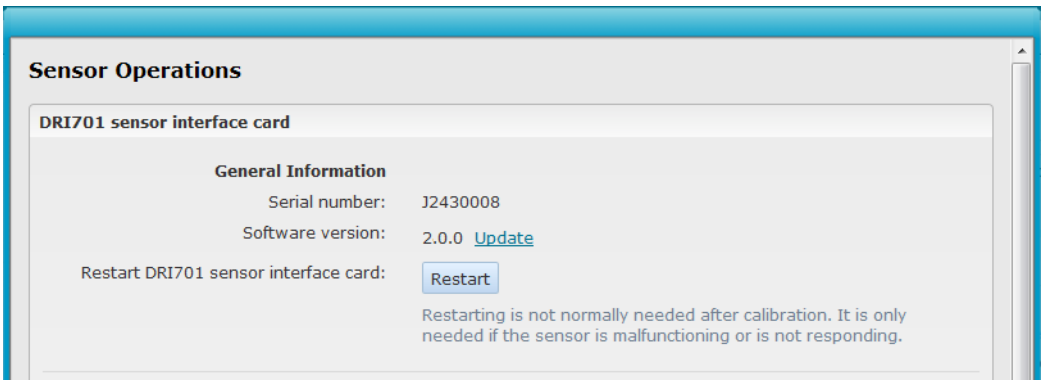
The restart takes at most 30 seconds.

19.6 Restarting DRI701

If there are problems with DRS511, FP2000, DTS12G, DTS210, or the global radiation sensor, restart DRI701.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Sensors** component, select **Operations** for DRI701.

3. In the **Sensor Operations** window, select **Restart**.



The restart takes several minutes.

19.7 Reverting station software to previous version

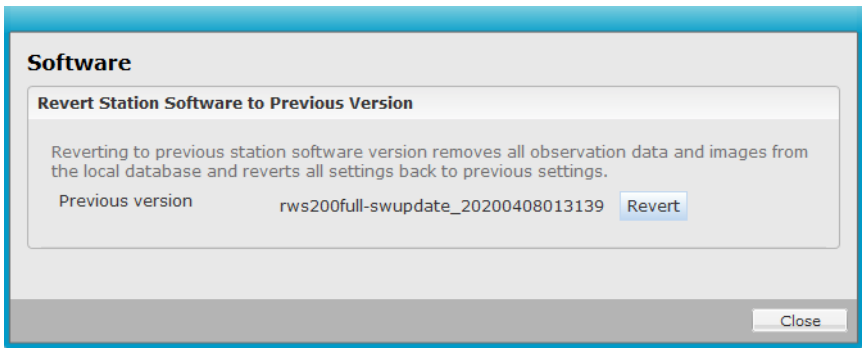
If you update the station software but have problems with a new feature, for example, you can revert back to the previous version of the station software.

CAUTION! Reverting to previous station software version removes all observation data and images from the local database, removes the system security certificate, and reverts all settings back to previous settings.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In **System Operations**, select **Revert to previous version**.

Revert to previous version is only available when reverting back to the previous software version is possible. You can only revert to station software version 4.1.0 or later.

3. In **Software**, select **Revert**.



   The station restarts.

4. Import the station settings from the backup file.

More information

- Updating software (page 314)

19.8 Resetting cellular router

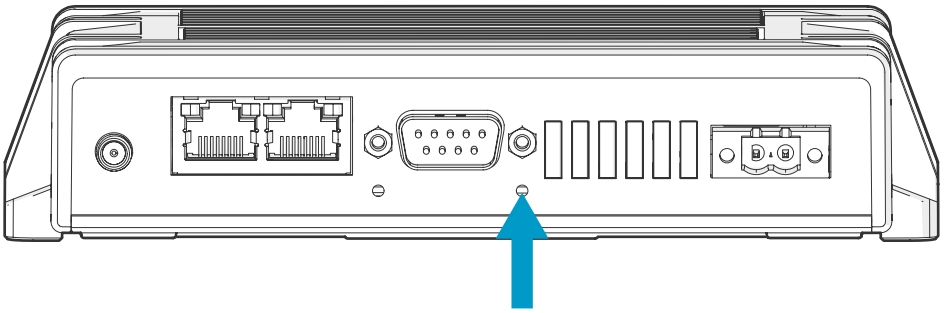
The cellular router password is changed at the factory. The original password is attached to the router and delivered on a separate sticker with the router.

Store the original password in a safe location. If you cannot find the password, contact Vaisala.

The cellular router also contains a Vaisala-specific configuration. The configuration file is included in the USB drive delivered with the station.

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1. To reset the cellular router, press **ERASE**.
   - To reset the cellular router to factory default, press **ERASE** once. Automatically generated certificates and keys for the cellular router remain, but the Vaisala configuration is erased.
   - To remove the generated cellular router certificates and keys, press **ERASE** again after the cellular router has rebooted.
   - To reset the cellular router to the version of firmware that was used prior to the current version, press and hold **ERASE** and then power on the cellular router.



2. If needed, upload the Vaisala-specific configuration file to the cellular router.

   For instructions, see manufacturer documentation.

CAUTION! Change the default username and password as soon as possible. Using the default credentials is a serious risk to data security.

More information

‣ IX20 cellular router maintenance (page 199)

19.9 Device configuration errors

The **Device Configuration** window shows the current status of the sensors and devices connected to the system.

Table 26 Device configuration icons

Icon	Explanation	Action
✔	The sensor or device is working properly.	None
✖	• Connection timeout occurred. • The sensor or device is disconnected. • The cable is damaged.	1. Check that the sensor is undamaged. 2. Check that the cable is undamaged and connected. 3. Check that the plug-in module or DRI701 are undamaged.

Icon	Explanation	Action
!	Error.	See the event log for more information about the possible cause. See Generating event history report (page 183).

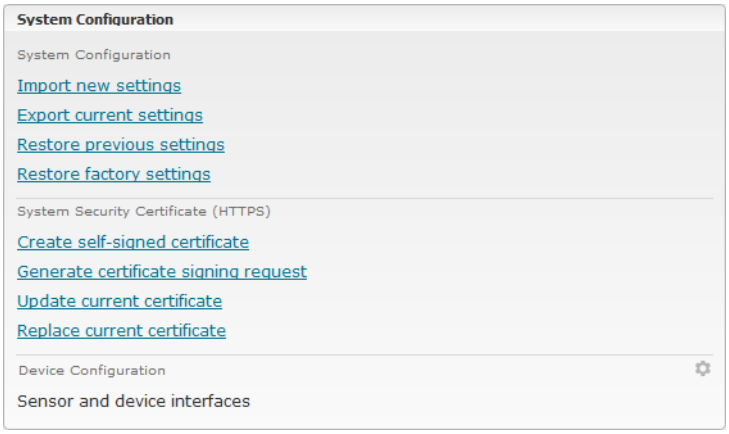
More information

- Updating DRI701 configuration (page 283)
- Changing sensor and device configuration for PMU701 (page 301)
- Changing sensor and device configuration for DRI701 (page 304)

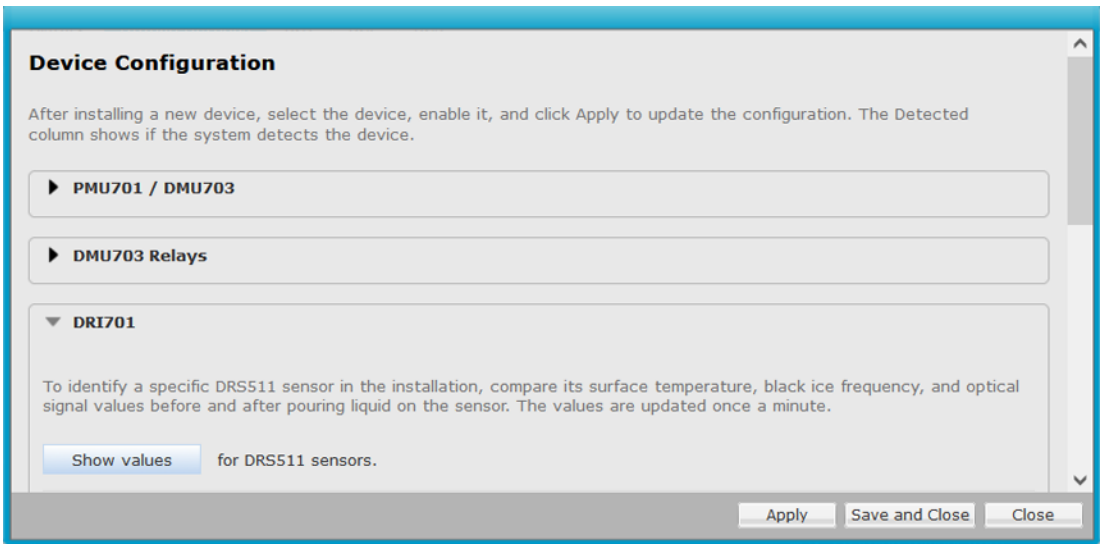
19.10 Identifying DRI701 cards and DRS511 sensors

You can check the status of all DRS511 sensors at once through the Web UI. The status view shows the ID of each sensor and the ID and port number of the DRI701 to which the device is connected. This helps you when troubleshooting DRS511 sensors.

