

# User Guide

Indigo500 Series Transmitters  
**Indigo510, Indigo520**



PUBLISHED BY

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# 1. About this document

## 1.1 Version information

This document provides detailed instructions for installing, using, and maintaining Vaisala Indigo510 and Indigo520 transmitters.

Table 1 Document versions (English)

Document code	Date	Description
M212287EN-P	May 2023	<p>Added sections:</p> <ul style="list-style-type: none"> <li>• Wall mounting with spatter guard (page 35)</li> <li>• Service port connection (page 48)</li> <li>• Enabling service port on touchscreen (page 88)</li> <li>• Enabling service port in web interface (page 98)</li> <li>• Indigo80 handheld indicator (page 101)</li> <li>• Connecting to Indigo80 handheld indicator (page 102)</li> <li>• PR53 process refractometers (page 103)</li> <li>• Connecting to PR53 process refractometers (page 104)</li> <li>• Data encoding (page 126)</li> <li>• Configuration registers (page 130)</li> <li>• Exception responses (page 134)</li> </ul> <p>Updated sections:</p> <ul style="list-style-type: none"> <li>• Related manuals (page 12)</li> <li>• Device compatibility (page 15)</li> <li>• Indigo500 basic features and options (page 15)</li> <li>• Data logging (page 25)</li> <li>• Mounting (page 31)</li> <li>• Probe connection terminals and lead-throughs (page 48)</li> <li>• Touchscreen display and main views (page 52)</li> <li>• Web interface and main views (page 56)</li> <li>• Enabling Modbus TCP/IP on touchscreen (page 88)</li> <li>• Configuring web interface home view (page 89)</li> <li>• Enabling Modbus TCP/IP in web interface (page 98)</li> <li>• Exporting logged data (page 99)</li> <li>• Updating transmitter software version (page 108)</li> <li>• Indigo510 specifications (page 114)</li> <li>• Indigo520 specifications (page 117)</li> <li>• Spare parts and accessories (page 122)</li> <li>• Unit IDs (page 126)</li> <li>• Measurement data registers (page 128)</li> </ul>

Document code	Date	Description
M212287EN-N	November 2022	<p>Added sections:</p> <ul style="list-style-type: none"> <li>• Analog input (page 23)</li> <li>• Analog input terminals and lead-through (page 45)</li> <li>• Analog input wiring when powering with Indigo520 (page 45)</li> <li>• Analog input wiring with external power supply (page 46)</li> <li>• Configuring analog input on touchscreen (page 84)</li> <li>• Configuring analog input in web interface (page 94)</li> <li>• Testing relays in web interface (page 97)</li> <li>• Status registers (page 129)</li> </ul> <p>Updated sections:</p> <ul style="list-style-type: none"> <li>• Updated images.</li> <li>• Indigo500 basic features and options (page 15)</li> <li>• Safety (page 27)</li> <li>• Touchscreen display (page 20)</li> <li>• Preparing AC (mains) power cable (page 42)</li> <li>• Touchscreen display and main views (page 52)</li> <li>• Web interface and main views (page 56)</li> <li>• Troubleshooting (page 111)</li> <li>• Indigo510 specifications (page 114)</li> <li>• Indigo520 specifications (page 117)</li> <li>• Unit IDs (page 126)</li> <li>• Measurement data registers (page 128)</li> </ul>
M212287EN-M	August 2022	<p>Updated sections:</p> <ul style="list-style-type: none"> <li>• Updated images throughout the document.</li> <li>• Data logging (page 25)</li> <li>• Probe connection terminals and lead-throughs (page 48)</li> <li>• Temperature compensation (page 51)</li> <li>• Touchscreen display and main views (page 52)</li> <li>• Configuring analog outputs on touchscreen (page 80)</li> <li>• Testing analog outputs on touchscreen (page 83)</li> <li>• Exporting logged data (page 99)</li> <li>• Indigo510 specifications (page 114)</li> <li>• Indigo520 specifications (page 117)</li> </ul>

## 1.2 Related manuals



For the latest versions of these documents, see [docs.vaisala.com](https://docs.vaisala.com).

Table 2 Related manuals

Document code	Name
M212290EN	<a href="#">Vaisala Indigo500 Series Transmitters Quick Guide</a>
M212022EN	<a href="#">Vaisala HMP Series with MMP8 and TMP1 User Guide</a>
M212357EN	<a href="#">Vaisala DMP Series User Guide</a>
M211799EN	<a href="#">Vaisala GMP251 Carbon Dioxide Probe User Guide</a>
M211897EN	<a href="#">Vaisala GMP252 Carbon Dioxide Probe User Guide</a>
M211888EN	<a href="#">Vaisala HPP271 Hydrogen Peroxide Probe User Guide</a>
M211972EN	<a href="#">Vaisala HPP272 Hydrogen Peroxide, Humidity and Temperature Probe User Guide</a>
M212722EN	<a href="#">Vaisala Indigo80 Handheld Indicator User Guide</a>
M212898EN	<a href="#">Vaisala Polaris Process Refractometer PR53 Series User Guide</a>

### 1.3 Documentation conventions



**WARNING! 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! Caution** warns you of 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.



