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User Guide

Indigo500 Series Transmitters

Indigo510, Indigo520



VAISALA

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Table of contents

1. About this document 13
1.1 Version information 13
1.2 Related manuals 15
1.3 Documentation conventions 16
1.4 Trademarks 17

2. Product overview 18
2.1 Introduction to Indigo510 and Indigo520 Transmitters 18
2.1.1 Device compatibility 18
2.2 Indigo500 basic features and options 19
2.3 Indigo500 transmitter parts 20
2.3.1 Cable gland and conduit options 21
2.4 Touchscreen display 23
2.5 LED indicator (non-display transmitter) 23
2.6 Web interface 24
2.7 Transmitter user modes 24
2.8 Output options 25
2.8.1 Analog outputs 25
2.8.2 Digital output 26
2.8.3 Relays 26
2.9 Analog input 26
2.10 Barometer module 27
2.11 Data logging 29
2.12 Environmental compensation 31
2.13 Ethernet connection 32
2.14 Vaisala cloud connection 32
2.15 Safety 33
2.15.1 ESD protection 36
2.16 Regulatory statements 36
2.16.1 FCC Part 15 compliance statement 36
2.16.2 Canada ICES-3 / NMB-3 compliance statement 37

3. Installation 38
3.1 Opening and closing transmitter cover 38
3.2 Mounting 38
3.2.1 Standard wall mounting 39
3.2.2 Wall mounting with retrofit mounting plate 40
3.2.3 Wall mounting with spatter guard 42
3.2.4 DIN rail mounting 44
3.2.5 Pole mounting and attaching weather shield 46
3.3 Wiring 49
3.3.1 Power supply terminals and lead-through – PELV option 50
3.3.2 Power supply terminals and lead through - AC (mains) power option 51
3.3.3 Relay output terminals and lead-through 55

3.3.4 Analog output terminals and lead-through 55
3.3.5 Analog input terminals and lead-through 57
3.3.6 Ethernet connector and lead-through 59
3.3.7 Probe connection terminals and lead-throughs 60
3.3.8 Service port connection 61
3.3.9 Verifying tightness of cable glands 62
3.4 Connecting measurement devices 63

4. User interfaces 65
4.1 Touchscreen display and main views 65
4.1.1 Graph data statistics 71
4.1.2 Alerts and events menu on touchscreen 71
4.1.3 Measurement devices menu on touchscreen 73
4.2 Web interface and main views 76
4.2.1 Alerts and events menu in web interface 77
4.2.2 Measurement devices menu in web interface 79

5. Startup 82
5.1 Starting up transmitter using touchscreen display 82
5.1.1 Configuring network connection on touchscreen 83
5.1.2 Setting date and time on touchscreen 85
5.1.3 Configuring units on touchscreen 87
5.1.4 Configuring screen lock on touchscreen 87
5.1.5 Configuring transmitter name on touchscreen 89
5.2 Starting up transmitter using web interface 91
5.2.1 Connecting to web interface 92
5.2.2 Connecting to web interface with a direct connection between transmitter and computer 93
5.2.3 Creating web interface users 95
5.2.4 Logging in to web interface 99
5.2.5 Changing language in web interface 99
5.2.6 Configuring network connection in web interface 100
5.2.7 Setting date and time in web interface 102
5.2.8 Configuring units in web interface 104
5.2.9 Configuring transmitter name in web interface 105
5.2.10 Finishing startup 105
5.2.11 Resetting PIN code in web interface 106

6. Configuring transmitter using touchscreen display 109
6.1 Configuring Measurements view on touchscreen 109
6.2 Configuring Graph view on touchscreen 110
6.3 Accessing configuration menu 111
6.4 Configuring alert rules on touchscreen 113

6.5 Configuring analog outputs on touchscreen ... 115
6.5.1 Configuring analog outputs with a non-display transmitter ... 118
6.5.2 Analog output configuration example ... 119
6.5.3 Testing analog outputs on touchscreen ... 119
6.5.4 Configuring analog output correction on touchscreen ... 121
6.6 Configuring analog input on touchscreen ... 122
6.7 Configuring relays on touchscreen ... 124
6.7.1 Testing relays on touchscreen ... 128
6.7.2 Relay configuration example, one condition configured ... 128
6.7.3 Relay configuration example, multiple conditions configured ... 129
6.7.4 Relay configuration example, inverted relay control logic ... 130
6.7.5 Relay wiring and relay activation mode ... 130
6.7.6 Relay hysteresis ... 131
6.8 Enabling Modbus TCP/IP on touchscreen ... 131
6.9 Adjusting barometer on touchscreen ... 132
6.10 Calibrating barometer on touchscreen ... 133
6.11 Configuring height-corrected pressure calculation on touchscreen ... 136
6.12 Disabling service port on touchscreen ... 136
6.13 Disabling cloud connection on touchscreen ... 137
6.14 Configuring environment settings on touchscreen ... 137
6.14.1 Example of configuring environment presets on touchscreen (HMP7 and TMP1) ... 139

7. Configuring transmitter using web interface ... 141
7.1 Configuring web interface home view ... 141
7.2 Configuring alert rules in web interface ... 143
7.3 Configuring analog outputs in web interface ... 145
7.3.1 Testing analog outputs in web interface ... 148
7.3.2 Configuring analog output correction in web interface ... 149
7.4 Configuring analog input in web interface ... 151
7.5 Configuring relays in web interface ... 153
7.5.1 Testing relays in web interface ... 156
7.6 Enabling Modbus TCP/IP in web interface ... 156
7.7 Adjusting barometer in web interface ... 157
7.8 Calibrating barometer in web interface ... 158
7.9 Configuring height-corrected pressure calculation in web interface ... 159
7.10 Disabling service port in web interface ... 160
7.11 Disabling cloud connection in web interface ... 160
7.12 Configuring environment settings in web interface ... 161
7.12.1 Example of configuring environment presets in web interface (HMP7 and TMP1) ... 162
7.13 Exporting logged data ... 163

8. Using transmitter with Indigo-compatible devices 166
8.1 Indigo80 handheld indicator 166
8.1.1 Connecting Indigo500 to Indigo80 handheld indicator 167
8.1.2 Calibration and adjustment with Indigo80 handheld indicator 168
8.2 PR53 process refractometers 170
8.2.1 Connecting to PR53 process refractometers 171

9. Using transmitter with Insight PC Software 172
9.1 Vaisala Insight PC Software 172
9.1.1 Insight software user modes 172
9.2 Connecting to Insight PC Software 173
9.3 Insight PC Software overview 175

10. Modbus 177
10.1 Modbus overview 177
10.2 Unit identification of transmitter and probes 177

11. Maintenance and troubleshooting 179
11.1 Cleaning 179
11.2 Replacing probes 179
11.3 Updating transmitter software version 180
11.4 Restoring factory default settings 182
11.5 Troubleshooting checklist 183
11.6 Troubleshooting 184
11.7 Recycling 187

12. Technical data 189
12.1 Indigo510 specifications 189
12.2 Indigo520 specifications 193
12.3 Spare parts and accessories 199

13. Vaisala services 201
13.1 Service centers 201
13.2 Technical support 201
13.3 Warranty 201

Appendix A: Modbus reference 203
A.1 Unit IDs 203
A.2 Function codes 203
A.3 Data encoding 204
A.3.1 32-bit floating point or 32-bit integer format 204
A.3.2 16-bit integer format 204
A.4 Modbus registers 205
A.4.1 Measurement data registers 205
A.4.2 Status registers 206
A.4.3 Configuration registers 207
A.4.4 Test value registers 217
A.5 Device identification objects 217

A.6 Exception responses....218
A.7 Modbus communication examples....218

Index....223

Open-source software (OSS)....225

List of figures

Figure 1 Indigo520 Transmitter parts....20
Figure 2 Indigo510 Transmitter parts, non-display version....21
Figure 3 Indigo520 cable gland and conduit options, example configurations....22
Figure 4 Indigo510 cable gland options, example configurations....23
Figure 5 Indigo520 Transmitter with optional barometer module, example configuration....28
Figure 6 Example of logged data....30
Figure 7 Standard wall mounting....39
Figure 8 Transmitter mounting dimensions....40
Figure 9 Wall mounting with retrofit mounting plate....41
Figure 10 Retrofit mounting plate dimensions....41
Figure 11 Wall mounting with spatter guard....43
Figure 12 Spatter guard dimensions....44
Figure 13 Attaching DIN rail clip fasteners....45
Figure 14 Attaching mounting plate to fixing brackets - vertical pole mounting....47
Figure 15 Attaching transmitter to mounting plate - vertical pole mounting....48
Figure 16 Attaching weather shield to mounting plate - vertical pole mounting....49
Figure 17 Power supply terminals and lead-through – PELV option....51
Figure 18 Power supply terminals and lead-through – AC (mains) power option....53
Figure 19 Example of stripped AC (mains) power cable....53
Figure 20 Relay output terminals and lead-through....55
Figure 21 Analog output terminals and lead-through....56
Figure 22 Analog input wiring when powering with Indigo520....57
Figure 23 PDT101 wiring when powering with Indigo520....58
Figure 24 Analog input wiring with external power supply....58
Figure 25 Ethernet connector and lead-through....59
Figure 26 M20×1.5 cable gland with split bushing....60
Figure 27 Probe connection terminals and lead-throughs....61
Figure 28 Service port connection....62
Figure 29 Connecting measurement devices to Indigo500 Transmitters....64
Figure 30 Measurements view on touchscreen....66
Figure 31 Graph view on touchscreen....67
Figure 32 I/O status view on touchscreen....68
Figure 33 Network and digital interfaces view on touchscreen....69
Figure 34 Configuration menu on touchscreen....70
Figure 35 Graph data statistics view on touchscreen....71
Figure 36 Events page on touchscreen....72
Figure 37 Alert rules page on touchscreen....73
Figure 38 Options in Measurement devices menu of Indigo500 configuration menu, example with HMP7 probe....74

Figure 39 Options in Measurement devicesSettings menu, HMP7 probe connected....75
Figure 40 Measurements view in web interface....76
Figure 41 I/O status view in web interface....77
Figure 42 Events page in web interface....78
Figure 43 Alert rules page in web interface....79
Figure 44 Options in Measurement devicesSettings menu, HMP7 probe connected, General tab active....80
Figure 45 Network settings on touchscreen....84
Figure 46 Date and time settings on touchscreen....85
Figure 47 Units settings on touchscreen....87
Figure 48 Screen lock configuration menu on touchscreen....88
Figure 49 General settings configuration menu on touchscreen....90
Figure 50 Web interface, Measurements view....91
Figure 51 Network settings in web interface....101
Figure 52 Date and time settings in web interface....103
Figure 53 Screen lock view in web interface....107
Figure 54 Configurable Measurements view with slots for 1 to 6 measurement parameters....109
Figure 55 Configurable Graph view with slots for 1 to 2 measurement parameters....110
Figure 56 Alert rules configuration page on touchscreen....113
Figure 57 Analog outputs configuration menu on touchscreen....117
Figure 58 Analog output 1 Test mode on touchscreen....120
Figure 59 Analog output 1 correction view on touchscreen....121
Figure 60 Analog input configuration menu on touchscreen....123
Figure 61 Relays configuration menu on touchscreen....126
Figure 62 Relay 1 Test mode enabled....128
Figure 63 Behavior of relay that activates above limit, with hysteresis....131
Figure 64 Barometer configuration menu on touchscreen, Correction tab active....132
Figure 65 Barometer configuration menu on touchscreen, Calibration tab active....134
Figure 66 Barometer configuration menu on touchscreen, HCP tab active....136
Figure 67 Environment presets configuration menu on touchscreen....138
Figure 68 Alert rules configuration page in web interface....143
Figure 69 Analog outputs configuration menu in web interface, Output 1 selected....147
Figure 70 Analog outputs Test mode in web interface....148
Figure 71 AnalogoutputsCorrection configuration menu in web interface....150
Figure 72 Analog input configuration menu in web interface....152
Figure 73 Relays configuration menu in web interface, Relay 1 selected....154
Figure 74 Relays test mode in web interface, Relay 1 selected....156
Figure 75 Indigo80 handheld indicator....166
Figure 76 Connecting Indigo500 transmitter to Indigo80 handheld indicator....167

Figure 77 Indigo80 calibration methods for probes..... 169
Figure 78 PR53 process refractometer with Indigo520..... 170
Figure 79 Connecting Indigo500 transmitter to Insight PC Software with Vaisala Indigo USB adapter and M12 - M8 service cable..... 173
Figure 80 Insight software main view with transmitter and connected probe.....175

List of tables

Table 1 Document versions (English)....14
Table 2 Related manuals....15
Table 3 LED indicator states....24
Table 4 Logs, their types, and logging periods....29
Table 5 Cloud connection icons in the user interface....33
Table 6 PELV power supply input terminals....51
Table 7 AC power supply input terminals....53
Table 8 Power cable specifications....54
Table 9 Output terminals for relay 1 and relay 2....55
Table 10 Analog output terminals....56
Table 11 Analog input terminals....57
Table 12 Probe connection terminals wiring....61
Table 13 Relay wiring: Normally open (NO)....130
Table 14 Relay wiring: Normally closed (NC)....131
Table 15 Unit IDs of transmitter and probes....177
Table 16 Materials for recycling....188
Table 17 Indigo510 Transmitter options....189
Table 18 Indigo510 Transmitter operating environment....189
Table 19 Indigo510 Transmitter powering....189
Table 20 Indigo510 Transmitter inputs and outputs....190
Table 21 Indigo510 Transmitter compliance....191
Table 22 Indigo510 and Indigo520 transmitters mechanical specifications....191
Table 23 Indigo510 and Indigo520 transmitters user interfaces....192
Table 24 Indigo510 Transmitter compatible devices....192
Table 25 Indigo520 Transmitter options....193
Table 26 Indigo520 Transmitter measurement performance....193
Table 27 Indigo520 Transmitter operating environment....194
Table 28 Indigo520 Transmitter powering....194
Table 29 Indigo520 Transmitter inputs and outputs....195
Table 30 Indigo520 Transmitter compliance....197
Table 31 Indigo510 and Indigo520 transmitters mechanical specifications....197
Table 32 Indigo510 and Indigo520 transmitters user interfaces....197
Table 33 Indigo520 Transmitter compatible devices....198
Table 34 Indigo510 and Indigo520 transmitters accessories....199
Table 35 Indigo510 Transmitter spare parts....199
Table 36 Indigo520 Transmitter spare parts....200
Table 37 Unit IDs of transmitter and probes....203
Table 38 Modbus function codes....203
Table 39 Interpretation of 16-bit signed integer values....204
Table 40 Floating point measurement data registers (read-only)....205
Table 41 Integer measurement data registers (read-only)....205
Table 42 Status registers (read-only)....206
Table 43 Error flags (read-only)....207
Table 44 Modbus configuration data registers....207

Table 45 Time zones....213
Table 46 Modbus test registers (read-only)....217
Table 47 Device identification objects....217
Table 48 Modbus exception responses....218

1. About this document

1.1 Version information

This document provides detailed instructions for installing, using, and maintaining Vaisala Indigo510 and Indigo520 transmitters. To see when new features have been released, refer to Indigo500 Software Release Notes (M213210EN), available at docs.vaisala.com.

Table 1 Document versions (English)

Document code	Date	Description
M212287EN-AJ	October 2026	This document. Added sections. Applicable from software version 2.2.0 onward: • Added instructions on configuring alert rules to Configuring alert rules on touchscreen (page 113) and Configuring alert rules in web interface (page 143). Updated sections. Applicable from software version 2.2.0 onward: • Added information on renaming **Measurements** views to Configuring Measurements view on touchscreen (page 109). • Updated information on events and added information on alerts and alert rules to Alerts and events menu on touchscreen (page 71) and Alerts and events menu in web interface (page 77). • The location of the configuration menu on touchscreen display has changed. Updated all images of the touchscreen display. • The location of the user menu in web interface has changed. Updated all images of the web interface. Updated sections: • Added DMT153 User Guide to Related manuals (page 15). • Added information on mounting the transmitter to different size poles to Pole mounting and attaching weather shield (page 46). • Added information on clearing a field on touchscreen display to Touchscreen display and main views (page 65). • Added information on the available time scales for the **Graph** view to Touchscreen display and main views (page 65) and Configuring Graph view on touchscreen (page 110). • Updated the instructions for pressing the **PRESS TO ACTIVATE WEB INTERFACE** button in Connecting to web interface with a direct connection between transmitter and computer (page 93), Finishing startup (page 105), and Restoring factory default settings (page 182). • Added information on powering off the transmitter during a factory reset to Restoring factory default settings (page 182). • Added a cause and a solution to the transmitter not powering up and to the preconfigured settings your transmitter was ordered with not being loaded to Troubleshooting (page 184). • Added information on using relay configuration registers to Configuration registers (page 207).

Document code	Date	Description
M212287EN-AH	April 2026	Updated sections. Applicable from software version 2.1.0 onward: • Added DMT153 to the list of compatible devices in Device compatibility (page 18), Indigo510 specifications (page 189), and Indigo520 specifications (page 193). • Updated instructions for testing analog outputs in Testing analog outputs on touchscreen (page 119) and Testing analog outputs in web interface (page 148). • Updated analog input configuration instructions in Configuring analog input on touchscreen (page 122) and Configuring analog input in web interface (page 151). • Added analog input as a source for compensation in Configuring environment settings on touchscreen (page 137) and Configuring environment settings in web interface (page 161).
M212287EN-AG	February 2026	Added sections. Applicable from software version 2.0.0 onward: • Added information on **Measurement devices** menu to Measurement devices menu on touchscreen (page 73) and Measurement devices menu in web interface (page 79). • Updated all web interface images to match the new visual appearance.

1.2 Related manuals



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

Table 2 Related manuals

Document code	Name
M213210EN	Vaisala Indigo500 Series Software Release Notes
M212290EN	Vaisala Indigo510 and Indigo520 Transmitters Quick Guide
M212754EN	Vaisala Indigo500MIK Meteorological Installation Kit Installation Guide
M212022EN	Vaisala HMP Series with MMP8 and TMP1 User Guide
M212357EN	Vaisala DMP Series User Guide
M213149EN	Vaisala DMT153 Dew Point Transmitter User Guide
M211799EN	Vaisala GMP251 and GMP80P Carbon Dioxide Probe User Guide

Document code	Name
M211897EN	Vaisala GMP252 Carbon Dioxide Probe User Guide
M211888EN	Vaisala HPP271 Hydrogen Peroxide Probe User Guide
M211972EN	Vaisala HPP272 Hydrogen Peroxide, Humidity and Temperature Probe User Guide
M212722EN	Vaisala Indigo80 Handheld Indicator User Guide
M212898EN	Vaisala Polaris Process Refractometer PR53 Series User Guide
M212808EN	Vaisala Polaris Process Refractometer PR53 Prism Wash System User Guide
M212670EN	Vaisala Jade Smart Cloud 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.

Lists tools needed to perform the task.

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

1.4 Trademarks

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2. Product overview

2.1 Introduction to Indigo510 and Indigo520 Transmitters

Vaisala Indigo510 and Indigo520 Transmitters are industrial-grade, robust transmitters that accommodate 1 or 2 Vaisala Indigo-compatible probes for humidity, temperature, dew point, carbon dioxide, hydrogen peroxide, and moisture in oil measurements. The transmitters can display measurements on the spot as well as transmit them to automation systems through analog signals, relays, or Modbus TCP/IP protocol.

Indigo520 Transmitter has 2 measurement device connections, and Indigo510 Transmitter has 1 measurement device connection. Both transmitters are available in 2 models: one with a touchscreen display, and a non-display model with an LED status indicator.

To get the newest features, update your transmitter's software. No other changes to your transmitter are required. To see when new features have been released, refer to Indigo500 Software Release Notes (M213210EN), available at docs.vaisala.com. The transmitter's Polaris™ Process Refractometer or Vaisala cloud compatibility cannot be altered afterward. The transmitter's hardware configuration cannot be altered afterward. This applies to the display, barometer module, and powering options.

For more information on Indigo500 Series models, see vaisala.com/indigo500.

2.1.1 Device compatibility

The Indigo500 series transmitters are the most versatile option for use with probes such as:

- HMP series humidity and temperature probes
- DMP series dew point probes
- GMP250 series carbon dioxide probes
- HPP270 series vaporized hydrogen peroxide probes
- MMP8 moisture in oil probe

The Indigo500 series transmitters can be connected to the MHT410 transmitter for display of measurement data and automation system connectivity. Through the transmitter service port, the Indigo500 series transmitters can also be connected to the free Vaisala Insight PC Software or Indigo80 Handheld Indicator.

Indigo500 series transmitters are also compatible with the DMT153 transmitter for measuring low dew point.

Indigo520 can be connected to Polaris™ PR53 process refractometers for measuring liquid concentrations, to MGP241 multigas probe, to MGP260 series multigas probes, and differential pressure transmitters PDT101 and PDT102.

2.2 Indigo500 basic features and options

- Universal transmitter for Vaisala Indigo-compatible probes
- Touchscreen display for real-time data viewing and configuration (non-display model also available)
- IP66 rated metal enclosure
- Ethernet connection with web interface and optional Vaisala cloud connectivity for remote monitoring
- Modbus® TCP/IP protocol
- UL Listed in USA and Canada
- Data logging of all measurement parameters
- Service port for connecting to Vaisala Insight PC Software or Indigo80 Handheld Indicator
- Screen lock feature
- User configurable alert rules
- Installation options:
  - Wall mounting
  - Wall mounting with retrofit mounting plate (to replace Vaisala 330 Series Transmitters such as HMT330)
  - Wall mounting with spatter guard
  - DIN rail with adapter
  - Pole mounting

Indigo510 features

- 1 detachable measurement device
- 2 configurable analog outputs
- Available operating power versions:
  - Protective extra-low voltage (PELV) version: 11–35 V DC, 24 V AC ±20 % 50/60 Hz

Indigo520 features

- 2 detachable measurement devices simultaneously
- 4 configurable analog outputs (not available with PoE option)
- 2 configurable relays (not available with PoE option)
- 2-wire current loop analog input (not available with PoE option)
- Barometer module for barometric pressure measurement (optional module)
- Available operating power versions:
  - Protective extra-low voltage (PELV) version: 15–35 V DC, 24 V AC ±20 %
  - AC (mains) power version: 100–240 V AC 50/60 Hz
  - Power over Ethernet (PoE) version: 50 V DC PoE+, IEEE 802.3at PD

2.3 Indigo500 transmitter parts

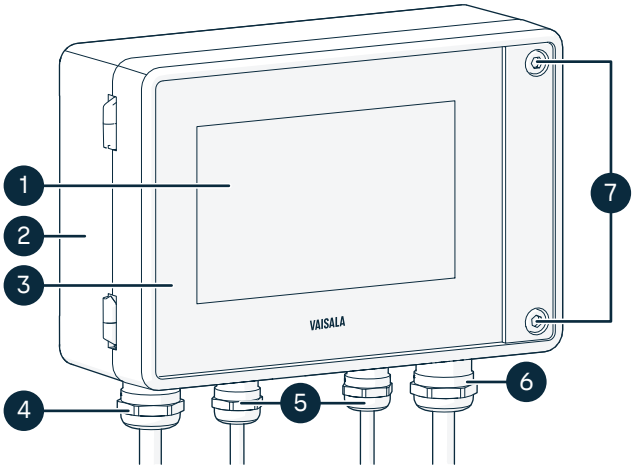


Figure 1 Indigo520 Transmitter parts

1 Touchscreen display (non-display model also available)
2 Transmitter base
3 Transmitter cover
4 Cable gland for Ethernet cable and optional analog output cable (M20×1.5 lead-through)
5 Cable gland for measurement device connection cable (M16×1.5 lead-throughs)
6 Cable gland for optional relay cable and power cable in the PELV and AC (mains) power supply options (M20×1.5 lead-through)
7 Hex screws for opening the cover

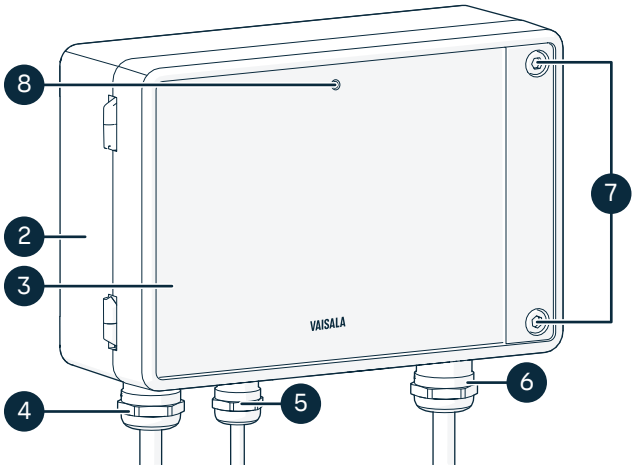


Figure 2 Indigo510 Transmitter parts, non-display version

2 Transmitter base
3 Transmitter cover
4 Cable gland for Ethernet cable and optional analog output cable (M20×1.5 lead-through)
5 Cable gland for measurement device connection cable (M16×1.5 lead-throughs)
6 Cable gland for optional relay cable and power cable in the PELV and AC (mains) power supply options (M20×1.5 lead-through)
7 Hex screws for opening the cover
8 Status LED (only in non-display model)

2.3.1 Cable gland and conduit options

The transmitter has 4 lead-throughs. The glands or conduit fittings for the lead-throughs are selected when ordering the transmitter. Unused lead-throughs are plugged.

The following figures show examples of different cable gland and conduit configurations available from Vaisala.

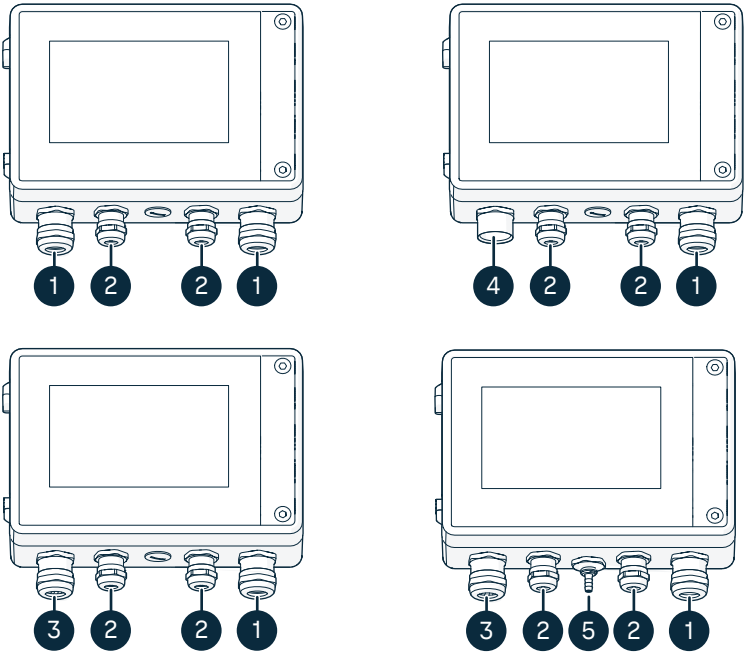


Figure 3 Indigo520 cable gland and conduit options, example configurations

1 Cable gland, M20×1.5
2 Cable gland, M16×1.5
3 Cable gland with split bushing, M20×1.5
4 Conduit fitting, M20×1.5 for NPT1/2″ conduit
5 Pressure port, barometer module

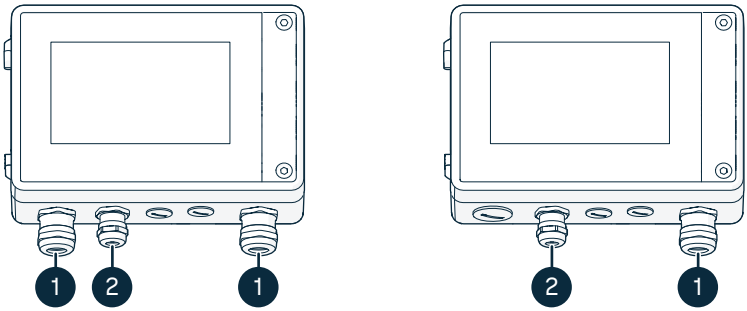


Figure 4 Indigo510 cable gland options, example configurations

1 Cable gland, M20×1.5
2 Cable gland, M16×1.5
3 Cable gland with split bushing, M20×1.5

More information

- Spare parts and accessories (page 199)

2.4 Touchscreen display

The transmitter can be ordered either with a touchscreen display, or as a non-display model that uses an LED indicator for notifications.

You can configure the transmitter's capacitive touchscreen display to show numeric readings of 1 to 6 measurement parameters at the same time, as well as graphs for 1 to 2 parameters. You can add up to 5 numeric measurement views. You can also configure the transmitter outputs and other transmitter settings.

The touchscreen display also shows the status of the analog and digital outputs, relays, and analog input.

The display window is made of strengthened glass.

More information

- Touchscreen display and main views (page 65)
- Starting up transmitter using touchscreen display (page 82)

2.5 LED indicator (non-display transmitter)

In the non-display transmitter model, the status of the transmitter and probe is indicated by LED color and whether the LED blinks. When the transmitter is ON, one of the LEDs is always illuminated (solid or blinking). If no LED is illuminated, the transmitter is OFF.

Table 3 LED indicator states

LED color and flashes	Description
Green	The transmitter, web UI, and probe are working normally.
Green, blinking	The transmitter is starting up or no probe is connected to the transmitter.
Red	The transmitter is booting, and is not ready to receive measurement data.
Red, blinking 4 times	The probe has been disconnected.
Red, slowly blinking	The transmitter is in error state.

2.6 Web interface

The transmitter also has a web interface for remote access. You can configure the web interface to show numeric readings and graphs of 1 to 6 measurement parameters at the same time. You can also configure the transmitter outputs and other transmitter settings, and update the transmitter software.

The web interface has 2 user levels:

- **Administrator**: Configuration rights. Can configure outputs and change transmitter settings.
- **Guest**: View-only access. Can add and remove measurement parameters in the **Measurements** view.

The web interface supports most major browsers (for example, Mozilla Firefox, Google Chrome, and Apple Safari): using the most recent version is recommended.

If you use the web interface with Firefox, make sure the time settings of your PC and Indigo500 transmitter are the same. Differing device time settings will prevent the use of the activation code. For transmitters without a display, you may need to use a different browser.

More information

- Web interface and main views (page 76)
- Starting up transmitter using web interface (page 91)
- Updating transmitter software version (page 180)

2.7 Transmitter user modes

You can switch between the transmitter's **Basic** and **Advanced** user modes in **Transmitter > General > User mode**. The transmitter user modes are a functionality introduced in software version 1.19.0.

The advanced mode provides access to additional configuration options. Use these options only as described in the product documentation or as instructed by Vaisala support.

From software version 1.22.1 onward, the transmitter user mode selection is persistent and your user mode selection remains unchanged at transmitter reboot and web interface restart.

CAUTION! Modifying advanced settings could impair your device's functionality or prevent it from operating correctly.

More information

- Configuring analog output correction on touchscreen (page 121)
- Calibrating barometer on touchscreen (page 133)
- Configuring analog output correction in web interface (page 149)
- Calibrating barometer in web interface (page 158)

2.8 Output options

The Indigo510 transmitter provides 2 analog output channels and an Ethernet connection for the Modbus TCP/IP protocol and web interface.

The Indigo520 transmitter provides 4 analog output channels, 2 relays, and an Ethernet connection for the Modbus TCP/IP protocol and web interface.

If the Indigo520 transmitter is powered using Power over Ethernet (PoE), analog outputs and relays are not available.

2.8.1 Analog outputs

The Indigo510 transmitter provides 2 scalable analog output channels with voltage or current output.

The Indigo520 transmitter provides 4 scalable analog output channels with voltage or current output.

Available analog output modes:

- Voltage: 0–1 V, 0–5 V, 0–10 V
- Current: 4–20 mA, 0–20 mA

Use the touchscreen or web interface to configure the output mode for the channels (same output mode in all channels), as well as the measurement parameter, scaling, and correction for each channel.

Analog outputs are not available in transmitters that are powered with Power over Ethernet (PoE).

More information

- Configuring analog outputs on touchscreen (page 115)
- Configuring analog outputs with a non-display transmitter (page 118)
- Configuring analog outputs in web interface (page 145)

2.8.2 Digital output

Indigo500 transmitters support the Modbus TCP/IP communication protocol (over Ethernet). Modbus TCP/IP read and Modbus TCP/IP write are disabled by default. You can manually enable Modbus TCP/IP read and Modbus TCP/IP write.

More information

- Enabling Modbus TCP/IP on touchscreen (page 131)
- Enabling Modbus TCP/IP in web interface (page 156)
- Modbus overview (page 177)
- Modbus reference (page 203)
- Modbus registers (page 205)

2.8.3 Relays

The Indigo520 transmitter provides 2 configurable relays that can be wired either as normally closed or as normally open. Use the touchscreen or web interface to configure the relay activation parameters.

Relays are not available in Indigo510 transmitters or transmitters that are powered with Power over Ethernet (PoE).

More information

- Configuring relays on touchscreen (page 124)
- Configuring relays in web interface (page 153)

2.9 Analog input

The Indigo520 transmitter provides 1 analog input channel with current input.

The analog input range is 4–20 mA and the range can be scaled.

Using analog input is possible from software version 1.14.0 onward and scaling the input range is possible from software version 1.17.0 onward. To get the analog input and analog input scaling working, update your transmitter's software. No other changes to your transmitter are required.

Analog input can be used as a source in analog output, relay, and Modbus TCP/IP settings.

You can use Indigo520 to power your 2-wire current loop analog input device. If it is not possible to power through Indigo520, or if you need 2 measurement probes, you can power the analog input device with an external power supply.

Use the touchscreen or web interface to enable analog input and analog input powering, and to scale the analog input range.

Only 1 measurement device can be connected to the transmitter when you power the analog input device through Indigo520 probe connection terminal 2. The measurement device has to be connected to probe connection terminal 1.

Analog input is not available in Indigo510 transmitters or transmitters that are powered with Power over Ethernet (PoE).

More information

- Analog input terminals and lead-through (page 57)
- Configuring analog input on touchscreen (page 122)
- Configuring analog input in web interface (page 151)
- Updating transmitter software version (page 180)

2.10 Barometer module

Indigo520 Transmitter is available with a barometer module. The barometer module uses a BAROCAP® silicone capacitive absolute pressure sensor developed by Vaisala for barometric pressure measurement applications. The sensor has excellent hysteresis and repeatability characteristics, low temperature dependence, and very good long-term stability.

The measurement principle of the digital barometer is based on an advanced RC oscillator and reference capacitors against which the capacitive pressure sensor is continuously measured. The microprocessor of the barometer performs compensation for pressure linearity and temperature dependence.

Like other device measurement parameters, the barometer measurement parameter can be configured to the home views, used as a analog output parameter, and as the measurement parameter that controls the relay. Software version 1.2.0 or later is required. From software version 1.22.1 onward you can use height-corrected pressure (HCP) calculation to remove the effect of the barometer's installation height, and to standardize the pressure to the desired elevation. The available range for the height correction is −30.0 … +30.0 m (−98.4 … +98.4 ft) from the barometer installation location.

The barometer can be adjusted and calibrated. Adjusting the barometer is possible from software version 1.16.0 onward, and calibrating the barometer is possible from software version 1.16.3 onward.

The barometer is equipped with a pressure port which is ideal for 3–4 mm internal diameter tubing. If you want to connect tubing to the pressure port (2), remove the filter (3).

The pressure port supplied with the barometer is not a static pressure head and cannot be used in turbulent or high-speed wind conditions. Protect the pressure port from the rain. If water gets into the pressure port it may cause errors in the pressure measurement. The barometer is designed to measure the pressure of clean, non-condensing, non-conducting, and non-corrosive gases only. If you use Static Pressure Head SPH10/20 with Indigo520 Transmitter, make sure the SPH10/20 tube is pointing downwards from the transmitter. This way the condensed water does not accumulate inside the tube and cause measurement errors.

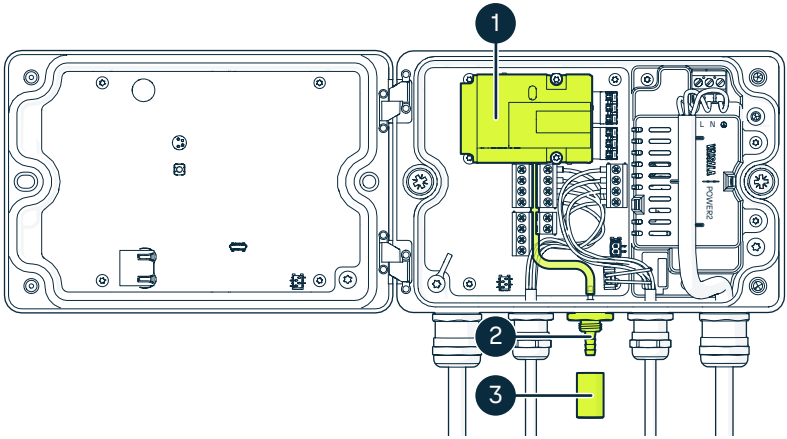


Figure 5 Indigo520 Transmitter with optional barometer module, example configuration

1 Barometer module
2 Pressure port
3 Filter (Vaisala item code DRW010335SP)

More information

- Adjusting barometer on touchscreen (page 132)
- Calibrating barometer on touchscreen (page 133)
- Configuring height-corrected pressure calculation on touchscreen (page 136)
- Adjusting barometer in web interface (page 157)
- Calibrating barometer in web interface (page 158)
- Configuring height-corrected pressure calculation in web interface (page 159)
- Modbus reference (page 203)
- Modbus registers (page 205)

2.11 Data logging

CAUTION! Data logging feature has changed. Installing software version 1.13.0 or later to replace software version 1.12.0 or earlier removes all previously logged data.

Data logging is always on and collects data automatically into the non-volatile memory of the transmitter. All available measurements in the connected measurement devices are logged. When the memory is full the data recording will not stop. Instead, the oldest data is overwritten. Collected data can be exported to CSV file format in the web interface. Extract the .zip file to access the .csv file.

All logs collect data simultaneously. The logs stored by the transmitter are shown in Table 4 (page 29). Sampled data is by default stored in the 5 s log. You can change the data logging interval for sampled data logging from 5 seconds to 1, 15, 30, or 60 seconds in **Transmitter > General > Data logging interval**. The 1, 15, 30, and 60 second logging intervals are a feature introduced in software version 1.21.1. The transmitter stores the same amount of measurements regardless of the logging interval you have selected. By selecting a longer logging interval, the device stores the same number of measurements, but the logging history covers a longer period of time. The 10 minute and 1, 6, and 24 hour logs store the minimum, maximum, and averaged values.

Table 4 Logs, their types, and logging periods

Log	Type	Logging period
1 s [1)]	Sampled data	At least 2 d
5 s (default setting)	Sampled data	At least 14 d
15 s	Sampled data	At least 42 d
30 s	Sampled data	At least 84 d
60 s	Sampled data	At least 168 d
10 min	Min./max./avg.	At least 90 d
1 h	Min./max./avg.	At least 1 year
6 h	Min./max./avg.	At least 2 years
24 h	Min./max./avg.	At least 10 years

1) *In transmitters ordered with software configuration for Vaisala cloud connectivity, the 1 second option is disabled, and is not visible in the settings.*

Make sure that you have set the time in your transmitter correctly. If you set the time again, the log will show data from the same time period 2 times. Changing the time setting will not overwrite any previously logged data.

The exported file will show data with the data logging interval you have selected in **Transmitter > General > Data logging interval**. If you have changed the data logging interval, the exported log can contain data with multiple data logging intervals.

Exporting large amounts of logged data can result in huge data files and take a long time, up to several hours. Typical export time is 30 to 90 min.

To ensure you do not lose any logged data, always export the data before updating transmitter software. A factory reset will delete all previously logged data.

Only 1 log can be exported at a time. To ensure you do not lose any exported files, download your data file before starting a new export. Exporting a new data file will delete the previously exported file.

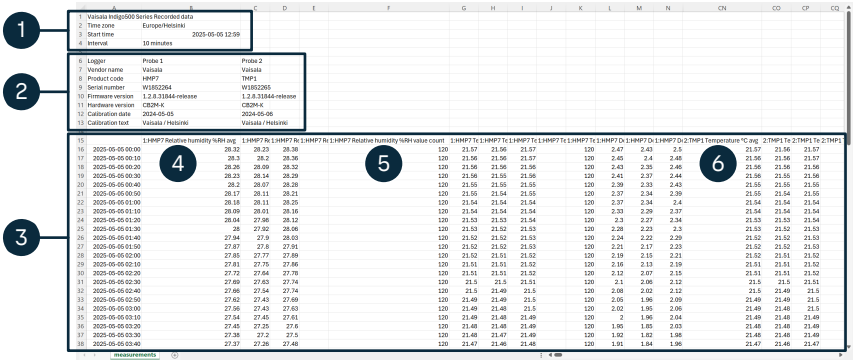


Figure 6 Example of logged data

1 The header shows the log's start time, time zone, and the selected log.
2 The second header shows to which connection the measurement device is connected, its vendor name, product code, and serial number. This header is created every time a measurement device is disconnected or connected and after any power outages.
3 Logged data. A new block of logged data is created every time a probe is disconnected or connected, and after any power outages.
4 Number 1 before the measurement parameter shows that this measurement device is connected to probe connection terminal 1.
5 The value count column shows how many samples the min./max./avg. value is made of.
6 Number 2 before the measurement parameter shows that this measurement device is connected to probe connection terminal 2.

More information

- Setting date and time on touchscreen (page 85)
- Setting date and time in web interface (page 102)
- Exporting logged data (page 163)

2.12 Environmental compensation

The compensation feature has changed. From software version 1.19.0 onward the transmitter supports environmental compensation that is not restricted to certain probes. You need to configure and enable the compensation manually.

Probe firmware version 1.2.8 or newer (probes with serial number V3121434 onward) is required to use environmental compensation with DMP5, DMP6, DMP7, DMP8, HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9, MMP8, and TMP1 probes. For other supported measurement devices there are no firmware version limitations.

For optimal measurement accuracy, you can use the Indigo500 transmitter to give additional information about the connected device's measurement environment by configuring environment presets for the connected devices.

For example, you can:

- Configure the pressure compensation setting for your probe
- Enable temperature compensation from another device that has a temperature output. For example, you can enable TMP1 to function as the temperature source for HMP7.

Temperature compensation (HMP7 and TMP1)

The HMP7 probe supports probe heating. Probe heating heats up not only the sensor, but the entire probe head and filter. When probe temperature is heated above dew point temperature, condensation on the probe can be avoided while measuring the dew point temperature of the process. The probe heating functionality in HMP7 can be activated either through a configuration code (set at the factory), or it can be activated using the Insight software and a service cable.