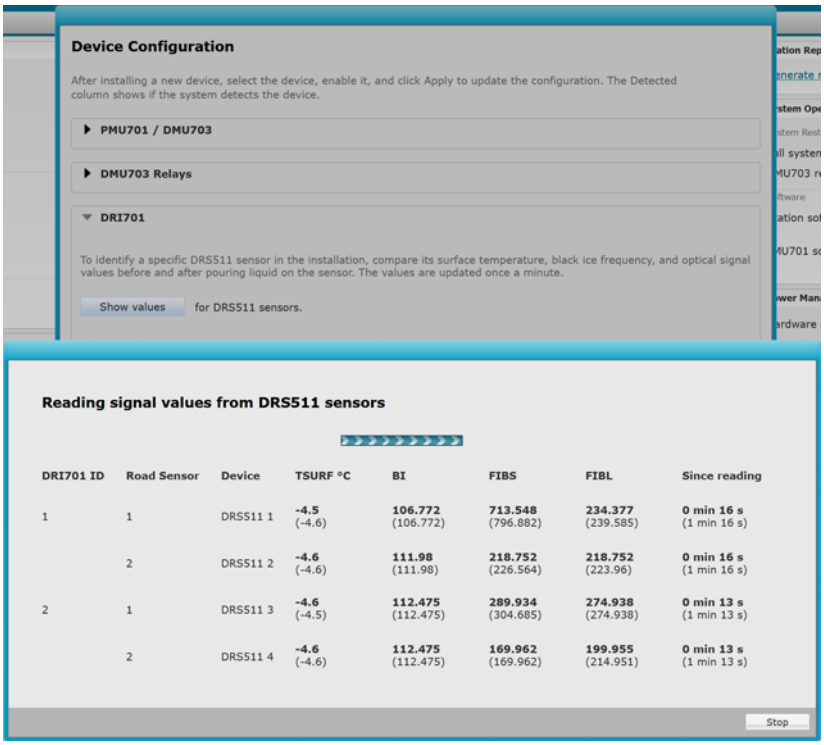
1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **System Configuration** component, select **Settings** ⚙ for **Sensor and device interfaces**.



3. In the **Device Configuration** window, to display the sensors and devices, select **DRI701**.



4. In **DRI701**, select **Show values**.



5. To identify a sensor, depending on the road condition: dry the sensor with a towel or wet it with water, or alter the sensor temperature by heating or cooling the sensor. Proceed to the next sensor until you have identified all sensors.

   The surface temperature, black ice, and fiber optical signal values are updated once a minute showing the change. The counter (**Since reading**) shows the time since the value was read.

19.11 Troubleshooting device control

The following cases present some common issues with device control:

- Device control status changes when observation value stays the same (page 334)
- Sensor nickname is not updated in device control rules (page 334)
- Station units are not updated in device control rules (page 335)

19.11.1 Device control status changes when observation value stays the same

Device control uses more accurate observations than the ones shown on the Web UI. For example, the system handles temperature average internally as a floating-point value, which is more accurate than the rounded value shown on the Web UI. This may lead to the device control status changing even when the Web UI shows the temperature to be constantly the same.

To check the reason for the change in the device control status, see the event log on the **History** page.



Regardless of the selected activation logic (normal or inverted), events always show the logical device control status of the relay.

To prevent device control status from changing too quickly, set a longer deactivation delay for the activation rule, or to set hysteresis, set a deactivation rule with the same observation but a clearly different value. For example:

- Activation rule:
  `Sensor HMP155E reports air temperature 30 s falls below 0 °C`
- Deactivation rule:
  `Sensor HMP155E reports air temperature 30 s rises above 1 °C`

More information

- Configuring activation rule, deactivation delay, and deactivation rule (page 149)

19.11.2 Sensor nickname is not updated in device control rules

When you change the nickname of a sensor in the sensor settings, the nickname is not updated in the device control rule or in the related events in the event log. When you change the sensor settings, this prevents the device control rule from accidentally changing.

To update the sensor nickname in the device control rule and in the related events, open the **Device Control Rule Viewer** for editing, and select **Save**.

More information

- Sensor settings (page 28)

19.11.3 Station units are not updated in device control rules

When you change the station units in the station settings, the units used in device control rules are not changed accordingly. This prevents the units from accidentally changing when the station units are changed.

1. Open the **Device Control Rule Viewer** for editing.

   The system converts the value and the unit to the one selected in the station settings.
2. If you do not want to change the unit and convert the value, select **Close**.
3. To save the converted value and unit, select **Save**.

   The converted value and unit are shown on the **Device Control Rule Viewer** component.

More information

- Setting station units (page 95)

Appendix A. RWS200 security checklist

To enhance the security of your RWS200, check that you have done applicable tasks from the following table.

RWS200 security checklist	
Human layer	
Create personal user account for all users, with the correct roles.	☐
Change the default user and admin passwords for the Web UI.	☐
Change the default password for the cellular router.	☐
Change the default passwords for the cameras.	☐
Hardware perimeter layer	
Change enclosure locks to locally-sourced ones with unique keys.	☐
Install a door switch to the enclosure and add active monitoring for door opening events.	☐
Prevent unauthorized access to the site.	☐
Network layer	
Use APN instead of a public, static IP address.	☐
Separate RWS200 to its own subnet in your private network.	☐
If your RWS200 is in the Internet, allow incoming traffic only from IP addresses in your backend system.	☐
Use push instead of polling in data reporting.	☐
Use secure HTTPS protocol in outgoing connections.	☐
Use unique credentials for each station's connection to the data collection system.	☐
Replace the default self-signed certificate with a signed certificate.	☐
Make sure that the WLAN hotspot is disabled when not in use.	☐
Cellular router	
Use a device-lock SIM.	☐
Install the latest cellular router software version and keep it up to date.	☐
Enable firewall in the cellular router.	☐
Block all incoming connections and only open the necessary ports.	☐
Close the SSH port, if open.	☐

Cellular router	
If you have Digi WR21 or other obsolete cellular router, replace it with IX20 or other supported router.	☐
Process layer	
Install the latest station (DMU703) software version and keep it up to date.	☐
Check software updates for the cameras, PMU701, DRI701, and sensors, and keep them up to date.	☐
Agree who is responsible for software updates.	☐

Appendix B. Configuring combined MES 14 data polling

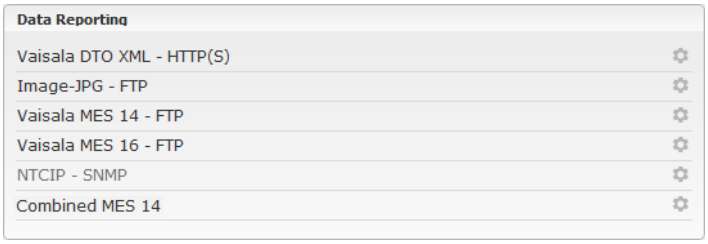
B.1 Configuring combined MES 14 interface

You can configure the station to combine DRS511, DTS12G, DSC211, and DST111 observations into Vaisala MES 14 data messages, and poll these messages.

For a description of the data messages, see RWS200 System Description (M211607EN).

To obtain the necessary information for configuration, contact the organization responsible for data collection.

1. Log in to the Web UI as an administrator or super user, and go to the **Station Settings** page.
2. In the **Data Reporting** component, select **Settings** ⚙ for **Combined MES 14**.