**Note** highlights important information on using the product.



**Tip** 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

Vaisala® and BAROCAP® are registered trademarks of Vaisala Oyj.

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## 2. Product overview

### 2.1 Introduction to Indigo500 Series Transmitters

Vaisala Indigo500 Series 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.

The Indigo520 transmitter has 2 measurement device connections, and the 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.

For more information on Indigo500 transmitter models, see [www.vaisala.com/indigo](http://www.vaisala.com/indigo).

#### 2.1.1 Device compatibility

Indigo500 Series Transmitters are the most versatile option for use with Indigo-compatible 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

Indigo500 Series transmitters can be connected to the MHT410 transmitter for display of measurement data and automation system connectivity. Indigo500 Series transmitters can also be connected to the portable diagnostics tool Indigo80 handheld indicator.

Indigo520 transmitter can be connected to Polaris™ PR53 process refractometers for measuring liquid concentrations.

### 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 and NEMA 4 rated metal enclosure
- Ethernet connection with web interface for remote access
- Modbus® TCP/IP protocol
- UL Listed in USA and Canada
- Data logging of all measurement parameters
- Screen lock feature

- Installation options:
  - Wall mounting
  - Wall mounting with adapter plate (retrofit 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  $\pm 15\%$  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
- 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  $\pm 20\%$
  - 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

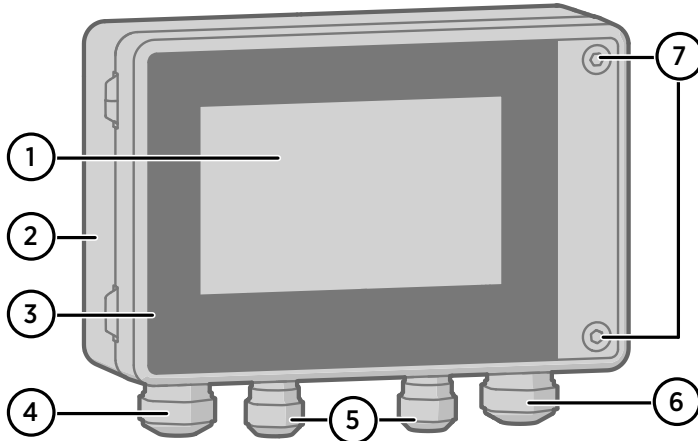


Figure 1 Indigo520 transmitter parts

- 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

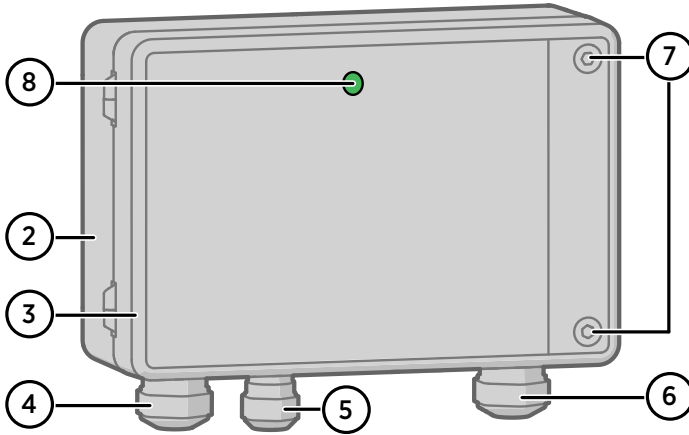


Figure 2 Indigo510 transmitter parts, non-display version

- 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 figure shows examples of different cable gland and conduit configurations available from Vaisala.

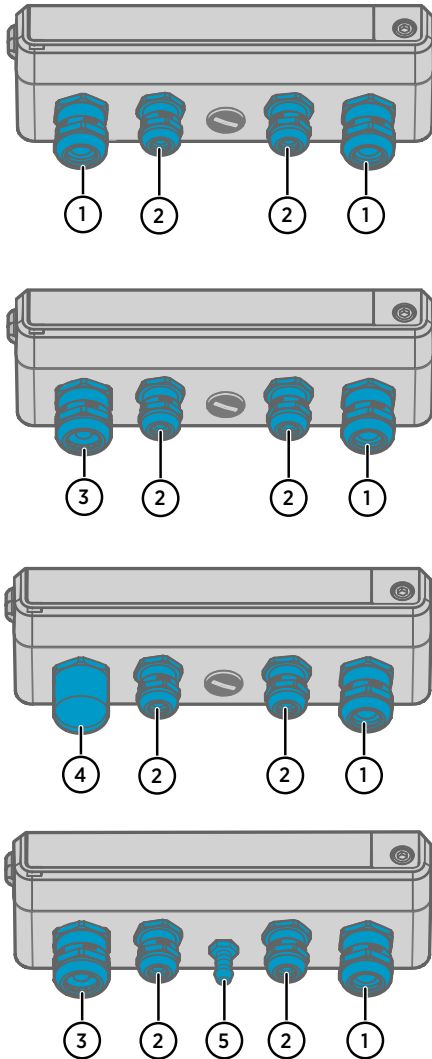


Figure 3 Indigo520 cable gland and conduit options, example configurations

- 1 Cable gland, M20x1.5
- 2 Cable gland, M16x1.5
- 3 Cable gland with split bushing, M20x1.5
- 4 Conduit fitting, M20x1.5 for NPT1/2" conduit
- 5 Pressure port, barometer module