Output parameters that are dependent on temperature measurement (such as relative humidity) are unavailable whenever the probe is heated, unless the true temperature of the measured environment is updated to the temperature compensation register of the HMP7 from the TMP1 probe. This happens automatically when both HMP7 and TMP1 are connected to the transmitter and an environment preset has been configured. Disconnecting TMP1 or manually disabling the temperature compensation preset will invalidate the temperature and relative humidity outputs of the heated HMP7, as the compensation measurements become unavailable.

The temperature output of HMP7 is equal to TMP1 temperature, when the heating function is activated. Make sure that the HMP7 and TMP1 probes are in the same environment to get the most accurate relative humidity measurement values.

More information

- Configuring environment settings on touchscreen (page 137)
- Example of configuring environment presets on touchscreen (HMP7 and TMP1) (page 139)
- Configuring environment settings in web interface (page 161)
- Example of configuring environment presets in web interface (HMP7 and TMP1) (page 162)

2.13 Ethernet connection

The Indigo500 transmitters provide an Ethernet connection for the Modbus TCP/IP protocol, web interface, and Vaisala cloud connection.

The transmitter's Ethernet interface can use both static and dynamic network settings. If you configure the connection to use dynamic settings, the network where the Ethernet interface is connected must have a DHCP server that provides the settings.



CAUTION! The transmitter's Ethernet interface is designed to be used in trusted network environments (trusted corporate LAN or VPN-based connection over the Internet). Avoid connecting the transmitter directly to a public network because the device can be attacked by a malicious user through the network.



You must use a shielded cable to meet the rated EMC performance of the device.

More information

- Configuring network connection on touchscreen (page 83)
- Configuring network connection in web interface (page 100)

2.14 Vaisala cloud connection

The Indigo500 transmitters are compatible with Vaisala Jade Smart Cloud software from transmitter software version 1.18.0 onward. Cloud connection is available in transmitters ordered from Vaisala manufacturing with cloud connection support software option selected. Your Indigo500 transmitter is associated with a Jade Smart Cloud account when it is purchased. The cloud features cannot be activated afterward for transmitters that were not originally ordered with cloud connection support software option selected.

Vaisala Jade Smart Cloud is a convenient cloud-based data service for monitoring and analyzing measurement data. The application can be accessed through a web browser on your computer, tablet, or mobile phone, making it ideal for professionals who want secure access to quality measurement data anywhere and at any time.

For more information on Jade Smart Cloud, see Jade Smart Cloud User Guide (M212670EN), available at docs.vaisala.com.

When you have ordered a transmitter with cloud connection support software option selected, the connection is enabled by default. You can manually disable the Vaisala cloud connection. For the transmitter to connect to cloud you need to connect it to the Internet though the transmitter's Ethernet connection.

Table 5 Cloud connection icons in the user interface

Icon	Description
	Vaisala cloud connection is enabled and working normally.
	Vaisala cloud connection is enabled, but is in error state.
No icon	Vaisala cloud connection is disabled.

More information

- Ethernet connector and lead-through (page 59)
- Disabling cloud connection on touchscreen (page 137)
- Disabling cloud connection in web interface (page 160)

2.15 Safety

This product has been type-tested for safety. Note the following precautions:

It is the user's responsibility to ensure that unauthorized persons do not have access to the transmitter or its configuration interface.



WARNING! Read the product documentation carefully before installing or operating the product. If you encounter the following marking during installation or operation, consult product documentation to find out the nature of the potential hazards and any actions which have to be taken to avoid them:



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

WARNING! Make sure that you prepare and connect only de-energized wires.

WARNING! Devices powered with AC (mains) power must be connected only to a grounded (earthed) power supply (class I equipment).

WARNING! Only licensed experts may connect the AC (mains) power connection to the power supply. A readily accessible disconnect device must be incorporated in the fixed wiring.

WARNING! Connect only cables with temperature rating of minimum +80 °C (+176 °F) to the PELV power supply terminal.

WARNING! Local and state legislation and regulations may require you to replace the power supply lead-through. If you remove the factory installed lead-through, use a replacing lead-through that is approved by UL, and has type rating 4. Ensure the replacing part provides sufficient ingress protection. Use a replacing part with M20×1.5 threads. Tightening torque is 10 Nm unless otherwise specified by the part manufacturer.

CAUTION! INDIGO520 PoE version transmitters shall be supplied by a Power Sourcing Equipment (PSE) unit which fulfills the requirements of IEEE802.3at specifications.

CAUTION! Always choose a power supply unit that conforms to the local standards and requirements.
In North America, only power Indigo510 and Indigo520 PELV version transmitters with one of the following:

- An approved/certified Class 2 power supply. The output of the power supply may not exceed 100 VA, with operating voltage not more than 30 V_{rms}, 42.4 V_{peak}, or 60 V DC.
- An approved/certified Limited Power Source (LPS) (CAN/CSA-C22.2 No. 60950-1 or UL 60950-1).

For more information on powering, see Indigo510 specifications (page 189) and Indigo520 specifications (page 193).

CAUTION! Only connect compatible measurement devices to the transmitter. Attempting to connect incompatible devices or cables can damage the equipment. Refer to transmitter specifications for compatibility information.

CAUTION! Do not modify the unit or use it in ways not described in the documentation. Improper modification or use may lead to safety hazards, equipment damage, failure to perform according to specification, decreased equipment lifetime, or the warranty or third party approvals becoming void.

CAUTION! The transmitter's Ethernet interface is designed to be used in trusted network environments (trusted corporate LAN or VPN-based connection over the Internet). Avoid connecting the transmitter directly to a public network because the device can be attacked by a malicious user through the network.

CAUTION! A factory reset deletes all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays. When you connect to the web interface the next time, you will be prompted to give the activation code and create new users.

CAUTION! Do not replace detachable mains supply cables by inadequately rated cables.

CAUTION! Do not use the device in a manner not specified by Vaisala. If the device is used in an unspecified manner, the protection provided by the equipment may be impaired.



CAUTION! Only factory installed AC (mains) cables have been safety type tested and assembly tested with the product. Modifying or replacing the factory installed AC (mains) cable may void UL/SGS listing.



CAUTION! Do not touch the PCB while it is energized – risk of electric shock.



CAUTION! The service port connection is only intended for temporary use during configuration, and must not be used for permanent installations. The IP rating, UL type 4 rating, and EMC properties of the transmitter can be affected by using the service port in permanent installations.



CAUTION! To prevent unauthorized access to the web interface, always log out of the web interface before closing the browser tab.

2.15.1 ESD protection

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

To avoid delivering high static voltages to the product:

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

2.16 Regulatory statements

2.16.1 FCC Part 15 compliance statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is

no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



CAUTION! This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.16.2 Canada ICES-3 / NMB-3 compliance statement

This Class B digital apparatus complies with Canadian ICES-003.

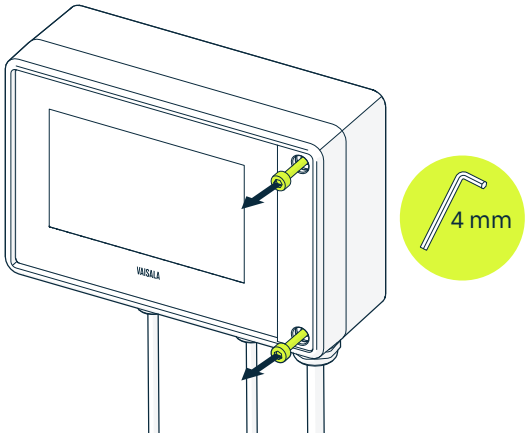
Cet appareil numérique de classe B est conforme à la norme canadienne NMB-003.

3. Installation

3.1 Opening and closing transmitter cover

Allen key (4 mm), provided

1. Loosen the 2 hex screws on the transmitter cover.



2. Open the transmitter cover.
3. When you close the transmitter cover, tighten the hex screws to 4.5 Nm.

3.2 Mounting

Consider configuring the transmitter before mounting it.

Choose the location of the transmitter so that the power outlet is accessible.

Besides the standard wall mounting, the device has the following mounting options:

- Wall mounting with retrofit mounting plate (to replace Vaisala 330 Series Transmitters such as HMT330)

- Wall mounting with spatter guard
- DIN rail mounting
- Pole mounting
- Mounting with Indigo500MIK Meteorological Installation Kit. Indigo500MIK must be ordered separately. For more information on the Indigo500MIK installation, see Indigo500MIK Installation Guide (M212754EN), available at docs.vaisala.com.

Wall mounting with spatter guard has not been evaluated by UL.

3.2.1 Standard wall mounting

- Allen key (4 mm), provided
- Crosshead screwdriver
- Drill with Ø 8 mm drill bit
- Screws (2 pcs), provided
- Washers (2 pcs), provided
- Wall plugs (2 pcs), provided

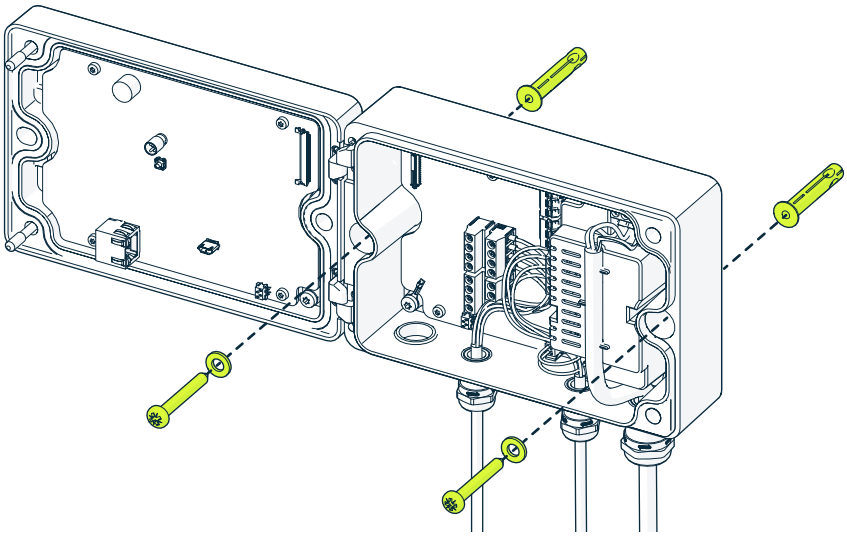


Figure 7 Standard wall mounting

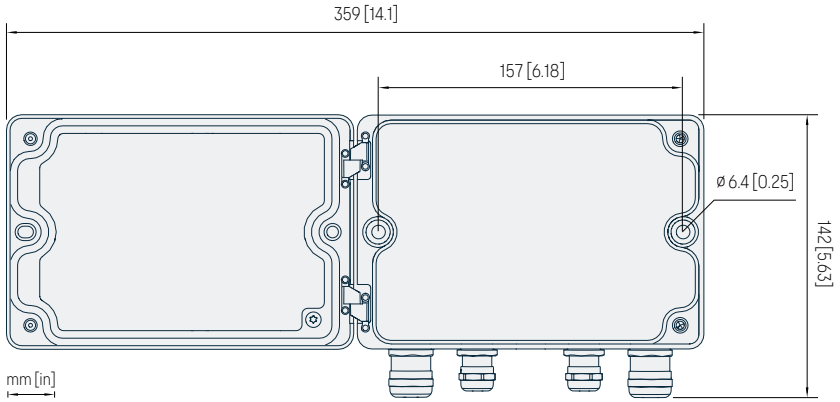


Figure 8 Transmitter mounting dimensions

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Hold the transmitter level against the installation surface and use a pen to mark the places of the mounting holes. The mounting holes are 157 mm (6.18 in) apart.
4. Drill 55 mm (2.17 in) deep holes and insert wall plugs.
5. Mount the transmitter to a wall using 2 screws and a crosshead screwdriver. Place nylon washers under the screws to protect the surface of the transmitter.

3.2.2 Wall mounting with retrofit mounting plate

- Allen keys (4 mm and 5 mm), provided
- Retrofit mounting plate (Vaisala item code DRW252186SP)
- Screws 14 mm (2 pcs), provided
- Washers (2 pcs), provided
- Wall screws (4 pcs)
- Wall plugs (4 pcs)

Using an retrofit mounting plate (Vaisala item code DRW252186SP), you can install a Indigo500 transmitter to replace a Vaisala 330 Series Transmitter in the exact same location.

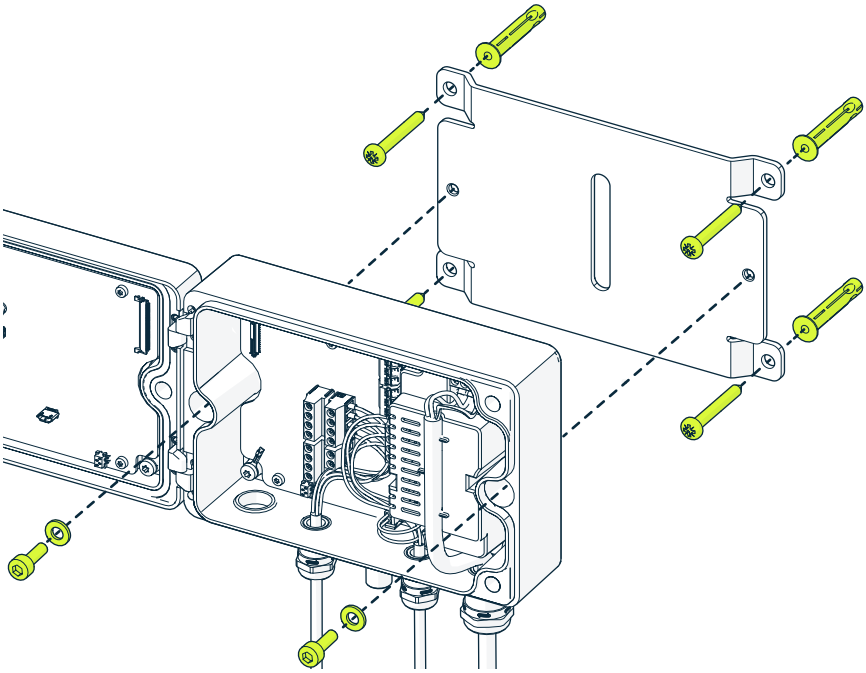


Figure 9 Wall mounting with retrofit mounting plate

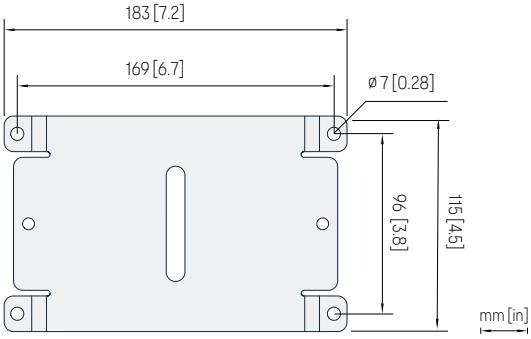


Figure 10 Retrofit mounting plate dimensions

1. Attach the retrofit mounting plate to the mounting holes using 4 screws and 4 wall plugs.
2. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.

3. Open the transmitter cover.
4. Attach the transmitter to the retrofit mounting plate using 14-mm screws (2 pcs) and a 5-mm Allen key. Place nylon washers under the screws to protect the surface of the transmitter.

3.2.3 Wall mounting with spatter guard

Wall mounting with spatter guard has not been evaluated by UL.

- Allen keys (4 mm and 5 mm), provided
- Crosshead screwdriver
- Drill with Ø 8 mm drill bit
- Rubber washers (4 pcs), provided
- Screws (4 pcs), provided
- Screws 14 mm (2 pcs), provided
- Wall plugs (2 pcs), provided
- Washers (2 pcs), provided

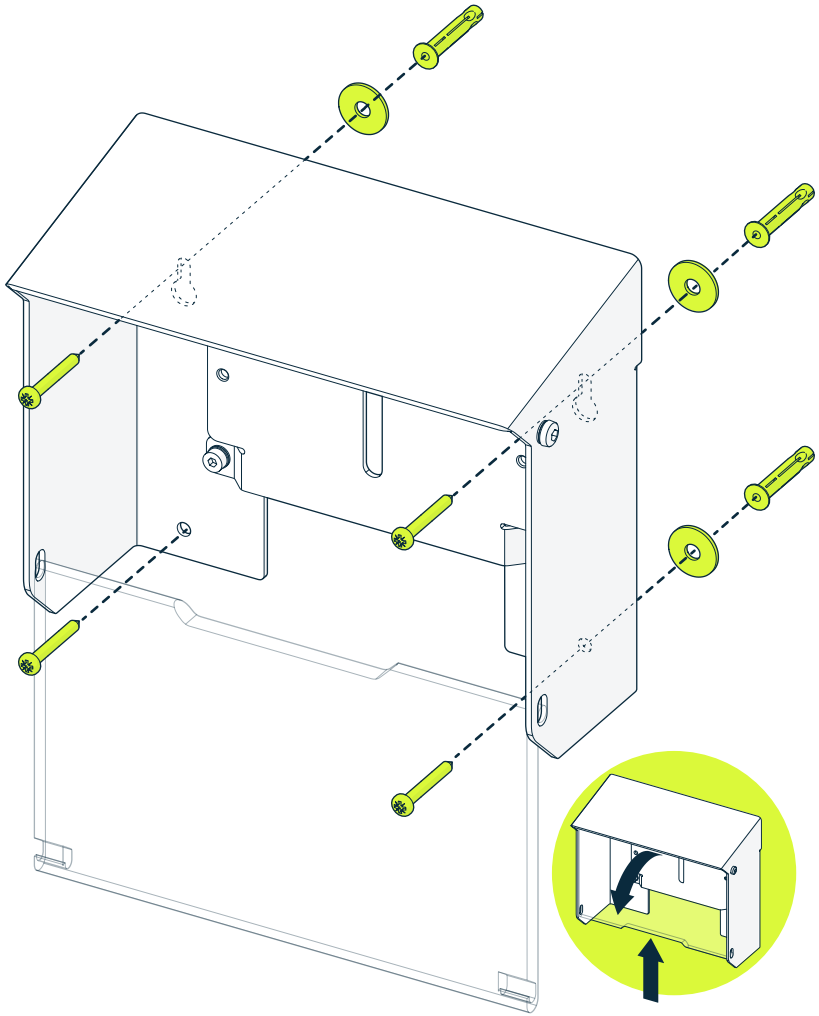


Figure 11 Wall mounting with spatter guard

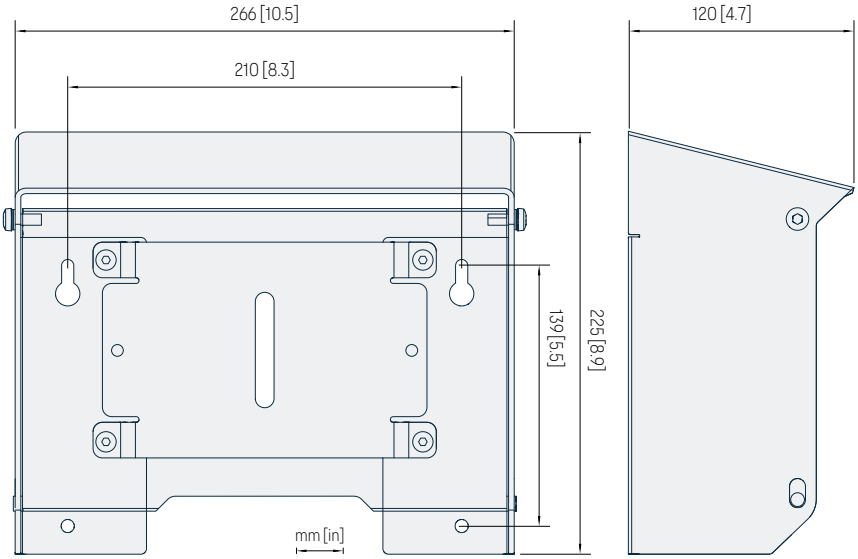


Figure 12 Spatter guard dimensions

1. Open the spatter guard cover by lifting it up.
2. Hold the spatter guard level against the installation surface and use a pen to mark the places of the mounting holes. The mounting holes are horizontally 210 mm (8.3 in) and vertically 139 mm (5.5 in) apart.
3. Drill 55 mm (2.17 in) deep holes and insert wall plugs.
4. Place rubber washers under the spatter guard and mount the spatter guard to a wall using 4 screws and a crosshead screwdriver.
5. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
6. Open the transmitter cover.
7. Attach the transmitter to the spatter guard using 14-mm screws (2 pcs) and a 5-mm Allen key. Place nylon washers under the screws to protect the surface of the transmitter.

3.2.4 DIN rail mounting

- Allen keys (4 mm and 5 mm), provided
- Screws 14 mm (2 pcs), provided
- Washers (2 pcs), provided
- DIN rail clip fasteners (2 pcs), provided

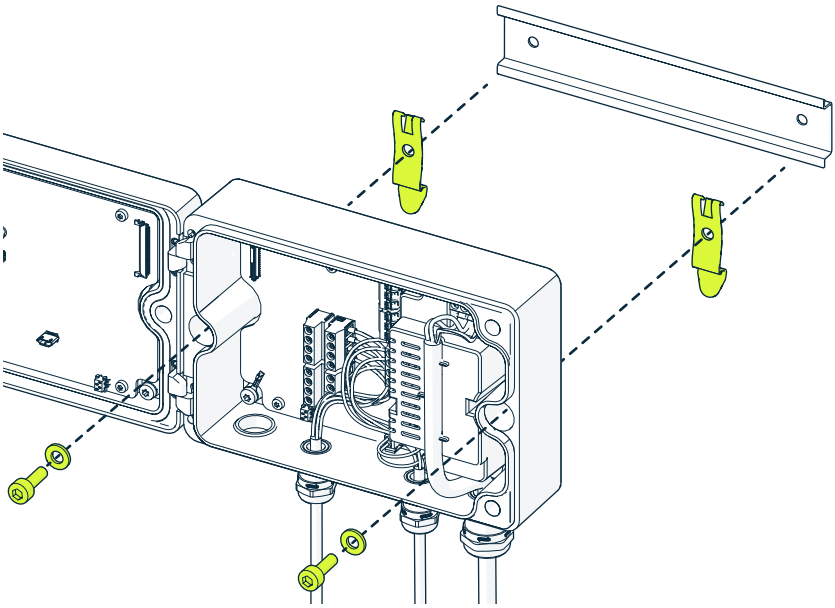


Figure 13 Attaching DIN rail clip fasteners

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Attach the DIN rail clip fasteners on the back of the transmitter using 14-mm screws (2 pcs) and a 5-mm Allen key. Place nylon washers under the screws to protect the surface of the transmitter.
4. Mount the transmitter on the DIN rail.

3.2.5 Pole mounting and attaching weather shield

- Allen keys (4 mm and 5 mm), provided
- Screws 14 mm (2 pcs), provided
- Washers (2 pcs), provided

- Installation kit for pole or pipeline (item code 215108):
  - Fixing brackets (2 pcs) for 100 mm (3.94 in) poles
  - Mounting nuts for fixing brackets, M8 (4 pcs)
  - Mounting plate (1 pcs)

- Installation kit with weather shield (item code 215109):
  - Fixing brackets (2 pcs) for 100 mm (3.94 in) poles
  - Mounting nuts for fixing brackets, M8 (4 pcs)
  - Mounting plate (1 pcs)
  - Rain shield (1 pcs)
  - Screws 10 mm (2 pcs)
  - Washers (2 pcs)

Using fixing brackets and a mounting plate, you can install the transmitter to a vertical or horizontal pole. If needed, you can also attach a rain shield.

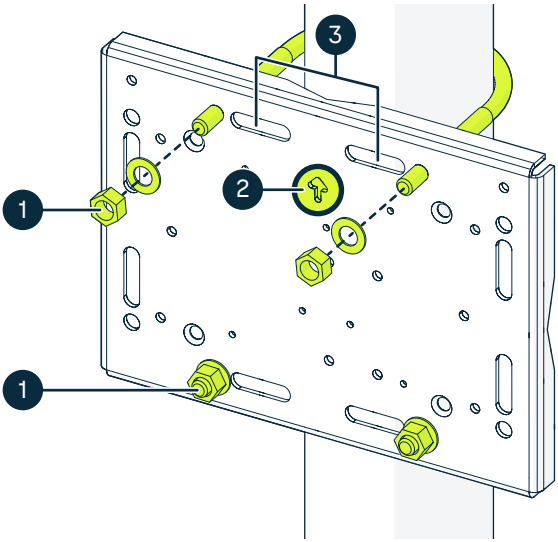


Figure 14 Attaching mounting plate to fixing brackets - vertical pole mounting

1 Mounting nuts for fixing brackets, M8 (4 pcs)
2 Note the position of the arrow when mounting. This side must be face up when mounting.



3 Install the transmitter to smaller poles using the larger slots in the mounting plate and your own fixing brackets. The smallest pole size is 30 mm (1.18 in).

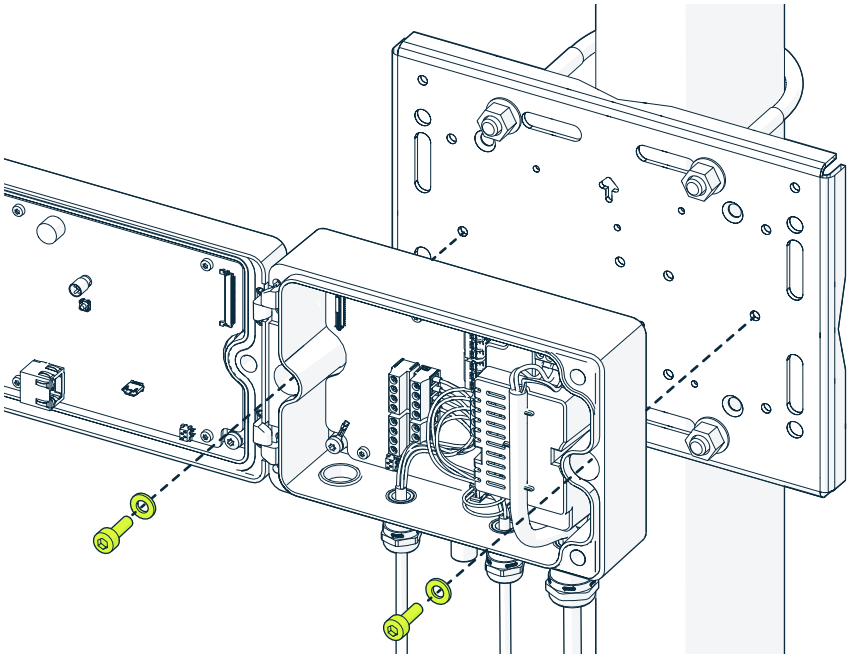


Figure 15 Attaching transmitter to mounting plate - vertical pole mounting

1. Place the fixing brackets around the pole and attach the mounting plate to the brackets using 4 mounting nuts.

> Make sure that the arrow in the mounting plate points upwards.

2. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
3. Open the transmitter cover.
4. Attach the transmitter to the mounting plate using 14-mm screws (2 pcs) and a 5-mm Allen key. Place nylon washers under the screws to protect the surface of the transmitter.

5. If needed, you can attach a rain shield. Attach the rain shield to the mounting plate using 10-mm screws (2 pcs) and washers (2 pcs).

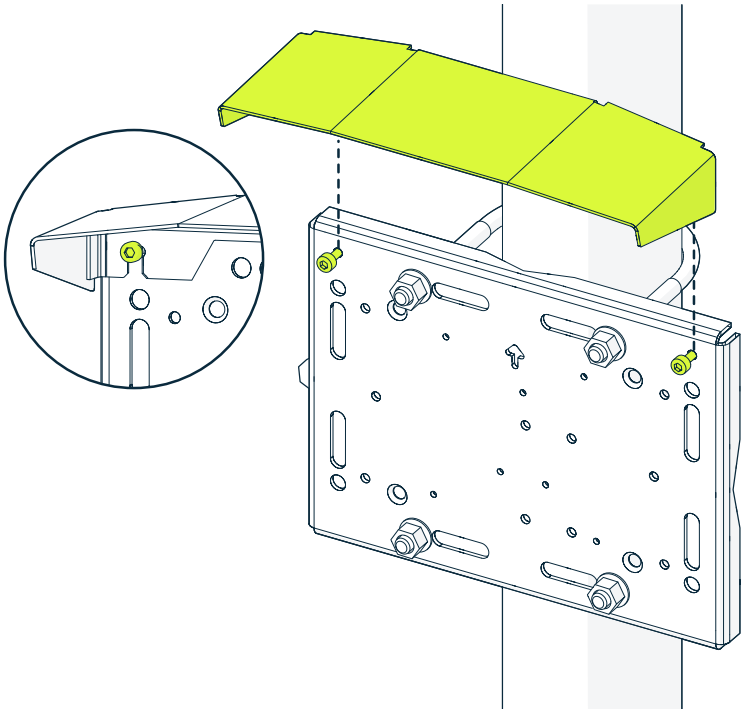


Figure 16 Attaching weather shield to mounting plate - vertical pole mounting

3.3 Wiring

WARNING! Read the product documentation carefully before installing or operating the product. If you encounter the following marking during installation or operation, consult product documentation to find out the nature of the potential hazards and any actions which have to be taken to avoid them:

WARNING! Make sure that you prepare and connect only de-energized wires.

For field wiring terminals, use copper conductors only.

- Allen key (4 mm) for opening the device cover, provided
- Open-ended wrenches of sizes 17 mm, 19 mm, 22 mm, and 24 mm
- Flat head screwdriver
- Cable glands as required by your application (available from Vaisala)
- Cables as required by your application (measurement device connection cables and power cables are available from Vaisala)

3.3.1 Power supply terminals and lead-through – PELV option

WARNING! Connect only cables with temperature rating of minimum +80 °C (+176 °F) to the PELV power supply terminal.

WARNING! Local and state legislation and regulations may require you to replace the power supply lead-through. If you remove the factory installed lead-through, use a replacing lead-through that is approved by UL, and has type rating 4. Ensure the replacing part provides sufficient ingress protection. Use a replacing part with M20×1.5 threads. Tightening torque is 10 Nm unless otherwise specified by the part manufacturer.

CAUTION! Always choose a power supply unit that conforms to the local standards and requirements.
In North America, only power Indigo510 and Indigo520 PELV version transmitters with one of the following:

- An approved/certified Class 2 power supply. The output of the power supply may not exceed 100 VA, with operating voltage not more than 30 V_{rms}, 42.4 V_{peak}, or 60 V DC.
- An approved/certified Limited Power Source (LPS) (CAN/CSA-C22.2 No. 60950-1 or UL 60950-1).

For more information on powering, see Indigo510 specifications (page 189) and Indigo520 specifications (page 193).

Power supply input wiring is required only for devices powered with protective extra-low voltage (PELV) or AC (mains) power.

For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0–9.0 mm (0.20–0.35 in). Tightening torque for the cable gland is 8 Nm.

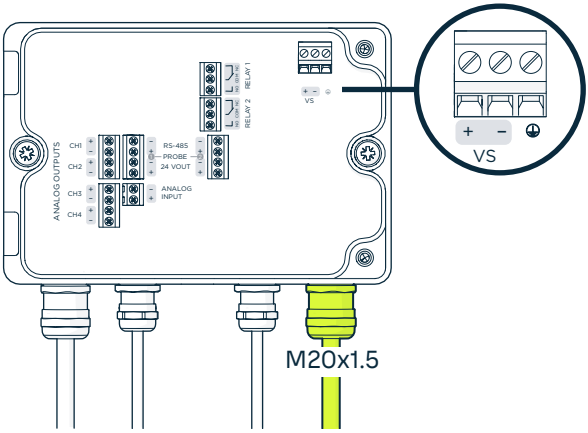


Figure 17 Power supply terminals and lead-through – PELV option

Table 6 PELV power supply input terminals

Terminal	Function	Notes
⏚	Power supply ground	
VS+	Positive supply voltage	15–35 V DC or 24 V AC ±20 %
VS-	Negative supply voltage	

3.3.2 Power supply terminals and lead through - AC (mains) power option

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

WARNING! Devices powered with AC (mains) power must be connected only to a grounded (earthed) power supply (class I equipment).

WARNING! Only licensed experts may connect the AC (mains) power connection to the power supply. A readily accessible disconnect device must be incorporated in the fixed wiring.

WARNING! Local and state legislation and regulations may require you to replace the power supply lead-through. If you remove the factory installed lead-through, use a replacing lead-through that is approved by UL, and has type rating 4. Ensure the replacing part provides sufficient ingress protection. Use a replacing part with M20×1.5 threads. Tightening torque is 10 Nm unless otherwise specified by the part manufacturer.

WARNING! Make sure that you prepare and connect only de-energized wires.

CAUTION! Only factory installed AC (mains) cables have been safety type tested and assembly tested with the product. When replacing the cable, select the replacement and install the cable according to local regulations. Modifying or replacing the factory installed AC (mains) cable may also void UL/SGS listing. For more information on AC (mains) cable requirements, see Table 8 (page 54).

CAUTION! Do not modify the unit or use it in ways not described in the documentation. Improper modification or use may lead to safety hazards, equipment damage, failure to perform according to specification, decreased equipment lifetime, or the warranty or third party approvals becoming void.

CAUTION! Do not use the device in a manner not specified by Vaisala. If the device is used in an unspecified manner, the protection provided by the equipment may be impaired.

CAUTION! Do not replace detachable mains supply cables by inadequately rated cables.

- Cable stripping tool
- Power supply cord, for example Feller GmbH SJTOW3x18AWGWB105CVW1

Power supply input wiring is required only for devices powered with protective extra-low voltage (PELV) or AC (mains) power.

For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0–9.0 mm (0.20–0.35 in). Tightening torque for the cable gland is 8 Nm.

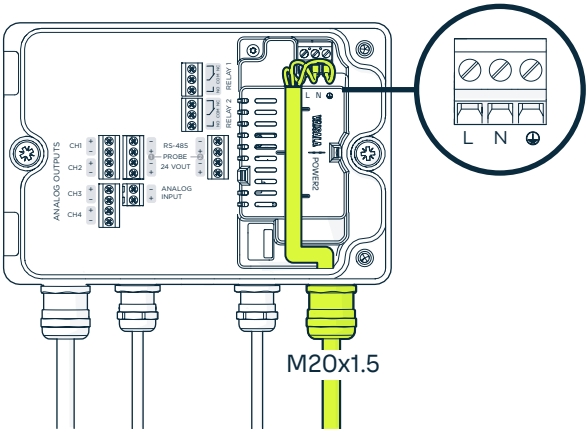


Figure 18 Power supply terminals and lead-through – AC (mains) power option

Table 7 AC power supply input terminals

Terminal	Function	Notes
⏚	Power supply ground	
L	Line	100–240 V AC 50/60 Hz
N	Neutral	

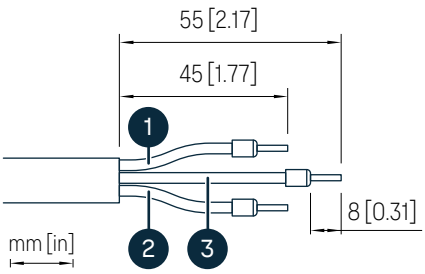


Figure 19 Example of stripped AC (mains) power cable

Number in figure	Wire	Min–max. wire cross-section
1	Line wire	0.5–2.5 mm^2 (20–14 AWG)
2	Neutral wire	
3	Grounding wire	

Table 8 Power cable specifications

Property	Description/Value
Example of powering cable	Feller GmbH SJTOW3x18AWGWB105CVW1
Cable diameter	5.0–9.0 mm (0.20–0.35 in)
Tightening torque for the cable gland	8 Nm
Minimum temperature range	−40 ... +90 °C (−40 ... +194 °F)
Minimum voltage/AC rating of the wall plug	10 A / 250 V AC
Minimum flammability rating	VW-1 or equivalent
UL approved with CCN	ZJCZ
Torque value for terminal screws	min. 0.5 Nm, max. 0.6 Nm

Choose a power cable that fits the intended application. The power cable must have a cable jacket. Prepare the AC (mains) power cable and connect the cable to the power supply input terminal:

1. Strip 55 mm (2.17 in) of the cable to expose the wires.
2. Cut off 10 mm (0.39 in) of the line and neutral wires. Leave the grounding wire 55 mm (2.17 in) long.

> **CAUTION!** Make sure that the grounding wire is longer than the line and neutral wires. Under mechanical stress, the grounding wire must be the last to disconnect from the protective ground terminal.

3. Strip the ends of the individual wires to expose the conductors for a length of 8 mm (0.32 in).
4. Attach the wires to the power supply terminal.
5. Pull the power cable to the rightmost lead-through and install the wires to the power module's screw terminals.
6. Tighten the lead-through so that the cable does not move back and forth.

3.3.3 Relay output terminals and lead-through

Before connecting wires or cables, make sure that the transmitter is powered off.

Relays are not available in Indigo510 transmitters or transmitters that are powered with Power over Ethernet (PoE).

Wire the relay connections as normally open (NO) or normally closed (NC). Use the touchscreen or web interface to configure the relay activation parameters.

For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0–9.0 mm (0.20–0.35 in). Tightening torque for the cable gland is 8 Nm.

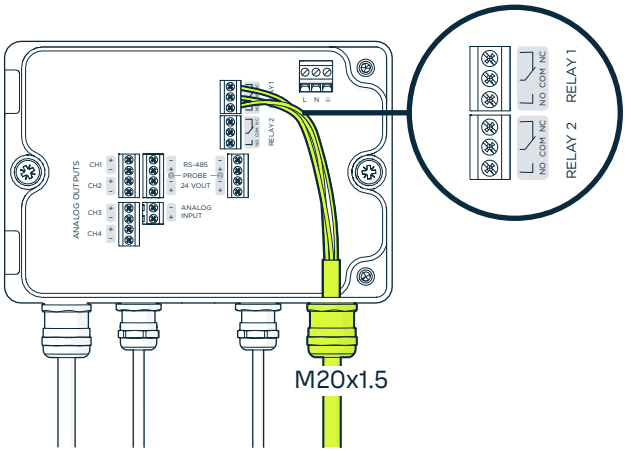


Figure 20 Relay output terminals and lead-through

Table 9 Output terminals for relay 1 and relay 2

Terminal	Function	Notes
COM	Relay 1 or 2 common	Terminals in PELV power supply version: • Type: Screw terminals • Max. wire size: 2.5 mm^2 (14 AWG) Terminals in AC (mains) power supply version: • Type: Push-in spring connection • Max. wire size: 1.5 mm^2 (16 AWG), solid wires or ferrules recommended
NO	Relay 1 or 2 normally open	
NC	Relay 1 or 2 normally closed	

3.3.4 Analog output terminals and lead-through

Before connecting wires or cables, make sure that the transmitter is powered off.

Analog outputs are not available in transmitters that are powered with Power over Ethernet (PoE).

Use the touchscreen or web interface to change the output mode (for example, 0–5 V or 4–20 mA) and scaling of the analog outputs.

For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0–9.0 mm (0.20–0.35 in). Tightening torque for the cable gland is 8 Nm.

For the M20×1.5 cable gland with split bushing, the cable diameter is 7 mm (0.28 in).

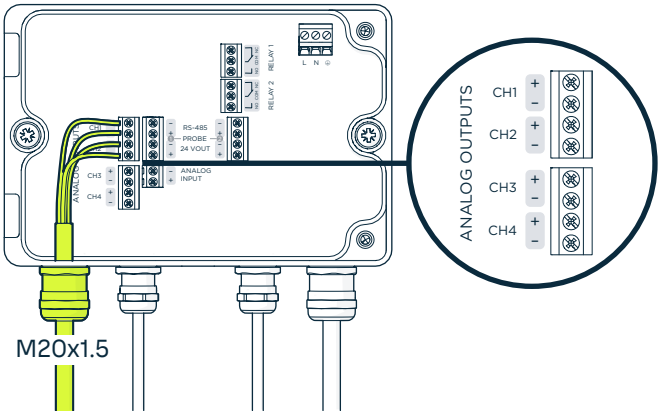


Figure 21 Analog output terminals and lead-through

Table 10 Analog output terminals

Terminal	Function	Notes
CH1 +	Analog output channel 1 +	Max. wire size: 2.5 mm^2 (14 AWG)
CH1 -	Analog output channel 1 -	
CH2 +	Analog output channel 2 +	
CH2 -	Analog output channel 2 -	
CH3 +	Analog output channel 3 +	
CH3 -	Analog output channel 3 -	
CH4 +	Analog output channel 4 +	
CH4 -	Analog output channel 4 -	

3.3.5 Analog input terminals and lead-through

Before connecting wires or cables, make sure that the transmitter is powered off.

Analog input is not available in Indigo510 transmitters or transmitters that are powered with Power over Ethernet (PoE).

Use the touchscreen or web interface to enable analog input and analog input powering.

Table 11 Analog input terminals

Terminal	Function	Notes
ANALOG INPUT +	Analog input channel 1 +	Max. wire size: 2.5 mm^2 (14 AWG)
ANALOG INPUT -	Analog input channel 1 -	
24 VOUT +	Power GND and RS-485 common	

3.3.5.1 Analog input wiring when powering with Indigo520

Only 1 measurement device can be connected to the transmitter when you power the analog input device through Indigo520 probe connection terminal 2. The measurement device has to be connected to probe connection terminal 1.

For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0–9.0 mm (0.20–0.35 in). Tightening torque for the cable gland is 8 Nm.

For the M20×1.5 cable gland with split bushing, the cable diameter is 7 mm (0.28 in).

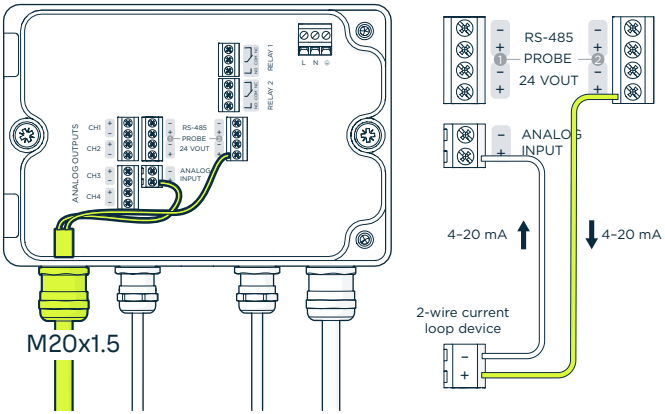


Figure 22 Analog input wiring when powering with Indigo520

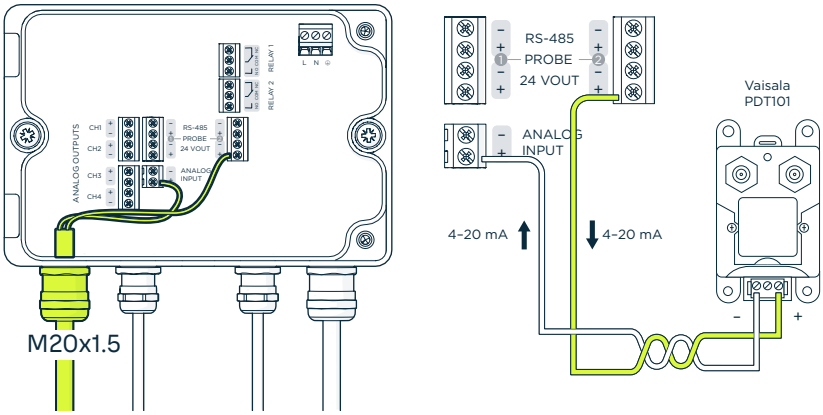


Figure 23 PDT101 wiring when powering with Indigo520

3.3.5.2 Analog input wiring with external power supply

For the M16×1.5 cable glands ordered together with the transmitter from Vaisala, the cable diameter is 2.0–6.0 mm (0.08–0.24 in) or 4.0–8.0 mm (0.16–0.31 in) depending on your configuration. Tightening torque for the cable gland is 6 Nm.