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3. In the **Combined MES 14** window, set the following:

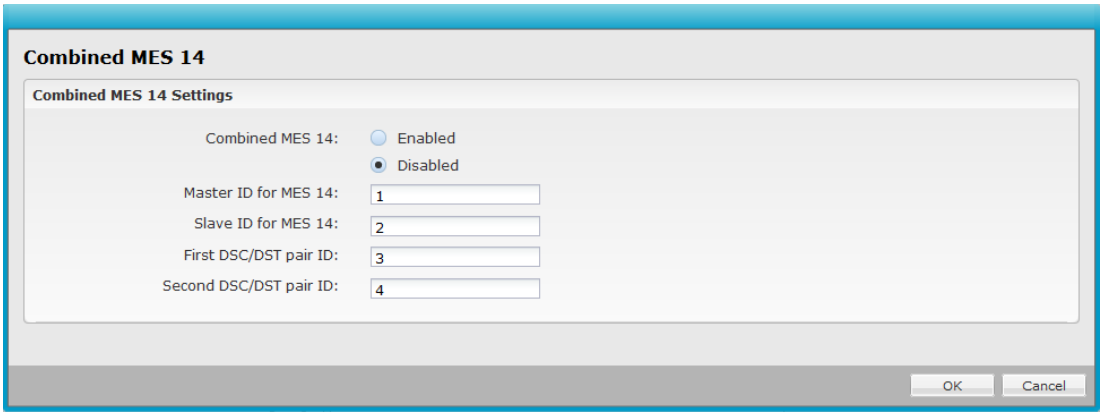
   Combined MES 14
   Select **Enabled** to have the system generate combined MES 14 data messages.

   Master ID for MES 14
   ID of the master DRI701. The ID is used for polling the correct data message.

   Slave ID for MES 14
   ID of the slave DRI701.

   First DSC/DST pair ID
   ID of the first DSC211/DST111 pair.

   Second DSC/DST pair ID
   ID of the second DSC211/DST111 pair.



4. To save the changes, select **OK**.

B.2 Using data polling interface

The following table explains how the combined MES 14 data polling interface differs from the MES 14 interface.

Table 27 Commands in combined MES 14 mode

Instructions	Data polling interface
Command MES 14 (page 187)	Use the ID set for the master or slave DRI701 or the DSC211/DST111 pair.
Command MES 16 (page 187)	
Command HIST (page 188)	
Command CONF HIST (page 189)	
Command DATE (page 190)	
Command TIME (page 190)	
MES interface commands (page 185)	The output for all commands starts with the ID given in the command.

Appendix C. RWS200 system device map

The following table shows the sensor and device mapping in the RWS200 system. The table helps troubleshooting in possible error situations.

Table 28 RWS200 system device map

System port (DMU703)	Device number	Device ID	Sensor/Device	PMU701 slot	Plug-in module
COM 2	1	23	DSC211_1	**D2**	PMS701
	2	26	DST111_1	**D1**	PMS701
	3	30	TPS10	**D1**	PMS701
COM 3	1	23	DSC211_2	**E2**	PMS701
	2	26	DST111_2	**E1**	PMS701
	3	33	SR50A_1	**E2**	PMS701
	4	34	SR50A_2	**E1**	PMS701
COM 5	1	–	RS-232/RS-485 customer interface	**K1**	PMS701
COM 6	1	10	HMP155E	**G2**	PMS701
	2	7	PWD12/PWD22	**G1**	PMS701
	3	20	PTB110	Internal	N/A
	4	1	AQT530 / AQT560	**G2**	PMS701
COM 7	1	A	WMT700_1	**F2**	PMS701
	1	B	WMT700_2	**F1**	PMS701
	1	K	WA15 (WAC155)	**F2**	PMS701
	1	1	WXT520 / WXT536	**F2**	PMS701
CH A	A	–	DRD11A	**C1**	PMA701
	B	–	Tipping bucket	**C2**	PMA701
	B	–	R.M. Young Wind Monitor	**C2**	PMA701
DIGITAL IN	0	–	Digital input	Internal	N/A
	1	–	Digital input	Internal	N/A
	–	–	Digital input	Internal	N/A

System port (DMU703)	Device number	Device ID	Sensor/Device	PMU701 slot	Plug-in module
DIGITAL OUT	0	–	Relay output 1	Internal	N/A
	1	–	DRD11A heating	**C1**	PMA701
	2	–	Relay output 2	Internal	N/A
	3	–	Relay output 3	Internal	N/A
ETH 1 (VLAN-A)	1	–	DRI701_1	**ETH 2**	N/A
	2	–	DRI701_2	**ETH 2**	N/A
	3	–	DRI701_3	**ETH 2**	N/A
	4	–	DRI701_4	**ETH 2**	N/A
	5	–	PMU701	**ETH 1**	N/A
ETH 1 (VLAN-B)	1	–	Mobotix fixed camera 1	**J1**	PME701
	1	–	AXIS PTZ camera	**J1**	PME701
	2	–	Mobotix fixed camera 2	**J2**	PME701
	4	–	Wavetronix traffic sensor	**H1**	PME701
ETH 1 (VLAN-C)	3	–	Ethernet customer interface	**K1**	PME701
WLAN	1	–	WLAN	Internal	Internal
ETH 0	1	–	Cellular router	Internal	Internal

Appendix D. Spare parts and accessories

D.1 Safety-critical spare parts

To maintain product safety, replace safety-critical components only with the spare parts listed in the following tables. Follow the replacement instructions carefully.

D.2 Enclosure spare parts and accessories

Table 29 ENC652 spare parts and accessories

Spare part or accessory	Order code
Enclosure ENC652 with locks and flanges, mounting frame, empty backplate, radiation shield, and cabling box	ENC652KIT [1)]
Cabling box	ASM210466SP
Radiation shield	ASM210463SP
Rubber flange (1 pc)	DRFLANGE10SP [1)]
Enclosure lock	ASM213869SP [1)]
Empty backplate	ASM211817SP
Pressure port	16941DM
Enclosure accessories: • Cable ties 2.5×100 mm (20 pcs) • Cable tie holders FTH-13R-01 (5 pcs) • DIN rail end brackets (10 pcs) • Washers with EPDM gasket 6.8/16×1.5/A2/EPDM (4 pcs) • Hex screws M6×16 ISO7380 A4 (2 pcs) • Hex nuts M6 Wulock Fe/Zn (2 pcs) • Torx screws M4×8 ISO14583 TX A4 (10 pcs) • Flat washers A6.4 DIN125 A4 (4 pcs)	BOX652ACC1SP
Accessory set including screws and washers	262928
DIN rail end bracket (5 pcs)	281394
Enclosure grounding cable, 16 mm^2 (5 AWG), 1.4 m (4 ft 7 in)	CBL210759
Table top	ASM213554

1) Safety-critical component.

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Table 30 ENC653 spare parts and accessories

Spare part or accessory	Order code
Enclosure ENC653 with flanges, mounting frame, empty backplate, radiation shield, and cabling box	ENC653KIT [1)]
Enclosure	ENC653SP [1)]
Cabling box	ASM215259SP
Radiation shield	ASM213010SP
Mounting frame	ASM213223SP
Rubber flange (1 pc)	DRFLANGE10SP [1)]
Empty backplate	ASM211817SP
Pressure port	16941DM
Wind lock	253494SP
Door locking system with swing handle	258058SP [1)]
Lock cylinder (Vaisala standard key)	277205SP [1)]
Door switch with mounting bracket, for use with LED light	ASM213613SP
Door switch with mounting bracket, for use without LED light	ASM215220SP
LED light with wiring	CBL210842+MARKERSP [1)]
LED fuse, 1 A (10 pcs)	232177SP
Wire assembly between backup battery, DMU703, door switch, and LED light	CBL211326SP [1)]
Enclosure accessories: • Cable ties 2.5×100 mm (20 pcs) • Cable tie holders FTH-13R-01 (5 pcs) • DIN rail end brackets (10 pcs) • Washers with EPDM gasket 6.8/16×1.5/A2/EPDM (4 pcs) • Hex screws M6×16 ISO7380 A4 (2 pcs) • Hex nuts M6 Wulock Fe/Zn (2 pcs) • Torx screws M4×8 ISO14583 TX A4 (10 pcs) • Flat washers A6.4 DIN125 A4 (4 pcs)	BOX652ACC1SP
Accessory set including screws and washers	262928
DIN rail end bracket (5 pcs)	281394
Enclosure grounding cable, 16 mm^2 (5 AWG), 1.4 m (4 ft 7 in)	CBL210759
Weather cover	ASM213363
Table top	ASM213554

1) Safety-critical component.