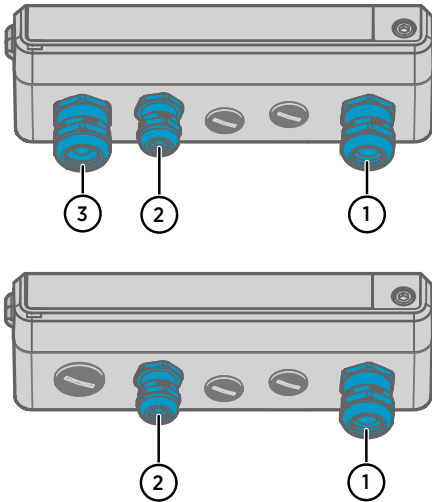


Figure 4 Indigo510 cable gland options, example configurations

- 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 \(page 122\)](#)

## 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 4 measurement parameters at the same time, as well as graphs for 1 to 2 parameters. 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 \(page 52\)](#)
- [Starting up transmitter using touchscreen display \(page 58\)](#)

## 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, Firefox, Chrome, and Safari): using the most recent version is recommended.



If you use the web interface with Firefox, make sure your device's time settings are correct. Incorrect device time settings will prevent the use of the activation code.

### More information

- [Web interface and main views \(page 56\)](#)
- [Starting up transmitter using web interface \(page 66\)](#)
- [Updating transmitter software version \(page 108\)](#)

## 2.7 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.

### 2.7.1 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 and scaling 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 \(page 80\)](#)
- [Configuring analog outputs in web interface \(page 90\)](#)

### 2.7.2 Digital output

Indigo500 transmitters support the Modbus TCP/IP communication protocol (over Ethernet).

#### More information

- [Enabling Modbus TCP/IP on touchscreen \(page 88\)](#)
- [Enabling Modbus TCP/IP in web interface \(page 98\)](#)
- [Modbus overview \(page 105\)](#)
- [Modbus reference \(page 126\)](#)
- [Modbus registers \(page 128\)](#)

## 2.7.3 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 transmitters that are powered with Power over Ethernet (PoE).

### More information

- [Configuring relays on touchscreen \(page 85\)](#)
- [Configuring relays in web interface \(page 95\)](#)

## 2.8 Analog input

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

Current input mode: 4 ... 20 mA.

Using analog input is possible from software version 1.14.0 onward. To get the analog input 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 set the analog input and the analog input powering on.



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



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 \(page 45\)](#)
- [Configuring analog input on touchscreen \(page 84\)](#)
- [Configuring analog input in web interface \(page 94\)](#)
- [Updating transmitter software version \(page 108\)](#)

## 2.9 BARO-1 barometer module

The Indigo520 transmitter is available with a BARO-1 module. The BARO-1 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 probe measurement parameters, the barometer measurement parameter can be configured to the home views, used as an analog output parameter, and as the measurement parameter that controls the relay. Software version 1.2.0 or later is required.

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, make sure the SPH10/20 tube is pointing downwards from Indigo520. This way the condensed water does not accumulate inside the tube and cause measurement errors.

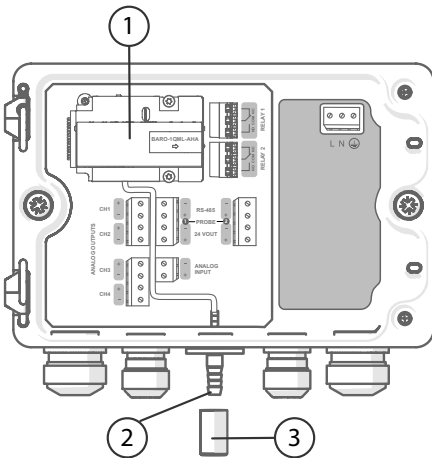


Figure 5 Indigo520 with optional BARO-1 barometer module, example configuration

- 1 BARO-1 barometer module
- 2 Pressure port
- 3 Filter



**More information**

- [Modbus reference \(page 126\)](#)
- [Modbus registers \(page 128\)](#)

## 2.10 Data logging



Data logging feature has changed. Installing software version 1.13 or later to replace software version 1.12 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 probes 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 \(page 25\)](#). Sample data is only stored in the 5 s log. The other logs store the minimum, maximum and averaged values.

**Table 4** Logs and their types and lengths

Log	Type	Length
5 s	Sampled data	At least 14 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

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.



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 ... 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.