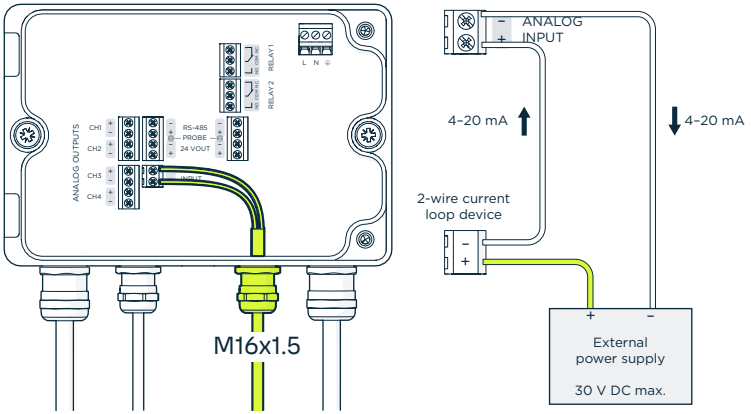


Figure 24 Analog input wiring with external power supply

3.3.6 Ethernet connector and lead-through

You must use a shielded cable to meet the rated EMC performance of the device.

Before connecting wires or cables, make sure that the transmitter is powered off.

The 8P8C (RJ45) Ethernet connector is located on the inside of the transmitter cover. The supported standards are 10BASE-T and 100BASE-TX.

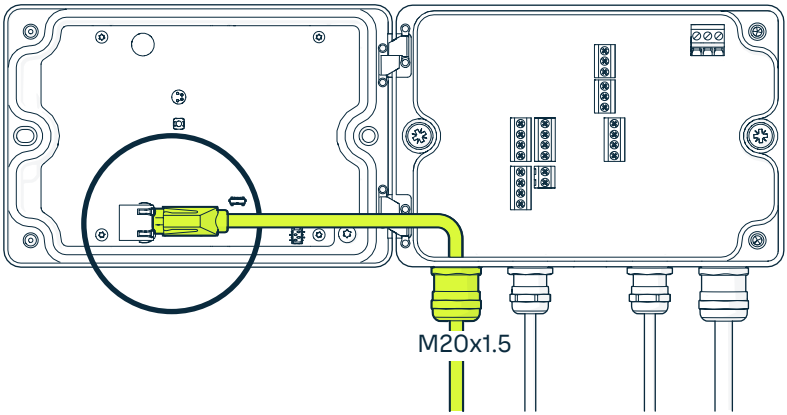


Figure 25 Ethernet connector and lead-through

For the M20×1.5 cable gland with split bushing, the cable diameter is 7 mm (0.28 in).

When configuring the non-display transmitter, the Ethernet connector can be used without taking the cable through the cable gland. Always wire through the cable gland for more long-term wiring.

When you insert the cable through the gland parts, also remove the split bushing (3) inside the nylon seal (2) to make the cable fit through the seal. Then place the bushing around the cable and push it back inside the seal. See the following figure.

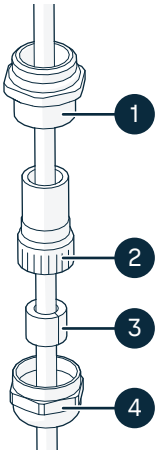


Figure 26 M20×1.5 cable gland with split bushing

1 Base of the cable gland
2 Nylon seal
3 Split bushing inside the seal
4 Nut of the cable gland

3.3.7 Probe connection terminals and lead-throughs

Probe connection terminals are used to connect measurement devices, such as probes and refractometers, to the transmitter.

Before connecting wires or cables, make sure that the transmitter is powered off.

For the M16×1.5 cable glands ordered together with the transmitter from Vaisala, the cable diameter is 2.0–6.0 mm (0.08–0.24 in) or 4.0–8.0 mm (0.16–0.31 in) depending on your configuration. Tightening torque for the cable gland is 6 Nm.

The minimum length of the measurement device connection cable is 30 cm (11.81 in). The recommended maximum length of the measurement device connection cable is 30 m (98 ft).

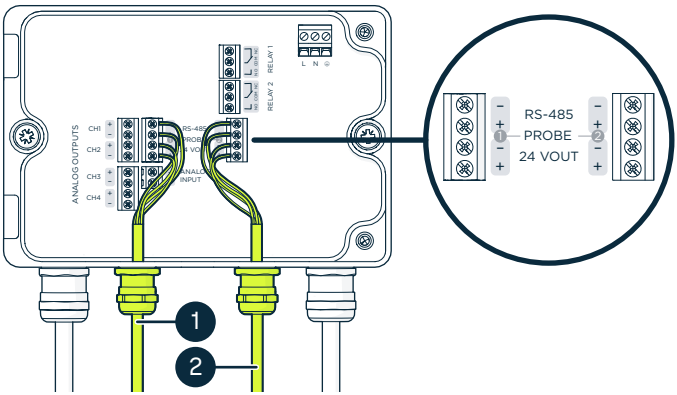


Figure 27 Probe connection terminals and lead-throughs

1 Probe connection terminal 1 lead-through, M16×1.5
2 Probe connection terminal 2 lead-through, M16×1.5

Table 12 Probe connection terminals wiring

Terminal	Function	Wire color in standard Vaisala cables	Wire color in Vaisala refractometer cables	Notes
RS-485-	RS-485-	White	Green	Max. wire size: 2.5 mm^2 (14 AWG)
RS-485+	RS-485+	Black	Yellow	
24 VOUT -	Power GND and RS-485 common	Blue	White	
24 VOUT +	Positive supply voltage to probe	Brown	Brown	

3.3.8 Service port connection

CAUTION! The service port connection is only intended for temporary use during configuration, and must not be used for permanent installations. The IP rating, UL type 4 rating, and EMC properties of the transmitter can be affected by using the service port in permanent installations.

CAUTION! Do not touch the PCB while it is energized – risk of electric shock.

Service port is used to connect Indigo80 Handheld Indicator or Insight software to the transmitter. The service port is located on the inside of the transmitter cover.

To connect Indigo80 to an Indigo500 transmitter, use M12 - M8 service cable 1.5 m (4.9 ft) (Vaisala item code 262195SP). To connect an Indigo500 transmitter to Insight software, use Vaisala Indigo USB adapter (Vaisala item code USB2) and M12 - M8 service cable (Vaisala item code 262195SP) or M8 - USB service cable (Vaisala item code 219690).

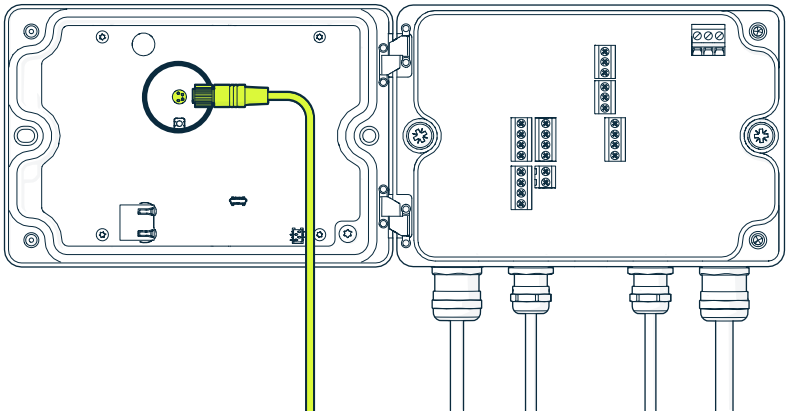


Figure 28 Service port connection

3.3.9 Verifying tightness of cable glands

- Adjustable wrench

To maintain enclosure tightness and provide strain relief to the cables, all cable glands must be tightened. Unused cable glands must remain plugged.

1. Check every cable gland that is in use:
   a. Pull on the cable to verify that the cable is securely held by the cable gland.
   b. Tighten the cable gland if the cable moves.
2. Check that every unused cable gland is plugged and tightened.

3.4 Connecting measurement devices

CAUTION! The IP classification of probes is valid only when the probes are connected to the probe connection cable.

If you want to configure the probe settings, such as purge interval, you can use Indigo80 Handheld Indicator or free Vaisala Insight PC Software. For more information on configuring the probe with Indigo80, see your probe's user guide and Indigo80 User Guide (M212722EN). For more information on configuring the probe with the Insight software, see Insight PC Software overview (page 175) and your probe's user guide, and visit vaisala.com/insight.

If your transmitter was delivered with preconfigured analog outputs, make sure that you connect the measurement devices accordingly.

Probe connection terminals are used to connect measurement devices, such as probes and refractometers, to the transmitter.

When the measurement device connection cables have been wired to the transmitter, you can connect and disconnect measurement devices both when the transmitter power is on and when it is off. If the power is on while you connect or disconnect a measurement device, the transmitter shows a notification about the measurement device. If you have configured the transmitter to use outputs, the transmitter also notifies you of the state of the outputs.

Connect only Vaisala Indigo-compatible devices to the transmitter.

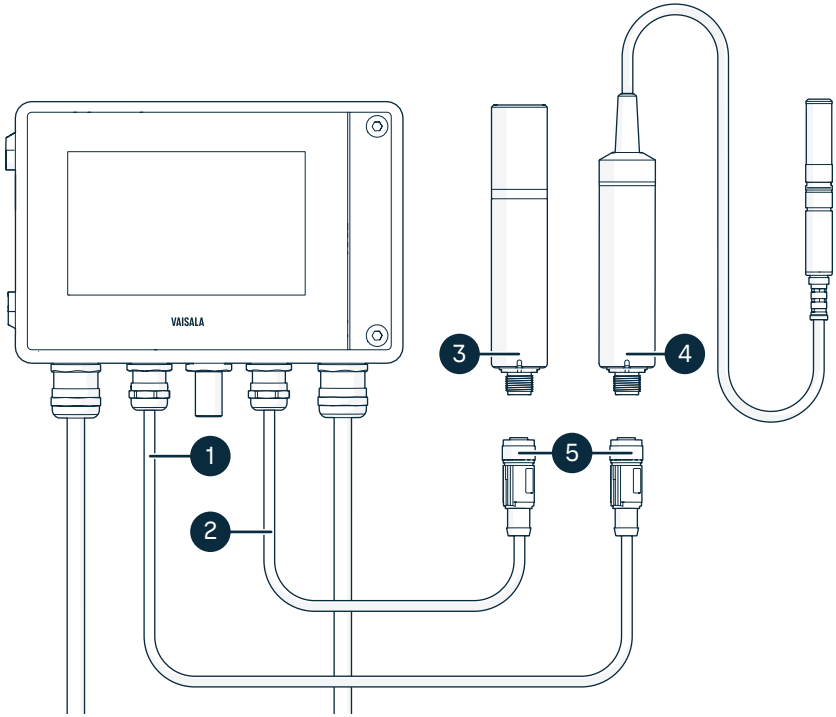


Figure 29 Connecting measurement devices to Indigo500 Transmitters

1 Connection cable, probe 1
2 Connection cable, probe 2 (dual-device support in Indigo520)
3 Measurement device to be connected as probe 2 (GMP252 example)
4 Measurement device to be connected as probe 1 (HMP7 example)
5 The connector of the connection cable (M12 5-pin A-coded female)

You can connect the probes to the wall using the mounting accessory provided with the probes.

More information

- Replacing probes (page 179)

4. User interfaces

4.1 Touchscreen display and main views

The touchscreen display starts up when you power up the transmitter.

On the touchscreen display, you can:

- View live measurement data numerically and graphically
- View output and input status
- View event notifications from the transmitter and connected devices
- Configure transmitter settings, outputs, and inputs



If you want to clear a field when you configure the transmitter settings on touchscreen, press the backspace key ⌫ for 2 seconds and release.

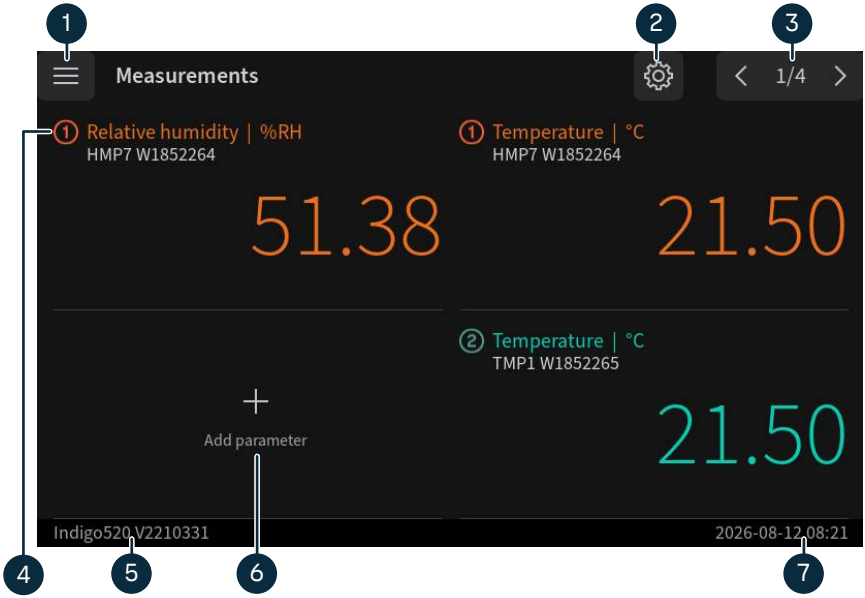


Figure 30 **Measurements** view on touchscreen

1 Access the configuration menu, where you can configure the transmitter's settings and outputs, and manage alerts and events.
2 **Measurements** view layout: select a view displaying 1, 2, 4, or 6 parameters. Add, delete, and rename **Measurements** views. You can have up to 5 **Measurements** views.
3 Switch between the **Home** views:
   - **Measurements** view: 1 to 6 configurable measurement parameters.
   - **Graph** view: 1 to 2 configurable measurement parameters.
   - **I/O status** view: Status of all connected analog outputs, analog input, and relays.
   - **Network and digital interfaces** view: current IP address and status of Modbus TCP/IP, Vaisala cloud connection, and service port.
4 Color coded icons to indicate the selected measurement device.
5 Transmitter name and serial number. You can set a custom name for the transmitter in **Transmitter > General > Transmitter name**.
6 Slots for 1 to 6 configurable measurement parameters. Configurable by touching the desired parameter or the **+** sign.
7 Date and time.



Figure 31 **Graph** view on touchscreen

1 Slots for 1 to 2 configurable measurement parameters.
2 **Graph data statistics**: View the maximum and minimum values observed during the time scale of the graph.
3 **View settings**: Configure the time scale of the graph. You can set the time scale to 1 min, 15 min, 1 h, 12 h, 1 d, or 7 d. The default value is 15 minutes.
4 Time scale of the graph.

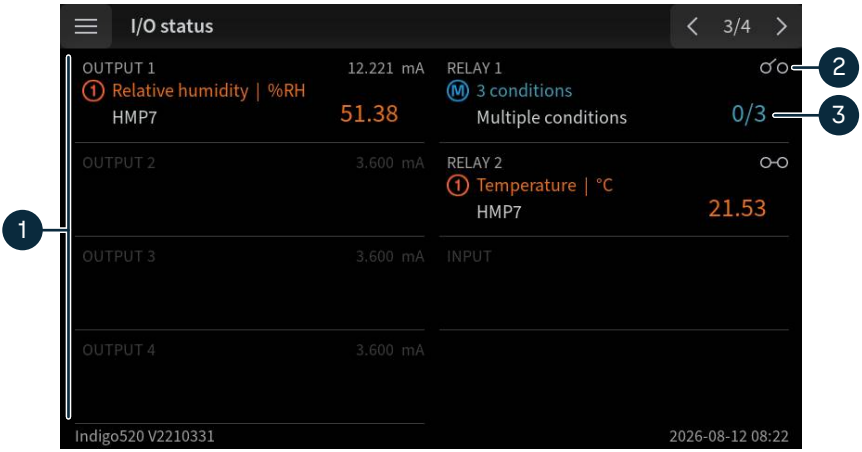


Figure 32 **I/O status** view on touchscreen

1 Slots for analog outputs, analog input, and relays.
2 Relay status symbol.
3 Number of met conditions. In this image **Relay 1** has three set conditions of which none are met.

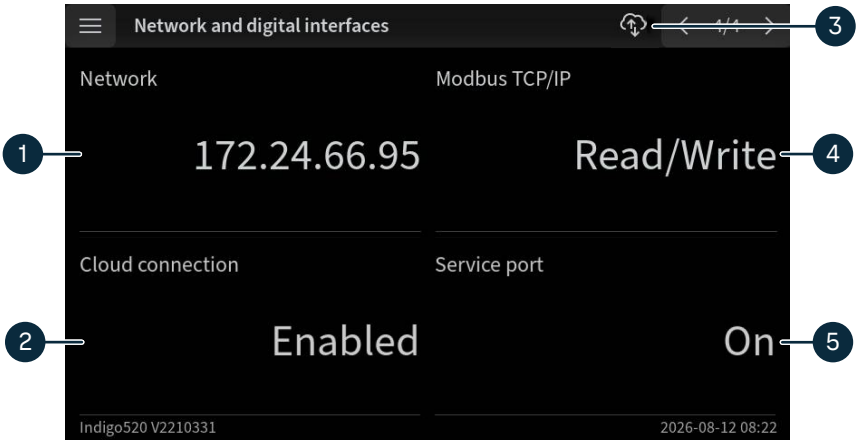


Figure 33 **Network and digital interfaces** view on touchscreen

1 View the current IP address of the transmitter.
2 Vaisala cloud connection status. The status is only visible, if you have ordered your transmitter from Vaisala manufacturing with cloud connection support software option selected.
3 Vaisala cloud connection icon. The icon is only visible, if you have ordered your transmitter from Vaisala manufacturing with cloud connection support software option selected.
4 Modbus TCP/IP status.
5 Service port connection status.

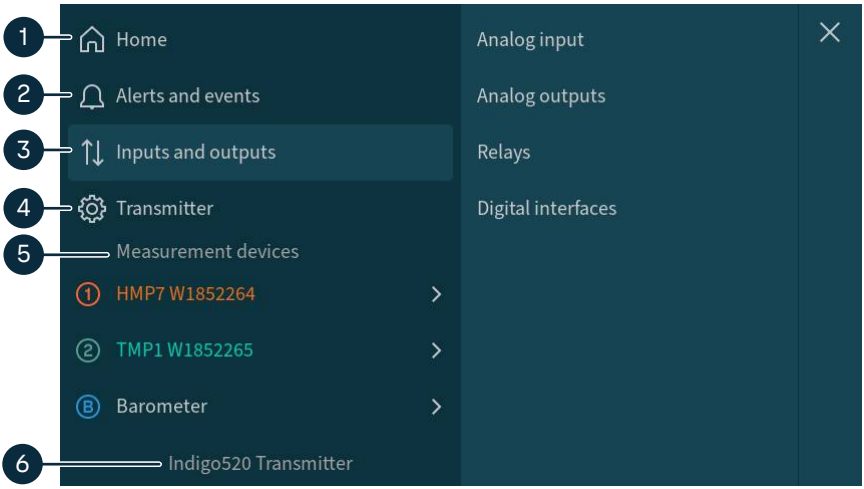


Figure 34 Configuration menu on touchscreen

1 **Home**: Return to **Home** views.
2 **Alerts and events**: View all active and past events and configure alert rules.
3 **Inputs and outputs**: Configure analog input, analog outputs, relays, Modbus TCP/IP, and service port.
4 **Transmitter**: Configure transmitter settings.
5 **Measurement devices**: View all the devices connected to your transmitter, access barometer settings, and view information about the connected device, such as firmware version, configuration code, serial number, and calibration date.
6 Transmitter name. You can set a custom name for the transmitter in **Transmitter > General > Transmitter name**.

More information

- Starting up transmitter using touchscreen display (page 82)
- Configuring Measurements view on touchscreen (page 109)
- Accessing configuration menu (page 111)
- Configuring Graph view on touchscreen (page 110)
- Relay wiring and relay activation mode (page 130)

4.1.1 Graph data statistics

You can view **Graph data statistics** in **Graph** view on the touchscreen display.

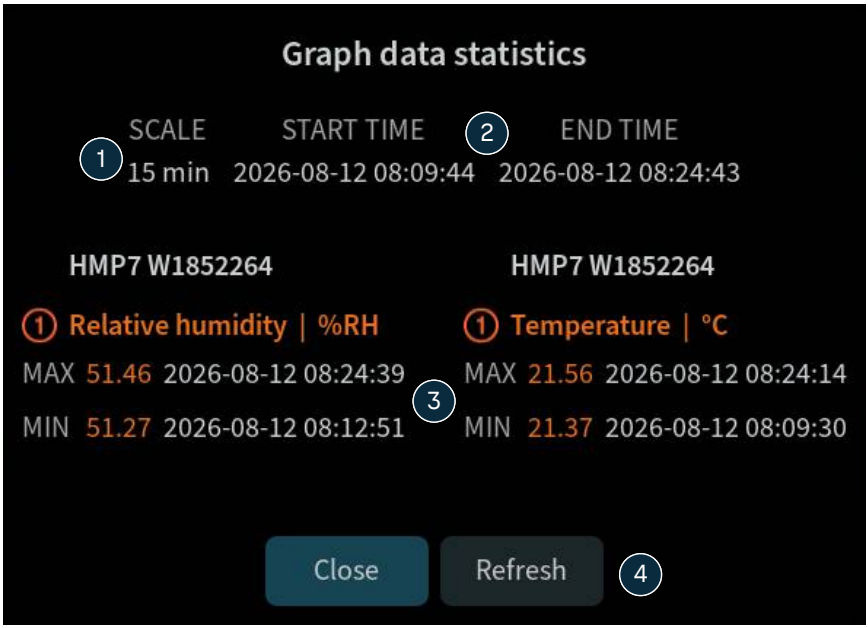


Figure 35 **Graph data statistics** view on touchscreen

1 **Scale**: Time scale of the graph data statistics.
2 **Start time**, **End time**: Start and end time for the measurements shown in statistics.
3 Measured parameters and their maximum and minimum values observed during the time scale of the graph.
4 To view the latest measurement data statistics, select **Refresh**.

4.1.2 Alerts and events menu on touchscreen

All active and past events related to Indigo500 or devices connected to Indigo500 are listed in **Alerts and events > Events**. There are two types of events in Indigo500: measurement events and device events.

Measurement events are based on the conditions of measurements. They are controlled by alert rules that are created for measurement parameters. Device events are based on device connectivity and status. Device events cannot be configured.

The events have four severity levels: Critical, Moderate, Informational, and Success.

Events can have two states: active and inactive. An event is active when conditions of the event are present. An event is inactive when the conditions of the event are not present anymore.

You can access the **Alerts and events** menu from the main menu of Indigo500. If you have active events, you can access the menu also from the upper right corner of the touchscreen, from the notification symbol.

Logged events remain in the persistent memory of Indigo500 and are available even after the transmitter has rebooted. Several thousand events are stored in the persistent memory of your transmitter. If the memory becomes full, the oldest events are deleted first.

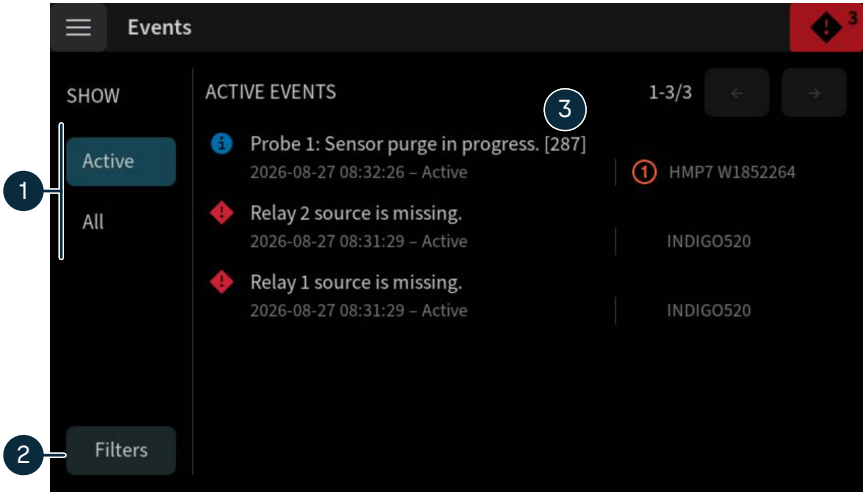


Figure 36 **Events** page on touchscreen

1 The **Active** tab lists events related to ongoing activities of Indigo500 or a connected device. The most recent events are listed on the top of the list.
Items stay on the **Active** tab until the status or activity that has triggered the notification expires or stops.
The **All** tab list all active and past events, with the most recent events shown at the top of the list.
2 You can filter the events based on their severity level category and the source of the notification.
3 A code related to the notification or error message is shown in brackets. Depending on your connected device, the *Troubleshooting* section of the device's User Guide at docs.vaisala.com may contain more information about the status or error.

You can create alert rules in **Alerts and events > Alert rules**. Alert rules define when alerts are triggered for a specific measurement parameter.

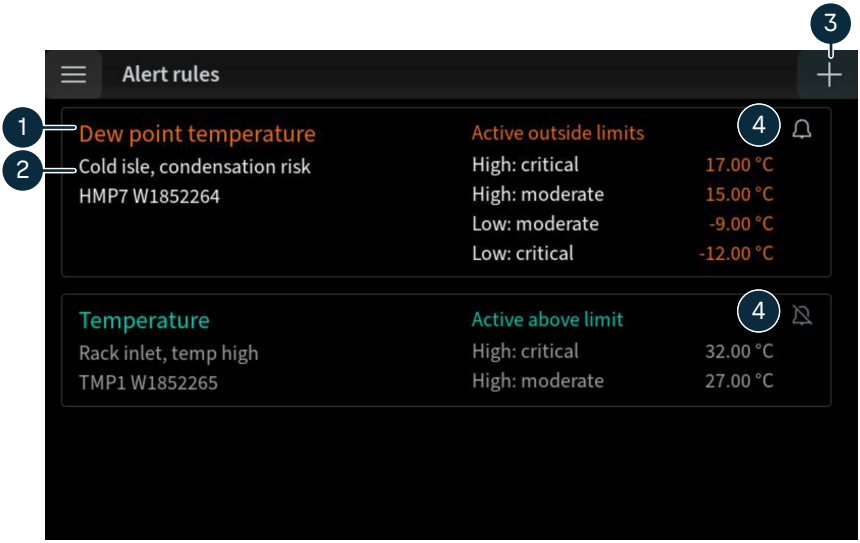


Figure 37 **Alert rules** page on touchscreen

1 Color coded name of the measurement parameter to indicate the source of the measurement.
2 Description of the alert rule to make distinction of alert rules for the same measurement parameter possible.
3 Add alert rules. You can configure up to 10 alert rules.
4 The alert rule is enabled when the alert rule information is shown in color and the bell icon is shown. The alert rule is disabled when the alert rule information is shown in gray and the bell icon has a line through it.

More information

- Configuring alert rules on touchscreen (page 113)

4.1.3 Measurement devices menu on touchscreen

In the **Measurement devices** menu you can see all the devices connected to Indigo500. The optional barometer module and its settings are also visible in the **Measurement devices** menu. The menu is available from software version 1.23.1 onward with barometer settings and information about the connected devices, such as firmware version, configuration code, serial number, and calibration date. From software version 2.0.0 onward, you can also configure device-specific settings for connected HMP7 probes.

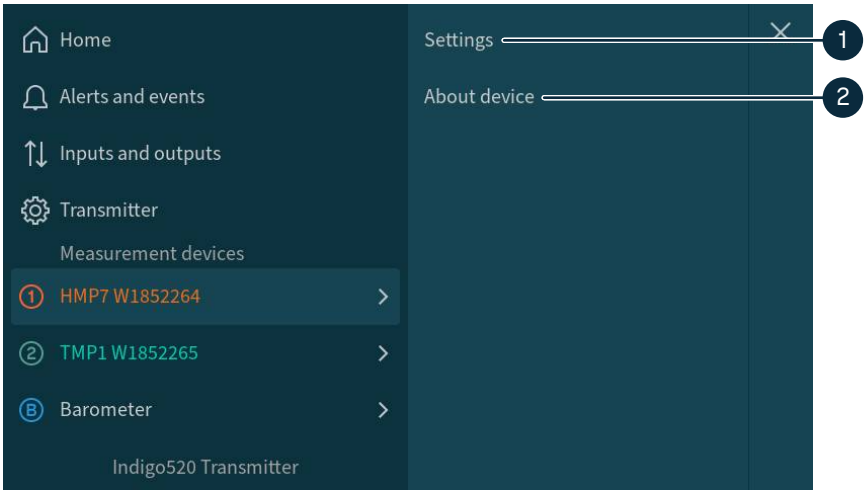


Figure 38 Options in **Measurement devices** menu of Indigo500 configuration menu, example with HMP7 probe

1 **Settings**
In this menu you can configure device-specific settings for connected HMP7 probes.
2 **About device**
This view contains information about the connected device, such as firmware revision, configuration code, serial number, and calibration date.

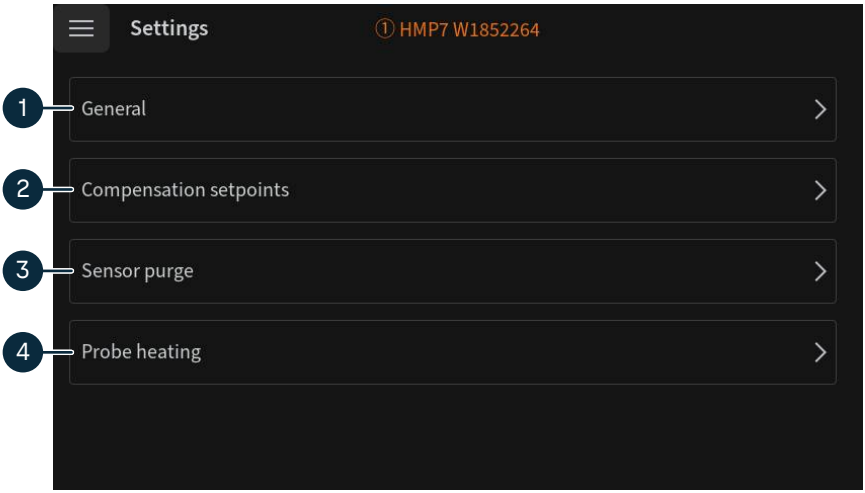


Figure 39 Options in **Measurement devices > Settings** menu, HMP7 probe connected

1 **General**
In this menu you can enable and disable the probe's condensation prevention feature and set a custom name for the probe. Depending on your probe's firmware version, you can also manually start the sensor purge function in this menu.

2 **Compensation setpoints**
Selecting **Environment presets** in this menu takes you to **Transmitter > Environment presets**, where you can give additional information about the connected device's measurement environment (such as pressure or temperature) to improve measurement accuracy.
For detailed information on the HMP7 requirements for the settings, see HMP Series with MMP8 and TMP1 User Guide (M212022EN), available at docs.vaisala.com.

3 **Sensor purge**
In this menu you can configure the sensor purge function for the probe. Sensor purge heats up the sensor briefly to evaporate possible contaminants that otherwise could affect measurement accuracy. You can manually start the sensor purge function, set sensor purge interval, and enable/disable interval purge and startup purge.

Changing the time unit for the sensor purge interval on touchscreen does not affect the inserted value. The value will however be displayed in the new time unit. If you have, for example, set the sensor purge interval to 60 hours, and change the time unit to minutes, the value displayed will be 3600 minutes.

4 **Probe heating**
In this menu you can configure probe heating.
For information on probe heating, see HMP Series with MMP8 and TMP1 User Guide (M212022EN), available at docs.vaisala.com.

4.2 Web interface and main views

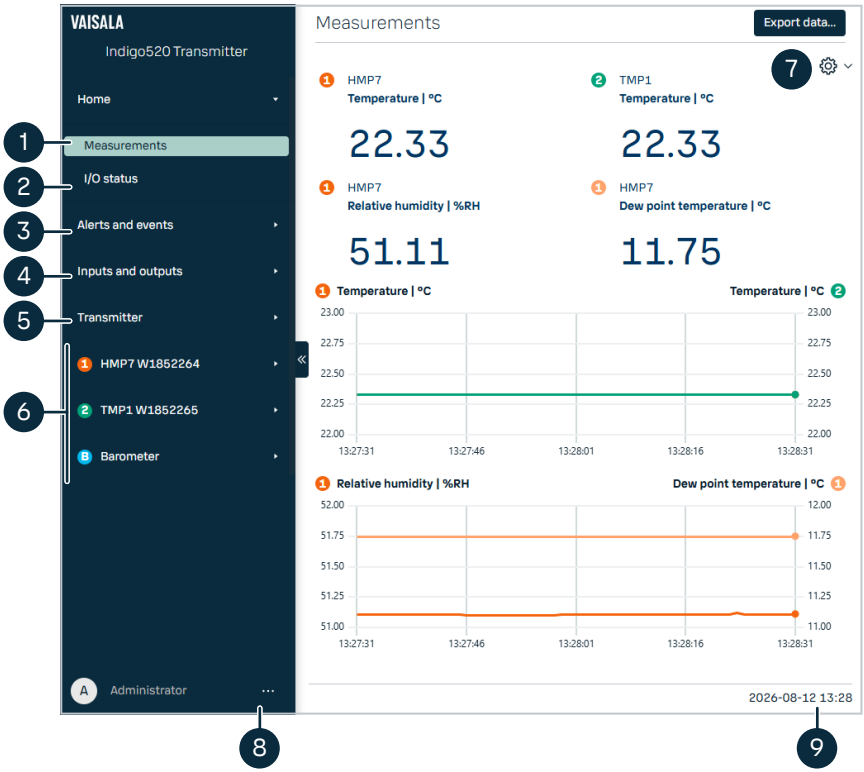


Figure 40 **Measurements** view in web interface

1 **Home > Measurements**: View live measurement data numerically and graphically. Add and remove measurement parameters (1 to 6).
2 **Home > I/O status**: View the status of outputs, relays, and inputs.
3 **Alerts and events**: View all active and past events and configure alert rules.
4 **Inputs and outputs**: Configure analog outputs, relays, analog input, and Modbus TCP/IP (**Administrator** user level only).
5 **Transmitter**: Configure transmitter settings and update transmitter software (**Administrator** user level only).
6 View all the devices connected to your transmitter, access barometer settings, and view information about the connected device, such as firmware version, configuration code, serial number, and calibration date.
7 Add measurement parameters to the **Measurements** view.
8 Change user interface theme, password and language, and log out.
9 Date and time

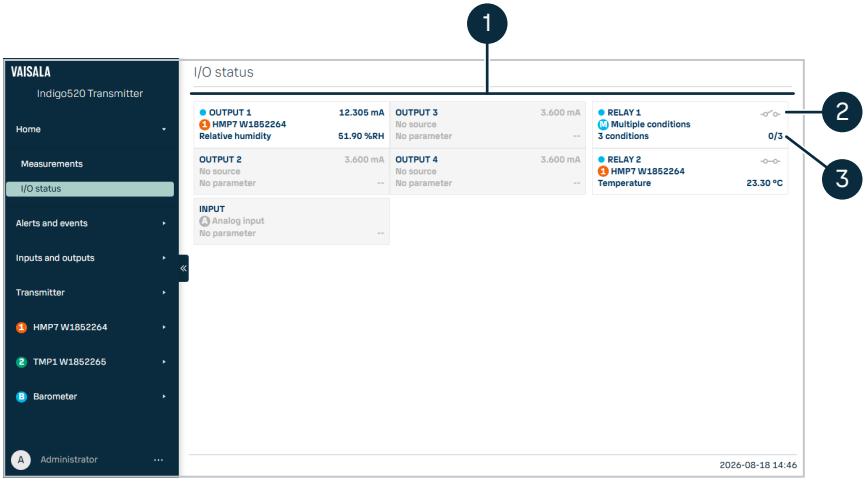


Figure 41 **I/O status** view in web interface

1 Slots for analog outputs, analog input, and relays.
2 Relay status symbol.
3 Number of met conditions. In this image **Relay 1** has three set conditions of which none are met.

More information

- Starting up transmitter using web interface (page 91)
- Relay wiring and relay activation mode (page 130)
- Configuring web interface home view (page 141)

4.2.1 Alerts and events menu in web interface

All active and past events related to Indigo500 or devices connected to Indigo500 are listed in **Alerts and events > Events**. There are two types of events in Indigo500: measurement events and device events.

Measurement events are based on the conditions of measurements. They are controlled by alert rules that are created for measurement parameters. Device events are based on device connectivity and status. Device events cannot be configured.

The events have four severity levels: Critical, Moderate, Informational, and Success.

Events can have two states: active and inactive. An event is active when conditions of the event are present. An event is inactive when the conditions of the event are not present anymore.

You can access the **Alerts and events** menu from the main menu of Indigo500. If you have active events, you can access the menu also from the footer of the web interface, from the notification symbol.

Logged events remain in the persistent memory of Indigo500 and are available even after the transmitter has rebooted. Several thousand events are stored in the persistent memory of your transmitter. If the memory becomes full, the oldest events are deleted first.

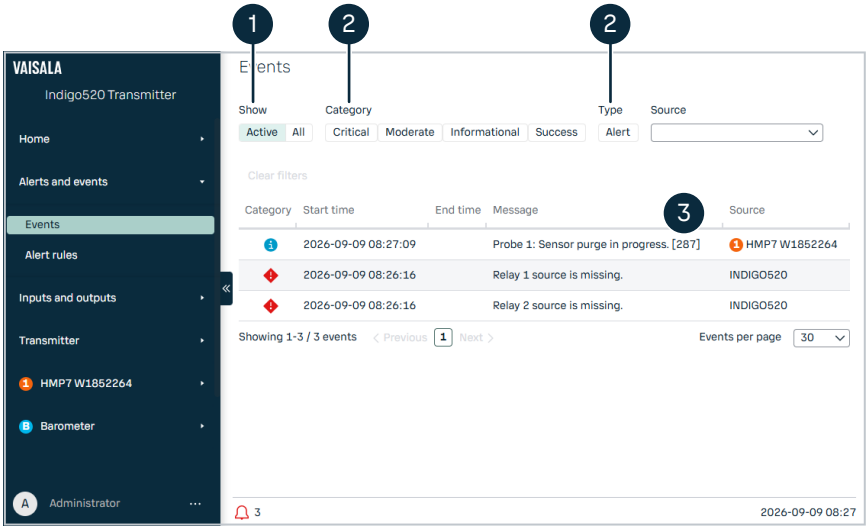


Figure 42 **Events** page in web interface

1 The **Active** tab lists events related to ongoing activities of Indigo500 or a connected device. The most recent events are listed on the top of the list.
Items stay on the **Active** tab until the status or activity that has triggered the event expires or stops.
The **All** tab list all active and past events, with the most recent events shown at the top of the list.
2 You can filter the events based on their severity level category and the source of the event.
3 A code related to the event or error message is shown in brackets. Depending on your connected device, the *Troubleshooting* section of the device's User Guide at docs.vaisala.com may contain more information about the status or error.

You can create alert rules in **Alerts and events > Alert rules**. Alert rules define when alerts are triggered for a specific measurement parameter.

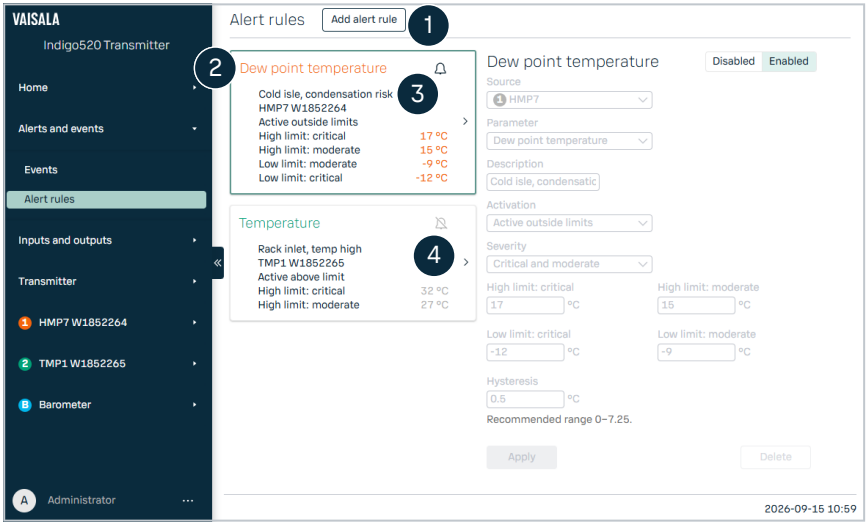


Figure 43 **Alert rules** page in web interface

1 Add alert rules. You can configure up to 10 alert rules.
2 Color coded name of the measurement parameter to indicate the source of the measurement.
3 Description of the alert rule to make distinction of alert rules for the same measurement parameter possible.
4 The alert rule is enabled when the alert rule information is shown in color and the bell icon is shown. The alert rule is disabled when the alert rule information is shown in gray and the bell icon has a line through it.

More information

- Configuring alert rules in web interface (page 143)

4.2.2 Measurement devices menu in web interface

In the **Measurement devices** menu you can see all the devices connected to Indigo500. The optional barometer module and its settings are also visible in the **Measurement devices** menu. The menu is available from software version 1.23.1 onward with barometer settings and information about the connected devices, such as firmware version, configuration code, serial number, and calibration date. From software version 2.0.0 onward, you can also configure device-specific settings for connected HMP7 probes.