Table 31 ENC652 and ENC653 mounting kit options

Mounting kit	Order code
Mounting kit for lattice mast [1)]	ASM210998
Mounting kit for 60 mm (2.36 in) pole mast [2)]	APPK-SET60
Mounting kit for 75 mm (2.95 in) pole mast [2)]	APPK-SET75
Mounting kit for 100 mm (3.94 in) pole mast [2)]	APPK-SET100
Mounting kit for 80–600 mm (3.15–23.62 in) pole mast, excluding stainless steel band and locks [2) 3)]	DRUNIV-US
Mounting kit for 80–600 mm (3.15–23.62 in) pole mast, including stainless steel band and locks [2)]	DRUNIV

1) *Installation requires 1 mounting kit.*
2) *Installation requires 2 mounting kits.*
3) *You can use any suitable stainless steel band and locks for attaching the mounting support to the pole mast, for example, Band-It 19.1 mm (0.75 in) with Ear-Lokt buckles. If you are only doing a few installations, use the DRUNIV mounting kit instead.*

Table 32 BOXALU-US and BOXSS-US spare parts and accessories

Item	Code
Aluminum enclosure	BOXALU-US
Stainless steel enclosure	BOXSS-US
Backplate mounting frame	ASM211177
Mounting support for lattice mast	60030004

More information

- Inside enclosure maintenance (page 196)

D.3 Support arm spare parts and accessories

Table 33 Support arm spare parts and accessories

Item	Order code
Support arm and mounting kit for lattice tower	ASM211057
Support arm and mounting kit for 63 mm (2.48 in) pole mast	DM32ARM63
Support arm and mounting kit for 75 mm (2.95 in) pole mast	DM32ARM75
Support arm and mounting kit for 102 mm (4.02 in) pole mast	DM32ARM102
Support arm and mounting kit for 80 ... 600 mm (3.15 ... 23.62 in) pole mast, excluding stainless steel band and locks	DRUNIVARM-US

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Item	Order code
Support arm and mounting kit for 80 ... 600 mm (3.15 ... 23.62 in) pole mast, including stainless steel band and locks	DRUNIVARM

D.4 DMU703 spare parts and accessories

Table 34 DMU703 spare parts and accessories

Spare part or accessory	Order code
DMU703-RWS unit including: • Ethernet cable 40 cm (15.75 in) • Phoenix Contact DFMC 1,5/3-ST-3,5-LR 6-pin cable connector (2 pc) • Phoenix Contact DFMC 1,5/5-ST-3,5-LR 10-pin cable connector (5 pc)	DMU703-RWSSP [1)]
Phoenix Contact DFMC 6-pin cable connector set (10 pcs)	262926
Phoenix Contact DFMC 10-pin cable connector set (10 pcs)	262924
Insulated ferrules 0.5 mm^2, length 10 mm, white (100 pcs)	237754SP

1) Safety-critical component.

More information

‣ Replacing DMU703 (page 260)

D.5 PMU701 spare parts and accessories

Table 35 PMU701 spare parts and accessories

Spare part or accessory	Order code
PMU701 unit including: • Sensor data cable • Phoenix Contact DFMC 1,5/10-ST-3,5-LR 20-pin cable connector (1 pc)	PMU701SP [1)]
PMU701 accessories including: • Torx screws M4×8 ISO14583 TX A4 (4 pcs) • Torx screws M3×6 ISO14583 A4-60 (6 pcs) • Cable shield grounding clamps SK 8 (10 pcs) (217844) • Cable shield grounding clamps SK 14 (10 pcs) (237528) • Hex-tapped spacers M4×55 FeZn Female/Male (2 pcs) • Enclosure grounding rail for sensor cables (DRW240852) • PMU701 grounding rail for sensor cables (DRW240399)	PMU701ACC1SP
PMU701 accessories including: • Cable shield grounding clamps SK 8 (10 pcs) • Cable shield grounding clamps SK 14 (10 pcs)	PMU701ACC2SP

Spare part or accessory	Order code
PMU701 accessories including: • Set of quick reference cards • Cable ferrules 0.5 mm^2 / 10 mm (100 pcs) (237754) • Phoenix Contact DFMC 1,5/1-ST-3,5-LR 2-pin cable connectors (4 pcs) • Phoenix Contact DFMC 1,5/3-ST-3,5-LR 6-pin cable connectors (10 pcs) • Phoenix Contact DFMC 1,5/4-ST-3,5-LR 8-pin cable connectors (10 pcs) • Phoenix Contact DFMC 1,5/5-ST-3,5-LR 10-pin cable connectors (30 pcs) • Phoenix Contact DFMC 1,5/8-ST-3,5-LR 16-pin cable connectors (10 pcs) • Phoenix Contact DFMC 1,5/10-ST-3,5-LR 20-pin cable connectors (5 pcs) • Phoenix Contact MVSTBR 2,5HC/2-ST-5.08 cable connectors (4 pcs) • Narrow cover plates for empty slots (7 pcs) • Wide cover plates for empty slots (3 pcs)	PMU701ACC3SP
Phoenix Contact DFMC 6-pin cable connector set (10 pcs)	262926
Phoenix Contact DFMC 8-pin cable connector set (10 pcs)	262923
Phoenix Contact DFMC 10-pin cable connector set (10 pcs)	262924
Phoenix Contact DFMC 16-pin cable connector set (10 pcs)	262925
Phoenix Contact DFMC 20-pin cable connector set (10 pc)	262927
Accessory set, screws and washers	262928
Insulated ferrules 0.5 mm^2, length 10 mm, white (100 pcs)	237754SP

1) Safety-critical component.

Table 36 PMU701 plug-in module spare parts

Spare part	Order code
External DC / Solar panel input module	PMP701SP
Analog input/output module with 10-pin cable connectors (2 pcs)	PMA701SP
Serial input/output module with 10-pin cable connectors (2 pcs)	PMS701SP
Ethernet / power over Ethernet module	PME701SP

More information

- Replacing PMU701 (page 279)
- Replacing PMU701 plug-in modules (page 281)

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D.6 DRI701 spare parts and accessories

Table 37 DRI701 spare parts and accessories

Spare part or accessory	Order code
DRI701 with: • Power cable 30 cm (11.81 in) • Ethernet cable 30 cm (11.81 in) • Phoenix Contact DFMC 6-pin cable connector (1 pc) • Phoenix Contact DFMC 8-pin cable connector (1 pc) • Phoenix Contact DFMC 16-pin cable connector (2 pcs)	DRI701SP [1)]
Phoenix Contact DFMC 8-pin cable connector set (10 pcs)	262923
Phoenix Contact DFMC 16-pin cable connector set (10 pcs)	262925
Insulated ferrules 0.5 mm^2, length 10 mm, white (100 pcs)	237754SP

1) Safety-critical component.

More information

- Replacing DRI701 (page 282)

D.7 Powering spare parts

D.7.1 AC (mains) input spare parts

Table 38 AC (mains) input spare parts

Item	Order code
AC (mains) input assembly with EU socket	ASM210483SP [1)]
AC (mains) input assembly with US socket	ASM210483USSP [1)]
AC (mains) input assembly with UK socket	ASM210483UKSP [1)]
AC (mains) input assembly with FR socket	ASM210483FRSP [1)]
AC (mains) input assembly without service socket	ASM213653SP [1)]
Surge protection plug (Phoenix Contact 2907923)	254404SP [1)]
Surge protection socket (Phoenix Contact 2907924)	254402SP [1)]

1) Safety-critical component.

More information

- Replacing AC (mains) input assembly (page 266)
- Replacing surge protector (page 273)

D.7.2 AC/DC power supply unit spare parts

Table 39 AC/DC power supply unit spare parts

Item	Order code
Phoenix QUINT-PS/ 1AC/24DC/10 AC/DC power supply unit with: • Power cable to PMU701 • AC wires	234881-RWSSP [1]

1) *Safety-critical component.*

More information

- Replacing AC/DC power supply unit (page 273)

D.7.3 Backup battery spare parts

Table 40 Backup battery spare parts for standard backplate

Item	Order code
12 V / 24 Ah VRLA battery [1]	275547SP [2]
12 V / 28 Ah VRLA battery with M6 terminal connectors [3]	275965SP [2]
Battery clamp	ASM211696SP
Battery cables (ENC652 and ENC653)	CBL210269SP [2]
Battery cables for ENC653 with LED light	CBL211326SP [2]

1) *The maximum operating temperature of RWS200 with the 24 Ah VRLA battery is +50 °C (+122 °F).*
2) *Safety-critical component.*
3) *The maximum operating temperature of RWS200 with the 28 Ah VRLA battery is +60 °C (+140 °F).*

More information

- Replacing backup battery (page 263)

D.8 Communication device spare parts and components

D.8.1 Cellular router spare parts and accessories

Table 41 Cellular router spare parts and accessories

Spare part or accessory	Order code
IX20 cellular router, 4G global [1]	241542-RWSSP [2]

Spare part or accessory	Order code
Mounting bracket for IX20, Ethernet cable, and power cable	ASM214704SP