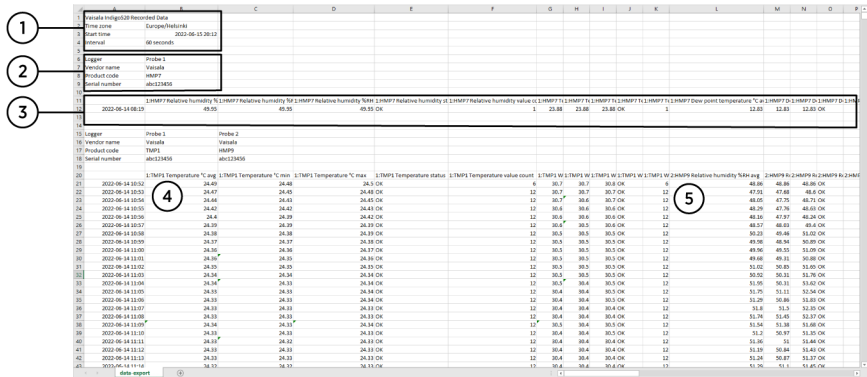


Figure 6 Example of logged data

- 1 The header shows the log's start time, time zone and selected log.
- 2 The second header shows to which port the probe is connected, its vendor name, product code and serial number. This header is created every time a probe 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 probe is connected to probe port 1.
- 5 Number 2 before the measurement parameter shows that this probe is connected to probe port 2.


**More information**

- [Exporting logged data \(page 99\)](#)
- [Setting date and time on touchscreen \(page 61\)](#)
- [Setting date and time in web interface \(page 73\)](#)

## 2.11 Ethernet connection

The Indigo transmitters provide an Ethernet connection for the Modbus TCP/IP protocol and web interface.

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 \(page 59\)](#)
- [Configuring network connection in web interface \(page 71\)](#)

## 2.12 Safety

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



**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!** Transmitters 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.



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



**CAUTION!** INDIGO510 and INDIGO520 PELV version transmitters shall be supplied by an isolated power source which fulfills the requirements of one of the following:

- Limited-Energy Circuit (LEC) in accordance with IEC/EN/UL/CSA 61010-1
- Limited Power Source (LPS) in accordance with IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1, Annex Q
- Class 2 supply source which complies with the National Electrical Code (NEC), NFPA 70, Clause 725.121 and Canadian Electrical Code (CEC), Part I, C22.1



**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 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 transmitter in a manner not specified by Vaisala. If the transmitter 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 will void UL/SGS listing.

### 2.12.1 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.

## 2.13 Regulatory statements

### 2.13.1 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.



**CAUTION!** 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.



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.