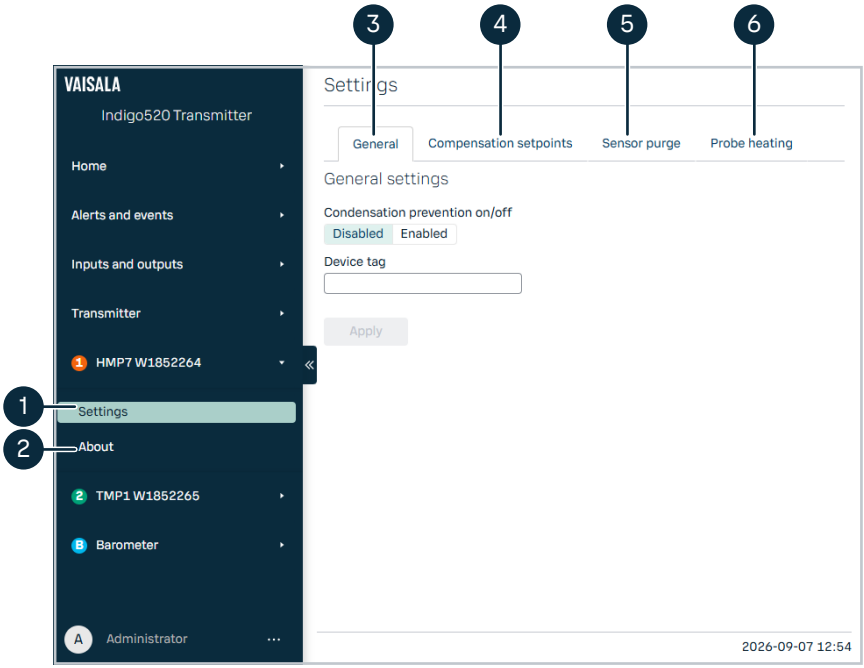


Figure 44 Options in **Measurement devices > Settings** menu, HMP7 probe connected, **General** tab active

1 **Settings**
In this menu you can configure device-specific settings for connected HMP7 probes.

2 **About**
This view contains information about the connected device, such as firmware revision, configuration code, serial number, and calibration date.

3 **General**
In this menu you can enable and disable the probe's condensation prevention feature and set a custom name for the probe. Depending on your probe's firmware version, you can also manually start the sensor purge function in this menu.

4 **Compensation setpoints**
Selecting **Environment presets** in this menu takes you to **Transmitter > Environment presets**, where you can give additional information about the connected device's measurement environment (such as pressure or temperature) to improve measurement accuracy.
For detailed information on the HMP7 requirements for the settings, see HMP Series with MMP8 and TMP1 User Guide (M212022EN), available at docs.vaisala.com.

5 **Sensor purge**
In this menu you can configure the sensor purge function for the probe. You can manually start the sensor purge function, set sensor purge interval, and enable/disable interval purge and startup purge. Sensor purge heats up the sensor briefly to evaporate possible contaminants that otherwise could affect measurement accuracy.

Changing the time unit for the sensor purge interval in the web interface does not affect the inserted value. If you have, for example, set the sensor purge interval to 60 hours, and change the time unit to minutes, the value displayed will be 60 minutes.

6 **Probe heating**
In this menu you can configure probe heating.
For information on probe heating, see HMP Series with MMP8 and TMP1 User Guide (M212022EN), available at docs.vaisala.com.

5. Startup

5.1 Starting up transmitter using touchscreen display

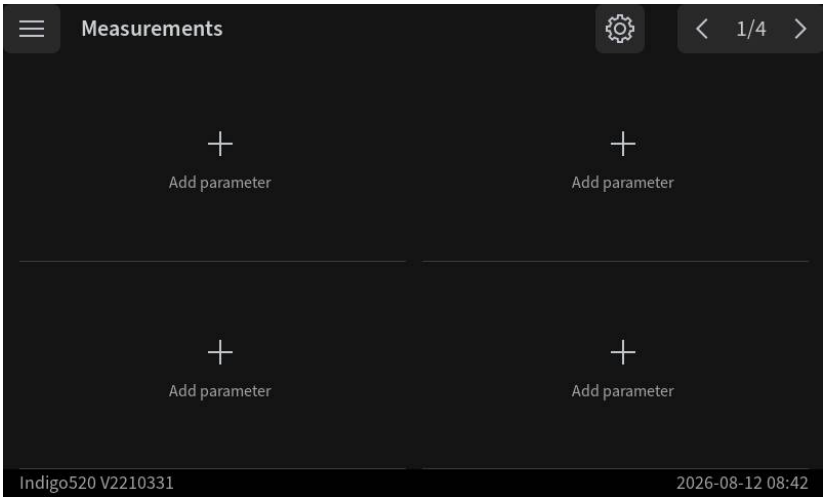
CAUTION! Do not power off the transmitter during the initial power-up. Powering off the transmitter during the initial power-up may cause the transmitter to not boot up without a factory reset. It may also affect the transmitter configurations in transmitters that have been delivered with preconfigured settings. The power-up is complete when

- in a transmitter with display, the **Measurements** view opens.
- in a non-display transmitter, the LED indicator color is solid green.

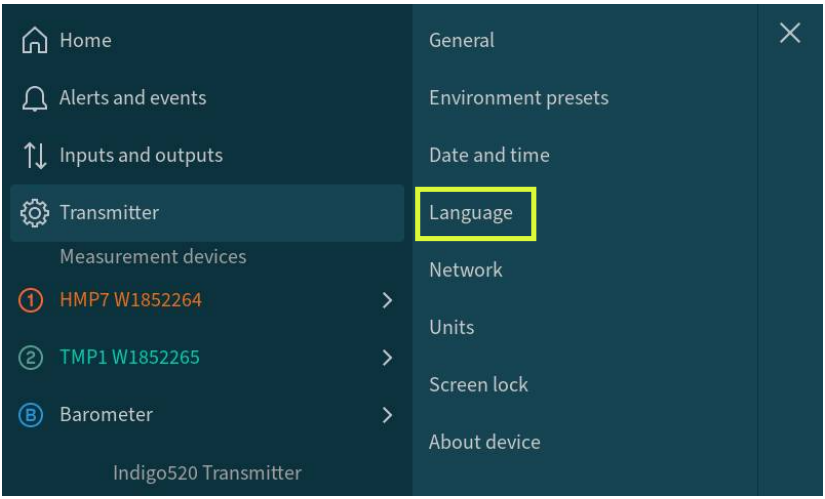
The power-up may take up to 3 minutes. If the LED indicator of a non-display transmitter is not solid green after 3 minutes, there may be another issue that requires attention. For more information on the LED indicator states, see LED indicator (non-display transmitter) (page 23).

1. Remove the plastic protection cover on the touchscreen display.
2. Power up the transmitter.

   Powering up takes some minutes.
   After the power-up, the **Measurements** view opens, showing 4 configurable slots for measurement parameters.



3. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
4. The default language of the user interface is English. If you want to use another language, select it in **Transmitter > Language**.



Your transmitter is now ready for operation. You can next go through these additional settings:

- **General > Transmitter name**
- **Environment presets**
- **Date and time**
- **Network**
- **Units**
- **Screen lock**

5.1.1 Configuring network connection on touchscreen

Before you start, find out from your local network administrator whether your transmitter uses dynamic or static network settings.

- Dynamic network settings are automatically assigned by a DHCP server each time the transmitter is powered up.
- Static network settings must be configured manually. Ask your local network administrator for the settings.

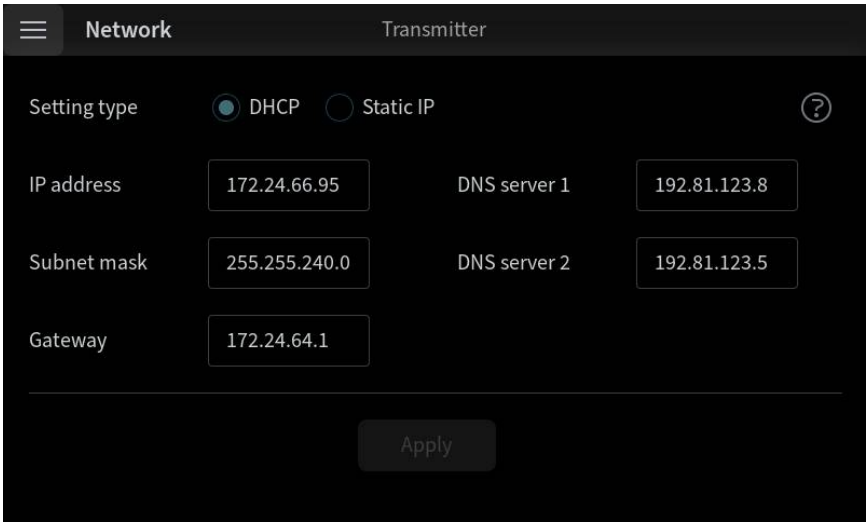


Figure 45 **Network** settings on touchscreen

1. Make sure that the Ethernet cable is connected to the transmitter.

   The Ethernet connector's LED lights up.
2. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
3. Select **Transmitter > Network**.
4. Select the setting type:
   - Select **DHCP** if the transmitter is in a network that assigns network settings automatically.
   - Select **Static IP** to configure network settings manually.
5. If you selected **Static IP**, fill in the rest of the fields with information provided by your local network administrator:

   IP address
   The four part network ID of the transmitter.

   Subnet mask
   Used together with the IP address to determine which network the transmitter is a part of.

   Gateway
   IP address of the server that enables the transmitter to access other networks.

   DNS servers
   Public computer server that translates the domain name of the transmitter into an IP address.

6. Select **Apply** to save your changes.

5.1.2 Setting date and time on touchscreen

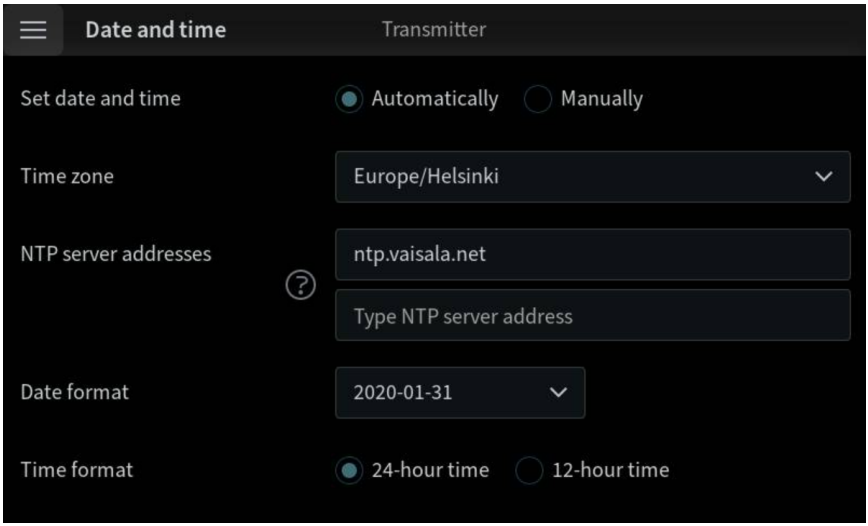


Figure 46 **Date and time** settings on touchscreen

The transmitter uses UTC (Coordinated Universal Time) internally. Time and time stamps in the touchscreen are shown according to the time zone set in **Transmitter > Date and time**.

When you use Etc/GMT time zones, the time zone identifier (+ or –) is intentionally inverted. For example, Etc/GMT+1 is UTC-1.

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Transmitter > Date and time**.

3. To set date and time automatically:
   a. In **Set date and time**, select **Automatically**.
   b. From the **Time zone** list, select the time zone.
   c. In the **NTP server addresses** fields, configure the Network Time Protocol (NTP) servers that the transmitter will attempt to synchronize with.

> NTP synchronization requires that the transmitter has a network connection and the IP address of the NTP server is reachable.

> **CAUTION!** In case the transmitter cannot synchronize with the defined NTP server, it will automatically synchronize with an NTP fallback server with the address ntp.vaisala.net.

   d. In the **Date format** list, select the date format.
   e. In **Time format**, select the time format.
4. To set date and time manually:
   a. In **Set date and time**, select **Manually**.
   b. From the **Time zone** list, select the time zone.
   c. In **Date and time**, select **Day**, **Month**, **Year**, and **Time**. Then select **Set**.

> When the year has been set to earlier than 2022 and the transmitter is rebooted, the date is set to 2022-04-23 in the reboot.

   a. In the **Date format** list, select the date format.
   b. In **Time format**, select the time format.

The new date and time appear at the lower right corner of the touchscreen.



More information

- Data logging (page 29)
- Configuring analog outputs on touchscreen (page 115)
- Configuring relays on touchscreen (page 124)
- Enabling Modbus TCP/IP on touchscreen (page 131)

5.1.3 Configuring units on touchscreen

Configuring units is a functionality introduced in software version 1.3.0. Defining custom units is possible from software version 1.4.0 onward.

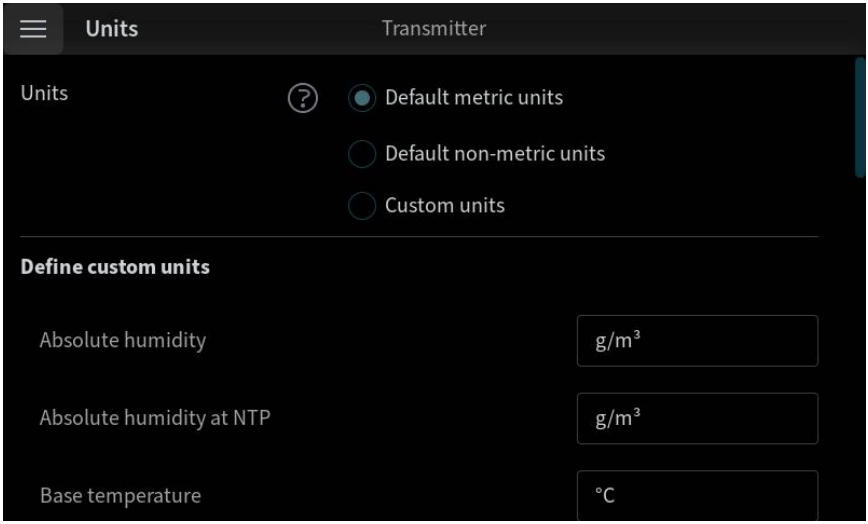


Figure 47 **Units** settings on touchscreen

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Transmitter > Units**.
3. Select the unit type: **Default metric units**, **Default non-metric units**, or **Custom units**.

   If you select default metric or default non-metrics units, all measurement parameters will use the selected unit type.
4. To define custom units for the measurement parameters one-by-one, select the units from the drop-down lists for each parameter.

5.1.4 Configuring screen lock on touchscreen

You can enable screen lock to lock the configuration menu. Screen lock functionality prevents accidental selections. **Home** views can still be viewed when screen lock is on.

Screen lock is a functionality introduced in software version 1.11.0.

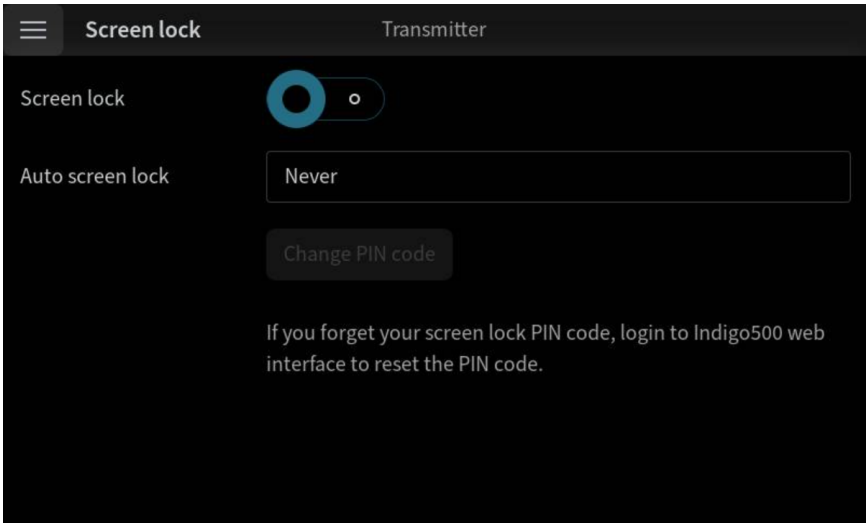


Figure 48 **Screen lock** configuration menu on touchscreen

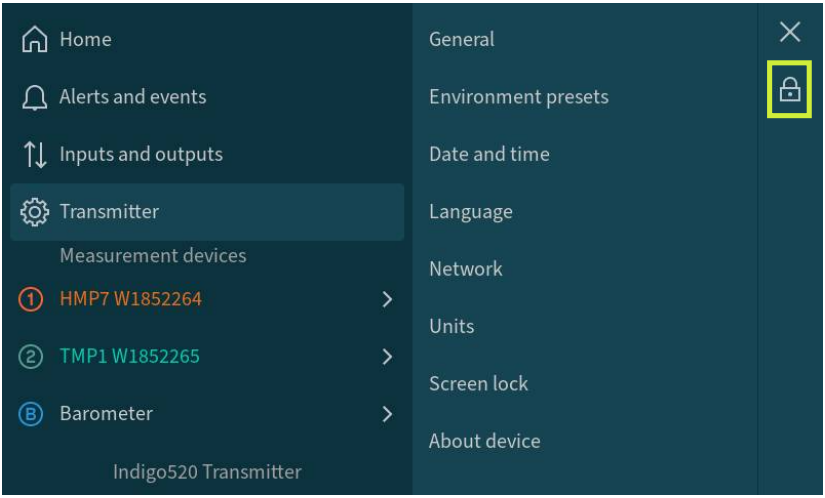
1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Transmitter > Screen lock**.
3. In **Screen lock**, toggle screen lock on.

   Change PIN code view opens.
4. In the **Change PIN code** field, enter a 6-digit PIN code and select **OK**.

   A confirmation window opens.
5. In the **Confirm PIN change** confirmation window, you can:
   - Select **Confirm** to change the PIN code.
   - Select **Cancel** to cancel the PIN change.

6. In **Auto screen lock**, select the period of inactivity after which the configuration menu is automatically locked.

   You can lock the screen manually by selecting the lock icon in the configuration menu.



7. You can change the PIN code to a new code with the following steps.
   a. Select **Change PIN code**.
   b. Type in the new PIN code and select **OK**.
   c. In the confirmation window, select **Confirm** to change the PIN code or select **Cancel** to cancel the PIN change.
8. If you want to disable screen lock, in **Screen lock**, toggle screen lock off.

If you forgot your screen lock PIN code, log in to the Indigo500 web interface to reset it.

More information

- Resetting PIN code in web interface (page 106)

5.1.5 Configuring transmitter name on touchscreen

Setting a custom transmitter name is possible from software version 1.17.0 onward.

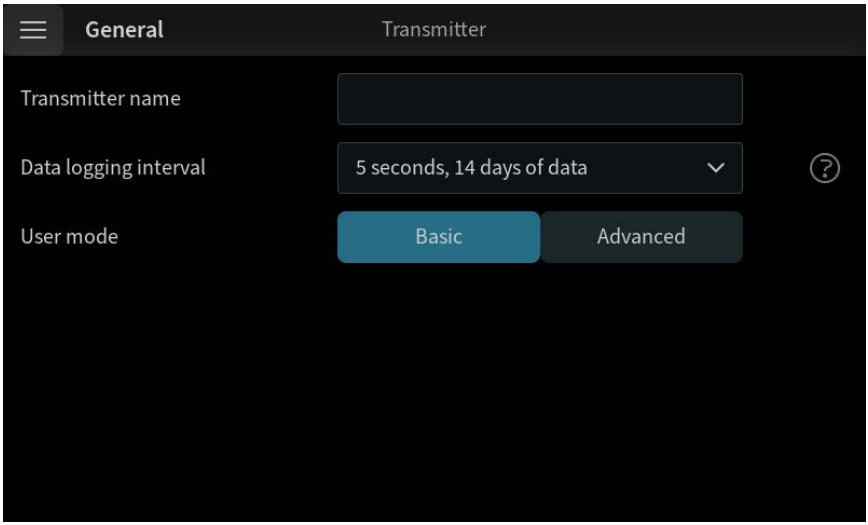


Figure 49 **General** settings configuration menu on touchscreen

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Transmitter > General**.
3. Select **Transmitter name**.

   Set transmitter name view opens.
4. In the **Set transmitter name** view, you can:
   - Type a name for your transmitter.
   - Save an empty field to restore the original transmitter name.
5. Select **OK** to save your changes.

5.2 Starting up transmitter using web interface

CAUTION! Do not power off the transmitter during the initial power-up. Powering off the transmitter during the initial power-up may cause the transmitter to not boot up without a factory reset. It may also affect the transmitter configurations in transmitters that have been delivered with preconfigured settings. The power-up is complete when

- in a transmitter with display, the **Measurements** view opens.
- in a non-display transmitter, the LED indicator color is solid green.

The power-up may take up to 3 minutes. If the LED indicator of a non-display transmitter is not solid green after 3 minutes, there may be another issue that requires attention. For more information on the LED indicator states, see LED indicator (non-display transmitter) (page 23).

The transmitter has a web interface for remote access. Take the following steps to start using the transmitter through the web interface.

Start up the non-display transmitter model using instructions in Connecting to web interface with a direct connection between transmitter and computer (page 93).

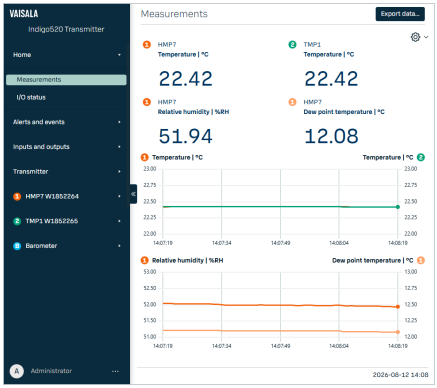


Figure 50 Web interface, **Measurements** view

5.2.1 Connecting to web interface

CAUTION! Do not power off the transmitter during the initial power-up. Powering off the transmitter during the initial power-up may cause the transmitter to not boot up without a factory reset. It may also affect the transmitter configurations in transmitters that have been delivered with preconfigured settings. The power-up is complete when

- in a transmitter with display, the **Measurements** view opens.
- in a non-display transmitter, the LED indicator color is solid green.

The power-up may take up to 3 minutes. If the LED indicator of a non-display transmitter is not solid green after 3 minutes, there may be another issue that requires attention. For more information on the LED indicator states, see LED indicator (non-display transmitter) (page 23).

Computer with:

- RJ45 Ethernet connector
- Web browser, for example, Firefox, Chrome, or Safari. Using the most recent version is recommended.

1. Connect your computer to the same network as the transmitter.
2. Power up the transmitter.

   Powering up takes some minutes.
3. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
4. In **Transmitter > Network**, configure the network connection.

   For instructions on configuring the network connection, see Configuring network connection on touchscreen (page 83).
   If you have already configured the network connection, you can move to step 5.
5. Open a web browser. In the address field, type `https://<transmitter's IP address>:8443`.

   - Example: `https://172.24.65.229:8443`

   You can see the IP address of the transmitter on the touchscreen in the **Network and digital interfaces** view, which is one of the **Home** views.

   Your web browser may give a certificate error, but you can safely proceed to the transmitter's IP address. You are next prompted to log in or create users.

5.2.2 Connecting to web interface with a direct connection between transmitter and computer

Before connecting wires or cables, make sure that the transmitter is powered off.

- Allen key (4 mm), provided
- Ethernet cable, provided
- A pointed object for pressing the button inside the transmitter.
- Computer with:
  - RJ45 Ethernet connector
  - Web browser, for example, Firefox, Chrome, or Safari. Using the most recent version is recommended.
- For transmitters with PoE powering option: A PoE switch

If your transmitter has a touchscreen display, it is possible to use a custom static IP address when connecting to the web interface with a direct connection. A static IP address must be set for both your transmitter and your computer. Do not follow the instructions below. Instead, contact your IT department for instructions. The web address to connect to the web interface is `https://<your transmitter's IP address>:8443`.

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Connect the Ethernet cable from the transmitter to the computer.

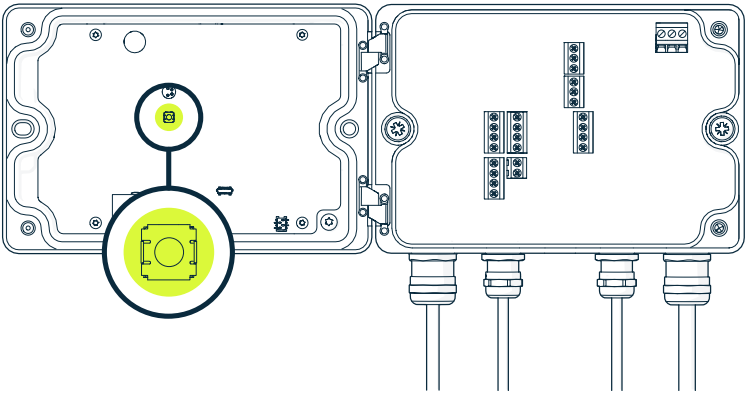
   Use a PoE switch with transmitters with PoE powering option.

4. Power up the transmitter.

   Powering up takes some minutes.

5. Carefully press the **PRESS TO ACTIVATE WEB INTERFACE** button straight down with a pointed object to enable the use of configuration mode IP. Avoid touching the metal that surrounds the button.

   The LED next to the button lights up.
   The transmitter's IP address: **192.168.5.20**



6. On your computer, select **Start > Settings > Network & internet > Ethernet > Unidentified network > IP settings > Edit** (this path may vary depending on your computer and settings).
   a. Select **Manual**.
   b. In **IPv4**, enable the IPv4 connection.
   c. In **IP address**, type an address that **differs from the transmitter's IP address** by its last digit.

      Example: `192.168.5.21`

   d. Depending on your computer, type either `255.255.255.0` in **Subnet mask** or `24` in **Subnet prefix length**.
   e. Select **Save**.
7. Open a web browser. In the address field, type `https://192.168.5.20:8443`.

   Your web browser may give a certificate error, but you can safely proceed to the transmitter's IP address. You are next prompted to log in or create users.

When you are ready with the startup and have done the necessary configurations, follow the instructions in Finishing startup (page 105).

5.2.3 Creating web interface users

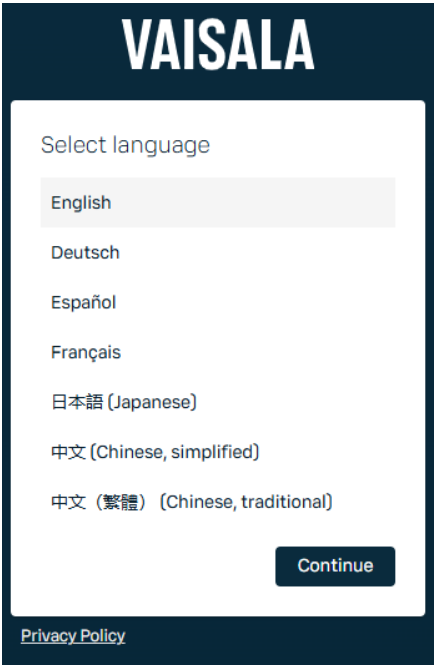
Allen key (4 mm, provided) for opening the transmitter cover

When you connect to the web interface for the first time, or when you start using the transmitter after a factory reset, you are prompted to create users for the web interface.

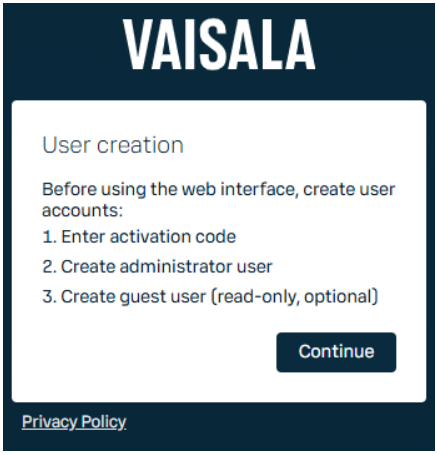
The web interface has 2 user levels:

- **Administrator**: Configuration rights. Can configure outputs and change transmitter settings.
- **Guest**: View-only access. Can add and remove measurement parameters in the **Measurements** view.

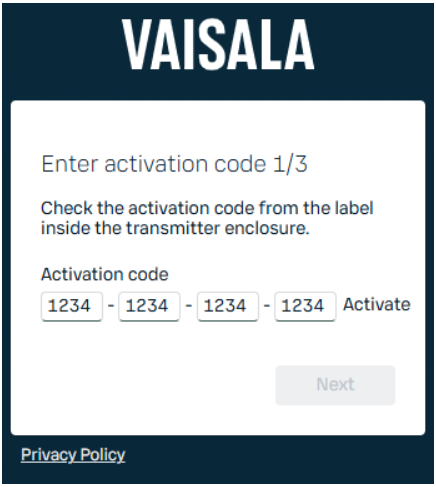
1. In the **Select language** page, select a language, and select **Continue**.



2. In the **User creation** page, select **Continue**.



3. Type the activation code, and select **Activate**. Then select **Next**.



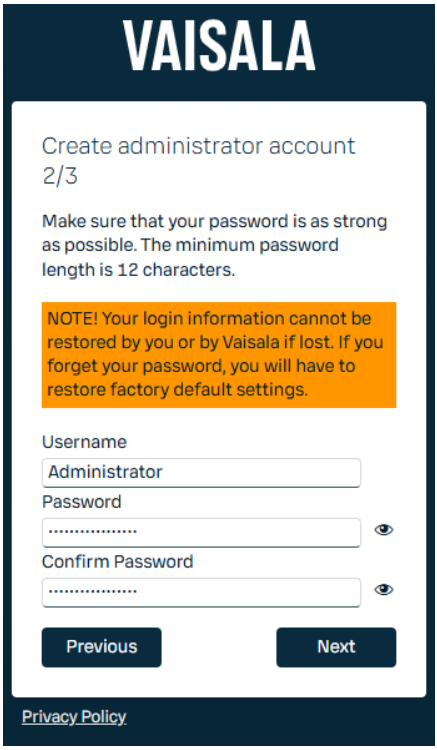
The activation code is printed on a label inside the transmitter enclosure. Use a 4-mm Allen key to open the transmitter cover.

If you use the web interface with Firefox, make sure the time settings of your PC and Indigo500 transmitter are the same. Differing device time settings will prevent the use of the activation code. For transmitters without a display, you may need to use a different browser.

4.

CAUTION! Your login information cannot be restored by you or by Vaisala if lost. If you forget your password, you will have to restore factory default settings. A factory reset will delete all previously logged data and all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays.

Create a username and password for the **Administrator** user, and select **Next**.



5. Create a username and password for the **Guest** user (optional), and select **Finish**.

   The web interface restarts. After the restart, you can log in using the credentials you just created.

5.2.4 Logging in to web interface



1. Type a username.
2. Type a password.
3. Select **Log in**.

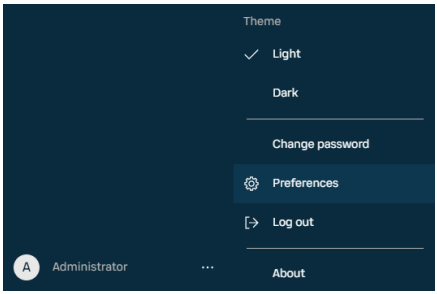
   The web interface opens in the **Measurements** view.

5.2.5 Changing language in web interface

1. Log in to the web interface.

2. You have selected the language of the web interface before you created web interface users. To use another language, select the three dots (...) next to the username to open the user menu.

   The language setting is web browser-specific. It is stored in the web browser's memory.



3. Select **Preferences**.
4. In **Language**, select the language you want to use for the web interface.

5.2.6 Configuring network connection in web interface

You need **Administrator** user rights for this task.

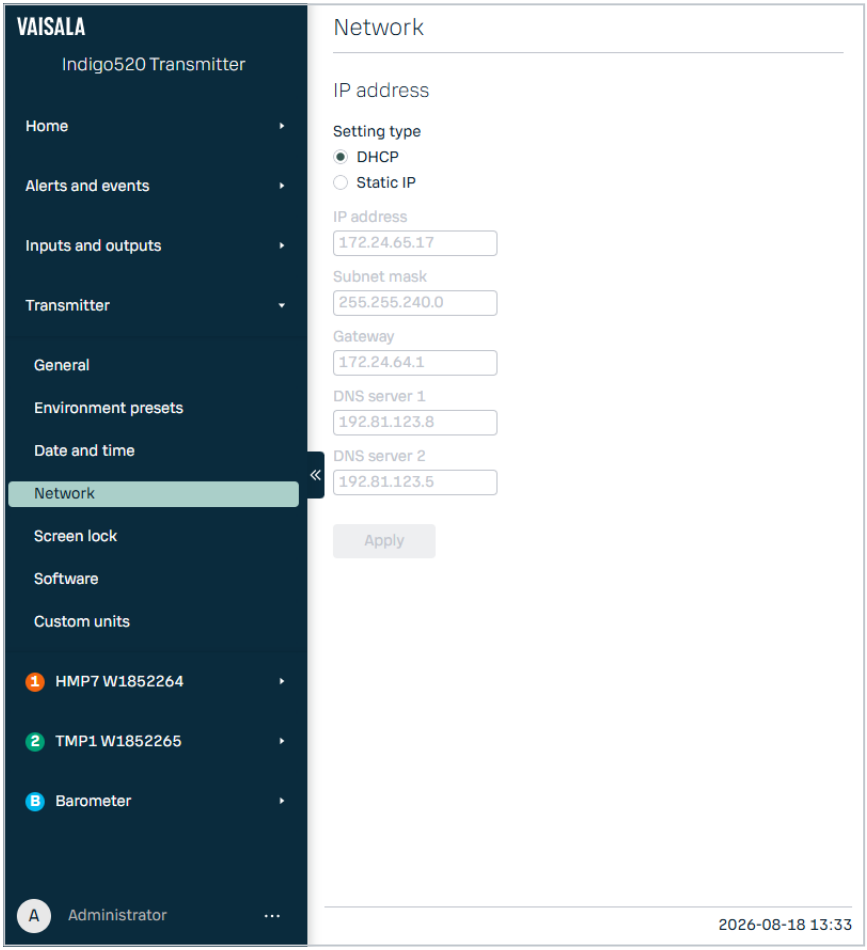


Figure 51 **Network** settings in web interface

1. Log in to the web interface as an **Administrator** user.
2. Select **Transmitter > Network**.
3. Select the setting type:
   - Select **DHCP** if the transmitter is in a network that assigns network settings automatically.
   - Select **Static IP** to configure network settings manually.

4. If you selected **Static IP**, fill in the rest of the fields with information provided by your local network administrator:

   IP address
   The four part network ID of the transmitter.

   Subnet mask
   Used together with the IP address to determine which network the transmitter is a part of.

   Gateway
   IP address of the server that enables the transmitter to access other networks.

   DNS servers
   Public computer server that translates the domain name of the transmitter into an IP address.

5. Select **Apply**.

5.2.7 Setting date and time in web interface



You need **Administrator** user rights for this task.

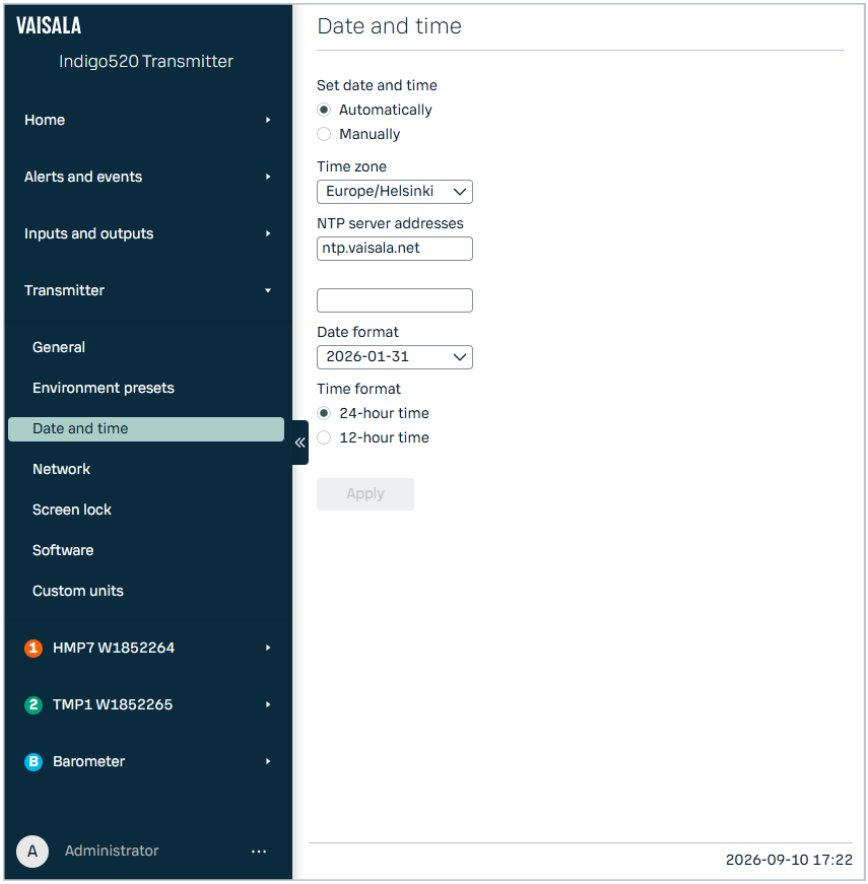


Figure 52 **Date and time** settings in web interface

The transmitter uses UTC (Coordinated Universal Time) internally. Time and time stamps in the web interface are shown according to the time zone set in **Transmitter > Date and time**.

When you use Etc/GMT time zones, the time zone identifier (+ or −) is intentionally inverted. For example, Etc/GMT+1 is UTC-1.

1. Log in to the web interface as an **Administrator** user.

2. Select **Transmitter > Date and time**.
3. To set date and time automatically:
   a. In **Set date and time**, select **Automatically**.
   b. Select **Time zone**.
   c. In the **NTP server addresses** fields, configure the Network Time Protocol (NTP) servers that the transmitter will attempt to synchronize with.



NTP synchronization requires that the transmitter has a network connection and the IP address of the NTP server is reachable.



CAUTION! In case the transmitter cannot synchronize with the defined NTP server, it will automatically synchronize with an NTP fallback server with the address ntp.vaisala.net.

4. To set date and time manually:
   a. In **Set date and time**, select **Manually**.
   b. Select **Time zone**, **Date**, and **Time**.



When the year has been set to earlier than 2022 and the transmitter is rebooted, the date is set to 2022-04-23 in the reboot.

5. Select **Apply**.

More information

- Data logging (page 29)
- Configuring web interface home view (page 141)
- Configuring analog outputs in web interface (page 145)
- Configuring relays in web interface (page 153)
- Enabling Modbus TCP/IP in web interface (page 156)

5.2.8 Configuring units in web interface



You need **Administrator** user rights for this task.

Configuring units is a functionality introduced in software version 1.3.0. Defining custom units is possible from software version 1.4.0 onward.

1. Log in to the web interface as an **Administrator** user.
2. Select the three dots (...) next to the username to open the user menu.
3. Select **Preferences**.
4. In **Units**, select the unit type:
   - Select **Default metric units** to use metric units in all measurement parameters.
   - Select **Default non-metric units** to use non-metric units in all measurement parameters.
   - Select **Custom units** to define the units for the measurement parameters one-by-one.
5. If you selected **Custom units**, define the units for the measurement parameters one-by-one.
   a. Select **Transmitter > Custom units**.
   b. Select the units from the drop-down lists for each parameter.
   c. Select **Apply**.

5.2.9 Configuring transmitter name in web interface

You need **Administrator** user rights for this task.

Setting a custom transmitter name is possible from software version 1.17.0 onwards.

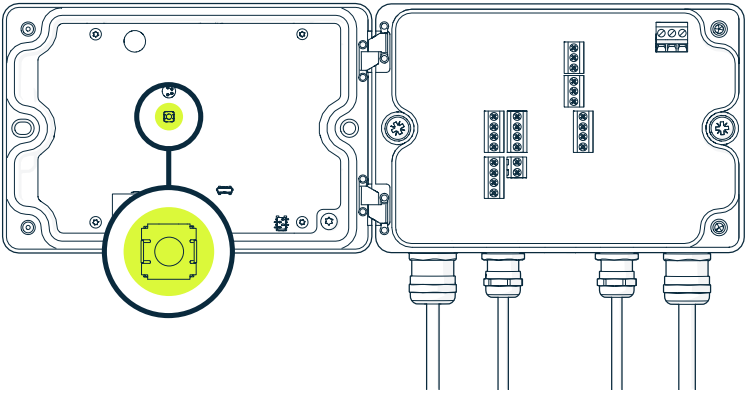
1. Log in to the web interface as an **Administrator** user.
2. Select **Transmitter > General**.
3. In **Transmitter name**, you can:
   - Type a name for your transmitter.
   - Save an empty field to restore the original transmitter name.
4. Select **Apply**.

5.2.10 Finishing startup

Follow these instructions only if you have connected to web interface with a direct connection between transmitter and computer.

- A pointed object for pressing the button inside the transmitter.

1. When you are ready with the startup and have done the necessary configurations, carefully press the **PRESS TO ACTIVATE WEB INTERFACE** button straight down again to disable the use of configuration mode IP. Avoid touching the metal that surrounds the button.



The LED next to the button shuts down. You can disconnect the Ethernet cable.

5.2.11 Resetting PIN code in web interface

You need **Administrator** user rights for this task.

If you forgot your screen lock PIN code, you can reset it in the web interface.

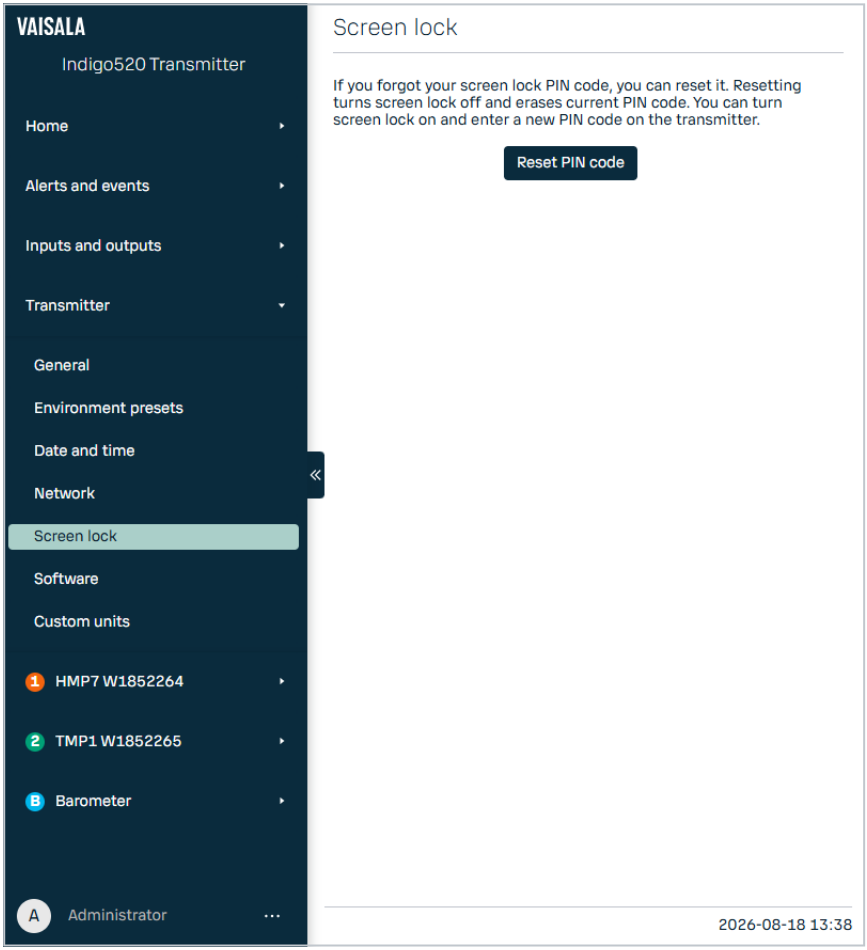


Figure 53 **Screen lock** view in web interface

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. In **Transmitter > Screen lock**, select **Reset PIN code**.