1) *With mounting bracket, Ethernet cable, and power cable.*
2) *Safety-critical component.*

More information

- Replacing WR21 cellular router with IX20 (page 275)

D.8.2 Antenna options and spare parts

Table 42 Antenna options and spare parts

Item	Order code
Mobile Mark LTM301 cellular/LTE and GPS antenna with fixed cables 10 m (32 ft 10 in)	251867
Mobile Mark LTM401 cellular/LTE, GPS, and WLAN antenna with fixed cables 4.5 m (14 ft 9 in)	243833SP
Mobile Mark LTM301 cellular/LTE and GPS antenna with fixed cables 4.5 m (14 ft 9 in) and mounting kit, and WLAN whip antenna	236774SP
Antenna mounting kit	ASM211224SP

D.9 Device control spare parts

Table 43 Device control spare parts

Item	Order code
Device control spare part with: • Pre-assembled Phoenix Contact relays (3 pcs) • Wire set • DIN rail • Mounting screw M4×8 ECO-Fix Zn TX20 (3 pcs)	RWS200DEVCSP [1)]

1) *Safety-critical component.*

D.10 Sensor spare parts and accessories

D.10.1 DSC211 options, spare parts, and accessories

Table 44 DSC211 options, spare parts, and accessories

Item	Order code
DSC211 sensor (maximum 2 pcs)	DSC211RWS
Cable 10 m (32 ft 10 in)	216546SP
Cable 25 m (82 ft 3 in)	216547SP
Cable 50 m (164 ft 1 in)	DR221741Z50MSP
Cable 100 m (328 ft 1 in)	DR221741Z100MSP
Cable 150 m (492 ft 2 in)	DR221741Z150MSP
USB service cable with battery cable and 1 A fuse	CBL210485
Weather shield	DRW217593SP
Mounting bracket	236372SP
Visibility reporting	DSCVIS

More information

- DSC maintenance (page 205)

D.10.2 DST111 options, spare parts, and accessories

Table 45 DST111 options, spare parts, and accessories

Item	Order Code
DST111 sensor (maximum 2 pcs)	DST111RWS
Cable 10 m (32 ft 10 in)	216546SP
Cable 25 m (82 ft)	216547SP
Cable 50 m (164 ft 1 in)	DR221741Z50MSP
Cable 100 m (328 ft 1 in)	DR221741Z100MSP
Cable 150 m (492 ft 2 in)	DR221741Z150MSP
USB service cable with battery cable and 1 A fuse	CBL210485
Weather shield	DRW218846SP
Mounting bracket	236372SP
INTERCAP humidity sensor	15778HM

Item	Order Code
Membrane filter	DRW010525SP

More information

- DST111 maintenance (page 211)
- Replacing HMP60 filter and humidity sensor (page 212)

D.10.3 DRS511 options and accessories

Table 46 DRS511 options

Option	Order code	
DRS511 sensor with cable: [1]	**Road sensor**	**Bridge sensor**
20 m (65 ft 7 in)	DRS511AB2	DRS511BB2
30 m (98 ft 5 in)	DRS511AB3	DRS511BB3
50 m (164 ft 1 in)	DRS511AB5	DRS511BB5
100 m (328 ft 1 in)	DRS511AB10	DRS511BB10
150 m (492 ft 2 in)	DRS511AB15	DRS511BB15
200 m (656 ft 2 in)	DRS511AB20	DRS511BB20
250 m (820 ft 2 in)	DRS511AB25	DRS511BB25
300 m (984 ft 3 in)	DRS511AB30	DRS511BB30

1) Maximum 4 pcs.

Table 47 DRS511 accessories

Accessory	Order code
Calibrator kit	DRC511
Splice kit	24051020
Type V extension cable 1524 m (5000 ft) [1]	North America local content

1) Manufacturer: General Cable, cable type: filled solid cable RDUP (RUS) PE-39 AL, 6 pairs (19 AWG).

More information

- Calibrating DRS511 (page 222)

D.10.4 DTS12G options and accessories

Table 48 DTS12G options

Option	Order code
DTS12G sensor with cable: [1]	
10 m (32 ft 10 in)	DTS12G1
20 m (65 ft 7 in)	DTS12G2
30 m (98 ft 5 in)	DTS12G3
50 m (164 ft 1 in)	DTS12G5
100 m (328 ft 1 in)	DTS12G10
120 m (393 ft 8 in)	DTS12G12
150 m (492 ft 2 in)	DTS12G15
200 m (656 ft 2 in)	DTS12G20

1) *Maximum 4 pcs.*

Table 49 DTS12G accessories

Accessory	Order code
Splice kit	24051020
Type V extension cable, maximum 1524 m (5000 ft) [1]	North America local content

1) *Manufacturer: General Cable, cable type: filled solid cable RDUP (RUS) PE-39 AL, 6 pairs (19 AWG).*

More information

- DTS12G maintenance (page 228)

D.10.5 TPS10 options and accessories

Table 50 TPS10 options and accessories

Option	Order code
Standard TPS10 sensor with: • 15 sensing elements • Sensor length 1.88 m (6 ft 2 in) • Cable 10 m (32 ft 10 in) between the sensor and the electronic unit • Cable 60 m (196 ft 10 in) between the electronic unit and the weather station	263207

Option	Order code
Custom TPS10 sensor with: • Maximum 20 sensing elements • Maximum sensor length 2.5 m (8 ft 2 in) • Cable 10 m (32 ft 10 in) between the sensor and the electronic unit • Maximum cable length 300 m (984 ft 3 in) between the electronic unit and the weather station	TPS10

More information

- TPS10 maintenance (page 228)

D.10.6 WMT700 options, spare parts, and accessories

Table 51 WMT700 options

Option	Order code	Configuration code
WMT703 sensor, heated transducers and arms (WMT700-CFG05), 150 W [1)]	WMT700	3C3A0A001A1A1
WMT703 sensor, heated transducers (WMT700-CFG06), 30 W	WMT700	3C2A0A001A1A1
WMT703 sensor, no heating (WMT700-CFG07), 0 W	WMT700	3C1A0A001A1A1

1) *Requires an additional power supply.*

Table 52 WMT700 spare parts and accessories

Spare part or accessory	Order code
Cable 10 m (32 ft 10 in)	227568SP
Cable 15 m (49 ft 3 in)	237890SP
Cable 26 m (85 ft 4 in)	237889SP
Cable 50 m (164 ft 1 in) [1)]	278371
USB service cable with battery cable and 1 A fuse	CBL210485
Connector cover kit	ASM211309
Mounting adapter for support arm and pole mast	WMT70FIXSP
Mounting bracket for support arm	SENSORARMFIX60
Bird cage	WMT70BIRDKIT
Zero wind verifier	WMT70VERIFIER

1) *Only for use with non-heated (0 W) or transducer-heated (30 W) WMT700.*

More information

- WMT700 maintenance (page 243)
- Testing operation (page 244)

D.10.7 R.M. Young Wind Monitor options, spare parts, and accessories

Table 53 R.M. Young Wind Monitor options, spare parts, and accessories

Item	Order code
R.M. Young Wind Monitor 05103-15 with: • Cable 15 m (49 ft 3 in) • Mounting accessories	59020001
Mounting bracket for support arm	SENSORARMFIX60

More information

‣ R.M. Young Wind Monitor maintenance (page 247)

D.10.8 WA15 spare parts and accessories

Table 54 WAC155 options, spare parts, and accessories

Item	Order code
Serial transmitter WAC155, cross arm, and mounting set for Ø 60 mm (2.36 in) pole mast	WAC155AWS
Mounting bracket for support arm	SENSORARMFIX60
Cable 10 m (32 ft 10 in)	ZZ45049

Table 55 WAA151 spare parts and accessories

Item	Order code
Anemometer WAA151	WAA151
Service kit for wind sensors	16644WA
Cable	ZZ45036
Cable connector	230118
Sensor board	1433WA
Cup assembly	7150WA

Table 56 WAV151 spare parts and accessories

Item	Order code
Wind vane WAV151	WAV151
Service kit for wind sensors	16644WA
Cable	ZZ45037

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Item	Order code
Cable connector	230119
Sensor board	1434WA
Standard tail	6389WA

More information

- WA15 maintenance (page 246)