### 2.13.2 Canada ICES-3 / NMB-3 compliance statement

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

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

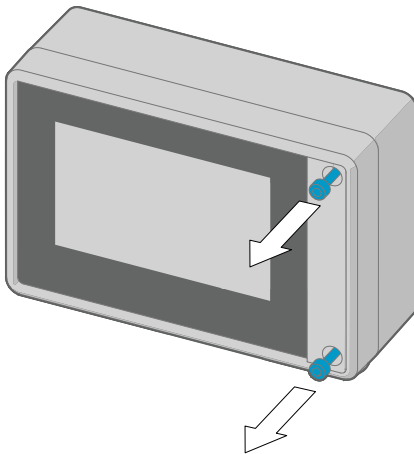
## 3. Installation

### 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 transmitter has the following mounting options:

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

- Wall mounting with spatter guard
- DIN rail mounting
- Pole mounting

### 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

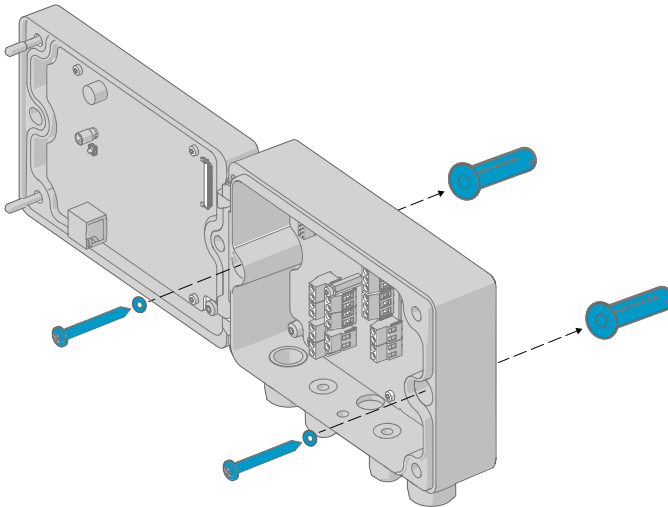


Figure 7 Standard wall mounting



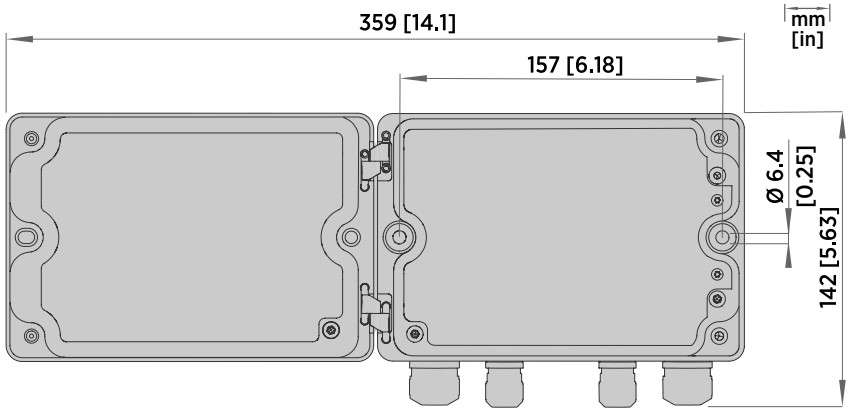


Figure 8 Transmitter mounting dimensions

- ▶ 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 adapter plate



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

Using an adapter plate, you can install an Indigo500 transmitter to replace a Vaisala 330 Series Transmitter in the exact same location.

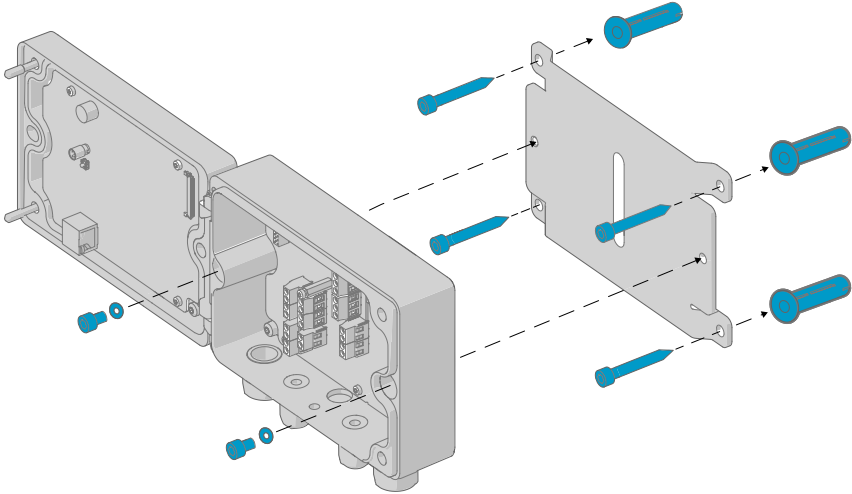


Figure 9 Wall mounting with adapter plate

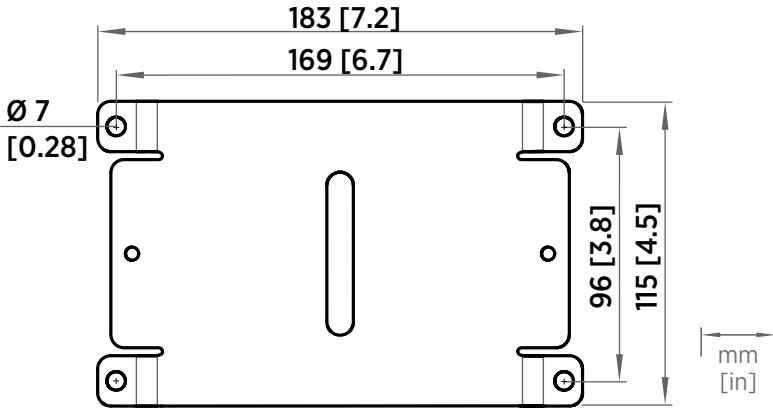


Figure 10 Adapter plate dimensions

- ▶ 1. Attach the adapter 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 adapter plate using 2 × 14-mm screws 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



- Allen keys (4 mm and 5 mm), provided
- Crosshead screwdriver
- Drill with  $\varnothing$  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