   A confirmation window opens.
4. In **Confirm PIN reset**, select **Confirm**.

   Screen lock is now disabled and the PIN code is erased.

You can enable screen lock and enter a new PIN code on the transmitter's touchscreen display.

More information

- Configuring screen lock on touchscreen (page 87)

6. Configuring transmitter using touchscreen display

6.1 Configuring Measurements view on touchscreen

You can select how many measurement parameters (1 to 6) you want to see in the **Measurements** view on the touchscreen display. You can also select the number of **Measurements** views.

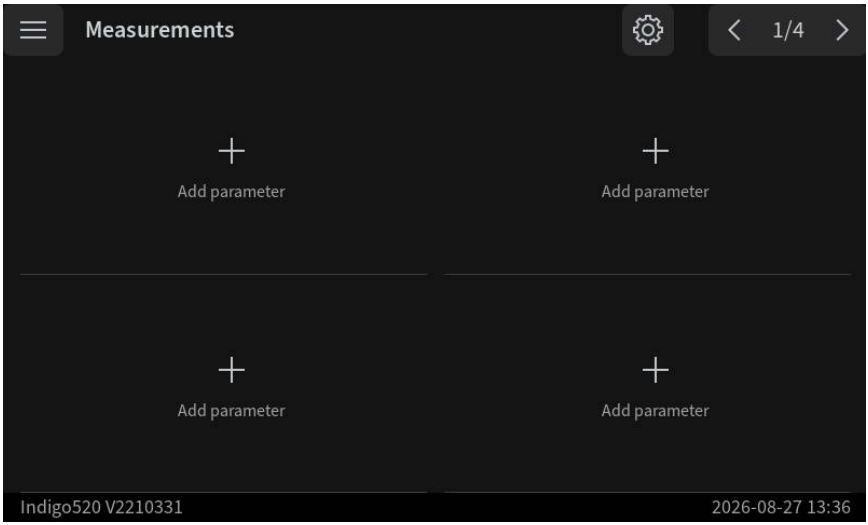


Figure 54 Configurable **Measurements** view with slots for 1 to 6 measurement parameters

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

1. Select ⚙ at the upper right corner of the touchscreen.

   The **Measurements** view settings window opens.

2. In the **Measurements** view settings window, you can:

   - Select how many parameters are shown in the **Measurements** view.
   - Select **Rename view** to rename the **Measurements** view you are currently on.
   - Select **Add new view** to add a new **Measurements** view.
   - Select **Delete view** to delete a **Measurements** view. You can delete a **Measurements** view only when you have more than 1 view.

3. To add new measurement parameters to the view, select + or the measurement parameter if one has already been selected.

   The **Select parameter** view opens.

4. In the **Select parameter** view, select which parameters are shown in the different slots in the **Measurements** view. In the **Select parameter** view, you can:

   - Select **Select** to confirm your selection.
   - Select **Cancel** to exit the view without saving your changes.
   - Select **Clear** to clear the slot.

> From software version 1.23.1 onward, the transmitter supports the full range of measurement parameters. The available parameters depend on the connected measurement device. For device-specific information on supported measurement parameters, see the user guidance of your measurement device at docs.vaisala.com.

6.2 Configuring Graph view on touchscreen

You can select how many measurement parameters (1 or 2) you want to see in the **Graph** view on the touchscreen display.

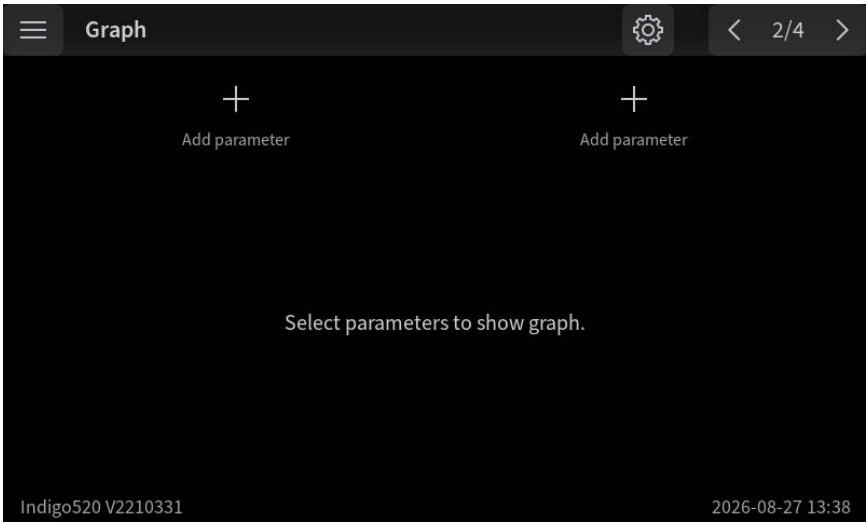


Figure 55 Configurable **Graph** view with slots for 1 to 2 measurement parameters

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

1. Select ⚙ at the upper right corner of the touchscreen.

   The **View settings** window opens.

2. In the **View settings** window, select a time scale for the graph. You can set the time scale to 1 min, 15 min, 1 h, 12 h, 1 d, or 7 d. The default value is 15 minutes.
3. To add new measurement parameters to the view, select the + symbol, or the measurement parameter if one has already been selected.

   The **Select parameter** view opens.

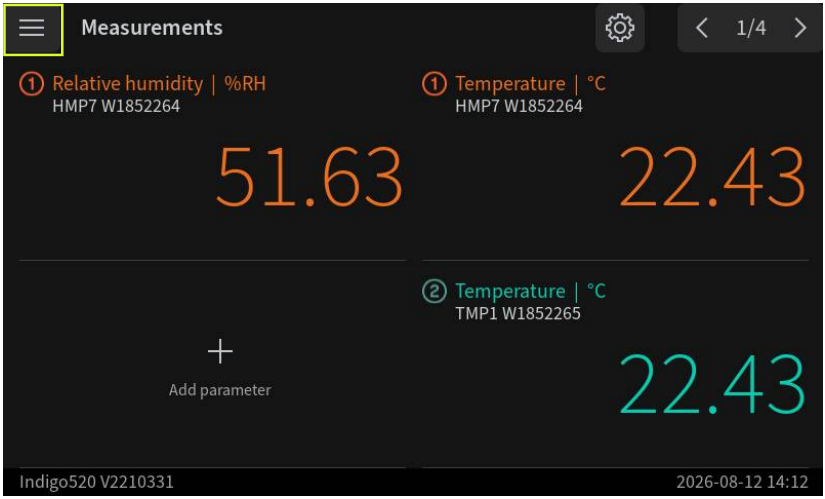
4. In the **Select parameter** view, select which parameters are shown in the **Graph** view. In the **Select parameter** view, you can:

   - Select **Add** to confirm your selection.
   - Select **Cancel** to exit the view without saving your changes.
   - Select 🗑 to clear the slot.

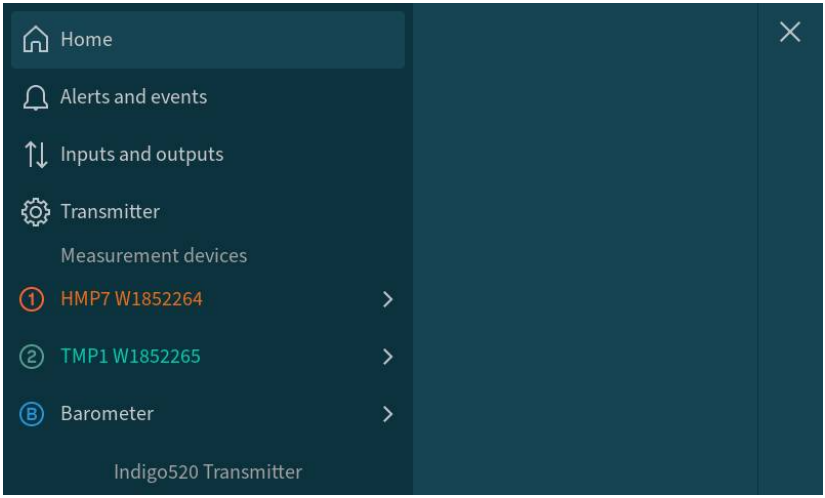
6.3 Accessing configuration menu

1. If the transmitter's configuration menu is locked, unlock it by selecting the lock icon 🔓. Type in the PIN code and select **OK**.

2. Select the configuration menu symbol at the upper left corner of the touchscreen.



The configuration menu opens.



6.4 Configuring alert rules on touchscreen

Alert rules define when alerts are triggered for a specific measurement parameter. You can configure up to 10 alert rules.

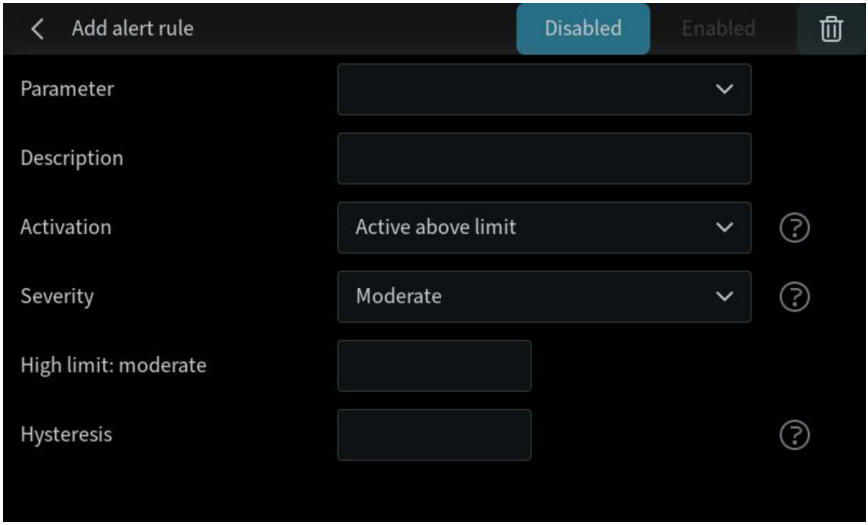


Figure 56 **Alert rules** configuration page on touchscreen

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Alerts and events > Alert rules**.
3. Select + at the upper right corner of the touchscreen to add an alert rule.

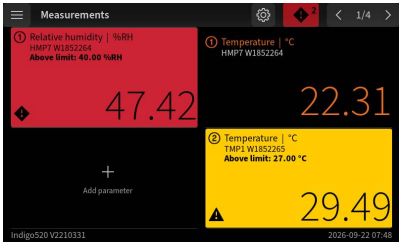
   The **Add alert rule** view opens.

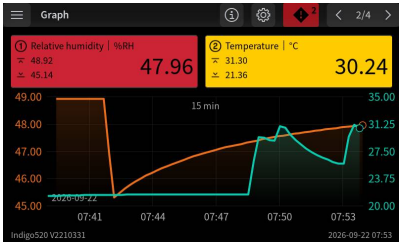
4. In the **Add alert rule** view, configure alert rule settings:
   a. From the **Parameter** list, select the measurement source and the measurement parameter that control the alert rule, then select **Add**.

      The unit of the parameter is set automatically. The alert rule is named after the selected measurement parameter.

   b. In the **Description** field, type a description for the rule.
   c. From the **Activation** list, select how the alert activates. You can set the alert to activate above or below a defined limit or to activate between or outside two defined limits.
   d. From the **Severity** list, select the severity for the alert. You can create alerts of critical or moderate severities. You can also create an alert with both critical and moderate limits.
   e. Depending on your selections in **Activation** and **Severity**, you have 1–4 limit fields for entering the limit values: **High limit: critical**, **High limit: moderate**, **Low limit: critical**, and **Low limit: moderate**. Enter the alert activation limit values in the limit fields.
   f. In the **Hysteresis** field, type a buffer value for alert activation. With hysteresis, an activated alert switches off only when the measured value crosses the alert limit and the additional buffer value.
5. After you have configured the alert rule, select **Enabled** to enable the alert rule.

   You can view active alerts from the **Measurements** and **Graph** views, if you have selected the measurement parameter to the view.





6. To edit or delete an alert rule you have created:
   - Select **Disabled** to disable the alert rule and to edit settings.
   - To delete an alert rule, select **Disabled** to disable the alert rule and select in the upper right corner of the touchscreen to delete the rule. In the **Delete alert rule** confirmation window, select **Confirm**.

More information

- Alerts and events menu on touchscreen (page 71)

6.5 Configuring analog outputs on touchscreen

If your transmitter is delivered with preconfigured analog outputs, you do not need to configure the outputs manually.

Analog outputs are not available in transmitters that are powered with Power over Ethernet (PoE).

The Indigo510 transmitter has 2 and the Indigo520 transmitter has 4 analog current (mA) or voltage (V) outputs.

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

If you have not configured the analog outputs before, the transmitter can receive the analog output settings automatically from the connected measurement device in the following cases:

1. You are connecting a measurement device to the probe connection terminal for the first time.
2. You have previously connected a measurement device but disconnected it within 30 minutes of connecting.

The automatic analog output configuration is a functionality introduced in software version 1.21.1. With automatic analog output configuration, the transmitter uses analog output current (mA) mode in the range of 4–20 mA. If you want to use a different analog output mode, you can change it in the analog output configuration menu. The automatically set analog output settings depend on the measurement device that is connected to the transmitter. The preferred parameters of the measurement device connected to probe connection terminal 1 are set in analog outputs 1 and 2. The preferred parameters of the measurement device connected to probe connection terminal 2 are set in analog outputs 3 and 4.

1. Analog outputs are configured automatically with the preferred parameters of the connected measurement device. This is possible if you have not configured the analog outputs before and you are either connecting a measurement device to the probe connection terminal for the first time, or you have previously connected a measurement device but disconnected it within 30 minutes of connecting. The following steps show how to accept, edit, or cancel the automatically set values.

   a. After the transmitter has discovered and connected the measurement device, **Analog output configuration** window opens.

      If you have enabled screen lock, unlock the screen lock on the touchscreen display to see the **Analog output configuration** window.

   b. In the **Analog output configuration** window, you can:

   - Select **OK** to accept the automatically configured analog output settings.
   - Select **Edit** to edit the analog output configuration settings in the **Analog outputs** configuration menu.
   - Select **Cancel** to cancel the automatic configuration. The window will not open again for measurement devices you connect to the same probe connection terminal later. You can configure the analog outputs manually.

   If you do not select any of the choices within 30 minutes, the automatically configured settings are applied and the **Analog output configuration** window closes. After the device has been connected for 30 minutes, the settings will not change, even if the device is later disconnected and connected again. This also applies to other measurement devices you later connect to the same probe connection terminal. You can configure the analog outputs manually.

2. If you have previously connected a measurement device to the probe connection terminal, configured the analog outputs, or canceled the automatically set values, you can configure analog outputs manually. The following steps show how to configure analog outputs manually.

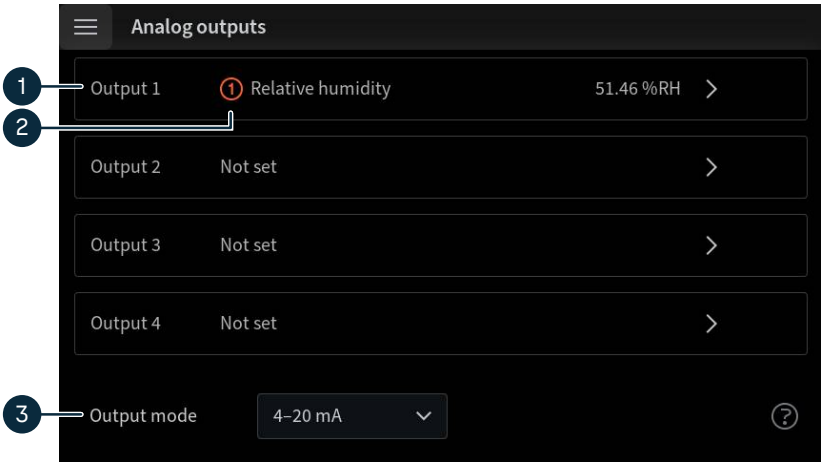


Figure 57 **Analog outputs** configuration menu on touchscreen

1 The Output 1–4 cards contain individual settings and test modes for each analog output channel.
2 The channel is on when a measurement device and a measurement parameter are visible in color.
3 **Output mode**: Select the current or voltage range for the outputs. The setting is common for all analog output channels.

a. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
b. Select **Inputs and outputs > Analog outputs**.
c. In **Output mode**, select the current or voltage range for the outputs.
d. From the Output 1–4 cards, select the output channel you want to configure.
e. If the output channel is enabled, select **Disabled** to edit settings.
f. In **Parameter**, select the measurement device and the measurement parameter that controls the output channel. The unit of the parameter is set automatically.
g. In the **Scale low end** and **Scale high end** fields, type the lower and upper ends of the measurement scale for the chosen output parameter.
h. In the **Error output** field, type the output level indicating that the device is in error state.
i. In the **Low clipping limit** field, type the point (in mA below the output range) when the output is clipped due to being out of range.

j. In the **High clipping limit** field, type the point (in mA or V above the output range) when the output is clipped due to being out of range.

k. Select **Enabled** to enable the output and to activate settings.

l. Repeat step 2.d–step 2.k for all the analog output channels you want to use.

To see the changes you made, select . Then use the left and right arrows at the bottom of the touchscreen to navigate to the **I/O status** view.

More information

- Analog output configuration example (page 119)
- Testing analog outputs on touchscreen (page 119)
- Configuring analog output correction on touchscreen (page 121)

6.5.1 Configuring analog outputs with a non-display transmitter

The Indigo510 transmitter has 2 and the Indigo520 transmitter has 4 analog current (mA) or voltage (V) outputs.

These instruction apply only if you have a non-display transmitter, and do not use the web interface. If you have a non-display transmitter and use the web interface, configure analog outputs using instructions in Configuring analog outputs in web interface (page 145).

If you have not configured the analog outputs before, the transmitter can receive the analog output settings automatically from the connected measurement device in the following cases:

1. You are connecting a measurement device to the probe connection terminal for the first time.
2. You have previously connected a measurement device but disconnected it within 30 minutes of connecting.

The automatic analog output configuration is a functionality introduced in software version 1.21.1. With automatic analog output configuration, the transmitter uses analog output current (mA) mode in the range of 4–20 mA. The automatically set analog output settings depend on the measurement device that is connected to the transmitter. The preferred parameters of the measurement device connected to probe connection terminal 1 are set in analog outputs 1 and 2. The preferred parameters of the measurement device connected to probe connection terminal 2 are set in analog outputs 3 and 4.

The automatically configured analog output settings are set when the transmitter has discovered and connected the measurement device. The settings are applied 30 minutes later. After the device has been connected for 30 minutes, the settings will not change, even if the device is later disconnected and connected again. This also applies to other measurement devices you later connect to the same probe connection terminal.

6.5.2 Analog output configuration example

This example shows how to configure analog output channel 1 to use the following settings when a relative humidity probe is connected to the transmitter as Probe 1:

- 4–20 mA current output
- Error output 3.6 mA
- Relative humidity measurement scaled to 0–100 %RH

To configure the analog output, use the following values:

- In the **Analog outputs** configuration menu:
  - **Output mode**: 4–20 mA
- In the **Output 1** settings page:
  - **Disabled**: Disable the output to edit setting.
  - **Parameter**: Probe 1, Relative humidity
  - **Scale low end**: 0
  - **Scale high end**: 100
  - **Error output**: 3.6
  - **Low clipping limit**: 3.8
  - **High clipping limit**: 20.5
  - **Enabled**: Enable the output and to activate settings.

6.5.3 Testing analog outputs on touchscreen

To test that the analog output of the transmitter is accurate, you can set the probe to output a fixed level of current and view the reading to verify the output.

If analog output correction is enabled, the correction is visible also in the **Test mode** view with 4 decimals displayed. This feature is available from software version 2.1.0 onward.

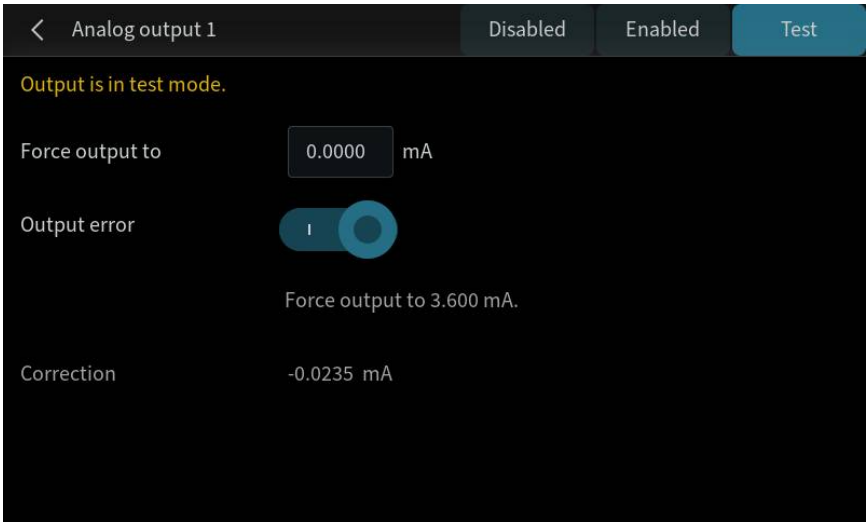


Figure 58 Analog output 1 **Test mode** on touchscreen

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Inputs and outputs > Analog outputs**.
3. In **Output mode**, select the current or voltage range for the outputs.
4. From the Output 1–4 cards, select the output channel you want to test.
5. Select **Test** to set the output in test mode.

   The test mode view opens.
6. Configure test mode settings:
   - In **Force output to**, enter the current or voltage level that you want the transmitter to output.
   - Select **Output error** to use the transmitter's error state output level.
7. Read the analog output and verify that the output is correct.
8. After verifying the output, go back to **Menu > Inputs and outputs > Analog outputs**, choose the output from Output 1–4 cards, and choose one of the following options to exit test mode:
   - Select **Disabled** to exit test mode without enabling the output.
   - Select **Enabled** to exit test mode and to enable the output.
9. Repeat step 4–step 8 for all the analog output channels you want to test.

To read the analog output, select . Then use the left and right arrows at the bottom of the touchscreen to navigate to the **I/O status** view.

More information

- Configuring analog outputs on touchscreen (page 115)

6.5.4 Configuring analog output correction on touchscreen

- Allen key, 4 mm (provided)
- Multimeter

You can view and edit these settings when the transmitter is in **Advanced** user mode.

You can use fixed 4 mA and 20 mA output states to measure correction.

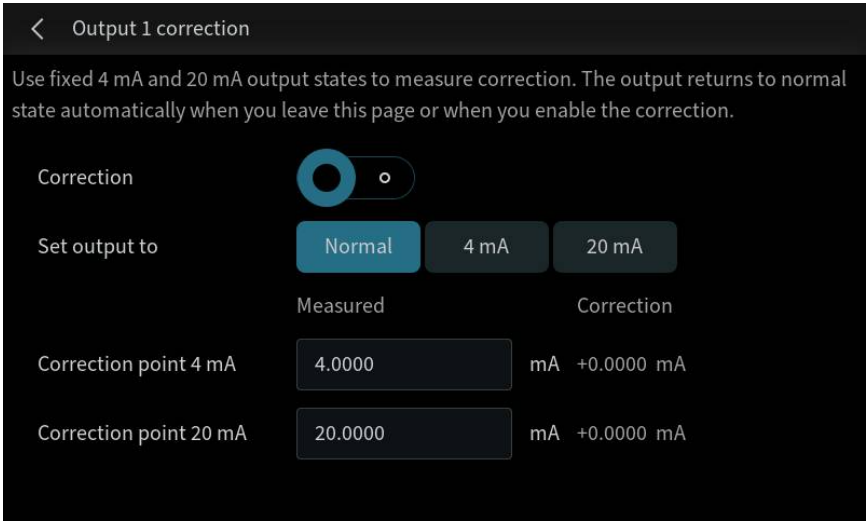


Figure 59 Analog output 1 correction view on touchscreen

1. Power off the transmitter.

2. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
3. Open the transmitter cover.
4. Connect the multimeter wiring to analog output screw terminals.
5. Power up the transmitter.

   Powering up takes some minutes.
6. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
7. In **Transmitter > General > User mode**, select **Advanced**.
8. Select **Menu > Inputs and outputs > Analog outputs**.
9. From the Output 1–4 cards, select the output channel you want to configure.
10. To configure analog output correction, select ⚙ next to the output you want to configure.

    The Output 1–4 correction view opens.
11. In **Set output to**, select **4 mA** to set the output to 4 mA.
12. Check the multimeter reading. Enter the reading of the multimeter in **Correction point 4 mA**.
13. In **Set output to**, select **20 mA** to set the output to 20 mA.
14. Check the multimeter reading. Enter the reading of the multimeter in **Correction point 20 mA**.
15. To enable correction, in **Correction**, toggle correction on.

    A confirmation window opens.
16. In the **Enable correction** confirmation window, you can:
    - Select **Confirm** to enable correction.
    - Select **Cancel** to exit without applying the changes.

More information

- Transmitter user modes (page 24)
- Configuring analog outputs on touchscreen (page 115)

6.6 Configuring analog input on touchscreen

Analog input is not available in Indigo510 transmitters or transmitters that are powered with Power over Ethernet (PoE).

Only 1 measurement device can be connected to the transmitter when you power the analog input device through Indigo520 probe connection terminal 2. The measurement device has to be connected to probe connection terminal 1.

The Indigo520 transmitter has 1 analog current (mA) input. The analog input range is 4–20 mA and the range can be scaled. Scaling the analog input range gives an additional value and does not change the unscaled value. When analog input scaling is in use, only the scaled value can be used. The unscaled value will be visible in the **I/O status** view.

From software version 2.1.0 onward, it is possible to select a standard parameter to use a predefined name and unit for the input parameter. The standard parameters can be used for environmental compensation.

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

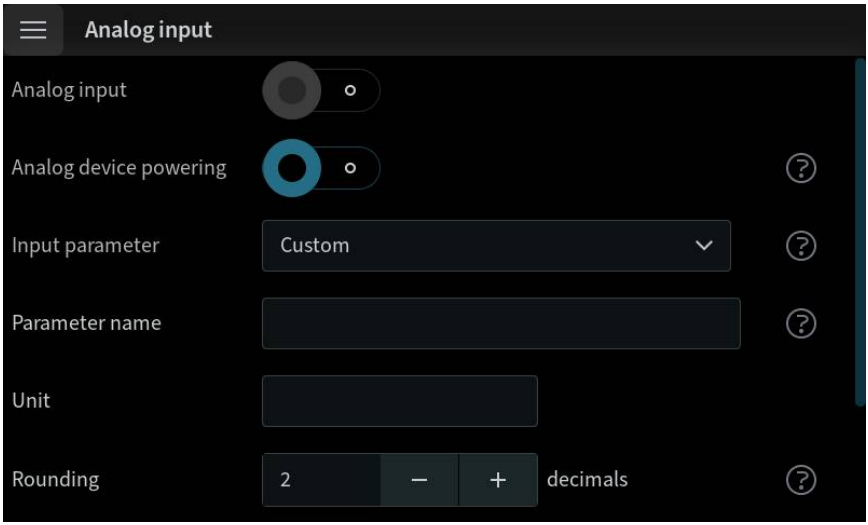


Figure 60 **Analog input** configuration menu on touchscreen

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Inputs and outputs > Analog input**.
3. In **Analog input**, toggle the input off to edit settings.
4. To power your analog device through Indigo520, in **Analog device powering**, enable analog device powering.

5. In **Input parameter**, select the input parameter you want to use.
   - Select **Current (mA)** to use the default input parameter.
   - Select **Custom** to define the name and unit of the input parameter.
   - Select a standard parameter to use a predefined name and unit for the input parameter. Only the standard parameters can be used for environmental compensation.

   If you selected **Current (mA)**, you can proceed to step 7.
   If you selected **Custom**, continue to step 6.a.
   If you selected a standard parameter, you can proceed to step 6.c.
6. If you selected **Custom** or a standard parameter in **Input parameter**, configure the applicable analog input settings:
   a. In the **Parameter name** field, type a name for the parameter. The name can consist of maximum 32 characters and it cannot be a number.
   b. In the **Unit** field, type the measurement unit for the parameter. The unit can consist of maximum 20 characters.
   c. In the **Rounding** field, select the number of decimals you want to see on the display by selecting a number in the range of 0 to 4. To round the value down, select a number in the range of −1 to −3. Selecting a negative value rounds the value down to the nearest 10, 100, or 1000.

      −1 rounds the value down to the nearest 10.
      −2 rounds the value down to the nearest 100.
      −3 rounds the value down to the nearest 1000.
   d. In the **Scale low end** field, define the lower end of the measurement scale for the chosen parameter.
   e. In the **Scale high end** field, define the upper end of the measurement scale for the chosen parameter.
7. In **Analog input**, toggle the input on to take the settings into use.

To see the changes you made, select . Then use the left and right arrows at the bottom of the touchscreen to navigate to the **I/O status** view.

6.7 Configuring relays on touchscreen

The Indigo520 transmitter has 2 configurable relays. Both relays have configuration options for selecting the parameter that is used to control the relay, activation triggers, and hysteresis.

From software version 1.23.1 onward, you can configure the relays to activate based on multiple conditions. You can set up to 10 conditions. You can set the relay to activate based on an active critical status or above or below a defined measurement value. The relay activates when any of the conditions are met. From software version 1.23.1 onward it is possible to use inverted relay control logic. Use the inverted relay control logic to monitor device errors and power loss.

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

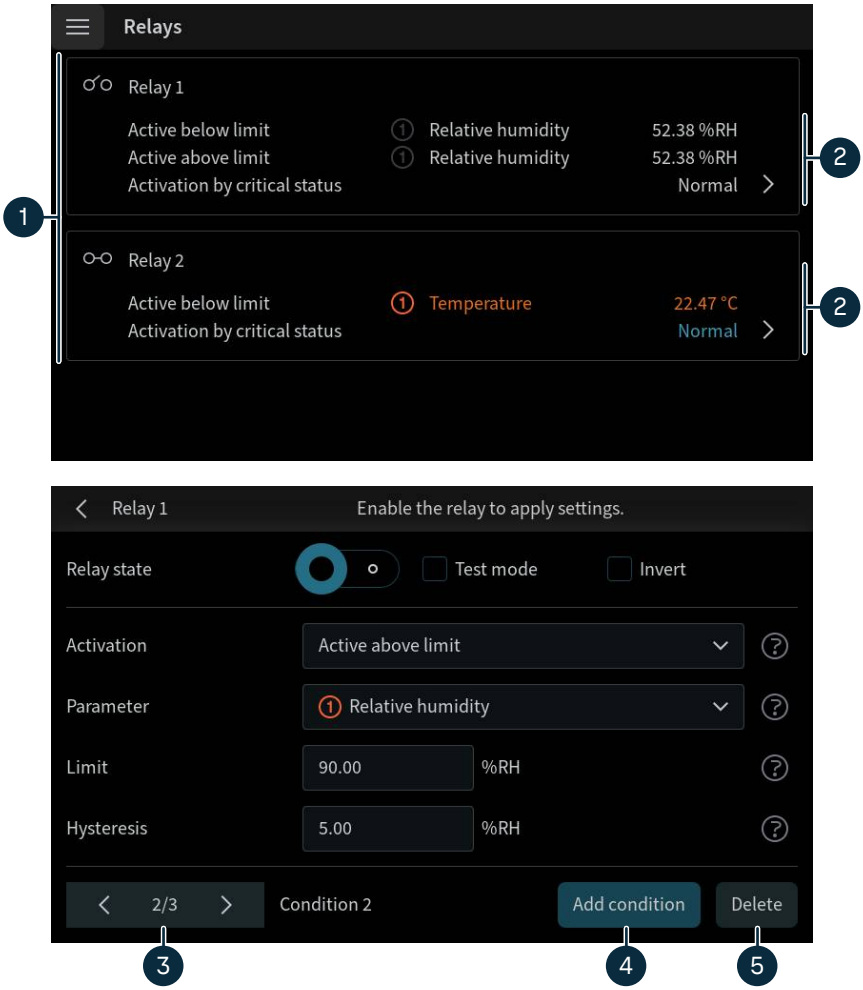


Figure 61 **Relays** configuration menu on touchscreen

1 The Relay 1–2 cards contain individual settings and test modes for each relay.
2 The relay is disabled when the condition set for the relay is shown in white and enabled when the condition is shown in color
3 Use the arrows to move between conditions.
4 The **Add condition** and **Apply** buttons are located in the same place. The **Add condition** button is visible only after you have applied the changes you have made to a condition.
5 The **Delete** and **Cancel** buttons are located in the same place. The **Delete** button is visible only after you have applied the changes you have made to a condition. With the **Cancel** button you can clear all fields of a condition you have not yet applied.

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Inputs and outputs > Relays**.
3. Select the relay you want to configure: **Relay 1** or **Relay 2**.
4. In **Relay state**, disable the relay to edit settings.
5. From the **Activation** list, select how the relay activates. You can set the relay to activate above or below the activation/deactivation limit or based on an active critical status.

   If you selected **Activation by critical status**, you can proceed to step 9.
6. From the **Parameter** list, select the measurement device and the measurement parameter that controls the relay.
7. In the **Limit** field, type the limit which the measured parameter value must reach for the relay to activate/deactivate.
8. In the **Hysteresis** field, type a buffer value for relay deactivation. With hysteresis, an activated relay switches off only when the measured value crosses the relay activation/deactivation limit and the additional buffer value.
9. Select **Apply**.
10. If you want to configure another condition for the relay, select **Add condition**. Repeat step 5–step 9 for all the conditions you want to use. If you want to delete a condition you created, select **Delete**.
11. After you have configured all the desired conditions for the relay, in **Relay state**, enable the relay.
12. If you want to use the inverted relay control logic, select **Invert**.
13. Repeat step 3–step 12 for all the relays you want to use.



To see the changes you made, select . Then use the left and right arrows at the bottom of the touchscreen to navigate to the **I/O status** view.

More information

- Testing relays on touchscreen (page 128)
- Relay configuration example, one condition configured (page 128)
- Relay configuration example, multiple conditions configured (page 129)
- Relay configuration example, inverted relay control logic (page 130)
- Relay wiring and relay activation mode (page 130)
- Relay hysteresis (page 131)

6.7.1 Testing relays on touchscreen

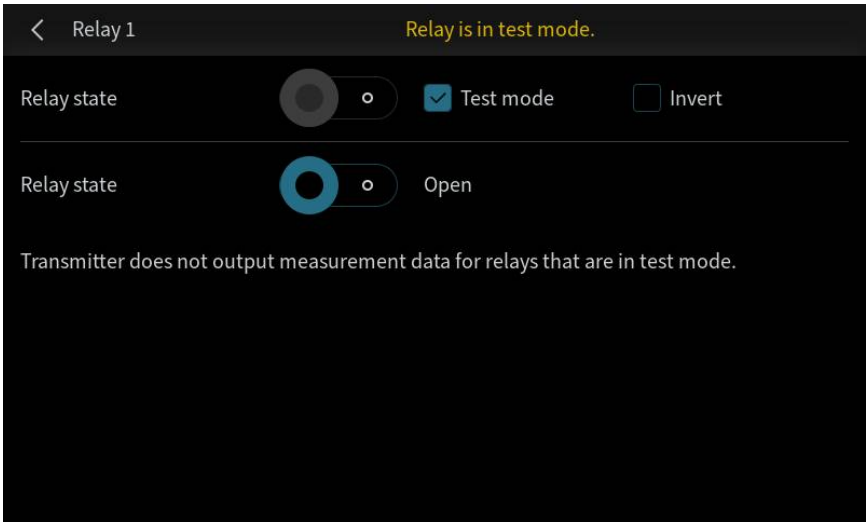


Figure 62 **Relay 1 Test mode** enabled

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Inputs and outputs > Relays**.
3. Select the relay you want to test: **Relay 1** or **Relay 2**.
4. Select **Test mode**.
5. In **Relay state**, you can open and close the relay.
6. After verifying the output, go back to **Menu > Inputs and outputs > Relays > Relay 1** or **Relay 2 > Test mode**, and disable the test mode.
7. Repeat step 3–step 6 for all the relays you want to test.

6.7.2 Relay configuration example, one condition configured

This example shows how to configure a relay to activate when relative humidity measurement from Probe 1 goes above 90 %RH, and to switch off only when the measurement falls below 85 %RH (hysteresis).

1. Select **Menu > Inputs and outputs > Relays**.
2. Select the relay you want to configure: **Relay 1** or **Relay 2**.
3. In **Relay state**, disable the relay to edit settings.

4. In **Activation**, select **Active above limit**.
5. In **Parameter**, select **Probe 1**, then select **Relative humidity**.
6. In the **Limit** field, type 90.
7. In the **Hysteresis** field, type 5.
8. Select **Apply** to save the condition.
9. In **Relay state**, enable the relay to activate settings.

6.7.3 Relay configuration example, multiple conditions configured

This example shows how to configure a relay to activate when temperature and relative humidity measurements from Probe 1 are not within 35–37.5 °C and 40–80 %RH.

1. Select **Menu > Inputs and outputs > Relays**.
2. Select the relay you want to configure: **Relay 1** or **Relay 2**.
3. In **Relay state**, disable the relay to edit settings.
4. In **Activation**, select **Active above limit**.
5. In **Parameter**, select **Probe 1**, then select **Temperature**.
6. In the **Limit** field, type `37.5`.
7. In the **Hysteresis** field, type `0`.
8. Select **Apply** to save the condition.
9. Select **Add condition** to add a new condition.
10. In **Activation**, select **Active below limit**.
11. In **Parameter**, select **Probe 1**, then select **Temperature**.
12. In the **Limit** field, type `35`.
13. In the **Hysteresis** field, type `0`.
14. Select **Apply** to save the condition.
15. Select **Add condition** to add a new condition.
16. In **Activation**, select **Active above limit**.
17. In **Parameter**, select **Probe 1**, then select **Relative humidity**.
18. In the **Limit** field, type `80`.
19. In the **Hysteresis** field, type `0`.
20. Select **Apply** to save the condition.
21. Select **Add condition** to add a new condition.
22. In **Activation**, select **Active below limit**.
23. In **Parameter**, select **Probe 1**, then select **Relative humidity**.
24. In the **Limit** field, type `40`.

25. In the **Hysteresis** field, type `0`.
26. Select **Apply** to save the condition.
27. In **Relay state**, enable the relay to activate settings.

6.7.4 Relay configuration example, inverted relay control logic

This example shows how to configure relays to activate based on an active critical status with inverted relay control logic. This configuration can be used to monitor device errors and power loss.

In this example the relay connections are wired as normally closed (NC).

1. Select **Menu > Inputs and outputs > Relays**.
2. Select the relay you want to configure: **Relay 1** or **Relay 2**.
3. In **Relay state**, disable the relay to edit settings.
4. In **Activation**, select **Activation by critical status**.
5. Select **Apply** to save the condition.
6. In **Relay state**, enable the relay to activate settings.
7. Select **Invert**.

6.7.5 Relay wiring and relay activation mode

The physical relay opens and closes the circuit depending both on the relay wiring and the relay activation mode.

The behavior of the relay is reversed if you use inverted relay control logic.

Table 13 Relay wiring: Normally open (NO)

Relay activation mode	Measurement above/below limit	Relay opened/closed
Relay active above limit	Above = Relay active	Closed
	Below = Relay inactive	Open
Relay active below limit	Above = Relay inactive	Open
	Below = Relay active	Closed

Table 14 Relay wiring: Normally closed (NC)

Relay activation mode	Measurement above/below limit	Relay opened/closed
Relay active above limit	Above = Relay active	Open
	Below = Relay inactive	Closed
Relay active below limit	Above = Relay inactive	Closed
	Below = Relay active	Open

6.7.6 Relay hysteresis

If the measurement you are using to control the relay is likely to move back and forth close to the activation setpoint, you can set a hysteresis that prevents the relay switching on and off too frequently.

When hysteresis is used, the relay activates at the defined limit, but does not switch off immediately when the measurement moves back to the other side of the activation limit. Instead, with hysteresis, the relay remains active until the measurement crosses the relay activation/deactivation limit and the additional buffer value.

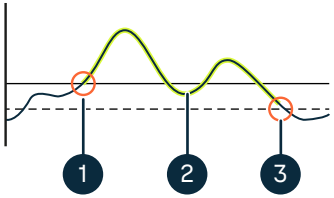


Figure 63 Behavior of relay that activates above limit, with hysteresis

1 Measurement goes above the relay activation limit (solid line —) and the relay activates.
2 Measurement falls below the activation limit, but stays above the hysteresis limit (dashed line - - -). The relay remains active.
3 Measurement falls below the hysteresis limit and the relay switches off.

6.8 Enabling Modbus TCP/IP on touchscreen

CAUTION! Enable **Modbus TCP/IP write** only when you need to write on the Modbus registers. Remember to disable **Modbus TCP/IP write**, when you don't need to write anymore.

CAUTION! Do not enable **Modbus TCP/IP write** in an open network.

1. Select **Menu > Transmitter > Network**.
2. Make sure that the network settings are configured correctly.
3. Select **Menu > Inputs and outputs > Digital interfaces**.
4. To read the Modbus registers of the transmitter and devices connected to it, in **Modbus TCP/IP read**, enable Modbus read.
5. To enable writing on the Modbus registers of the transmitter and devices connected to it, in **Modbus TCP/IP write**, enable Modbus write.

More information

- Modbus overview (page 177)

6.9 Adjusting barometer on touchscreen

If your indigo520 transmitter has a barometer module, you can adjust the barometric measurement. Adjusting the barometer is a functionality introduced in software version 1.16.0. Use offset or linear correction to adjust the measurements without recalibrating the barometer. When the transmitter applies the adjustments, it arranges multiple adjustment points automatically to an ascending order.