D.10.9 PWD options, spare parts, and accessories

Table 57 PWD options

Option	Configuration code
Present weather detector PWD22, no heating (PWD-CFG07)	DNNNN4NANNNNNN
Present weather detector PWD22, heated (PWD-CFG08)	DNHNN4NANNNNNN
Present weather detector PWD22, heated, with stricter warning limits (PWD-CFG15)	DNHNNCNANNNNNN
Present weather detector PWD12, heated (PWD-CFG09)	CNHNN4NANNNNNN
Present weather detector PWD12, no heating (PWD-CFG10)	CNNNN4NANNNNNN

Table 58 PWD spare parts and accessories

Spare part or accessory	Order code
Cable 10 m (32 ft 10 in)	241767
Cable 15 m (49 ft 3 in)	217148
Cable 35 m (114 ft 10 in)	217149
Cable 50 m (164 ft 1 in)	CBL210518-50M
USB service cable with battery cable and 1 A fuse	CBL210485
Calibration kit	PWA12
Controller/Receiver	PWC22 (for PWD22) PWC12 (for PWD12)
RAINCAP rain sensor	PWR211SP (for PWD22) PWR111SP (for PWD12)
Hood heater set	PWH111

Spare part or accessory	Order code
Transmitter	PWT11

More information

- PWD maintenance (page 230)
- Calibrating PWD (page 235)

D.10.10 DRD11A options and spare parts

Table 59 DRD11A options and spare parts

Item	Order code
DRD11A sensor with cable 10 m (32 ft 10 in)	DRD11A-10M

More information

- DRD11A maintenance (page 238)

D.10.11 RG13(H) options, spare parts, and accessories

Table 60 RG13(H) options

Option	Order code	Configuration code
Rain gauge RG13H, heated (RG13-CFG01), rainfall per pulse 0.1 mm (0.004 in), with cable 10 m (32 ft 10 in)	RG13	J1N5

Table 61 RG13(H) spare parts and accessories

Spare part or accessory	Order code
Rain gauge pedestal 1140 mm (44.88 in) with installation kit	RGSTAND1140

More information

- RG13(H) maintenance (page 240)

D.10.12 HMP155 options, spare parts, and accessories

Table 62 HMP155 options

Option	Order code	Configuration code
Humidity and temperature probe HMP155E, no heating (HMP155-CFG08)	HMP155	E1AA11A0A0E1A0A

Option	Order code	Configuration code
Humidity and temperature probe HMP155E, with heating (HMP155-CFG18)	HMP155	E1AA16B1A0G1A0A

Table 63 HMP155 spare parts and accessories

Spare part or accessory	Order code
Cable 10 m (32 ft 10 in)	220497
Cable 30 m (98 ft 5 in)	220498
Cable 50 m (164 ft 1 in)	245931
Cable 100 m (328 ft 1 in)	279350
DTR13 radiation shield with mounting equipment	DTR13
T-probe installation adapter for DTR13	221069
DTR503A radiation shield with mounting equipment	DTR503ASP
T-probe installation adapter for DTR503	221072
Support arm for pole mast or wall	DKPFIXP44H
Support arm for lattice mast	DKPFIXP44HLTT
Humidity sensor	HUMICAP180R
Membrane filter	230727SP

More information

- HMP155 maintenance (page 241)
- Changing HMP155 probe filter (page 242)

D.10.13 PTB110 options, spare parts, and accessories

Table 64 PTB110 options

Option	Order code	Configuration code
PTB110 sensor, class B calibration (PTB110-CFG02)	PTB110	1S1AA [1)]

1) Safety-critical component.

Table 65 PTB110 spare parts and accessories

Spare part or accessory	Order code
Plastic cover	219268

Spare part or accessory	Order code
DIN rail connector	219269

More information

- PTB110 maintenance (page 248)

D.10.14 WXT530 options, spare parts, and accessories

Table 66 WXT530 options

Option	Order code	Configuration code
Weather transmitter WXT536, no heating (WXT536-CFG01)	WXT530	6D1B1K1A1A1B
Weather transmitter WXT536, heated (WXT536-CFG02)	WXT530	6D1B2K1A1A1B

Table 67 WXT530 spare parts and accessories

Spare part or accessory	Order code
Cable 10 m (32 ft 10 in)	222288
Vaisala Configuration Tool, USB service cable	220614
USB service cable with battery cable and 1 A fuse	CBL210485
Mounting kit	212792
Mounting adapter for pole mast and support arm	WMSFIX60
Mounting bracket for support arm	SENSORARMFIX60
Radiation shield	218817SP
PTU module	WXTPTUSP

More information

- Weather transmitter maintenance (page 248)
- Replacing PTU module (page 249)

D.10.15 SR50A options, spare parts, and accessories

Table 68 SR50A options and accessories

Option	Order code
Water and snow level sensor SR50A (maximum 2 pcs)	SR50A-RS485
Mounting kit	ASM210958
Support arm extension	ASM212380

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Option	Order code
Cable 10 m (32 ft 10 in)	SR50ACBL-10M
Cable 30 m (98 ft 5 in)	SR50ACBL-30M
Cable 100 m (328 ft 1 in)	SR50ACBL-100M

More information

- SR50A maintenance (page 251)

D.10.16 SP Lite2 options, spare parts, and accessories

Table 69 SP Lite2 options, spare parts, and accessories

Item	Order code
Pyranometer SP Lite2 with cable 15 m (49 ft 3 in)	245430
Mounting kit	KZFIXPLATE
Extension cable 5 m (16 ft 5 in)	26720

More information

- SP Lite2 maintenance (page 258)

D.10.17 Mobotix options, spare parts, and accessories

Table 70 Mobotix options, spare parts, and accessories

Item	Item code	Order code
Mobotix M ONE fixed camera with optics	285515	CAM200
Mounting frame kit	ASM211036	–
Cable 10 m (32 ft 10 in)	CBL210324-10M	–
Cable 25 m (82 ft 3 in)	CBL210324-25M	–
Cable 35 m (114 ft 10 in)	CBL210324-35M	–

More information

- Mobotix fixed camera maintenance (page 258)

D.10.18 IR illuminator options, spare parts, and accessories

Table 71 IR illuminator options, spare parts, and accessories

Item	Item code	Order code
VARIO2 13 W IR illuminator (maximum 2 pcs) with cable 10 m (32 ft 10 in)	240980	CAM200
Fastening set	241641	–

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Appendix E. 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.

If applicable, Vaisala recommends removing the battery unit before recycling the rest of the device. The battery unit can be recycled separately in accordance with local waste management practices and regulations.

Integrated small sized batteries are typically left in place and removed by professionals at the recycling facilities.

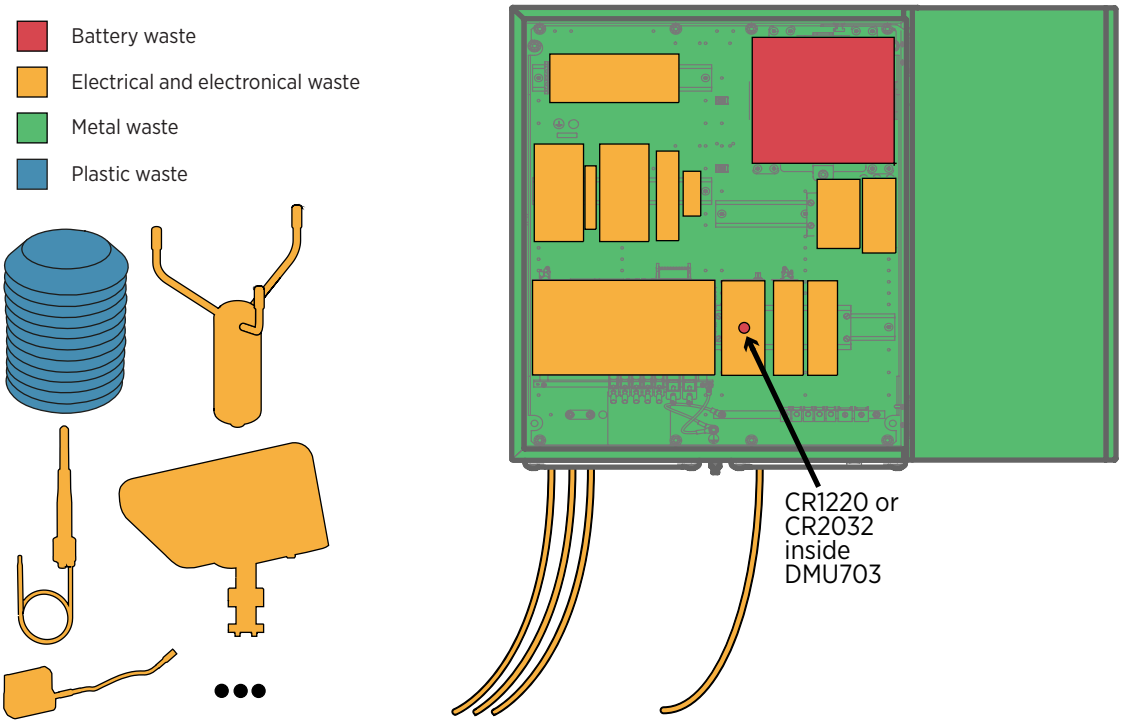


Figure 40 RWS200 materials for recycling

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Index

A

abbreviations....14
AC/DC power supply
  replacing....273
AC (mains) input
  spare parts....347
access control list....109
AC input assembly
  replacing....266
activation control
  device control....139
activation logic
  device control....139
activation rule
  device control....140, 142, 143
adding
  components....176
  new sensors....290
  pages....174
  users....168
administrator....168
administrator username and password....26
aiming Mobotix....70
air temperature and humidity probe, *see* HMP155
aligning R.M. Young Wind Monitor....57
alignment data....38, 227
antenna
  spare parts....349
antenna maintenance....196