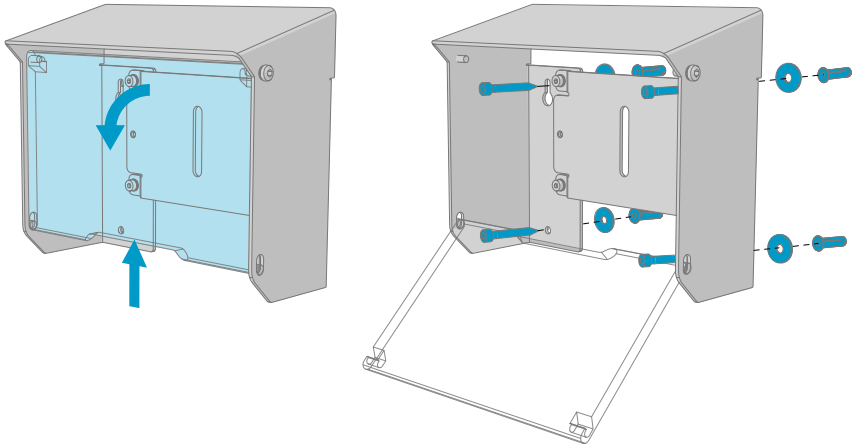


Figure 11 Wall mounting with spatter guard

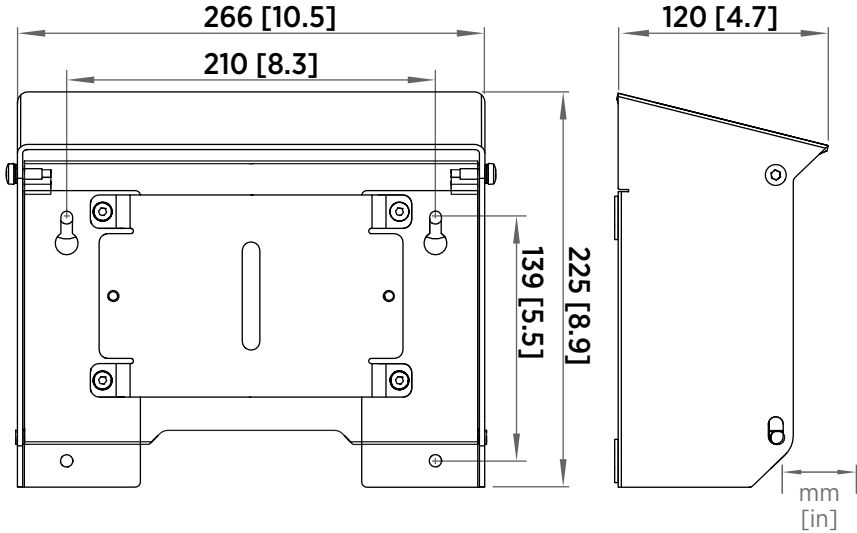


Figure 12 Spatter guard dimensions

- ▶ 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 2 × 14-mm screws 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
- Washers (2 pcs), provided
- Screws 14 mm (2 pcs), provided
- DIN rail clip fasteners (2 pcs), provided

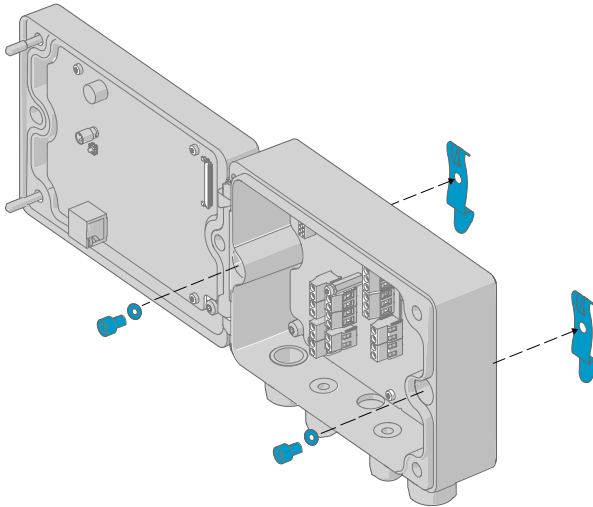


Figure 13 Attaching DIN rail clip fasteners

- ▶ 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 2 × 14-mm screws 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



- 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 poles
  - Mounting nuts for fixing brackets, M8 (4 pcs)
  - Mounting plate (1 pcs)

Using fixing brackets and a mounting plate, you can install the transmitter to a vertical or horizontal pole.

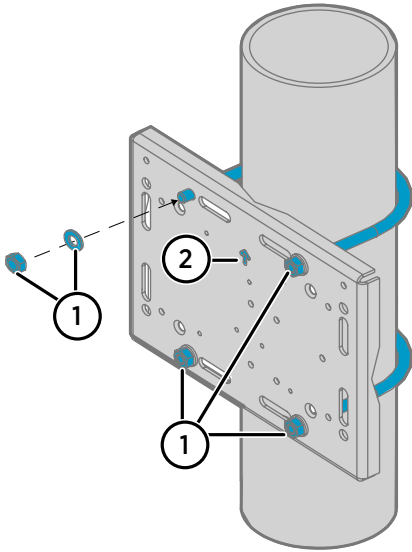


Figure 14 Attaching mounting plate to fixing brackets - vertical pole mounting

- 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.

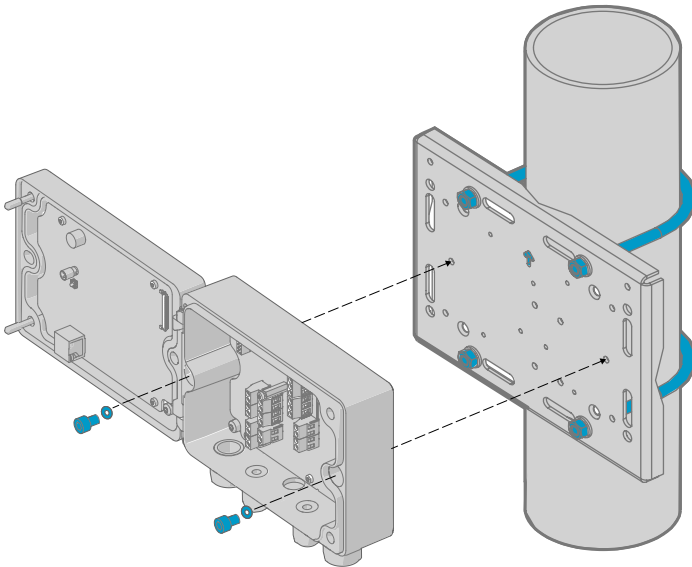


Figure 15 Attaching transmitter to mounting plate - vertical pole mounting

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 2 × 14-mm screws and a 5-mm Allen key. Place nylon washers under the screws to protect the surface of the transmitter.