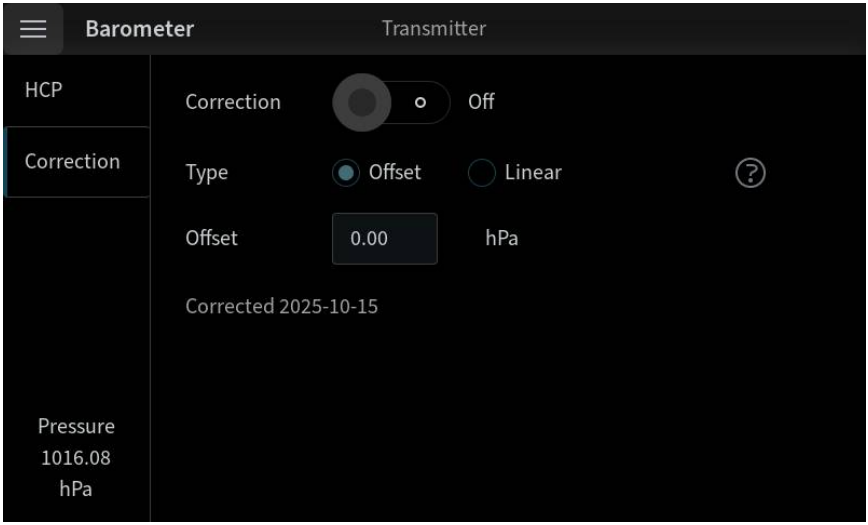


Figure 64 **Barometer** configuration menu on touchscreen, **Correction** tab active

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. In **Measurement devices**, select **Barometer**.

3. In the **Correction** tab, configure barometer correction.
   a. In **Correction**, enable barometer correction. Select **OK** to confirm.
   b. In **Type**, select either **Offset** or **Linear** depending how you want to adjust the barometer.
      - In the **Offset** field, type the offset correction value.
      - In the **Linear** fields, type values in **Point 1** and **Point 2**. The values cannot be the same.
4. To disable barometer correction, in **Correction**, disable barometer correction. Select **OK** to confirm.

6.10 Calibrating barometer on touchscreen

If your Indigo520 transmitter has a barometer module, you can perform a complete readjustment of the barometer module. Calibrating the barometer is a functionality introduced in software version 1.16.3.



You can view and edit these settings when the transmitter is in **Advanced** user mode.



You cannot restore the values that you have changed. Write down the current settings if you want to restore the old values later on.

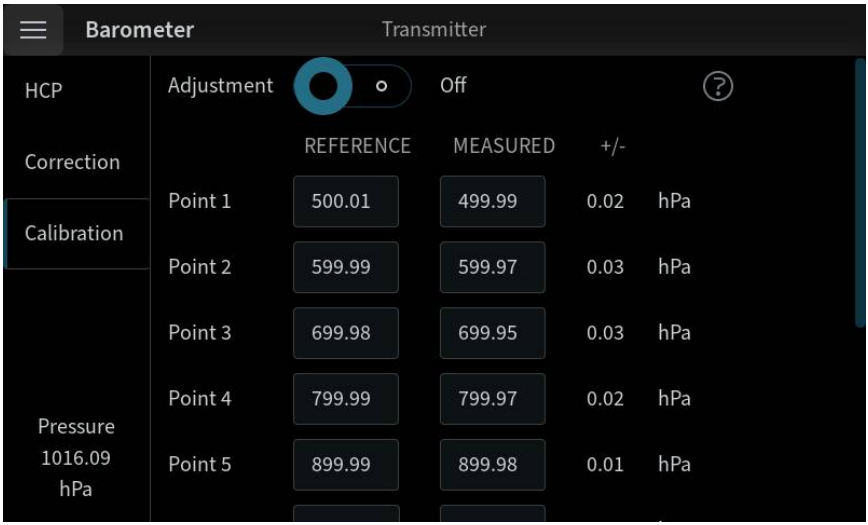


Figure 65 **Barometer** configuration menu on touchscreen, **Calibration** tab active

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. In **Transmitter > General > User mode**, select **Advanced**.
3. In **Menu > Measurement devices**, select **Barometer**.

4. In the **Calibration** tab, configure barometer calibration.
   a. In **Adjustment**, disable adjustment.

      Disabling adjustment affects the barometric measurement.

      Disabling adjustment also disables offset and linear correction.

   b. In the **Point 1**–**Point 8** fields, type the reference and measured values for calibrating the barometer. You can enter values for up to 8 points. When the transmitter applies the adjustments, it arranges multiple adjustment points automatically to an ascending order.
   c. You can apply the changes you made, clear all fields to start again, or cancel the adjustment.
      - To apply the changes, select **Apply changes**. A confirmation window opens.
      - To clear all fields, select **Clear fields**.
      - To cancel the calibration, select **Cancel**.
   d. In the **Apply changes** confirmation window you can:
      - Select **Confirm** to apply the changes.
      - Select **Cancel** to exit without applying the changes.

      If you did not apply the changes, and want to apply offset or linear correction instead, in the **Correction** tab, enable linear or offset correction.

   e. In **Adjustment**, enable adjustment.

More information

- Transmitter user modes (page 24)

6.11 Configuring height-corrected pressure calculation on touchscreen

Atmospheric pressure decreases with altitude. Height-corrected pressure (HCP) calculation removes the effect of the barometer's installation height, and standardizes the pressure to the desired elevation. It is a direct height correction to the height difference between the barometer installation location and the level where the pressure is to be calculated. The available range for the correction is −30.0 ... +30.0 m (−98.4 ... +98.4 ft). HCP calculation is available from software version 1.22.1 onward.

HCP calculation does not change the value of the **Pressure** output parameter. The result of HCP calculation is available on a parameter called **Height-corrected pressure**.

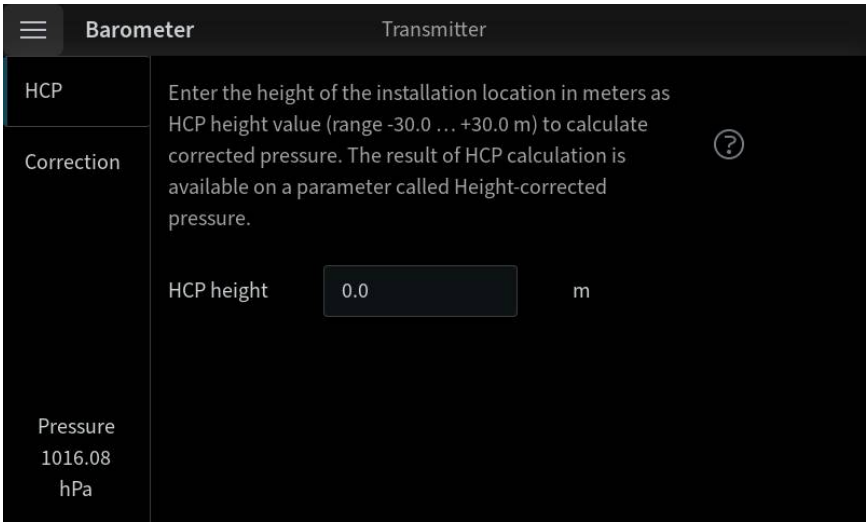


Figure 66 **Barometer** configuration menu on touchscreen, **HCP** tab active

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Transmitter > Barometer > HCP**.
3. In **HCP height**, enter the height of the barometer installation location, and select **OK**.

   The result of HCP calculation is available on a parameter called **Height-corrected pressure**.

6.12 Disabling service port on touchscreen

The service port connection is enabled by default. You can manually disable the service port connection.

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Inputs and outputs > Digital interfaces**.
3. In **Service port**, disable service port.

6.13 Disabling cloud connection on touchscreen

Cloud connection is available in Indigo500 transmitters ordered from Vaisala manufacturing with cloud connection support software option selected.

Cloud connection is enabled by default. You can manually disable cloud connection.

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Inputs and outputs > Digital interfaces**.
3. In **Cloud connection**, disable cloud connection.

More information

- Vaisala cloud connection (page 32)

6.14 Configuring environment settings on touchscreen

The compensation feature has changed. From software version 1.19.0 onward the transmitter supports environmental compensation that is not restricted to certain probes. You need to configure and enable the compensation manually.

Probe firmware version 1.2.8 or newer (probes with serial number V3121434 onward) is required to use environmental compensation with DMP5, DMP6, DMP7, DMP8, HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9, MMP8, and TMP1 probes. For other supported measurement devices there are no firmware version limitations.

For optimal measurement accuracy, you can use the Indigo500 transmitter to give additional information about the connected device's measurement environment by configuring environment presets for the connected devices. The presets define the source for the compensation value. The compensation value can be entered manually, or it can be continuously read from a connected measurement device, the barometer module, or analog input.

For example, you can:

- Configure the pressure compensation setting for your measurement device.

- Enable temperature compensation from another device that has a temperature output. For example, you can enable TMP1 to function as the temperature source for HMP7.

For detailed information on the device-specific requirements for the settings, such as **Pressure** and **Temperature**, see your device's user documentation, available at docs.vaisala.com.

Make sure that both measurement devices are in the same environment to get the most accurate measurement values.

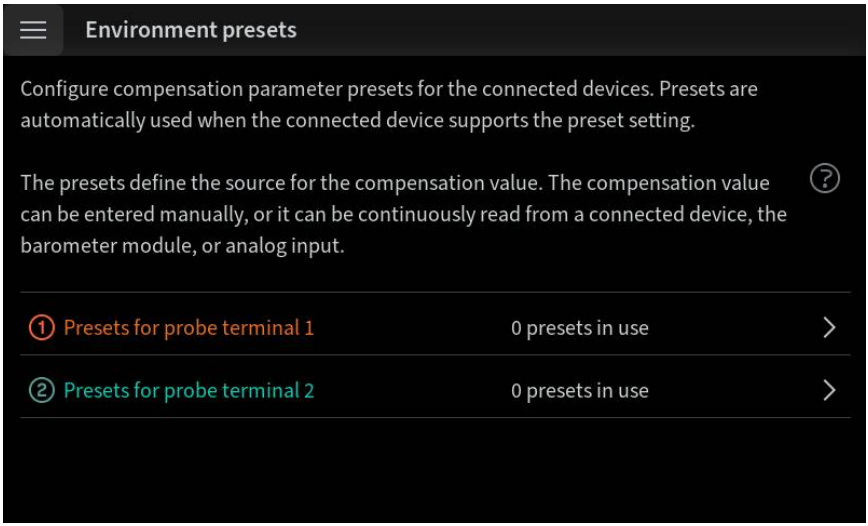


Figure 67 **Environment presets** configuration menu on touchscreen

1. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
2. Select **Transmitter > Environment presets**.
3. Select **Presets for probe terminal 1** or **Presets for probe terminal 2** depending on the probe connection terminal you want to configure.

   The preset settings view opens.

4. In the preset settings view, configure the compensation source for the desired parameters. The compensation value can be entered manually, or it can be continuously read from a connected device, the barometer module, or analog input.

   Presets are automatically used when the connected device supports the preset setting.

   Connected devices use presets as environment settings. Changing preset settings automatically updates the compensation value of the connected device.

More information

- Environmental compensation (page 31)
- Example of configuring environment presets on touchscreen (HMP7 and TMP1) (page 139)

6.14.1 Example of configuring environment presets on touchscreen (HMP7 and TMP1)

The temperature-dependent output parameters of the HMP7 humidity and temperature probe are unavailable when the probe heating function of HMP7 is active. Therefore the temperature measurement data needs to be provided from an external source, which can be, for example, any Indigo-compatible probe with a temperature output. With HMP7 and TMP1 connected to the Indigo500 transmitter, you can enable TMP1 to function as the temperature source for HMP7.

For more information on the condensation prevention and temperature compensation functions, see HMP Series with MMP8 and TMP1 User Guide (M212022EN).

Make sure that both measurement devices are in the same environment to get the most accurate measurement values.

1. Connect the probes to your transmitter in any order.

   In this example, HMP7 is connected to probe connection terminal 1 and TMP1 to probe connection terminal 2.
2. Select the configuration menu icon ☰ at the upper left corner of the touchscreen.
3. Select **Transmitter > Environment presets > Presets for probe terminal 1**.

4. In **Temperature**, select **Read from probe terminal 2**, and select **Save**.

   The preset is automatically used.

More information

- Environmental compensation (page 31)

7. Configuring transmitter using web interface

7.1 Configuring web interface home view

You can select how many measurement parameters (1 to 6) you want to see in the **Measurements** view of the web interface.

Both **Guest** and **Administrator** users can configure the **Measurements** view.

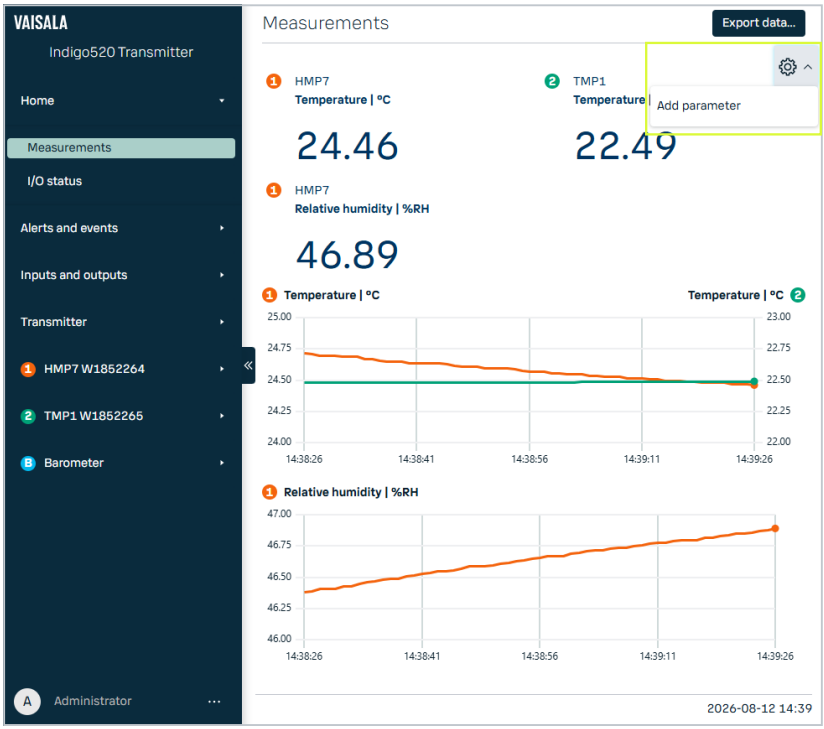
1. Connect to the web interface.
2. Log in to the web interface.

   The web interface opens in the **Measurements** view.

3. Select ⚙ **> Add parameter** to select the desired probe and measurement parameter combinations.

> From software version 1.23.1 onward, the transmitter supports the full range of measurement parameters. The available parameters depend on the connected measurement device. For device-specific information on supported measurement parameters, see the user guidance of your measurement device at docs.vaisala.com.

You can freely select the device and parameter combinations for the 6 possible locations. The selected measurement parameters will also be displayed in the graph below the locations, each with a color of their own.
You can edit the measurement parameters in the **Measurements** view by selecting the measurement parameter you want to edit.



7.2 Configuring alert rules in web interface

You need **Administrator** user rights for this task.

Alert rules define when alerts are triggered for a specific measurement parameter. You can configure up to 10 alert rules.

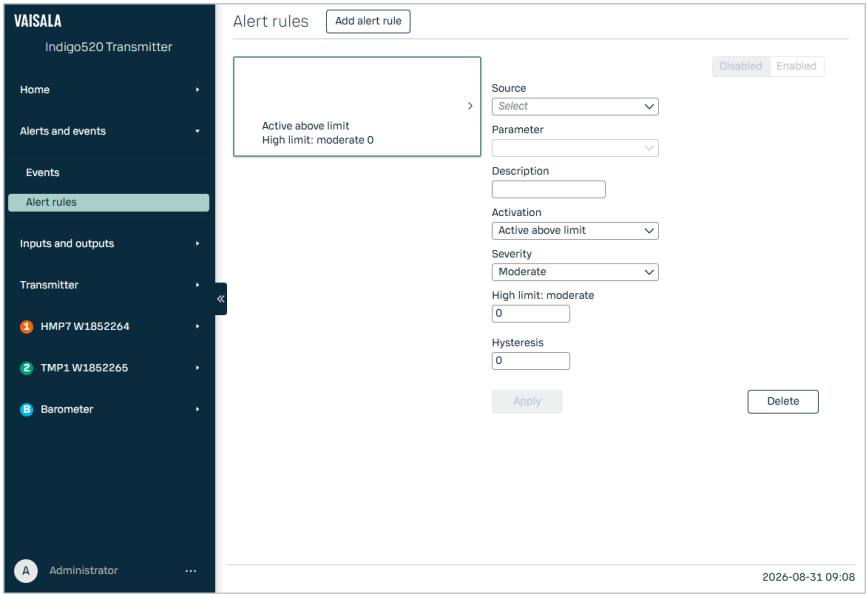


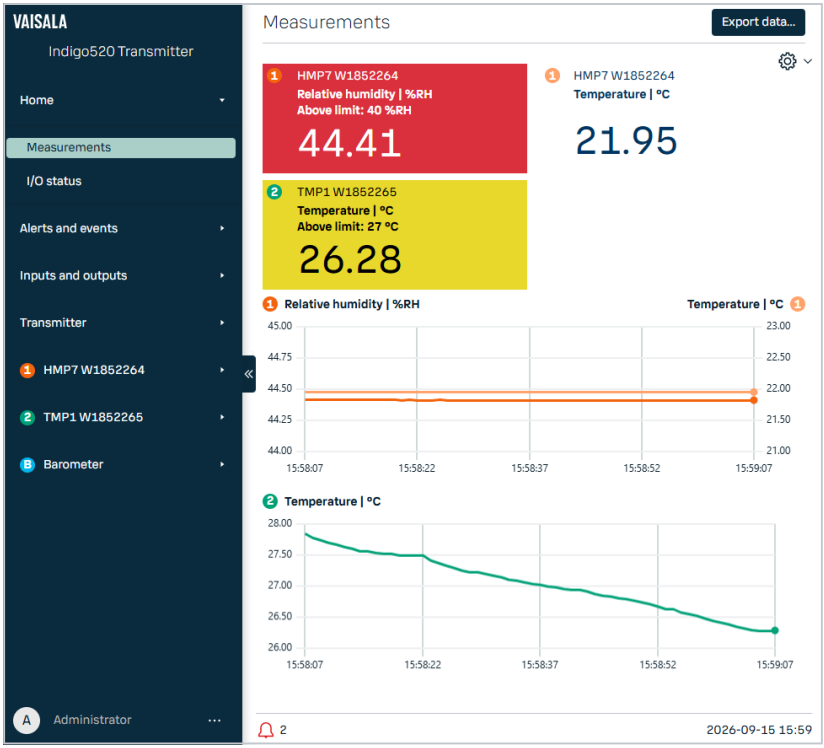
Figure 68 **Alert rules** configuration page in web interface

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Alerts and events > Alert rules**.
4. Select **Add alert rule** to add an alert rule.
5. From the **Source** list, select the source for the measurement parameter that controls the alert rule.
6. From the **Parameter** list, select the measurement parameter that controls the alert rule.

   The unit of the parameter is set automatically. The alert rule is named after the selected measurement parameter.
7. In the **Description** field, type a description for the rule.

8. From the **Activation** list, select how the alert activates. You can set the alert to activate above or below a defined limit or to activate between or outside two defined limits.
9. From the **Severity** list, select the severity for the alert. You can create alerts of critical or moderate severities. You can also create an alert with both critical and moderate limits.
10. Depending on your selections in n **Activation** and **Severity**, you have 1–4 limit fields for entering the limit values: **High limit: critical**, **High limit: moderate**, **Low limit: critical**, and **Low limit: moderate**. Enter the alert activation limit values in the limit fields.
11. In the **Hysteresis** field, type a buffer value for alert activation. With hysteresis, an activated alert switches off only when the measured value crosses the alert limit and the additional buffer value.
12. Select **Apply**.
13. After you have configured the alert rule, select **Enabled** to enable the alert rule.

    You can view active alerts from the **Measurements** view, if you have selected the measurement parameter to the view.



14. To edit or delete an alert rule you have created:
    - Select **Disabled** to disable the alert rule and to edit settings.
    - To delete an alert rule, select **Disabled** to disable the alert rule and select **Delete** to delete the rule. In the **Delete alert rule** confirmation window, select **Confirm**.

More information

- Alerts and events menu in web interface (page 77)

7.3 Configuring analog outputs in web interface

You need **Administrator** user rights for this task.

If your transmitter is delivered with preconfigured analog outputs, you do not need to configure the outputs manually.

Analog outputs are not available in transmitters that are powered with Power over Ethernet (PoE).

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

The Indigo510 transmitter has 2 and the Indigo520 transmitter has 4 analog current (mA) or voltage (V) outputs.

If you have not configured the analog outputs before, the transmitter can receive the analog output settings automatically from the connected measurement device in the following cases:

1. You are connecting a measurement device to the probe connection terminal for the first time.
2. You have previously connected a measurement device but disconnected it within 30 minutes of connecting.

The automatic analog output configuration is a functionality introduced in software version 1.21.1. With automatic analog output configuration, the transmitter uses analog output current (mA) mode in the range of 4–20 mA. If you want to use a different analog output mode, you can change it in the analog output configuration menu. The automatically set analog output settings depend on the measurement device that is connected to the transmitter. The preferred parameters of the measurement device connected to probe connection terminal 1 are set in analog outputs 1 and 2. The preferred parameters of the probe connected to probe connection terminal 2 are set in analog outputs 3 and 4.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Analog outputs are configured automatically with the preferred parameters of the connected measurement device. This is possible if you have not configured the analog outputs before and you are either connecting a measurement device to the probe connection terminal for the first time, or you have previously connected a measurement device but disconnected it within 30 minutes of connecting. The following steps show how to accept, edit, or cancel the automatically set values.

   a. After the transmitter has discovered and connected the measurement device, **Analog output configuration** window opens.

   b. In the **Analog output configuration** window, you can:

   - Select **OK** to accept the automatically configured analog output settings.
   - Select **Edit** to edit the analog output configuration settings in the **Analog outputs** configuration menu.
   - Select **Cancel** to cancel the automatic configuration. The window will not open again for measurement devices you connect to the same probe connection terminal later. You can configure the analog outputs manually.

   If you do not select any of the choices within 30 minutes, the automatically configured settings are applied and the **Analog output configuration** window closes. After the device has been connected for 30 minutes, the settings will not change, even if the device is later disconnected and connected again. This also applies to other measurement devices you later connect to the same probe connection terminal. You can configure the analog outputs manually.

4. If you have previously connected a measurement device to the probe connection terminal, configured the analog outputs, or canceled the automatically set values, you can configure analog outputs manually. The following steps show how to configure analog outputs manually.

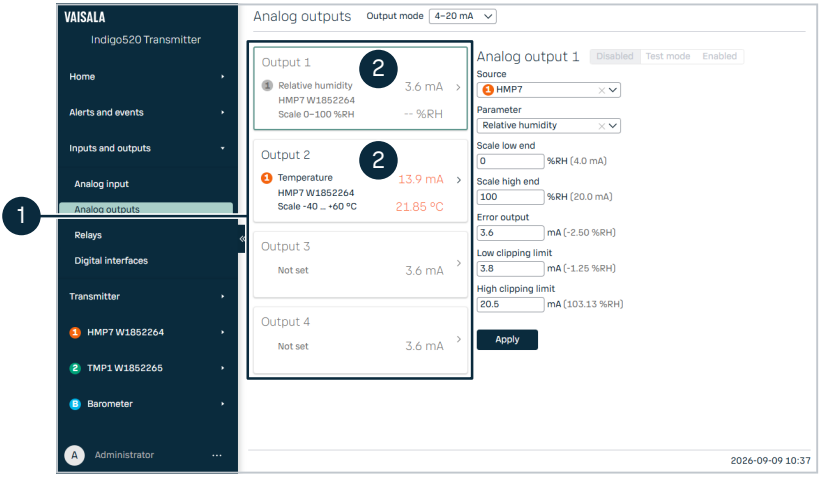


Figure 69 **Analog outputs** configuration menu in web interface, **Output 1** selected

1 The Output 1–4 cards contain individual settings and test modes for each relay.
2 The output is disabled when the output settings are shown in gray and enabled when the settings are shown in color.

a. Select **Inputs and outputs > Analog outputs**.
b. In **Output mode**, select the current or voltage range for the outputs.
c. In the tabs Output 1–4, select the output channel you want to configure.
d. If the output channel is enabled, in Analog output 1–4, disable the output to edit settings and select **Apply**.
e. In **Parameter**, select the measurement device and the measurement parameter that controls the output channel. The unit of the parameter is set automatically.
f. In the **Scale low end** and **Scale high end** fields, type the lower and upper ends of the measurement scale for the chosen output parameter.
g. In the **Error output** field, type the output level indicating that the device is in error state.
h. In the **Low clipping limit** field, type the point (in mA below the output range) when the output is clipped due to being out of range.
i. In the **High clipping limit** field, type the point (in mA or V above the output range) when the output is clipped due to being out of range.

j. In Analog output 1–4, enable the output to activate settings and select **Apply**.

k. Repeat step 4.c–step 4.j for all the analog output channels you want to use.

More information

- Analog output configuration example (page 119)
- Testing analog outputs in web interface (page 148)
- Configuring analog output correction in web interface (page 149)

7.3.1 Testing analog outputs in web interface

To test that the analog output of the transmitter is accurate, you can set the probe to output a fixed level of current and view the reading to verify the output.

If analog output correction is enabled, the correction is visible also in the **Test mode** view with 4 decimals displayed. This feature is available from software version 2.1.0 onward.

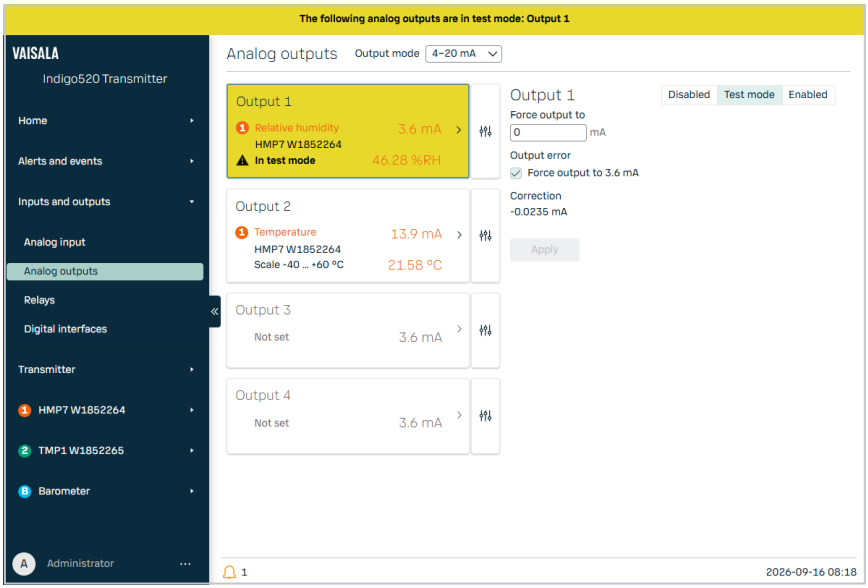


Figure 70 **Analog outputs Test mode** in web interface

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Inputs and outputs > Analog outputs**.
4. In **Output mode**, select the current or voltage range for the outputs.

5. From the Output 1–4 cards, select the output channel you want to test.
6. Select **Test mode** to set the output in test mode.
7. Configure test mode settings:
   - In **Force output to**, enter the current or voltage level that you want the transmitter to output.
   - Select **Output error** to use the transmitter's error state output level.
8. Select **Apply**.
9. Read the analog output and verify that the output is correct.
10. After verifying the output, go back to **Inputs and outputs > Analog outputs > Test mode**, disable the test mode and select **Apply**.
11. Repeat step 5–step 10 for all the analog output channels you want to test.

More information

- Configuring analog outputs in web interface (page 145)

7.3.2 Configuring analog output correction in web interface



- Allen key, 4 mm (provided)
- Multimeter



You need **Administrator** user rights for this task.



You can view and edit these settings when the transmitter is in **Advanced** user mode.

You can use fixed 4 mA and 20 mA output states to measure correction.

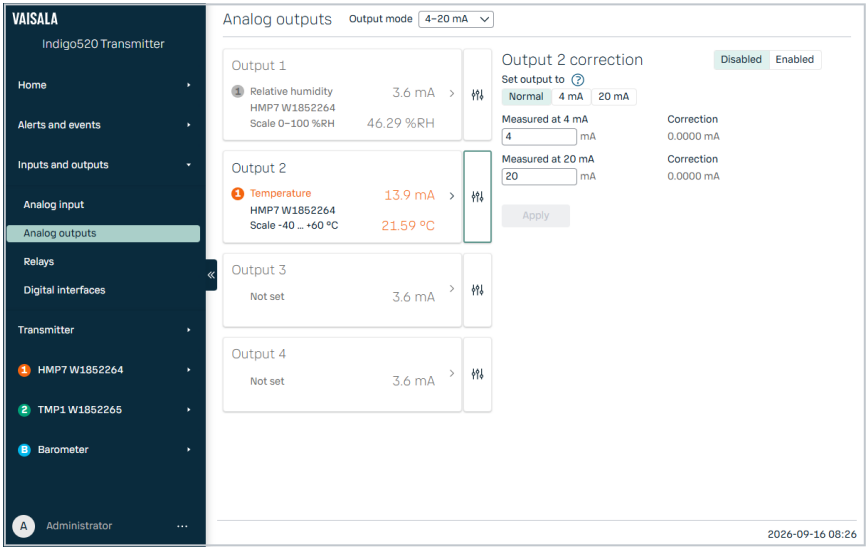


Figure 71 **Analog outputs > Correction** configuration menu in web interface

1. Power off the transmitter.
2. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
3. Open the transmitter cover.
4. Connect the multimeter wiring to analog output screw terminals.
5. Power up the transmitter.

   Powering up takes some minutes.
6. Connect to the web interface.
7. Log in to the web interface as an **Administrator** user.
8. In **Transmitter > General > User mode**, enable **Advanced** user mode, and select **Apply**.
9. Select **Menu > Inputs and outputs > Analog outputs**.
10. In the tabs Output 1–4, select the output channel you want to configure.
11. In **Correction > Set output to**, select **4 mA** to set the output to 4 mA.
12. Check the multimeter reading. Enter the reading of the multimeter in **Correction point 4 mA**.
13. In **Correction > Set output to**, select **20 mA** to set the output to 20 mA.
14. Check the multimeter reading. Enter the reading of the multimeter in **Correction point 20 mA**.

15. In **Correction**, toggle correction on.

    A confirmation window opens.

16. In the **Enable correction** confirmation window, you can:

    - Select **Confirm** to enable correction.
    - Select **Cancel** to exit without applying the changes.

17. Select **Apply** to enable correction.

More information

- Transmitter user modes (page 24)
- Configuring analog outputs in web interface (page 145)

7.4 Configuring analog input in web interface

You need **Administrator** user rights for this task.

Analog input is not available in Indigo510 transmitters or transmitters that are powered with Power over Ethernet (PoE).

Only 1 measurement device can be connected to the transmitter when you power the analog input device through Indigo520 probe connection terminal 2. The measurement device has to be connected to probe connection terminal 1.

The Indigo520 transmitter has 1 analog current (mA) input. The analog input range is 4–20 mA and the range can be scaled. Scaling the analog input range gives an additional value and does not change the unscaled value. When analog input scaling is in use, only the scaled value can be used. The unscaled value will be visible in the **I/O status** view.

From software version 2.1.0 onward, it is possible to select a standard parameter to use a predefined name and unit for the input parameter. The standard parameters can be used for environmental compensation.

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

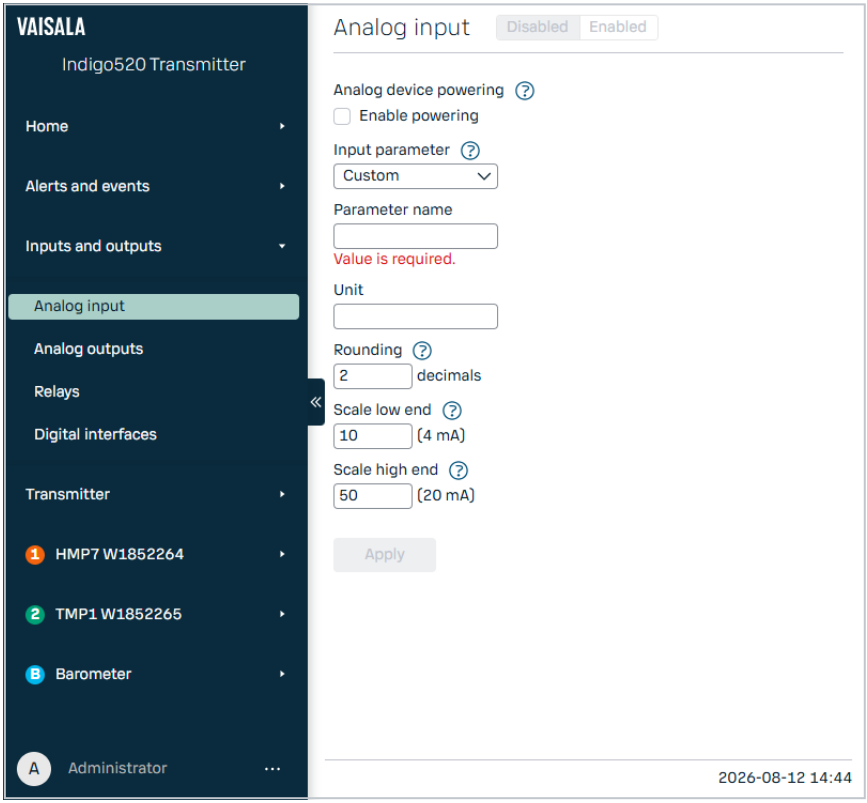


Figure 72 **Analog input** configuration menu in web interface

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Inputs and outputs > Analog input**.
4. Select **Disabled** to disable the input and to edit settings.
5. To power your analog device through Indigo520, in **Analog device powering**, select **Enable powering**.

6. In **Input parameter**, select the input parameter you want to use.
   - Select **Current (mA)** to use the default input parameter.
   - Select **Custom** to define the name and unit of the input parameter.
   - Select a standard parameter to use a predefined name and unit for the input parameter. Only the standard parameters can be used for environmental compensation.

   If you selected **Current (mA)**, you can proceed to step 7.f.
   If you selected **Custom**, continue to step 7.a.
   If you selected a standard parameter, you can proceed to step 7.c.
7. If you selected **Custom** or a standard parameter in **Input parameter**, configure the applicable analog input settings:
   a. In the **Parameter name** field, type a name for the parameter. The name can consist of maximum 32 characters and it cannot be a number.
   b. In the **Unit** field, type the measurement unit for the parameter. The unit can consist of maximum 20 characters.
   c. In the **Rounding** field, type the number of decimals you want to see on the display by typing a number in the range of 0 to 4. To round the value down, type a number in the range of −1 to −3. Typing a negative value rounds the value down to the nearest 10, 100, or 1000.

      −1 rounds the value down to the nearest 10.
      −2 rounds the value down to the nearest 100.
      −3 rounds the value down to the nearest 1000.
   d. In the **Scale low end** field, define the lower end of the measurement scale for the chosen parameter.
   e. In the **Scale high end** field, define the upper end of the measurement scale for the chosen parameter.
   f. To apply the changes, select **Apply**.
8. To take the saved settings into use, select **Enabled** to enable the input.

7.5 Configuring relays in web interface

You need **Administrator** user rights for this task.

The Indigo520 transmitter has 2 configurable relays. Both relays have configuration options for selecting the parameter that is used to control the relay, activation triggers, and hysteresis.

From software version 1.23.1 onward, you can configure the relays to activate based on multiple conditions. You can set up to 10 conditions. You can set the relay to activate based on an active critical status or above or below a defined measurement value. The relay activates when any of the conditions are met. From software version 1.23.1 onward it is possible to use inverted relay control logic. Use the inverted relay control logic to monitor device errors and power loss.

Before you start, make sure that the measurement devices you want to use are connected to the transmitter.

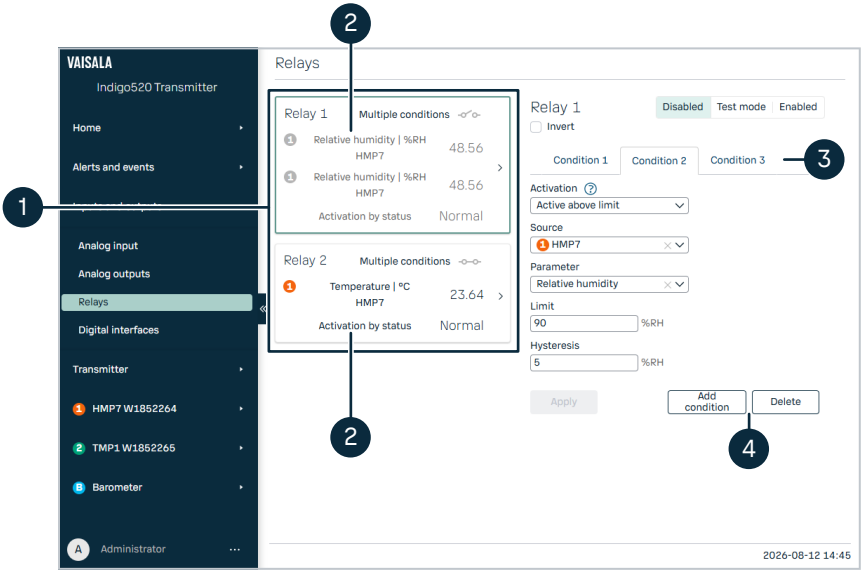


Figure 73 **Relays** configuration menu in web interface, **Relay 1** selected

1 The Relay 1–2 cards contain individual settings and test modes for each relay.
2 The relay is disabled when the condition set for the relay is shown in gray and enabled when the condition is shown in color.
3 Switch between tabs to view and edit existing conditions.
4 Apply changes made in the condition, add new conditions, and delete conditions you have created. The **Add condition** and **Delete** buttons are enabled only after you have applied the changes you have made to a condition.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Inputs and outputs > Relays**.
4. Select the relay you want to configure: **Relay 1** or **Relay 2**.
5. Select **Disabled** to disable the relay and to edit settings.
6. From the **Activation** list, select how the relay activates. You can set the relay to activate above or below the activation/deactivation limit or based on an active critical status.

   If you selected **Activation by critical status**, you can proceed to step 11.
7. From the **Source** list, select the source for the measurement parameter that controls the relay.

8. From the **Parameter** list, select the measurement parameter that controls the relay.
9. In the **Limit** field, type the limit which the measured parameter value must reach for the relay to activate/deactivate.
10. In the **Hysteresis** field, type a buffer value for relay deactivation. With hysteresis, an activated relay switches off only when the measured value crosses the relay activation/deactivation limit and the additional buffer value.
11. Select **Apply**.
12. If you want to configure another condition for the relay, select **Add condition**. Repeat step 6–step 11 for all the conditions you want to use. If you want to delete a condition you created, select **Delete**.
13. After you have configured all the desired conditions for the relay, select **Enabled** to enable the relay.
14. If you want to use the inverted relay control logic, select **Invert**.
15. Repeat step 4–step 14 for all the relays you want to use.

More information

- Relay configuration example, one condition configured (page 128)
- Relay configuration example, multiple conditions configured (page 129)
- Relay configuration example, inverted relay control logic (page 130)
- Relay wiring and relay activation mode (page 130)
- Relay hysteresis (page 131)
- Testing relays in web interface (page 156)

7.5.1 Testing relays in web interface

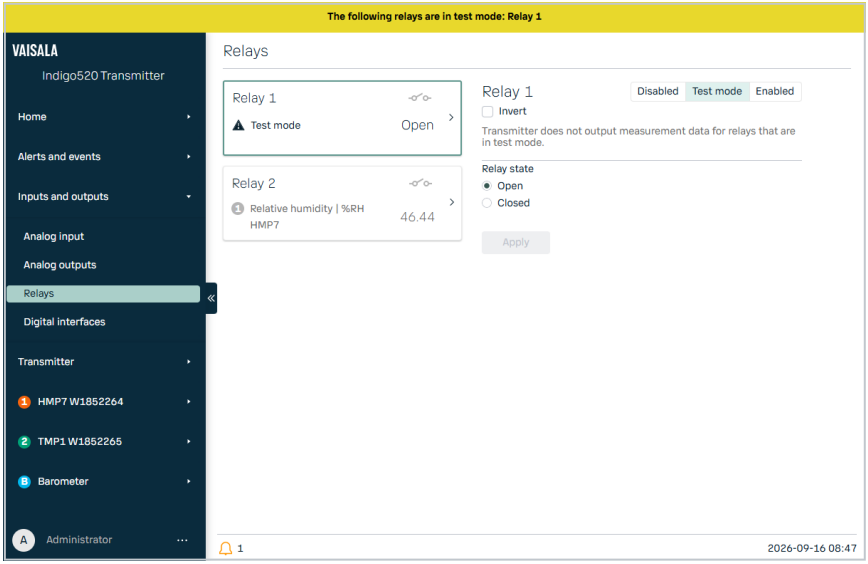


Figure 74 **Relays** test mode in web interface, **Relay 1** selected

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Inputs and outputs > Relays**.
4. Select the relay you want to test: **Relay 1** or **Relay 2**.
5. Select **Test mode**.
6. In **Relay state**, you can open and close the relay.
7. Select **Apply**.
8. After verifying the output, go back to **Menu > Inputs and outputs > Relays > Relay 1** or **Relay 2**, and disable the test mode by selecting **Disabled** or **Enabled**.
9. Repeat step 4–step 8 for all the relays you want to test.

7.6 Enabling Modbus TCP/IP in web interface

You need **Administrator** user rights for this task.

CAUTION! Enable **Modbus TCP/IP write** only when you need to write on the Modbus registers. Remember to disable **Modbus TCP/IP write**, when you don't need to write anymore.

CAUTION! Do not enable **Modbus TCP/IP write** in an open network.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Transmitter > Network**.
4. Check that the network settings are set correctly.
5. Select **Inputs and outputs > Digital interfaces**.
6. To read the Modbus registers of the transmitter and devices connected to it, in **Modbus TCP/IP read**, enable Modbus read.
7. To enable writing on the Modbus registers of the transmitter and devices connected to it, in **Modbus TCP/IP write**, enable Modbus write.
8. Select **Apply**.

More information

- Modbus overview (page 177)

7.7 Adjusting barometer in web interface

If your indigo520 transmitter has a barometer module, you can adjust the barometric measurement. Adjusting the barometer is a functionality introduced in software version 1.16.0. Use offset or linear correction to adjust the measurements without recalibrating the barometer. When the transmitter applies the adjustments, it arranges multiple adjustment points automatically to an ascending order.