B

backing up
  cellular router configuration....115
  Mobotix settings....79
  system settings....311
backup battery
  checking....202
barometer, *see* PTB110
battery
  replacing....263
  spare parts....348

C

cable length
  DRD11A....49
  DRS511....33
  DTS210....44
  FP2000....38
calibrating
  DRS511....222
  DSC211....209, 210
  HMP155....243
  PWD12/22....235
camera, *see* Mobotix
  network....98
camera image URL....68
camera software....70
capacitance readings....227
cellular Ethernet settings....100
cellular router....196
  access control list....109
  backing up....115
  configuring....100
  configuring cellular Ethernet settings....100
  configuring network....105
  firewall....113
  IP forwarding....109
  logging in....102
  maintenance....199
  NTP....103
  replacing....275
  restoring configuration....116
  spare parts....348
  timeout....104
  troubleshooting....330
  updating firmware....102
checking
  backup battery....202
checking position
  DRS511....215
checklist
  security....336
cleaning
  DSC211....206, 212
  DST111....211
  HMP155....241
  Mobotix....258
  PWD....232
  PWD12/22....233, 237
  RAINCAP rain sensor....238
  WMT700....243
  WXT530....248
clean value
  DRD11A....239
  PWD12/22....234
clock....92
CLOSE command....185
COM 5 settings....124, 125
combined wind sensor, *see* R.M. Young Wind Monitor
command
  CLOSE....185
  combined MES 14....339
  CONF HIST....189
  DATE....190

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HIST....188
MES 12....186
MES 14....187
MES 16....187
OPEN....185
TIME....190
communication device
spare parts....348
components....14
adding....176
changing observations....178
modifying....177
removing....178
CONF HIST command....189
configuration, *see* settings
configuration code
DSC211....350
DST111....350
PTB110....357
configuring
cellular router....100
coordinates....90
customer-provided modem....123–125

D

data polling
MES 12....186
MES 14....187
MES 16....187
data reporting
configuring for FTP....129, 133
configuring for HTTPS....133
configuring for serial line....123
DATE command....190
deactivation delay
device control....141
deactivation rule
device control....142, 143
de-icing compound
DRS511....33
FP2000....38
deleting
components....178
pages....175
user accounts....172
device configuration....283
DRI701....304
PMU701....301
device control
activation control....139
activation logic....139
activation rule....140, 142, 143
deactivation delay....141
deactivation rule....142, 143
design principles....139
spare parts....349
digital inputs....157
settings....157
distance measurement
DSC211....29
DST111....31
DMU703
replacing....260
resetting to factory settings....326
reverting to previous software version....329
spare parts....345
updating software....315
DMU703 lithium battery
replacing....262
door switch....157
DRD11A
cable length....49
clean value....239
maintenance....238
replacing....238
settings....49
spare parts....356
DRI701
adding new....294
changing sensors....283
de-icing compound....33
identifying....332
replacing....282
restarting....328
sensor connections....293
settings....33, 38, 42, 44
spare parts....347
updating software....321
DRS511
cable length....33
calibrating....222
checking position....215
grinding....220
identifying....332
installation place....33
installation plate....222
maintenance....215
parts....220
pavement elevation....33
pavement exposure....33
pavement type....33
scaling factors....33
settings....33
spare parts....351
testing operation....216
DSC211
adjusting signal strength....208
calibrating....209, 210
cleaning....206

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clean limit ... 207
configuration code ... 350
distance measurement ... 29
heating ... 29
installation angle ... 29
low visibility limit ... 29
maintenance ... 205
settings ... 29
spare parts ... 350
surface state format ... 95
surface state mode ... 29
DSC weather shield
replacing ... 211
DST111
cleaning ... 211, 212
configuration code ... 350
distance measurement ... 31
installation angle ... 31
maintenance ... 211
orientation ... 31
settings ... 31
spare parts ... 350
DTS12G
installation depth ... 42
installation place ... 42
maintenance ... 228
settings ... 42
spare parts ... 352
subsurface type ... 42
DTS210
cable length ... 44
installation depth ... 44
installation place ... 44
maintenance ... 228
settings ... 44
subsurface type ... 44

E

embedded road sensor, *see* DRS511
EN 15518 ... 95
ENC652
spare parts ... 342
ENC653
spare parts ... 342
ENC722
spare parts ... 342
enclosure
spare parts ... 342
enclosure maintenance ... 196
equipment ... 192, 193
ESD protection ... 19, 238
Ethernet
configuring cellular settings ... 100
connecting locally ... 23
connecting to station ... 23
event log ... 183
exporting current settings ... 311

F

factory settings ... 313
resetting DMU703 ... 326
firewall ... 113
fixed camera, *see* Mobotix
FP2000
alignment data ... 38, 227
cable length ... 38
capacitance readings ... 227
de-icing compound ... 38
maintenance ... 227
pavement elevation ... 38
pavement exposure ... 38
pavement type ... 38
resistance readings ... 227
settings ... 38
FTP settings ... 129, 133
fuse
replacing ... 275

G

global radiation ... 66
global radiation sensor ... 64
settings ... 64
see also SP Lite2
GPS ... 90, 196
grinding DRS511 ... 220

H

heating
DSC211 ... 29
PWD12/22 ... 47
SR50A ... 62
WA15 ... 55
WMT700 ... 53
WXT536 ... 60
HIST command ... 188
HMP155
calibrating ... 243
cleaning ... 241
installation height ... 52
maintenance ... 241
parts ... 242
radiation shield ... 52
replacing filter ... 242
settings ... 52
spare parts ... 356
HMP60
maintenance ... 212
replacing ... 212

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HTTPS settings....133
humidity sensor, *see* HMP155

I

images
configuration....133
imperial units....95
importing
software update files....314
system settings....308
inputs
digital....157
installation angle
DSC211....29
DST111....31
installation depth
DTS12G....42
DTS210....44
TPS10....45, 228
installation height
HMP155....52
PWD12/22....47
R.M. Young Wind Monitor....57
SR50A....62
WA15....55
WMT700....53
WXT536....60
installation place
DRS511....33
DTS12G....42
DTS210....44
TPS10....45
installing
new sensors....290
plug-in modules....290
IP address....98
cellular Ethernet connection....100
Mobotix....72
IP forwarding....109
IR illuminator
spare parts....360
IX20
replacing....275

L

LAN/Ethernet
connecting to station....26
level sensor, *see* SR50A
LI-COR....66
location coordinates....90
logging in
cellular router....102
Mobotix....70
Web UI....26
loop resistance....38
low visibility limit....29

M

mains input assembly
replacing....266
maintenance....193
antenna....196
cellular router....199
DRD11A....238
DRS511....215
DSC211....205
DST111....211
DTS12G....228
DTS210....228
enclosure....196
FP2000....227
HMP155....241
HMP60....212
Mobotix....258
painted surfaces....195
PTB110....248
PWD12/22....230
R.M. Young Wind Monitor....247
RG13(H)....240
site....195
SP Lite2....258
SR50A....251
TPS10....228
upgrades....321
WA15....246
WMT700....243
WXT530....248
maintenance schedule....192
materials....361
mechanical wind sensor, *see* WA15
MES 12 command....186
MES 12 configuration....123
MES 14 command....187
MES 14 configuration....123
MES 16 command....187
MES 16 configuration....123
MES commands....185
combined mode....339
message type
PWD12/22....47
metric units....95
Mobotix
backing up settings....79
camera image URL....68
IP address....72
logging in....70
maintenance....258
restoring settings....80