### 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 wiring only.



- Allen key (4 mm) for opening the transmitter cover
- 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 (probe connection cables and power cables are available from Vaisala)

### 3.3.1 Power supply terminals and lead-through – PELV option

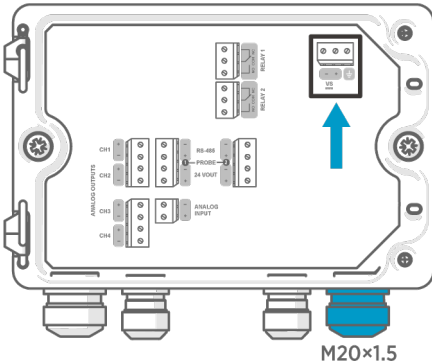


**WARNING!** Connect only cables with temperature rating of minimum +80 °C (+176 °F) to the PELV power supply terminal.



**CAUTION!** INDIGO510 and INDIGO520 PELV version transmitters shall be supplied by an isolated power source which fulfills the requirements of one of the following:


- Limited-Energy Circuit (LEC) in accordance with IEC/EN/UL/CSA 61010-1
- Limited Power Source (LPS) in accordance with IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1, Annex Q
- Class 2 supply source which complies with the National Electrical Code (NEC), NFPA 70, Clause 725.121 and Canadian Electrical Code (CEC), Part I, C22.1



Power supply input wiring is required only for transmitters 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 ... 8.0 mm (0.20 ... 0.31 in). Tightening torque for the cable gland is 8 Nm.

Table 5 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!** Transmitters 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!** Make sure that you prepare and connect only de-energized wires.



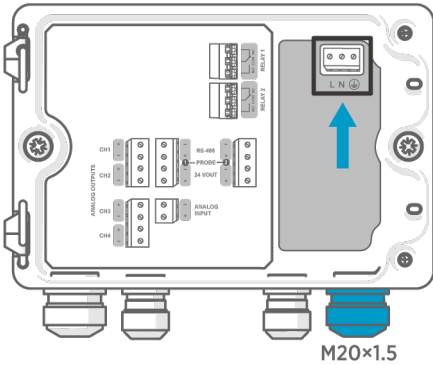
**CAUTION!** Do not modify the unit or use it in ways not described in the documentation. Improper modification or use may lead to safety hazards, equipment damage, failure to perform according to specification, decreased equipment lifetime, or the warranty becoming void.



**CAUTION!** Do not use the transmitter in a manner not specified by Vaisala. If the transmitter 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.



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

For the M20x1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0 ... 8.0 mm (0.20 ... 0.31 in). Tightening torque for the cable gland is 8 Nm.

Table 6 AC power supply input terminals

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

### 3.3.2.1 Preparing AC (mains) power cable



**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 will void UL/SGS listing.



- Cable stripping tool

Prepare the AC (mains) power cable for connection to the power supply input terminal:

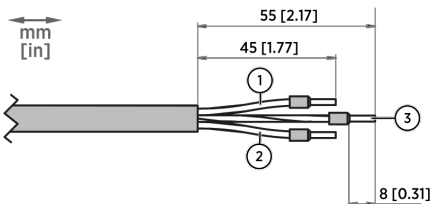


Figure 16 Example of stripped AC (mains) power cable

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

- ▶ 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.

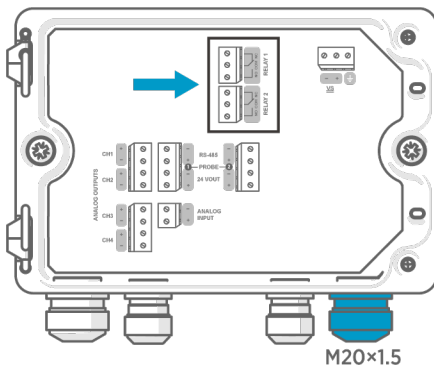
- 3. Strip the ends of the individual wires to expose the conductors for a length of 8 mm (0.32 in).

### 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 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 ... 8.0 mm (0.20 ... 0.31 in). Tightening torque for the cable gland is 8 Nm.

Table 7 Output terminals for relay 1 and relay 2

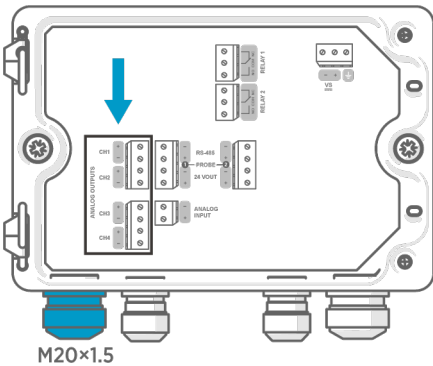
Terminal	Function	Notes
COM	Relay 1 or 2 common	Terminals in PELV power supply version: <ul style="list-style-type: none"> <li>Type: Screw terminals</li> <li>Max. wire size: 2.5 mm<sup>2</sup> (14 AWG)</li> </ul> Terminals in AC (mains) power supply version: <ul style="list-style-type: none"> <li>Type: Push-in spring connection</li> <li>Max. wire size: 1.5 mm<sup>2</sup> (16 AWG), solid wires or ferrules recommended</li> </ul>
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 ... 8.0 mm (0.20 ... 0.31 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).