You need **Administrator** user rights for this task.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. In **Measurement devices**, select **Barometer**.

4. In the **Correction** tab, configure barometer correction.
   a. In **Correction**, enable barometer correction. Select **OK** to confirm.
   b. In **Type**, select either **Offset** or **Linear** depending how you want to adjust the barometer.
      - In the **Offset** field, type the offset correction value.
      - In the **Linear** fields, type values in **Point 1** and **Point 2**. The values cannot be the same.
5. Select **Apply**.
6. To disable barometer correction, in **Correction**, disable barometer correction. Select **OK** to confirm.

7.8 Calibrating barometer in web interface

If your Indigo520 transmitter has a barometer module, you can perform a complete readjustment of the barometer module. Calibrating the barometer is a functionality introduced in software version 1.16.3.

You can view and edit these settings when the transmitter is in **Advanced** user mode.

You need **Administrator** user rights for this task.

You cannot restore the values you have changed. Write down the current settings if you want to restore the old values later on.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. In **Transmitter > General > User mode**, enable **Advanced** user mode, and select **Apply**.
4. In **Measurement devices**, select **Barometer**.

5. In the **Calibration** tab, configure barometer calibration.
   a. In **Adjustment**, disable adjustment.

      Disabling adjustment affects the barometric measurement.

      Disabling adjustment also disables offset and linear correction.

   b. In the **Point 1**–**Point 8** fields, type the reference and measured values for calibrating the barometer. You can enter values for up to 8 points. When the transmitter applies the adjustments, it arranges multiple adjustment points automatically to an ascending order.
   c. To apply the changes you made, select **Apply**.

      A confirmation window opens.
   d. In the **Apply changes** confirmation window you can:

      - Select **Confirm** to apply the changes.
      - Select **Cancel** to exit without applying the changes.

      If you did not apply the changes, and want to apply offset or linear correction instead, in the **Correction** tab, enable linear or offset correction.

   e. In **Adjustment**, enable adjustment.

More information

- Transmitter user modes (page 24)

7.9 Configuring height-corrected pressure calculation in web interface

You need **Administrator** user rights for this task.

Atmospheric pressure decreases with altitude. Height-corrected pressure (HCP) calculation removes the effect of the barometer's installation height, and standardizes the pressure to the desired elevation. It is a direct height correction to the height difference between the barometer installation location and the level where the pressure is to be calculated. The available range for the correction is −30.0 ... +30.0 m (−98.4 ... +98.4 ft). HCP calculation is available from software version 1.22.1 onward.

HCP calculation does not change the value of the **Pressure** output parameter. The result of HCP calculation is available on a parameter called **Height-corrected pressure**.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Transmitter > Barometer > Height-corrected pressure**.
4. In **HCP height**, enter the height of the barometer installation location, and select **Apply**.

   The result of HCP calculation is available on a parameter called **Height-corrected pressure**.

7.10 Disabling service port in web interface

You need **Administrator** user rights for this task.

The service port connection is enabled by default. You can manually disable the service port connection.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Inputs and outputs > Digital interfaces**.
4. In **Service port**, disable service port.
5. Select **Apply**.

7.11 Disabling cloud connection in web interface

Cloud connection is available in Indigo500 transmitters ordered from Vaisala manufacturing with cloud connection support software option selected.

You need **Administrator** user rights for this task.

Cloud connection is enabled by default. You can manually disable cloud connection.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Inputs and outputs > Digital interfaces**.
4. In **Cloud connection**, disable cloud connection.

More information

- Vaisala cloud connection (page 32)

7.12 Configuring environment settings in web interface

You need **Administrator** user rights for this task.

The compensation feature has changed. From software version 1.19.0 onward the transmitter supports environmental compensation that is not restricted to certain probes. You need to configure and enable the compensation manually.

Probe firmware version 1.2.8 or newer (probes with serial number V3121434 onward) is required to use environmental compensation with DMP5, DMP6, DMP7, DMP8, HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9, MMP8, and TMP1 probes. For other supported measurement devices there are no firmware version limitations.

For optimal measurement accuracy, you can use the Indigo500 transmitter to give additional information about the connected device's measurement environment by configuring environment presets for the connected devices. The presets define the source for the compensation value. The compensation value can be entered manually, or it can be continuously read from a connected measurement device, the barometer module, or analog input.

For example, you can:

- Configure the pressure compensation setting for your device.
- Enable temperature compensation from another device that has a temperature output. For example, you can enable TMP1 to function as the temperature source for HMP7.

For detailed information on the device-specific requirements for the settings, such as **Pressure** and **Temperature**, see your device's user documentation, available at docs.vaisala.com.

Make sure that both measurement devices are in the same environment to get the most accurate measurement values.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.
3. Select **Transmitter > Environment presets**.
4. Select **Presets for probe terminal 1** or **Presets for probe terminal 2** depending on the probe connection terminal you want to configure.
5. In the preset settings section, configure the compensation source for the desired parameters. The compensation value can be entered manually, or it can be continuously read from a connected device, the barometer module, or analog input.
6. Select **Apply**.

   Presets are automatically used when the connected device supports the preset setting.

   Connected devices use presets as environment settings. Changing preset settings automatically updates the compensation value of the connected device.

More information

- Environmental compensation (page 31)
- Example of configuring environment presets in web interface (HMP7 and TMP1) (page 162)

7.12.1 Example of configuring environment presets in web interface (HMP7 and TMP1)

You need **Administrator** user rights for this task.

The temperature-dependent output parameters of the HMP7 humidity and temperature probe are unavailable when the probe heating function of HMP7 is active. Therefore the temperature measurement data needs to be provided from an external source, which can be, for example, any Indigo-compatible probe with a temperature output. With HMP7 and TMP1 connected to the Indigo500 transmitter, you can enable TMP1 to function as the temperature source for HMP7.

For more information on the condensation prevention and temperature compensation functions, see HMP Series with MMP8 and TMP1 User Guide (M212022EN).

Make sure that both measurement devices are in the same environment to get the most accurate measurement values.

1. Connect the probes to your transmitter in any order.

   In this example, HMP7 is connected to probe connection terminal 1 and TMP1 to probe connection terminal 2.
2. Connect to the web interface.
3. Log in to the web interface as an **Administrator** user.
4. Select **Transmitter > Environment presets > Presets for probe terminal 1**.
5. In **Temperature**, select **Read from probe terminal 2**, and select **Apply**.

   The preset is automatically used.

More information

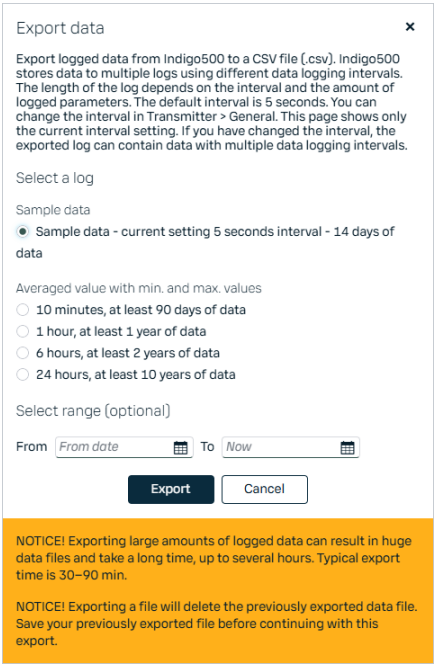
- Environmental compensation (page 31)

7.13 Exporting logged data

Exporting large amounts of logged data can result in huge data files and take a long time, up to several hours. Typical export time is 30 to 90 min.

Exporting a file deletes the previously exported data file. Save your previously exported file before continuing with this export.

The exported file will show data with the data logging interval you have selected in **Transmitter > General > Data logging interval**. If you have changed the data logging interval, the exported log can contain data with multiple data logging intervals. Only the data logging interval you have selected on the touchscreen display is visible in **Export data > Select a log > Sample data**. The selection does not affect the data that has been logged with a different setting.



1. Connect to the web interface.
2. Log in to the web interface.

   The web interface opens in the **Measurements** view.
3. Select **Export data**.
4. In **Select a log**, select the log you want to export.

   Only the data logging interval you have selected on the touchscreen display is visible in **Sample data**. The selection does not affect the data that has been logged with a different setting. You can change the data logging interval for sampled data logging from the default 5 seconds to 1, 15, 30, and 60 seconds in **Transmitter > General > Data logging interval**.
5. If you want to select the date and time range for which you want to export the log, do that in **Select range**.
6. Select **Export**.

   You can freely use the web interface while your data file is exporting.

7. To download the exported file, select **Downloads**.



More information

- Data logging (page 29)

8. Using transmitter with Indigo-compatible devices

8.1 Indigo80 handheld indicator

Connecting to Indigo80 is possible from software version 1.14.3 onward.

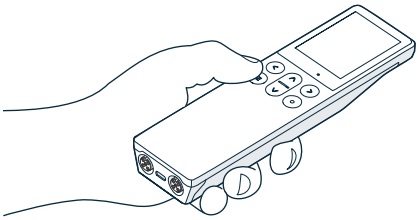


Figure 75 Indigo80 handheld indicator

Vaisala Indigo80 handheld indicator is a portable diagnostics tool that accommodates up to two compatible Vaisala devices for measuring a wide range of parameters.

With the indicator, you can:

- See real-time measurements and device and status information
- Log measurement data from the probes connected to the transmitter
- Calibrate and adjust the connected probes
- Configure the transmitter settings (for example, network and date and time settings)
- Test and adjust the analog output channels of the transmitter (from transmitter software version 1.14.4 onward)
- Configure the analog outputs (from transmitter software version 1.14.4 onward)
- Configure the relays of the transmitter (from transmitter software version 1.14.4 onward)
- Configure the connected probes' features and settings. The available features and settings depend on the probe model and firmware version. For more information, see your probe's user documentation at docs.vaisala.com.

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

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

8.1.1 Connecting Indigo500 to Indigo80 handheld indicator

- Allen key, 4 mm (provided)
- M12 - M8 service cable (Vaisala item code 262195SP)

CAUTION! Use only cables provided by Vaisala to connect devices to the transmitter. Attempting to connect incompatible devices or cables can damage the equipment.

CAUTION! The service port connection is only intended for temporary use during configuration, and must not be used for permanent installations. The IP rating, UL type 4 rating, and EMC properties of the transmitter can be affected by using the service port in permanent installations.

Before connecting wires or cables, make sure that the transmitter is powered off.

Upon connecting, the transmitter receives date and time settings from Indigo80.

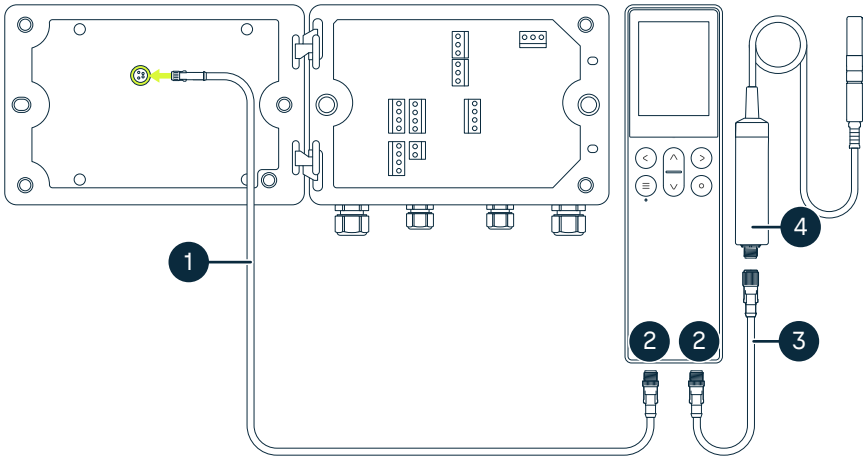


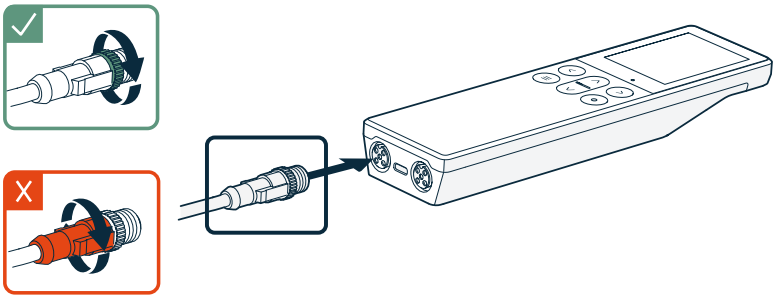
Figure 76 Connecting Indigo500 transmitter to Indigo80 handheld indicator

1 M12 - M8 service cable
2 M12-5F ports on the bottom of Indigo80 for connecting compatible Vaisala devices. Ports are labeled ❶ (left) and ❷ (right) on Indigo80.
3 Probe connection cable
4 Probe connected to Indigo80

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Connect the M8 end of the service cable to the service port.

   Avoid touching any other part of the PCB by hand or with the service cable M8 connector.
4. Connect the M12 end of the cable to the desired port on the bottom of the indicator. You can select the port freely based on your set of connected devices.

   - **Note the orientation of the cable connector when inserting it**
   - **Hold the connector in place while turning its locking ring clockwise – never twist the connector body!**



5. Power up the transmitter.

   Powering up takes some minutes.

> **CAUTION!** Do not touch the PCB while it is energized – risk of electric shock.

> The transmitter needs to be powered separately. The power from Indigo80 is not enough to power the transmitter.

6. Wait for the indicator to detect the transmitter.

   When the indicator recognizes the connected transmitter, it shows a notification on the display. On the transmitter display, the active connection symbol ⇄ appears.

8.1.2 Calibration and adjustment with Indigo80 handheld indicator

The Indigo80 handheld indicator provides two ways to calibrate and adjust measurements for probes: **Guided calibration** and **Manual adjustment**.

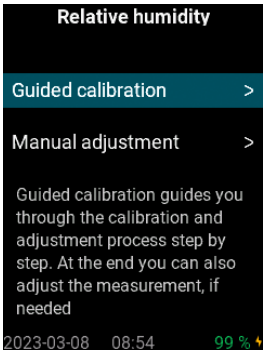


Figure 77 Indigo80 calibration methods for probes

- Choose **Guided calibration** when you have a reference environment or a calibrated reference instrument and want the indicator to guide you through the calibration process step by step. At the end you can also adjust the measurement, if needed.
- Choose **Manual adjustment** if you already have previously collected calibration readings (for example, from a calibration certificate) for 1 or 2 calibration points and want to adjust the probe to correct the observed errors. No separate reference instrument or reference environment is needed during the manual adjustment procedure. For all other use cases, **Guided calibration** is recommended.

8.1.2.1 Relative humidity probe adjustment example

- Allen key, 4 mm (provided)
- M12 - M8 service cable (Vaisala item code 262195SP)

This procedure tells you how to use the Indigo80 handheld indicator to adjust the humidity measurement of the probe connected to the transmitter.

1. Connect the transmitter to the indicator.
2. Wait for the indicator to detect the transmitter.

   When the indicator recognizes the connected transmitter, it shows a notification on the display. On the transmitter display, the active connection symbol ⇄ appears.
3. Open the indicator main menu by pressing ☰.
4. Select **Devices**. If you have more than one device connected to the indicator, make a further selection between the devices.

   In this case, select the probe connected to the transmitter. For example, if the transmitter is connected to port 2 of Indigo80, and the probe is connected to connection terminal 1 of the transmitter, the connected probe is identified with icon **2A** on the Indigo80 display.

5. If the probe connected to the transmitter supports the sensor purge feature, wait for the startup purge to finish or start the purge manually by selecting **Devices > <your device> > Sensor purge**.
6. Select **Calibrate / Adjust**.
7. Select the type of calibration or adjustment to perform, for example, **RH adjustment**.
8. Scroll down and acknowledge the notification by selecting **OK**.
9. Select **Reference value, point 1**.
10. Use the arrow buttons to set the reference value (for example, the reference humidity from your calibration certificate), and then select **OK** or **Set**.
11. Scroll down and select the **Measured value, point 1** field. Replace the automatically inserted value with your previously measured calibration reading (for example, the observed humidity value from your calibration certificate).
12. Scroll down and select the **Measured temperature, point 1** field. Select the correct unit, then replace the automatically inserted temperature value with your previously measured value (for example, the observed temperature value from your calibration certificate).

    Scroll down and repeat for **Reference value, point 2**, **Measured value, point 2**, and **Measured temperature, point 2** (if performing a 2-point adjustment).
13. To store the adjustments to the probe, scroll down and select **Activate adjustment > OK**. Confirm by selecting **OK**.

    To exit without taking the adjustment in use, press ☰ to end calibration.
14. Update the calibration information in **Calibrate / Adjust > Calibration information**. Navigate to the **Calibration information** menu by pressing ⟲.
15. Press ☰ to end calibration.

8.2 PR53 process refractometers

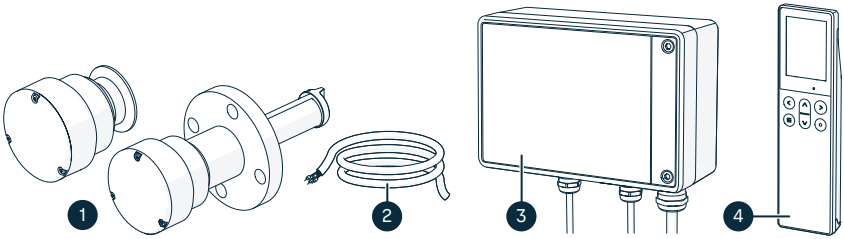


Figure 78 PR53 process refractometer with Indigo520

1 Vaisala Polaris™ Process Refractometers
2 Interconnecting cables
3 Vaisala Indigo520 Transmitter
4 Vaisala Indigo80 Handheld Indicator

The PR53 inline refractometer is an instrument for measuring liquid concentration in the process line. The measurement is based on the refraction of light in the process medium, an accurate and safe way of measuring liquid concentration.

The inline process refractometer (1) measures the refractive index RI and the temperature of the process medium. This information is sent through the interconnecting cable (2) to Indigo520 Transmitter (3).

In most applications the PR53 prism keeps clean due to the self-cleaning effect. If coating occurs, your application requires a wash system. The wash system is controlled by Indigo520.

To use PR53 refractometers with Indigo520 Transmitter, your transmitter needs to be ordered PR53-compatible. It is not possible to connect a refractometer to Indigo510 Transmitters.

For more information on PR53 process refractometers and the Prism wash system, see PR53 Series User Guide (M212898EN) and PR53 Prism Wash System User Guide (M212808EN), available at docs.vaisala.com.

8.2.1 Connecting to PR53 process refractometers

Before connecting wires or cables, make sure that the transmitter is powered off.

For more information on PR53 process refractometers and the Prism wash system, see PR53 Series User Guide (M212898EN) and PR53 Prism Wash System User Guide (M212808EN), available at docs.vaisala.com.

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Connect the wires inside the refractometer.

   For more information on connecting the refractometers, see PR53 Series User Guide (M212898EN) available at docs.vaisala.com.

4. Connect the wires inside the transmitter, see Probe connection terminals and lead-throughs (page 60).

9. Using transmitter with Insight PC Software

9.1 Vaisala Insight PC Software

Vaisala Insight PC Software is a configuration software for Vaisala Indigo-compatible probes and transmitters. Insight software is available for the Windows operating system (64-bit only). For a full list of supported operating system versions, see vaisala.com/insight.

To ensure support for your transmitter, download the latest version of Insight software at vaisala.com/insight.

With the Insight software connected to your transmitter, you can:

- See real-time measurements and device and status information
- Configure outputs and relays
- Calibrate and adjust the probe connected to the transmitter
- Configure the transmitter settings (for example, network, and date and time settings)
- Configure the connected probes' features and settings. The available features and settings depend on the probe model and firmware version. For more information, see your probe's user documentation at docs.vaisala.com.

CAUTION! The service port connection is only intended for temporary use during configuration, and must not be used for permanent installations. The IP rating, UL type 4 rating, and EMC properties of the transmitter can be affected by using the service port in permanent installations.

9.1.1 Insight software user modes

You can switch between the **Basic mode** and **Advanced mode** user modes in the **Settings** menu.

Depending on the connected device, switching to **Advanced mode** may provide access to additional configuration options. Use these options only as described in the product documentation or as instructed by Vaisala support.

9.2 Connecting to Insight PC Software

- Allen key, 4 mm (provided)
- Computer with a Microsoft Windows® operating system (64-bit version) and Vaisala Insight PC Software installed
- Vaisala Indigo USB adapter (Vaisala item code USB2) and M12 - M8 service cable (Vaisala item code 262195SP) or M8 - USB service cable (Vaisala item code 219690)

Before connecting wires or cables, make sure that the transmitter is powered off.

CAUTION! Use only cables provided by Vaisala to connect devices to the transmitter. Attempting to connect incompatible devices or cables can damage the equipment.

CAUTION! The service port connection is only intended for temporary use during configuration, and must not be used for permanent installations. The IP rating, UL type 4 rating, and EMC properties of the transmitter can be affected by using the service port in permanent installations.

Upon connecting, the transmitter receives date and time settings from Insight software.

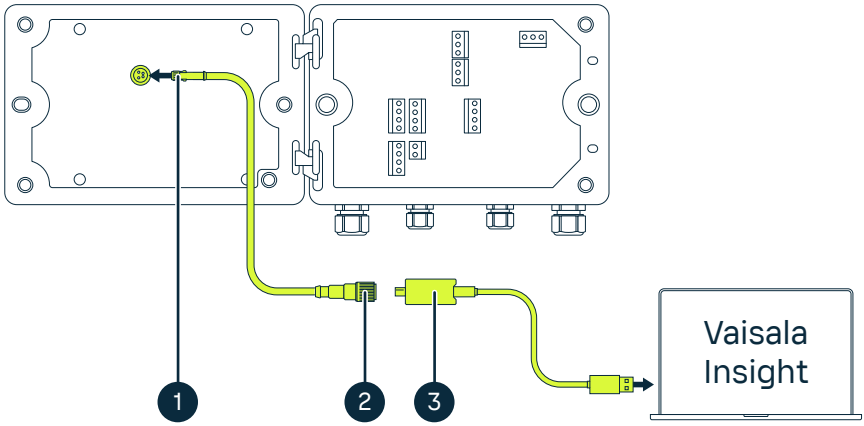


Figure 79 Connecting Indigo500 transmitter to Insight PC Software with Vaisala Indigo USB adapter and M12 - M8 service cable

1 M8 connector of the service cable
2 M12 connector of the service cable
3 USB adapter

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Connect the M8 end of the service cable to the service port.

   Avoid touching any other part of the PCB by hand or with the service cable M8 connector. If you are using M8 - USB service cable (Vaisala item code 219690), you can proceed to step 5.
4. Connect the USB adapter to the M12 connector of the M12 - M8 service cable.
5. Connect the USB adapter or USB end of the service cable to a free USB port on the PC.
6. Power up the transmitter.

   Powering up takes some minutes.

   CAUTION! Do not touch the PCB while it is energized – risk of electric shock.
7. Open the Insight software on your computer.
8. Wait for the Insight software to detect the transmitter.

9.3 Insight PC Software overview



Figure 80 Insight software main view with transmitter and connected probe

1 Select ⚙ to access device settings menu.
   - **Configure device**: transmitter and probe configuration settings.
     - Indigo500: analog output, relay (if applicable), date and time, and network settings.
     - Connected measurement devices: environmental compensation settings, filtering factor, probe options, and general settings.
   - **Export settings**: creates a text file export of the device settings.
   - **Calibrate**: options for calibrating and adjusting the measurement of the connected probe, adjusting outputs, viewing adjustment data, and restoring factory adjustments.
   - Various reset, factory default settings, and restart options for transmitter and probe.
   - **About device**: general device information such as serial number and software version.
2 Select **Settings** to switch between the **Basic mode** and **Advanced mode** user modes, change the units of parameters (metric/non-metric), enter a factory code to access restricted functionalities, or view information about the Insight software.
3 **Monitoring** provides options for monitoring and recording selected parameters, and exporting the monitoring data as a CSV (comma-separated values) file.

4 Device information pages under **Devices** menu with the following tabs:
- **Measurements**: measurement graph view with parameter drop-down selection.
- **Calibration information**: read-only information about the latest stored calibration, only available for connected measurement devices.
- **Diagnostics**: analog output and relay test modes and troubleshooting and administrative information.
  - Indigo500: settings for testing analog outputs and relays.
  - Connected measurement devices: troubleshooting and administrative information about the device status. Also includes options for exporting the device error log and other diagnostics information as files (CSV/ZIP). When contacting Vaisala support, it is recommended to include an up-to-date export of the error log with the support request.

10. Modbus

10.1 Modbus overview

Indigo500 transmitters support the Modbus TCP/IP communication protocol (over Ethernet). The transmitter and the connected probes are treated as separate Modbus devices, each with their own fixed unit identifier (unit ID) value.

Note the following limitations of the Modbus implementation:

- Use only one Modbus TCP/IP connection at a time. Design the system so that only one Modbus TCP/IP client accesses the transmitter.
- Modbus TCP/IP can process reliably only one Modbus transaction at a time. Reduce the polling rate of the client to avoid nested transactions.

The transmitter's Modbus response time is approximately 2000 ms. If the Modbus client gives a timeout error, increase the request timeout parameter.

The transmitter's Modbus server port is 502.

More information

- Enabling Modbus TCP/IP on touchscreen (page 131)
- Enabling Modbus TCP/IP in web interface (page 156)

10.2 Unit identification of transmitter and probes

The transmitter and the connected probes are treated as separate Modbus devices, each with their own fixed unit identifier (unit ID) value. The unit ID in the Modbus request defines the intended recipient of the request.

Table 15 Unit IDs of transmitter and probes

Device	Unit ID
Transmitter with barometer module	240
Measurement device connected to probe connection terminal 2	241
Measurement device to probe connection terminal 2	242

The unit IDs of the connected measurement devices identify the measurement devices based on the probe connection terminal that they are connected to. The measurement devices use these unit IDs (241 and 242) only when they are connected to the transmitter. When the measurement devices are accessed directly without the transmitter, the measurement devices have their own Modbus address settings instead of these unit IDs.

If the measurement device fails to respond to the request, the transmitter responds to the client with the exception code `Gateway Target Device Failed to Respond`.

For probe-specific register information, see the connected probe's Modbus documentation.

More information

- Modbus reference (page 203)

11. Maintenance and troubleshooting

11.1 Cleaning

You can clean the Indigo transmitter body by wiping it with a moist cloth. Standard cleaning agents can be used.

Refer to the probe-specific cleaning instructions when cleaning the probe connected to transmitter. Do not spray anything directly on the probe, since that may deposit impurities on the sensor.

Chemical tolerance

The following chemicals can be used to clean the transmitter:

- H_2O_2 (6000 ppm), non-condensing
- Alcohol-based cleaning agents such as ethanol and IPA (70 % Isopropyl Alcohol, 30 % water)
- $Ca(Clo)_2$ (calcium hypochlorite) max. 0.5 %
- QAC (quaternary ammonium cations) max. 0.5 %

Avoid exposing the transmitter to chemicals for unnecessarily long periods of time. Do not immerse it in a chemical, and wipe chemicals off the surfaces after cleaning.

11.2 Replacing probes

CAUTION! Only connect compatible measurement devices to the transmitter. Attempting to connect incompatible devices or cables can damage the equipment. Refer to transmitter specifications for compatibility information.

If you want to configure the probe settings, such as purge interval, you can use Indigo80 Handheld Indicator or free Vaisala Insight PC Software. For more information on configuring the probe with Indigo80, see your probe's user guide and Indigo80 User Guide (M212722EN). For more information on configuring the probe with the Insight software, see Insight PC Software overview (page 175) and your probe's user guide, and visit vaisala.com/insight.

You can replace probes both when transmitter power is on and when it is off. There is no need to disconnect any wires from the transmitter; just detach the probe from the probe cable connector (5-pin M12).

When you replace a probe, measurement parameters and outputs will behave differently depending on whether the new probe's parameters are the same as the parameters of the old probe:

- If you replace a probe with a new one that has the same measurement parameters as the removed probe, the transmitter will continue to show those measurements once it detects the new probe.
- If you replace a probe with a new one that has different measurement parameters as the removed probe, you need to reconfigure the measurement parameters and analog outputs for the new probe.

More information

‣ Connecting measurement devices (page 63)

11.3 Updating transmitter software version

You can update the transmitter software through the web interface.

You need **Administrator** user rights for this task.

CAUTION! Data logging feature has changed. Installing software version 1.13.0 or later to replace software version 1.12.0 or earlier removes all previously logged data.

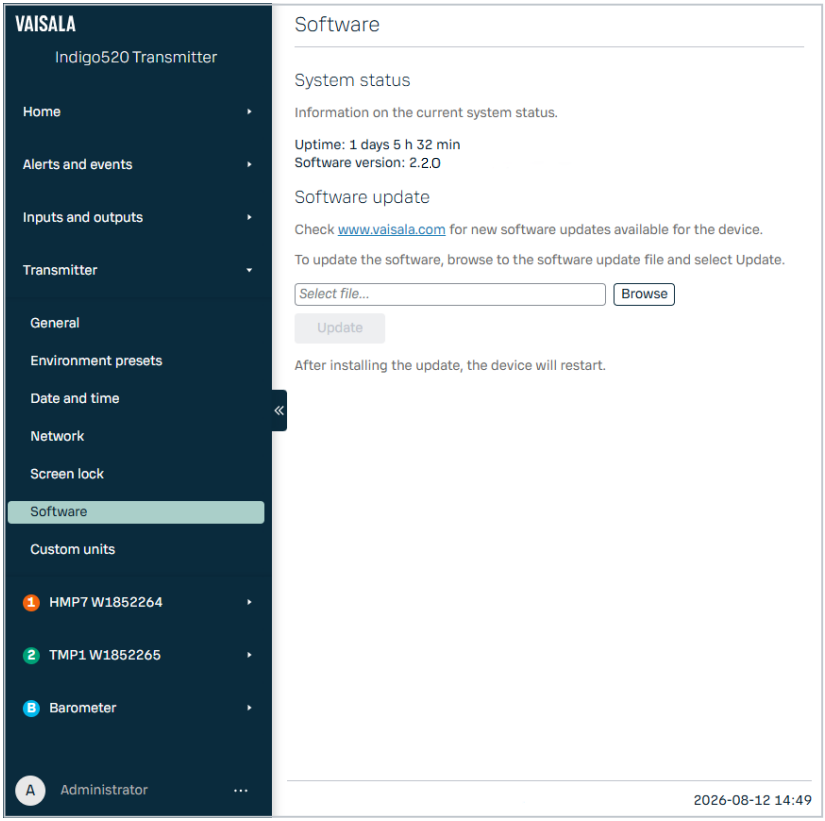
A factory reset is needed after updating to an older software version.

Before you start:

- Make sure that you have the software update file locally on your computer. Link to the latest Indigo500 software update package is available on the Indigo500 product page at vaisala.com/indigo500.
- If your transmitter does not have a network connection, make sure that both the transmitter and the computer connected to it are set to use static network settings.

1. Connect to the web interface.
2. Log in to the web interface as an **Administrator** user.

3. In **Transmitter > Software**, select **Browse**, and browse to the software update file.



4. Select **Update**.

   Updating takes some minutes.

The transmitter restarts. After the restart, you will be prompted to log in again. You can see the updated software version under **Software > System status**.

If the transmitter's IP address is assigned via DHCP, the transmitter may get a new IP address upon restarting. To continue using the web interface, reconnect using the transmitter's new IP address.

More information

- Connecting to web interface (page 92)
- Logging in to web interface (page 99)

11.4 Restoring factory default settings

You can restore all device settings to the factory default settings. This will take some minutes.

To ensure you do not lose any logged data, always export the data before restoring factory default settings. A factory reset will delete all previously logged data.

CAUTION! A factory reset deletes all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays. When you connect to the web interface the next time, you will be prompted to give the activation code and create new users.

CAUTION! Do not power off the transmitter during the factory reset. Powering off the transmitter during a factory reset may cause the transmitter to not reboot without a new factory reset. It may also affect the transmitter configurations in transmitters that have been delivered with preconfigured settings. The preconfigured settings will be visible only after a new factory reset. The factory reset is complete when

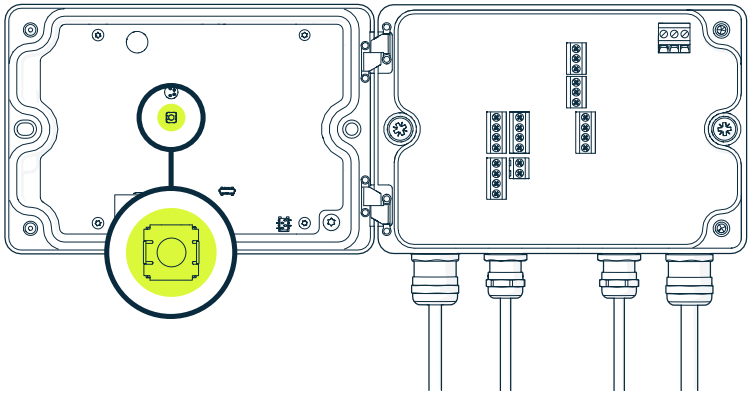
- in a transmitter with display, the **Measurements** view opens.
- in a non-display transmitter, the LED indicator color is solid green.

The power-up may take up to 3 minutes. If the LED indicator of a non-display transmitter is not solid green after 3 minutes, there may be another issue that requires attention. For more information on the LED indicator states, see LED indicator (non-display transmitter) (page 23).

- Allen key (4 mm), provided
- A pointed object for pressing the button inside the transmitter.

1. Power off the transmitter.
2. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
3. Open the transmitter cover.

4. Keep carefully pressing the **PRESS TO ACTIVATE WEB INTERFACE** button while you power up the transmitter. Press the button straight down and avoid touching the metal that surrounds the button. Keep pressing the button until the LED next to the button lights up.



The transmitter restarts.

When the transmitter restarts after a factory reset, it will switch to using DHCP and may get a new IP address. If needed, reconfigure the network settings using the touchscreen. To continue using the web interface, reconnect using the transmitter's new IP address.

More information

- Opening and closing transmitter cover (page 38)
- Connecting to web interface (page 92)
- Creating web interface users (page 95)
- Logging in to web interface (page 99)

11.5 Troubleshooting checklist

When troubleshooting, check the questions listed in Technical support (page 201) before contacting Vaisala technical support.

11.6 Troubleshooting

If you have a problem with using the transmitter, check the following tables before contacting Vaisala. If the problem you have is not listed in the tables, or if the proposed solution does not fix the problem, contact Vaisala technical support.

If you suspect that the problem is with the probes connected to the transmitter, you can also check the probe diagnostics and status with the Insight software and Modbus status registers. For probe-specific register information, see the connected probe's Modbus documentation.

Problem: A power outage occurred.	
Possible cause:	**Solution:**
	Wait for the transmitter to power up again. This will take some minutes. When the transmitter powers up, it will continue to show measurements just like before the power outage. To access the web interface again: 1. Check the current IP address of the transmitter on the touchscreen. The IP address is visible in the **Network and digital interfaces** view, which is one of the **Home** views. 2. Reconnect to the web interface using the current IP address.

Problem: The transmitter does not power up during the first boot-up or after a factory reset.	
Possible cause:	**Solution:**
The transmitter was powered off during the first boot-up or during a factory reset.	Perform a factory reset.  **CAUTION!** A factory reset will delete all previously logged data and all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays.

Problem: The preconfigured settings your transmitter was ordered with are not loaded.	
Possible cause:	**Solution:**

Problem: The preconfigured settings your transmitter was ordered with are not loaded.	
The transmitter was powered off during the first boot-up or during a factory reset.	Perform a factory reset.  **CAUTION!** A factory reset will delete all previously logged data and all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays.

Problem: You cannot access the web interface login page.	
Possible cause:	**Solution:**
If the transmitter's IP address is assigned via DHCP, the IP address may have changed, for example, because the transmitter has been restarted.	1. Check the current IP address of the transmitter on the touchscreen. The IP address is visible in the **Network and digital interfaces** view, which is one of the **Home** views. 2. Reconnect to the web interface using the current IP address.
If the transmitter is using a static IP address, there may be something wrong with the static network settings.	Check the static network settings on the touchscreen. • Menu path on touchscreen: **Menu > Transmitter > Network**
The Ethernet cable may be disconnected from the transmitter.	1. Open the transmitter cover. 2. If the Ethernet connector's green light is not blinking, reconnect the Ethernet cable. 3. Check the current IP address of the transmitter on the touchscreen. The IP address is visible in the **Network and digital interfaces** view, which is one of the **Home** views. 4. Reconnect to the web interface using the current IP address.

Problem: There is no Modbus TCP/IP connection.	
Possible cause:	**Solution:**
Check the possible causes for the web interface login page problem above.	Check the solutions for the web interface login page problem above.
The **Modbus TCP/IP read** setting may be disabled.	Make sure that **Modbus TCP/IP read** is enabled. • Menu path on touchscreen: **Menu > Inputs and outputs > Digital interfaces > Modbus TCP/IP read** • Menu path in web interface: **Inputs and outputs > Digital interfaces > Modbus TCP/IP read**

Problem: Logging in to the web interface fails.	
Possible cause:	**Solution:**
The transmitter's time has not been set correctly. Some browsers do not accept valid browser sessions if the transmitter's time is significantly different from the browser's time.	Set the transmitter's time on the touchscreen so that browsers will be able to create a valid browser session. • Menu path on touchscreen: **Menu > Transmitter > Date and time**
You have forgotten your web interface password.	Restore factory default settings and reconnect to the web interface. When you reconnect, you will be prompted to give the activation code and create new users and passwords.  **CAUTION!** A factory reset will delete all previously logged data and all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays.

Problem: The web interface does not show the same contents as the touchscreen display.	
Possible cause:	**Solution:**
You have changed a setting on the touchscreen, but the change is not shown in the web interface before you refresh the web page.	Refresh the web page.

Problem: There is no measurement data from the connected probe.	
Possible cause:	**Solution:**
The probe may be disconnected from the transmitter.	1. If the connected probe has a status indicator, check its color. 2. If the indicator is off, make sure that the probe is properly connected to the probe cable connector. 3. If the indicator is red, check the probe sensor. If the sensor is faulty, replace it. 4. If the indicator is blinking green, restart the transmitter. 5. If the problem still persists, contact Vaisala.
The probe sensor may be faulty.	

Problem: Analog input is not available.	
Possible cause:	**Solution:**
You have not updated your transmitter's software.	Ensure you have updated to a software version that supports analog input.

Problem: Analog input shows incorrect values.	
Possible cause:	**Solution:**
If you have an external power source, the ground potential may have differences.	Use probe connection terminal 2 as power source.

Problem: Analog input is not showing any values.	
Possible cause:	**Solution:**
Analog input is wired incorrectly.	Check analog input wiring.
Analog input powering is not on.	If you are powering your analog input device through the transmitter, make sure analog input powering is on.

More information

- Opening and closing transmitter cover (page 38)
- Analog input terminals and lead-through (page 57)
- Connecting to web interface (page 92)
- Creating web interface users (page 95)
- Logging in to web interface (page 99)
- Configuring analog input on touchscreen (page 122)
- Configuring analog input in web interface (page 151)
- Updating transmitter software version (page 180)
- Restoring factory default settings (page 182)

11.7 Recycling

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.