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settings....68
spare parts....359
storing settings....76
time and date....74
modem configuration....123
modifying
components....177
pages....174
users....171
multidepth sensor, *see* TPS10
multi-parameter transmitter, *see* WXT536

N

network....98
cellular router....105
NTP
cellular router....103
NTP server....92

O

observations
changing observations in components....178
checking in Web UI....181
OPEN command....185
orientation
DSC211....29
DST111....31
PWD12/22....47
WA15....55
WMT700....53

P

pages
adding....174
modifying....174
removing....175
pavement elevation
DRS511....33
FP2000....38
pavement exposure
DRS511....33
FP2000....38
pavement sensor, *see* DRS511
pavement type
DRS511....33
FP2000....38
plug-in modules
installing....290
replacing....281
PMU701
battery....199
replacing....279
sensor connections....290
spare parts....345
updating software....318
PMU701 plug-in modules
spare parts....345
powering
spare parts....347
power supply
spare parts....348
present weather detector, *see* PWD12/22
pressure sensor, *see* PTB110
previous settings....312
PTB110
configuration code....357
maintenance....248
settings....59
spare parts....357
PWD
cleaning....232
PWD12/22
cleaning....233, 237
clean value....234, 235
heating....47
installation height....47
maintenance....230
message type....47
orientation....47
parts....230
road direction....47
settings....47
spare parts....355
pyranometer, *see* global radiation sensor

R

R.M. Young Wind Monitor
aligning....57
ball bearings....247
installation height....57
maintenance....247
settings....57
spare parts....354
radiation, *see* global radiation
radiation shield for HMP155....52
RAINCAP rain sensor....238
rain gauge
see RG13
see tipping bucket
RAW serial (COM 5)....124, 125
RAW socket....131
recycling....361
remote road state sensor, *see* DSC211
remote road temperature sensor, *see* DST111
removing
components....178
pages....175

user accounts....172
replacing
AC/DC power supply....273
AC (mains) input assembly....266
battery....263
cellular router....275
DMU703....260
DMU703 lithium battery....262
DRD11A....238
DRI701....282
DSC weather shield....211
fuse....275
HMP155 filter....242
HMP60 filter and humidity sensor....212
plug-in modules....281
PMU701....279
PTU module in WXT530....249
sensors....259
surge protector....273
system components....260
reporting
generating event history report....183
generating station report....182
station information....183
resetting
DMU703....326
resistance readings....227
restarting
DMU703....327
DRI701....328
sensors....327, 328
system....327
restoring
cellular router configuration....116
factory settings....313
Mobotix settings....80
previous settings....312
reverting to previous software version....329
RG13
settings....50
RG13(H)
maintenance....240
spare parts....356
road direction for PWD12/22....47
road state sensor, *see* DSC211, DRS511, or FP2000

S

safety....15
scaling factors....33
schedule
maintenance....192
searching user accounts....171
security
checklist....336
sensors
adding new....290
replacing....259
restarting....327, 328
settings....28
spare parts....350
serial line configuration....123
setting clean limit
DSC211....207
setting clean value
PWD12/22....235
settings
cellular Ethernet....100
changing system settings....301
COM 5....124, 125
digital inputs....157
DRD11A....49
DRI701....33, 42
DRS511....33
DSC211....29
DST111....31
DTS210....44
exporting....311
FP2000....38
FTP....129, 133
global radiation sensor....64
HMP155....52
HTTPS....133
importing....308
MES 12....123
MES 14....123
MES 16....123
Mobotix....68, 76
modem....124, 125
PTB110....59
PWD12/22....47
R.M. Young Wind Monitor....57
restoring factory settings....313
restoring previous settings....312
RG13....50
sensors....28
serial line connection....124, 125
SP Lite2....64
SR50A....62
station....87
synchronization....92
TCP....131
time....92
tipping bucket....50
TPS10....45, 228
WA15....55
WLAN....116

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WLAN hotspot ... 117
WMT700 ... 53
WXT536 ... 60
signal strength
DSC211 ... 208
site
info ... 91
site maintenance ... 195
site visit ... 193
SI units ... 95
snow depth sensor, *see* SR50A
software
updating ... 315
software updates ... 314
solar radiation, *see* global radiation
spare parts
AC (mains) input ... 347
antenna ... 349
battery ... 348
cellular router ... 348
communication devices ... 348
device control ... 349
DMU703 ... 345
DRD11A ... 356
DRI701 ... 347
DRS511 ... 351
DSC211 ... 350
DST111 ... 350
DTS12G ... 352
ENC652 ... 342
ENC653 ... 342
ENC722 ... 342
enclosure ... 342
HMP155 ... 356
IR illuminator ... 360
Mobotix ... 359
PMU701 ... 345
PMU701 plug-in modules ... 345
powering ... 347
power supply ... 348
PTB110 ... 357
PWD12/22 ... 355
R.M. Young Wind Monitor ... 354
RG13(H) ... 356
sensors ... 350
SP Lite2 ... 359
SR50A ... 358
support arm ... 344
TPS10 ... 352
WA15 ... 354
WAA151 ... 354
WAC155 ... 354
WMT700 ... 353
WXT530 ... 358
SP Lite2
maintenance ... 258
settings ... 64
spare parts ... 359
SR50A
heating ... 62
installation height ... 62
maintenance ... 251
settings ... 62
spare parts ... 358
station
checking observations ... 181
clock ... 92
configuring settings ... 301
connecting locally ... 23, 25
connecting remotely ... 26
name ... 87
replacing components ... 260
report ... 183
serial number ... 88
settings ... 87
site info ... 91
synchronization ... 92
time zone ... 92
units ... 95
station summary report ... 182
subsurface temperature multidepth sensor, *see* TPS10
subsurface temperature sensor
see DTS12G
see DTS12G or DTS210
subsurface type
DTS12G ... 42
DTS210 ... 44
superUser ... 168
support arm
spare parts ... 344
surface state format ... 95
surface state mode ... 29
surge protector
maintenance ... 273
synchronization settings ... 92
system operations ... 327
system settings ... 301
backing up ... 311

T

TCP port ... 131
temperature profile sensor, *see* TPS10
testing
DRS511 ... 216

WMT700 244
time and date
Mobotix 74
station 92
TIME command 190
timeout
cellular router 104
time zone 92
tipping bucket 50
see also RG13
settings 50
tools 192, 193
TPS10
installation depth 45, 228
installation place 45
maintenance 228
settings 45, 228
spare parts 352
trademarks 13
troubleshooting 324
cellular router 330

U

UL/CSA C22.2
warnings and cautions 19
ultrasonic wind sensor, *see* WMT700
units 95
unit selection 95
updating firmware
cellular router 102
updating software 314
upgrading the system 321
user accounts
adding 168
modifying 171
removing 172
user interface, *see* Web UI
username and password 26
user roles 168
users
searching 171

V

virtual port 131

W

WA15
ball bearings 246
heating 55
installation height 55
maintenance 246
orientation 55
settings 55
spare parts 354
wind direction offset 55
WAA151
spare parts 354
WAC155
spare parts 354
water level sensor, *see* SR50A
weather transmitter, *see* WXT536
webServiceAdministrator 168
webServicePowerUser 168
webServiceUser 168
Web UI
adding components 176
adding pages 174
address 26
connecting 23, 25, 26
logging in 26
modifying components 177
modifying pages 174
removing components 178
removing pages 175
widgets, *see* components
wind direction offset
WA15 55
WMT700 53
WXT536 60
wind sensor
see R.M. Young Wind Monitor
see WA15
see WMT700
wind speed and direction sensor
see R.M. Young Wind Monitor
see WA15
see WMT700
WLAN 196
connecting to station 25
hotspot settings 117
settings 116
WMT700
cleaning 243
heating 53
installation height 53
maintenance 243
orientation 53
parts 243
settings 53
spare parts 353
testing 244
wind direction offset 53
WMT70VERIFIER 244
WR21
replacing 275
WXT530
ball bearings 251
cleaning 248
maintenance 248

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replacing PTU module....249
spare parts....358
WXT536
heating.... 60
installation height....60
settings 60
wind direction offset.... 60

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Note that warranty coverage may not apply if the product is damaged due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. See the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Technical support



You can contact Vaisala technical support at vaisala.my.site.com/myvaisala or helpdesk@vaisala.com. You can find all our support channels at vaisala.com/support.

When contacting technical support, provide the following 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
- Diagnostics package for the application

If applicable, also provide the following details:

- 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?
- What is the input power source type, voltage, and what else (such as lighting, heaters, and motors) was connected to the same power output?
- Are all parts connected and grounded properly? Take a photo to help the troubleshooting.

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