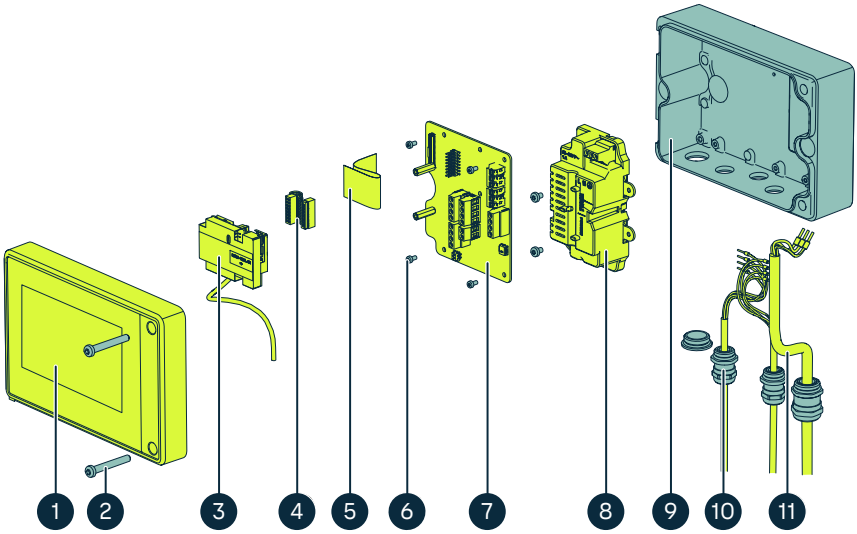


Table 16 Materials for recycling

Recycling	Part	Material
Electrical and electronic waste	1, 3, 4, 5, 7, 8, 11	Various
Metal waste	2, 6, 9	Stainless steel
	9	Aluminum alloy
	10	Nickel-plated brass

12. Technical data

12.1 Indigo510 specifications

Table 17 Indigo510 Transmitter options

Property	Description/Value
Display	• Capacitive touchscreen display • No display (indicator LED) [1)]
Powering	Protective extra-low voltage (11–35 V DC, 24 V AC ± 20 % 50/60 Hz)

1) *Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.*

Table 18 Indigo510 Transmitter operating environment

Property	Description/Value
Operating environment	Outdoor use
Use in wet location	Yes
Operating humidity	0–100 %RH
Maximum operating altitude	4000 m (approx. 13 100 ft)
IP rating	IP66: Dust-tight. Protected from powerful water jets from any direction. [1)]
UL 50E rating	Type 4
Operating temperature	
With display	–20 … +60 °C (–4 … +140 °F)
Without display	–40 … +60 °C (–40 … +140 °F)
Storage temperature	
With display	–30 … +60 °C (–22 … +140 °F)
Without display	–40 … +60 °C (–40 … +140 °F)

1) *Evaluated by Eurofins, not by UL.*

Table 19 Indigo510 Transmitter powering

Property	Description/Value
Operating power	

Property	Description/Value
Protective extra-low voltage (PELV)	11–35 V DC, 24 V AC ±20 % 50/60 Hz, max. current 2 A (power supply is galvanically isolated) [1] Fuse size for power supply: 3 A Isolation voltage: 500 V AC, 1000 V DC
PELV power cable temp. rating	≥ +80 °C (+176 °F)
Typical current consumption at +20 °C (+68 °F) (U_{in} 24 V DC) [2]	
Base consumption (no display, analog outputs, or communication)	50 mA
With display	+ 60 mA
With voltage analog output	< 2 mA per channel
With current analog output	+ 21 mA per channel
With Ethernet cable connected	+ 15 mA

1) *The DNV type approval is valid in operating voltage range 15–35 V DC.*
2) *For the current consumption of the connected measurement device, see the device's documentation, available at docs.vaisala.com.*

Table 20 Indigo510 Transmitter inputs and outputs

Property	Description/Value
Transmitter service port connection	• Connection to Insight software with USB2 and cable 262195SP or with cable 219690 [1] • Connection to Indigo80 with cable 262195SP
Analog outputs	
Number of analog outputs	2
Isolation	Isolated from power supply
Selectable voltage output types	0–1 V, 0–5 V, 0–10 V, scalable
Selectable current output types	4–20 mA, 0–20 mA, scalable
Max. wire size	2.5 mm^2 (14 AWG)
Accuracy of analog outputs at +20 °C (+68 °F)	±0.05 % full scale
Temperature dependence	±0.005 % / °C full scale
External loads:	
Current outputs	R_L < 500 Ω
0–1 V output	R_L > 2 kΩ

Property	Description/Value
0–5 V and 0–10 V outputs	R_L > 10 kΩ
Ethernet interface	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)
Vaisala cloud connectivity [2)]	Requires outbound TCP port 443 and UDP port 123

1) *Vaisala Insight PC Software for Windows® available at vaisala.com/insight.*
2) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

Table 21 Indigo510 Transmitter compliance

Property	Description/Value
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Safety	IEC/EN 61010-1
Type approvals	DNV GL certificate no. TAA000032M EU RO Mutual Recognition certificate no. MRA000004F
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	UL Listed (USA and Canada)
FCC compliance	FCC Part 15, Class B

Table 22 Indigo510 and Indigo520 transmitters mechanical specifications

Property	Description/Value
Housing classification	IK08, DIN EN ISO 11997-1: Cycle B (VDA 621-415)
Housing material	AlSi10Mg (DIN 1725)
Display window material	Strengthened glass (IK08)
Weight	1.5 kg (3.3 lb)
Dimensions (H × W × D)	142 × 182 × 67 mm (5.63 × 7.17 × 2.64 in)

Property	Description/Value
Cable diameters for cable glands	
M20×1.5 glands	5.0–9.0 mm (0.20–0.35 in)
M20×1.5 glands with split bushing	7 mm (0.28 in)
M16×1.5 glands	2.0–6.0 mm (0.08–0.24 in)

Table 23 Indigo510 and Indigo520 transmitters user interfaces

Property	Description/Value
User interfaces	Web interface, optional touchscreen display, optional Vaisala cloud connectivity for remote monitoring [1)]
Supported languages	English, Chinese (simplified), Chinese (traditional), French, German, Japanese, Spanish
Optional display	5″ capacitive touchscreen
Integrated data logging capabilities	Non-volatile memory, at least 10 years' storage with 24 h interval logging

1) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

Table 24 Indigo510 Transmitter compatible devices

Device or series	Models
Probes	
Carbon Dioxide Probes	GMP251, GMP252
Dew Point and Temperature Probes	DMP1, DMP5, DMP6, DMP7, DMP8
Hydrogen Peroxide Probe	HPP271
Hydrogen Peroxide, Humidity and Temperature Probe	HPP272
Moisture in Oil Probe	MMP8
Relative Humidity and Temperature Probes	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature Probe	TMP1
Transmitters and handhelds	
Dew Point Transmitter	DMT153
Indigo80 Handheld Indicator	Indigo80

Device or series	Models
Moisture, Hydrogen and Temperature Transmitter MHT410	MHT410

12.2 Indigo520 specifications

Table 25 Indigo520 Transmitter options

Property	Description/Value
Display	• Capacitive touchscreen display • No display (indicator LED) [1]
Powering	• Protective extra-low voltage (15–35 V DC, 24 V AC ± 20%) • AC (mains) power (100–240 V AC 50/60 Hz) • Power over Ethernet (no analog outputs, analog input, or relays)

1) *Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.*

Table 26 Indigo520 Transmitter measurement performance

Property	Description/Value
Barometric pressure (optional module)	
Pressure range	500–1100 hPa
Class A:	
Linearity	±0.05 hPa
Hysteresis	±0.03 hPa
Repeatability	±0.03 hPa
Calibration uncertainty	±0.07 hPa
Accuracy at +20 °C / +68 °F	±0.10 hPa
Temperature dependence	±0.1 hPa
Total accuracy (-40 ... +60 °C / -40 ... +140 °F)	±0.15 hPa
Long-term stability/year	±0.1 hPa
Response time (100 % response):	
One sensor	2 s

Property	Description/Value
Pressure units	hPa, mbar, kPa, Pa, inHg, mmH20, mmHg, torr, psia

Table 27 Indigo520 Transmitter operating environment

Property	Description/Value
Operating environment	Outdoor use
Use in wet location	Yes
Operating humidity	0–100 %RH
Maximum operating altitude, AC (mains) power	3000 m (approx. 9800 ft)
Maximum operating altitude, protective extra-low voltage (PELV) and Power over Ethernet (PoE)	4000 m (approx. 13 100 ft)
IP rating	IP66: Dust-tight. Protected from powerful water jets from any direction. [1)]
UL 50E rating	Type 4
Operating temperature	
With display	−20 ... +55 °C (−4 ... +131 °F)
Without display	−40 ... +60 °C (−40 ... +140 °F)
Without display with barometer module	−40 ... +55 °C (−40 ... +131 °F)
Storage temperature	
With display	−30 ... +60 °C (−22 ... +140 °F)
Without display	−40 ... +60 °C (−40 ... +140 °F)

1) Evaluated by Eurofins, not by UL.

Table 28 Indigo520 Transmitter powering

Property	Description/Value
Operating power [1)]	
Protective extra-low voltage (PELV) version	15–35 V DC, 24 V AC ±20 % 50/60 Hz, max. current 2 A (power supply is galvanically isolated) Fuse size for power supply: 3 A Isolation voltage: 500 V AC, 1000 V DC
PELV power cable temp. rating	≥ +80 °C (+176 °F)

Property	Description/Value
AC (mains) power version	100–240 V AC 50/60 Hz, max. current 1 A (power supply is galvanically isolated) Fuse size for power supply: 10 A Isolation voltage: 1500 V AC
AC (mains) power cable length	2.5 m (approx. 8 ft 2 in)
Power over Ethernet version [2)]	Power over Ethernet (PoE) IEEE 802.3at Type 2 Class 4 Max. current 600 mA, max. power consumption 25.5 W Isolation voltage: 500 V AC, 1000 V DC
Typical current consumption at +20 °C (+68 °F) (U_{in} 24 V DC) [3)]	
Base consumption (no display, analog outputs, or communication)	50 mA
With display	+ 60 mA
With voltage analog output	< 2 mA per channel
With current analog output	+ 21 mA per channel
With relays	+ 9 mA per relay
With Ethernet cable connected	+ 15 mA
With barometer module	+ 5 mA

1) *The power supply option is selected when ordering the transmitter.*
2) *Transmitter shall be supplied by a Power Sourcing Equipment (PSE) unit which fulfills the requirements of IEEE802.3at specifications.*
3) *For the current consumption of the connected measurement device, see the device's documentation, available at docs.vaisala.com.*

Table 29 Indigo520 Transmitter inputs and outputs

Property	Description/Value
Transmitter service port connection	• Connection to Insight software with USB2 and cable 262195SP or with cable 219690 [1)] • Connection to Indigo80 with cable 262195SP
Analog input [2)]	
Available ranges	4–20 mA
Resolution	6 µA
Display resolution	0.01 mA
Accuracy	±0.05 mA

Property	Description/Value
Input impedances	200 Ω
Isolation	Isolated from power supply
Overload protection	40 mA max. (reverse polarity protected)
Analog outputs [2]	
Number of analog outputs	4
Isolation	Isolated from power supply
Selectable voltage output types	0–1 V, 0–5 V, 0–10 V, scalable
Selectable current output types	4–20 mA, 0–20 mA, scalable
Max. wire size	2.5 mm^2 (14 AWG)
Accuracy of analog outputs at +20 °C (+68 °F)	±0.05 % full scale
Temperature dependence	±0.005 % / °C full scale
External loads:	
Current outputs	R_L < 500 Ω
0–1 V output	R_L > 2 kΩ
0–5 V and 0–10 V outputs	R_L > 10 kΩ
Relay outputs [2]	
Number and type of relays	2 pcs, SPDT
Max. switching power, current, voltage	30 W, 1 A, 40 V DC / 28 V AC
Max. wire size in PELV version	2.5 mm^2 (14 AWG)
Max. wire size in AC (mains) version	1.5 mm^2 (16 AWG)
Ethernet interface	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)
Vaisala cloud connectivity [3]	Requires outbound TCP port 443 and UDP port 123

1) *Vaisala Insight PC Software for Windows® available at vaisala.com/insight.*
2) *Not available in transmitters that are powered with Power over Ethernet (PoE).*
3) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

Table 30 Indigo520 Transmitter compliance

Property	Description/Value
EU directives and regulations	EMC Directive (2014/30/EU) Low Voltage Directive (2014/35/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Safety	IEC/EN 61010-1
Type approvals	DNV GL certificate no. TAA000032M EU RO Mutual Recognition certificate no. MRA000004F
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	UL Listed (USA and Canada)
FCC compliance	FCC Part 15, Class B

Table 31 Indigo510 and Indigo520 transmitters mechanical specifications

Property	Description/Value
Housing classification	IK08, DIN EN ISO 11997-1: Cycle B (VDA 621-415)
Housing material	AlSi10Mg (DIN 1725)
Display window material	Strengthened glass (IK08)
Weight	1.5 kg (3.3 lb)
Dimensions (H × W × D)	142 × 182 × 67 mm (5.63 × 7.17 × 2.64 in)
Cable diameters for cable glands	
M20×1.5 glands	5.0–9.0 mm (0.20–0.35 in)
M20×1.5 glands with split bushing	7 mm (0.28 in)
M16×1.5 glands	2.0–6.0 mm (0.08–0.24 in)

Table 32 Indigo510 and Indigo520 transmitters user interfaces

Property	Description/Value
User interfaces	Web interface, optional touchscreen display, optional Vaisala cloud connectivity for remote monitoring [1)]

Property	Description/Value
Supported languages	English, Chinese (simplified), Chinese (traditional), French, German, Japanese, Spanish
Optional display	5″ capacitive touchscreen
Integrated data logging capabilities	Non-volatile memory, at least 10 years' storage with 24 h interval logging

1) *Available only for transmitters ordered with software configuration for Vaisala cloud connectivity.*

Table 33 Indigo520 Transmitter compatible devices

Device or series	Models
Probes	
Carbon Dioxide Probes	GMP251, GMP252
Dew Point and Temperature Probes	DMP1, DMP5, DMP6, DMP7, DMP8
Hydrogen Peroxide Probe	HPP271
Hydrogen Peroxide, Humidity and Temperature Probe	HPP272
MGP241 Multigas Probe	MGP241
MGP260 Series Multigas Probes	MGP261, MGP262
Moisture in Oil Probe	MMP8
Relative Humidity and Temperature Probes	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature Probe	TMP1
Transmitters, handhelds, and refractometers	
Dew Point Transmitter	DMT153
Differential Pressure Transmitters [1)]	PDT101, PDT102
Indigo80 Handheld Indicator	Indigo80
Moisture, Hydrogen and Temperature Transmitter MHT410	MHT410
Polaris Process Refractometers [2)]	PR53AC, PR53AP, PR53GC, PR53GP, PR53M, PR53SD, PR53W

1) *PDT101 and PDT102 can be used through analog input.*
2) *Compatible with transmitters ordered with software configuration "L" for process refractometers.*

12.3 Spare parts and accessories

Table 34 Indigo510 and Indigo520 transmitters accessories

Item	Item code
Retrofit mounting plate	DRW252186SP
Installation kit for pole or pipeline	215108
Installation kit with weather shield	215109
Indigo500 spatter guard	ASM214526
M12 - M8 service cable 1.5 m (4.9 ft), for connecting to Indigo80	262195SP
Vaisala Indigo USB adapter and M12 - M8 service cable, for connecting to Insight software	USB2 and 262195SP
M8 - USB service cable, for connecting to Insight software	219690
Probe connection cables	
Probe connection cable, 0.3 m (approx. 12 in), open end [1)]	CBL210896-03MSP
Probe connection cable, 1 m (approx. 3 ft 3 in), open end [1)]	CBL210896-1MSP
Probe connection cable, 3 m (approx. 9 ft 10 in), open end [1)]	CBL210896-3MSP
Probe connection cable, 5 m (approx. 16 ft 5 in), open end [1)]	CBL210896-5MSP
Probe connection cable, 10 m (approx. 32 ft 10 in), open end [1)]	CBL210896-10MSP
Extension cable, 1 m (approx. 3 ft 3 in)	INDIGOCABLE1M
Extension cable, 3 m (approx. 9 ft 10 in)	INDIGOCABLE3M
Extension cable, 5 m (approx. 16 ft 5 in)	INDIGOCABLE5M
Extension cable, (approx. 32 ft 10 in)	INDIGOCABLE10M

1) *The usable length outside of the transmitter enclosure is approx. 0.1 m (4 in) shorter than the total length of the cable.*

Table 35 Indigo510 Transmitter spare parts

Item	Item code
Cable gland, M20×1.5, 5.0–9.0 mm (0.20–0.35 in)	ASM213670SP

Item	Item code
Cable gland with split bushing, M20×1.5 [1)]	262632SP
Cable gland, M16×1.5, 2.0–6.0 mm (0.08–0.24 in)	ASM213671SP
Conduit fitting, M20×1.5 for NPT1/2″ conduit	214780SP

1) With 7-mm (0.28 in) hole for cable and 14-mm (0.55 in) hole for 8P8C (RJ45) connector to pass through.

Table 36 Indigo520 Transmitter spare parts

Item	Item code
Cable gland, M20×1.5, 5.0–9.0 mm (0.20–0.35 in)	ASM213670SP
Cable gland, M20×1.5, 10.0–14.0 mm (0.39–0.55 in)	ASM215414
Cable gland with split bushing, M20×1.5 [1)]	262632SP
Cable gland, M16×1.5, 2.0–6.0 mm (0.08–0.24 in)	ASM213671SP
Conduit fitting, M20×1.5 for NPT1/2″ conduit	214780SP
Sintered filter (for barometer module)	DRW010335SP

1) With 7-mm (0.28 in) hole for cable and 14-mm (0.55 in) hole for 8P8C (RJ45) connector to pass through.

13. Vaisala services

13.1 Service centers

Vaisala offers comprehensive customer care throughout the life cycle of our products. Our service centers offer maintenance, calibration, upgrade, and repair services. All the services are provided worldwide with fast deliveries. For more information, go to vaisala.com/services.

The services are available from:

- Vaisala Online Store, store.vaisala.com
- Vaisala Services, helpdesk@vaisala.com

The provided services vary product by product.

13.2 Technical support



You can contact Vaisala technical support at my.vaisala.com 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.

13.3 Warranty

For warranty terms and conditions and the warranty claim process, see vaisala.com/warranty.

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.

Appendix A. Modbus reference

A.1 Unit IDs

Table 37 Unit IDs of transmitter and probes

Device	Unit ID
Transmitter (including analog input, analog outputs, relays, network settings, date and time settings, and optional barometer module)	240
Probe connected to probe connection terminal 1	241
Probe connected to probe connection terminal 2	242

For probe-specific register information, see the connected probe's Modbus documentation.

A.2 Function codes

Table 38 Modbus function codes

Function code (decimal)	Function code (hexadecimal)	Name	Notes
03	0x03	Read Holding Registers	Can be used for reading pressure value using unit ID 240, and for reading probe registers, for example, measurement results, using unit ID 241 or 242. [1)]
16	0x10	Write Multiple Registers	Can be used for writing transmitter configuration registers using unit ID 240, and for writing probe configuration registers using unit ID 241 and 242. [1)]
43 / 14	0x2B / 0x0E	Read Device Identification	Can be used only for reading transmitter identification information using unit ID 240.

1) See the connected probe's Modbus documentation for a probe-specific register list.

A.3 Data encoding

In the data registers, the numeric values are available in one or two formats with separate register addresses: 32-bit IEEE floating point format and/or 16-bit signed integer format.

A.3.1 32-bit floating point or 32-bit integer format

Registers using **32-bit float** data format are encoded using the **binary32** encoding defined in IEEE 754. The format is also known as "single-precision floating point format".

The least significant 16 bits of a floating point number are placed at the Modbus register listed in the table, while the most significant 16 bits are placed in the register with number/address + 1, as specified in Open Modbus TCP Specification, Release 1.0. This is also known as "little-endian" or "Modicon" word order.

Despite the specification, some Modbus clients[1)] may expect a "big-endian" word order (most significant word first). In such case, you must select "word-swapped" floating point format in your Modbus client for the Modbus registers of the device.

A complete 32-bit floating point or 32-bit integer value should be read and written in a single Modbus transaction.



CAUTION! Reading the measurement data registers with incorrect floating point format setting may occasionally result in correct-looking, but nevertheless incorrect values.



It is highly recommended to verify that you have configured the floating point format correctly on your Modbus host system by reading a floating point value from a test value register.

A.3.2 16-bit integer format

Most 16-bit integer values in the data registers are scaled to include the necessary decimals. The scaling factors for those values are shown in the register tables.

Table 39 Interpretation of 16-bit signed integer values

Value (decimal)	Value (hexadecimal)	Description
0–32766	0x0000–0x7FFE	Value in range 0–32766
32767	0x7FFF	Value is 32767 or larger
32768	0x8000	Value is not available
32769	0x8001	Value is –32767 or smaller

1) *Formerly 'master'.*

Value (decimal)	Value (hexadecimal)	Description
32770–65535	0x8002–0xFFFF	Value in range −32766 … −1 (2's complement)

A.4 Modbus registers

Registers are numbered in decimal, starting from 1. Register addresses in actual Modbus messages (Modbus Protocol Data Unit (PDU)) are in hexadecimal and start from zero. Register number 1 corresponds to address 0x0 in the actual Modbus message.

CAUTION! Reading the wrong register(s) may result in correct-looking values. Check the reference documentation of your Modbus host (PLC) to verify which notation it uses for Modbus register addresses.

A.4.1 Measurement data registers

Measurement data registers in this appendix can be used only for transmitters with optional barometer module and transmitters using analog input, using unit ID 240.

Table 40 Floating point measurement data registers (read-only)

Register number	Register address	Register description	Data format	Unit
43	0x002A	Barometric pressure	32-bit float	hPa
49	0x0030	Height-corrected pressure	32-bit float	hPa
53	0x0034	Actual current level of analog input (mA)	32-bit float	mA
55	0x0036	Validated current level of analog input (mA) or NaN if analog input is out of valid range (3.8–20.5 mA)	32-bit float	mA

Table 41 Integer measurement data registers (read-only)

Register number	Register address	Register description	Data format	Scale factor	Offset	Unit
278	0x0115	Barometric pressure	16-bit signed integer	10	0	hPa
281	0x0118	Height-corrected pressure	16-bit signed integer	10	0	hPa

Register number	Register address	Register description	Data format	Scale factor	Offset	Unit
283	0x011A	Actual level of analog input	16-bit signed integer	1000	0	mA
284	0x011B	Validated level of analog input or 0x8000 (-32768) if analog input is out of valid range (3.8–20.5 mA)	16-bit signed integer	1000	0	mA

A.4.2 Status registers

Status registers in this appendix can be used only for transmitters with optional barometer module using unit ID 240.

Table 42 Status registers (read-only)

Register number	Register address	Register description	Data format	Value
514	0x0201	Barometer status	16-bit unsigned integer	0x0000 OK 0x0020 Value locked 0x0080 Sensor failure

Table 43 Error flags (read-only)

Register number	Address	Register description	Data format	Value
515	0x0202	Barometer error flags	16-bit unsigned integer	0x0000 OK 0x0004 Pressure out of range 0x0008 Pressure measurement error 0x0010 Manufactory error 0x0020 Module type not defined 0x0100 F meas 0x0400 Temperature meas 0x0800 Info 2nd bank checksum 0x1000 Info 1st bank checksum 0x2000 Checksum error of current settings 4000 User setting bank checksum 8000 Factory bank setting checksum

Multiple device statuses can be present simultaneously. In those cases, the value of the device status register is the sum of the applicable numbers, for example 0x0014 if pressure is out of range (0x0004) and a manufactory error (0x0010) are present simultaneously.

A.4.3 Configuration registers

Registers in this appendix can be used for configuring analog output, relay, network, and date and time settings, and for configuring height-corrected pressure settings for transmitters with optional barometer module, using unit ID 240.

Table 44 Modbus configuration data registers

Register number	Address	Description	Data format	Read/write	Value
Analog output 1					

Register number	Address	Description	Data format	Read/write	Value
1793	0x0700	Output mode	16-bit signed integer	Read/write	0 = off 1 = 0–20mA 2 = 4–20mA 3 = 0–1V 4 = 0–5V 5 = 0–10V
1794	0x0701	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
1795	0x0702	Scale low end	32-bit float	Read/write	NaN if not set
1797	0x0704	Scale high end	32-bit float	Read/write	NaN if not set
1799	0x0706	Error output	32-bit float	Read/write	NaN if not set
1801	0x0708	Low clipping limit	32-bit float	Read/write	NaN if not set
1805	0x070C	High clipping limit	32-bit float	Read/write	NaN if not set
1809	0x0710	Output level	32-bit float	Read	
1811	0x0712	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
Analog output 2					
2049	0x0800	Output mode	16-bit signed integer	Read/write	0 = off 1 = 0–20mA 2 = 4–20mA 3 = 0–1V 4 = 0–5V 5 = 0–10V
2050	0x0801	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
2051	0x0802	Scale low end	32-bit float	Read/write	NaN if not set
2053	0x0804	Scale high end	32-bit float	Read/write	NaN if not set
2055	0x0806	Error output	32-bit float	Read/write	NaN if not set

Register number	Address	Description	Data format	Read/write	Value
2057	0x0808	Low clipping limit	32-bit float	Read/write	NaN if not set
2061	0x080C	High clipping limit	32-bit float	Read/write	NaN if not set
2065	0x0810	Output level	32-bit float	Read	
2067	0x0812	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
Analog output 3					
2305	0x0900	Output mode	16-bit signed integer	Read/write	0 = off 1 = 0–20mA 2 = 4–20mA 3 = 0–1V 4 = 0–5V 5 = 0–10V
2306	0x0901	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
2307	0x0902	Scale low end	32-bit float	Read/write	NaN if not set
2309	0x0904	Scale high end	32-bit float	Read/write	NaN if not set
2311	0x0906	Error output	32-bit float	Read/write	NaN if not set
2313	0x0908	Low clipping limit	32-bit float	Read/write	NaN if not set
2317	0x090C	High clipping limit	32-bit float	Read/write	NaN if not set
2321	0x0910	Output level	32-bit float	Read	
2323	0x0912	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
Analog output 4					

Register number	Address	Description	Data format	Read/write	Value
2561	0x0A00	Output mode	16-bit signed integer	Read/write	0 = off 1 = 0–20mA 2 = 4–20mA 3 = 0–1V 4 = 0–5V 5 = 0–10V
2562	0x0A01	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
2563	0x0a02	Scale low end	32-bit float	Read/write	NaN if not set
2565	0x0A04	Scale high end	32-bit float	Read/write	NaN if not set
2567	0x0A06	Error output	32-bit float	Read/write	NaN if not set
2569	0x0A08	Low clipping limit	32-bit float	Read/write	NaN if not set
2573	0x0A0C	High clipping limit	32-bit float	Read/write	NaN if not set
2577	0x0A10	Output level	32-bit float	Read	
2579	0x0A12	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
Relay 1 [1)]					
3073	0x0C00	Mode	16-bit signed integer	Read/write	0 = off 1 = above setpoint 2 = below setpoint
3074	0x0C01	Parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
3075	0x0C02	Active above	32-bit float	Read/write	Same as 0x04, NaN if not set
3077	0x0C04	Active below	32-bit float	Read/write	Same as 0x02, NaN if not set
3079	0x0C06	Hysteresis	32-bit float	Read/write	NaN if not set

Register number	Address	Description	Data format	Read/write	Value
3082	0x0C09	Output state	16-bit signed integer	Read	0 = disabled 1 = active 2 = inactive
3083	0x0C0A	Force output	16-bit signed integer	Read/write	0 = normal mode 1 = active 2 = force inactive
Relay 2 [1)]					
3329	0x0D00	Mode	16-bit signed integer	Read/write	0 = off 1 = above setpoint 2 = below setpoint
3330	0x0D01	Parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
3331	0x0D02	Active above	32-bit float	Read/write	Same as 0x04, NaN if not set
3333	0x0D04	Active below	32-bit float	Read/write	Same as 0x02, NaN if not set
3335	0x0D06	Hysteresis	32-bit float	Read/write	NaN if not set
3338	0x0D09	Output state	16-bit signed integer	Read	0 = disabled 1 = active 2 = inactive
3339	0x0D0A	Force output	16-bit signed integer	Read/write	0 = normal mode 1 = active 2 = force inactive
Network					
1537	0x0600	Setting type	16-bit signed integer	Read/write	1 = DHCP 2 = static IP
1538–1545	0x0601–0x0608	IP address	15-character ASCII string	Read/write	

Register number	Address	Description	Data format	Read/write	Value
1546–1553	0x0609–0x0610	Gateway	15-character ASCII string	Read/write	
1554–1561	0x0611–0x0618	Subnet mask	15-character ASCII string	Read/write	
1562–1569	0x0619–0x0620	DNS server 1	15-character ASCII string	Read/write	
1570–1577	0x0621–0x0628	DNS server 2	15-character ASCII string	Read/write	
1578	0x0629	Apply settings	16-bit signed integer	Write	1 = apply settings
Date and time					
1025	0x0400	Mode	16-bit signed integer	Read/write	1 = NTP 2 = Manual time setting
1026	0x0401	NTP address 1	31-character ASCII string	Read/write	
1042	0x0411	NTP address 2	31-character ASCII string	Read/write	
1058	0x0421	Time zone	enum	Read/write	Valid range 0–90 For description of values, see Table 45 (page 213)
1059	0x0422	Year	16-bit signed integer	Read/write	For example 2024
1060	0x0423	Month	16-bit signed integer	Read/write	Valid range 1–12 For example, 4 = April
1061	0x0424	Day	16-bit signed integer	Read/write	Valid range 1–31
1062	0x0425	Hour	16-bit signed integer	Read/write	Valid range 0–23
1063	0x0426	Minute	16-bit signed integer	Read/write	Valid range 0–59
1064	0x0427	Second	16-bit signed integer	Read/write	Valid range 0–59
Barometer					

Register number	Address	Description	Data format	Read/write	Value
785	0x0310	HCP height	32-bit float	Read/write	Valid range −30 m ... +30 m

1) *Relay configuration registers can be used for configuring a single condition. The condition can be either Active above or Active below limit. For multiple conditions and other relay activation types than limit, use the user interfaces to configure the relay. Reading output state registers 0x0C09 and 0x0D09 is possible regardless of the configuration.*

Table 45 Time zones

Value	Time zone description	Corresponding time zone name used by the device
0	Modbus register value for when a time zone outside of this list is selected. Writing 0 is ignored.	
1	UTC-11 Midway, Samoa (SST)	Pacific/Pago Pago
2	UTC-11 Niue	Pacific/Niue
3	UTC-10 Hawaii (HST)	Pacific/Honolulu
4	UTC-10 Tahiti, Cook Islands	Pacific/Tahiti
5	UTC-10/-09 Western Aleutians in Alaska (HST/HDT)	America/Adak
6	UTC-09:30 Marquesas	Pacific/Marquesas
7	UTC-09 Gambier	Pacific/Gambier
8	UTC-09/-08 Most of Alaska (AKST/AKDT)	America/Anchorage
9	UTC-08 Pitcairn	Pacific/Pitcairn
10	UTC-08/-07 Pacific (PST/PDT): US & Canada, Mexico	America/Los Angeles
11	UTC-07 Mountain Standard (MST): US & Canada, Mexico	America/Phoenix
12	UTC-07/-06 Mountain (MST/MDT): US & Canada, Mexico	America/Denver
13	UTC-06 Galápagos	Pacific/Galapagos
14	UTC-06 Central Standard (CST): Mexico, Central America	America/Mexico City
15	UTC-06/-05 Easter IslandUTC-06/05 Easter Island	Pacific/Easter

Value	Time zone description	Corresponding time zone name used by the device
16	UTC-06/-05 Central (CST/CDT): US & Canada, Mexico	America/Chicago
17	UTC-05 Eastern South America	America/Lima
18	UTC-05 Eastern Standard (EST): Caymans, Jamaica, Mexico, Panama	America/Jamaica
19	UTC-05/-04 Cuba	America/Havana
20	UTC-05/-04 Eastern (EST/ EDT): US & Canada	America/New York
21	UTC-04 Western South America	America/Caracas
22	UTC-04 Atlantic Standard (AST): Eastern Caribbean	America/Santo Domingo
23	UTC-04/-03 Most of Chile	America/Santiago
24	UTC-04/-03 Paraguay	America/Asuncion
25	UTC-04/-03 Atlantic (AST/ ADT): Canada, Bermuda	America/Halifax
26	UTC-03:30/-02:30 Newfoundland (NST/NDT)	America/St Johns
27	UTC-03 Eastern South America	America/Sao Paulo
28	UTC-03/-02 St Pierre & Miquelon	America/Miquelon
29	UTC-02 Fernando de Noronha, South Georgia	America/Noronha
30	UTC-02/-01 Most of Greenland	America/Nuuk
31	UTC-01 Cape Verde	Atlantic/Cape Verde
32	UTC-01/-00 Azores	Atlantic/Azores
33	UTC+00 Far western Africa, Iceland (GMT)	Africa/Abidjan
34	UTC+00/+01 United Kingdom (GMT/BST)	Europe/London
35	UTC+00/+01 Western Europe (WET/WEST)	Europe/Lisbon
36	UTC+00/+02 Troll Station in Antarctica	Antarctica/Troll
37	UTC+01 Algeria, Tunisia (CET)	Africa/Algiers

Value	Time zone description	Corresponding time zone name used by the device
38	UTC+01 Western Africa (WAT)	Africa/Lagos
39	UTC+01/+00 Ireland (IST/GMT)	Europe/Dublin
40	UTC+01/+00 Morocco	Africa/Casablanca
41	UTC+01/+02 Central Europe (CET/CEST)	Europe/Paris
42	UTC+02 Central Africa (CAT)	Africa/Maputo
43	UTC+02 Libya, Kaliningrad (EET)	Africa/Tripoli
44	UTC+02 Southern Africa (SAST)	Africa/Johannesburg
45	UTC+02/+03 Eastern Europe (EET/EEST)	Europe/Athens
46	UTC+02/+03 Egypt	Africa/Cairo
47	UTC+02/+03 Lebanon	Asia/Beirut
48	UTC+02/+03 Moldova	Europe/Chisinau
49	UTC+02/+03 Palestine	Asia/Gaza
50	UTC+02/+03 Israel	Asia/Jerusalem
51	UTC+03 Near East, Belarus	Europe/Istanbul
52	UTC+03 Eastern Africa (EAT)	Africa/Nairobi
53	UTC+03 Moscow (MSK)	Europe/Moscow
54	UTC+03:30 Iran	Asia/Tehran
55	UTC+04 Russia, Caucasus, Persian Gulf, Seychelles, Réunion	Asia/Dubai
56	UTC+04:30 Afghanistan	Asia/Kabul
57	UTC+05 Russia, Tajikistan, Turkmenistan, Uzbekistan, Maldives	Asia/Tashkent
58	UTC+05 Pakistan (PKT)	Asia/Karachi
59	UTC+05:30 Sri Lanka	Asia/Colombo
60	UTC+05:30 India (IST)	Asia/Kolkata
61	UTC+05:45 Nepal	Asia/Kathmandu
62	UTC+06 Russia, Kyrgyzstan, Bhutan, Bangladesh, Chagos	Asia/Dhaka

Value	Time zone description	Corresponding time zone name used by the device
63	UTC+06:30 Myanmar, Cocos	Asia/Yangon
64	UTC+07 Russia, Mainland Southeast Asia, Christmas Island	Asia/Bangkok
65	UTC+07 Indonesia (WIB)	Asia/Jakarta
66	UTC+08 Russia, Brunei, Malaysia, Singapore	Asia/Singapore
67	UTC+08 Western Australia (AWST)	Australia/Perth
68	UTC+08 China (CST)	Asia/Shanghai
69	UTC+08 Hong Kong (HKT)	Asia/Hong Kong
70	UTC+08 Philippines (PHT)	Asia/Manila
71	UTC+08 Indonesia (WITA)	Asia/Makassar
72	UTC+08:45 Eucla	Australia/Eucla
73	UTC+09 Russia, Palau, East Timor	Asia/Chita
74	UTC+09 Japan (JST)	Asia/Tokyo
75	UTC+09 Korea (KST)	Asia/Seoul
76	UTC+09 Indonesia (WIT)	Asia/Jayapura
77	UTC+09:30 Northern Territory (ACST)	Australia/Darwin
78	UTC+09:30/+10:30 South Australia (ACST/ACDT)	Australia/Adelaide
79	UTC+10 Russia, Yap, Chuuk, Papua New Guinea, Dumont d'Urville	Asia/Vladivostok
80	UTC+10 Queensland (AEST)	Australia/Brisbane
81	UTC+10 Mariana Islands (ChST)	Pacific/Guam
82	UTC+10/+11 Southeast Australia (AEST/AEDT)	Australia/Sydney
83	UTC+10:30/+11 Lord Howe Island	Australia/Lord Howe
84	UTC+11 Russia, Kosrae, Bougainville, Solomons	Pacific/Bougainville
85	UTC+11/+12 Norfolk Island	Pacific/Norfolk

Value	Time zone description	Corresponding time zone name used by the device
86	UTC+12 Russia, Tuvalu, Fiji	Asia/Kamchatka
87	UTC+12/+13 New Zealand (NZST/NZDT)	Pacific/Auckland
88	UTC+12:45/+13:45 Chatham Islands	Pacific/Chatham
89	UTC+13 Kanton, Tokelau, western Samoa, Tonga	Pacific/Tongatapu
90	UTC+14 Kiritimati	Pacific/Kiritimati

A.4.4 Test value registers

Read the known test values from the test registers to verify the functionality of your Modbus implementation.

Table 46 Modbus test registers (read-only)

Register number	Address	Description	Data format	Test value
7937	0x1F00	Signed integer	16-bit integer	–12345
7938	0X1F01	Floating point	32-bit float	–123.45
7940	0X1F03	Text string	7-character ASCII string	Text string "–123.45"

A.5 Device identification objects

Device identification objects in this appendix can be used only for transmitters, using unit ID 240.

Table 47 Device identification objects

Object ID (decimal)	Object ID (hexadecimal)	Object name	Example contents
0	0x00	VendorName	"Vaisala"
1	0x01	ProductCode	"INDIGO5X0"
2	0x02	MajorMinorVersion	"1.2.3" Software version of the device.
3	0x03	VendorUrl	"https://www.vaisala.com/"
4	0x04	ProductName	"Indigo5X0 Transmitter"

Object ID (decimal)	Object ID (hexadecimal)	Object name	Example contents
128	0x80	SerialNumber [1)]	"K0710040"

1) Vaisala-specific device identification object.

A.6 Exception responses

Table 48 Modbus exception responses

Code	Name	Reason
01	Illegal function	Unsupported function code
02	Illegal data address	Register address or Object ID out of valid ranges
03	Illegal data value	Otherwise invalid request

Accessing unavailable (temporarily missing) measurement data does not generate a Modbus exception. “Unavailable” value (a quiet NaN for floating point data or 0x8000 for integer data) is returned instead. An exception is generated only for any access outside the applicable register ranges.

A.7 Modbus communication examples

Reading RH value from HMP4 probe connected to the transmitter as Probe 1

The values returned by the device differ depending on the ambient conditions. Your device might not return exactly the same values.

Request		Response	
Bytes in the frame (hexadecimal)	**Description**	**Bytes in the frame (hexadecimal)**	**Description**
0x00	Transaction ID	0x00	Transaction ID
0x01		0x01	
0x00	Protocol ID	0x00	Protocol ID
0x00		0x00	
0x00	Length (6)	0x00	Length (7)
0x06		0x07	
0xF1	Unit ID (probe 1)	0xF1	Unit ID (probe 1)
0x03	Function (read holding registers)	0x03	Function (read holding registers)
0x00	Register address	0x04	Number of data bytes
0x00		0x7A	Value of first register (least significant word)
0x00	Number of 16-bit registers to read (2)	0xE1	
0x02		0x41	Value of second register (most significant word)
		0xF4	

Communication description	
Transaction identifier	Any number identifying the response and the corresponding request on a Modbus TCP/IP transaction
Protocol identifier	0 (Modbus Protocol) as specified for Modbus TCP/IP
Length	Number of remaining bytes in the frame starting from the unit ID
Register number	1 (1-based Modbus register number) = 0x0000 (0-based register address used in actual communication) based on the Modbus reference in HMP Series with MMP8 and TMP1 User Guide (M212022EN)
Data format	Two 16-bit Modbus registers interpreted as IEEE 754 binary32 floating point value, least significant word first
Returned value	0x41F47AE1, which is binary32 representation of 30.56 (%RH)

Configuring static IP network settings

The response to a write function informs that the function was correctly received by the device. It does not guarantee that the written value was accepted by the device (for example, in case of out-of-range values).
To verify that the value was really accepted by the device, read the register value after writing.

Request		Response	
Bytes in the frame (hexadecimal)	**Description**	**Bytes in the frame (hexadecimal)**	**Description**
0x00, 0x01	Transaction ID	0x00, 0x01	Transaction ID
0x00, 0x00	Protocol ID	0x00, 0x00	Protocol ID
0x00, 0x5B	Length	0x00, 0x06	Length
0xF0	Unit ID	0xF0	Unit ID
0x10	Function (write multiple registers)	0x10	Function (write multiple registers)
0x06, 0x00	Starting address	0x06, 0x00	Starting address
0x00, 0x2A	Word count	0x00, 0x2A	Registers written
0x54	Byte count		
0x00, 0x02	Static IP = 2		
0x31, 0x39, 0x32, 0x2E, 0x31, 0x36, 0x38, 0x2E, 0x31, 0x2E, 0x31, 0x30, 0x30, 0x00, 0x00, 0x00	"192.168.1.100" encoded as ASCII		
0x31, 0x39, 0x32, 0x2E, 0x31, 0x36, 0x38, 0x2E, 0x31, 0x2E, 0x31, 0x00, 0x00, 0x00, 0x00, 0x00	"192.168.1.1" encoded as ASCII		
0x32, 0x35, 0x35, 0x2E, 0x32, 0x35, 0x35, 0x2E, 0x32, 0x35, 0x35, 0x2E, 0x30, 0x00, 0x00, 0x00	"255.255.255.0" encoded as ASCII		

Request		Response
0x31, 0x39, 0x32, 0x2E, 0x31, 0x36, 0x38, 0x2E, 0x39, 0x2E, 0x31, 0x32, 0x33, 0x00, 0x00, 0x00	"192.168.9.123" encoded as ASCII	
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	"" encoded as ASCII	
0x00, 0x01	Apply = 1	

Configuring DHCP network settings

The response to a write function informs that the function was correctly received by the device. It does not guarantee that the written value was accepted by the device (for example, in case of out-of-range values).
To verify that the value was really accepted by the device, read the register value after writing.

Request		Response	
Bytes in the frame (hexadecimal)	**Description**	**Bytes in the frame (hexadecimal)**	**Description**
0x00, 0x01	Transaction ID	0x00, 0x01	Transaction ID
0x00, 0x00	Protocol ID	0x00, 0x00	Protocol ID
0x00, 0x5B	Length	0x00, 0x06	Length
0xF0	Unit ID	0xF0	Unit ID
0x10	Function (write multiple registers)	0x10	Function (write multiple registers)
0x06, 0x00	Starting address	0x06, 0x00	Starting address
0x00, 0x2A	Word count	0x00, 0x2A	Registers written
0x54	Byte count		
0x00, 0x01	DHCP = 1		

Request		Response
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	"" encoded as ASCII	
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	"" encoded as ASCII	
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	"" encoded as ASCII	
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	"" encoded as ASCII	
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	"" encoded as ASCII	
0x00, 0x01	Apply = 1	

Index

A

accessories....199
adjustment....169
alert rules....113, 143
alerts....113, 143
analog input....26
analog outputs....25
  correction....121, 149
  testing....119, 148

B

barometer....27
  adjustment....132, 157
  calibration....133, 158
  HCP....136, 159

C

cable glands....21, 62
cleaning....179
closing....38
compensation....137, 161
configuration....111
  analog input....122, 151
  analog outputs....115, 118, 119, 121, 145, 149
  date and time....85
  graph view....110
  measurements view....109
  network....83
  relays....124, 128–130, 153
  screen lock....87
  transmitter name....89, 105
  units....87
  web interface home view....141

D

data logging....29
  exporting....163
digital output....26

E

environmental compensation....31, 139, 162
environment presets....31, 139, 162
environment settings....137, 161
ESD protection....36
Ethernet....32, 59

F

factory default settings....182
factory reset....182
features....19

I

Indigo80....166
  calibration and adjustment....168
  connecting....167
Insight software
  connecting....173
  overview....172, 175
  user modes....172
installation
  connecting measurement devices....63
  mounting....38
  wiring....49

L

LED....23

M

measurement device
  compatibility....18
  connecting....63
Modbus....26, 131, 156, 177
  communication examples....218
  configuration registers....207
  device identification....217
  function codes....203
  measurement data....205
  status....206

test value registers....217
unit ID....177, 203
mounting....42

O
opening....38
output options....25

P
parts....20
PR53....170
connecting....171
probes
replacing....179
product overview....18

R
recycling....187
relays....26
activation mode....130
hysteresis....131
testing....128, 156

S
safety....33, 36
screen lock
PIN code....106
service centers....201
service port....61, 136, 160
software update....180
spare parts....199
specifications
Indigo510....189
Indigo520....193
startup....82, 91, 93

T
terminals
analog input....57, 58
analog output....55
measurement device connection....60
power supply....50, 51
relay output....55
service port....61
touchscreen....23, 65, 71
troubleshooting....184

U
user modes
advanced mode....24
basic mode....24

V
Vaisala cloud connection....137, 160
Jade smart cloud....32
views
alert rules....71, 77
alerts and events....71, 77
configuration menu....65
events....71, 77
graph....65, 71, 76
I/O status....65, 76
measurement devices....73, 79
measurements....65, 76
network and digital interfaces....65

W
web interface....24, 76, 77
activating....105
connecting....92, 93
date and time....102
language....99
logging in....99
network settings....100
transmitter name....105
units....104
users....95

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