Table 8 Analog output terminals

Terminal	Function	Notes
CH1 +	Analog output channel 1 +	Max. wire size: 2.5 mm <sup>2</sup> (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 set the analog input and analog input powering on.

Table 9 Analog input terminals

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

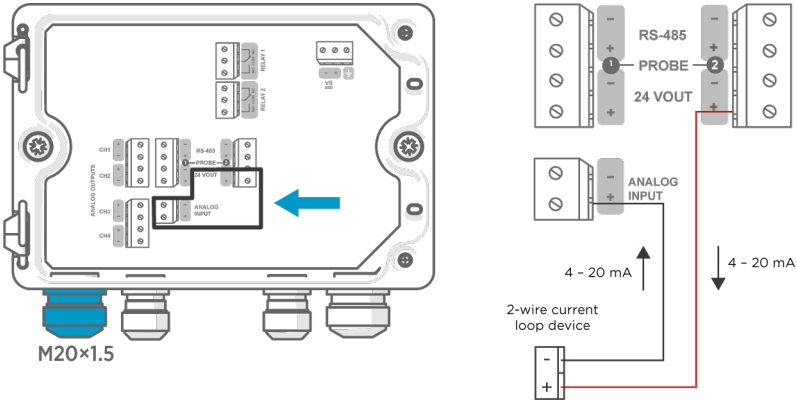
#### 3.3.5.1 Analog input wiring when powering with Indigo520



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

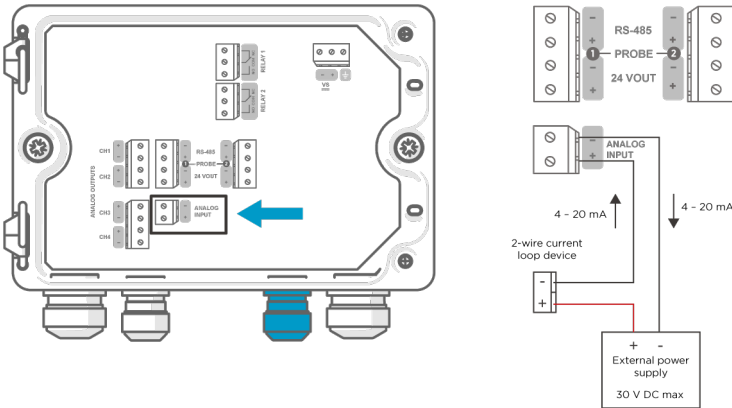
For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0 ... 8.0 mm (0.20 ... 0.31 in). Tightening torque for the cable gland is 8 Nm.

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



### 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.



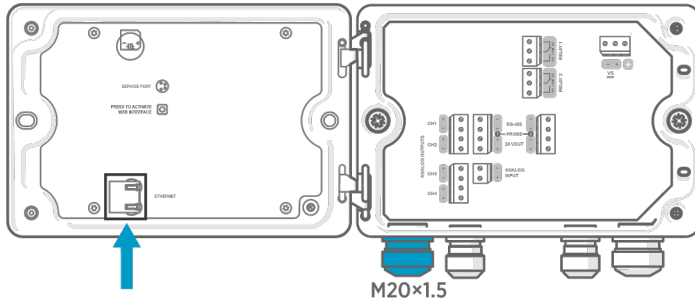
### 3.3.6 Ethernet connector and lead-through



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.



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.

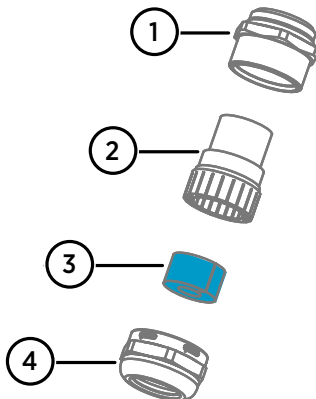


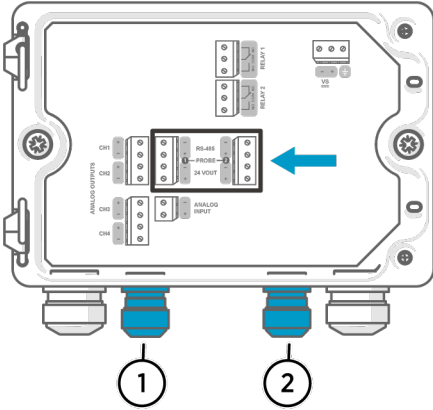
Figure 17 M20×1.5 cable gland with split bushing

- 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).

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

Table 10 Connection terminals for probe 1 and probe 2

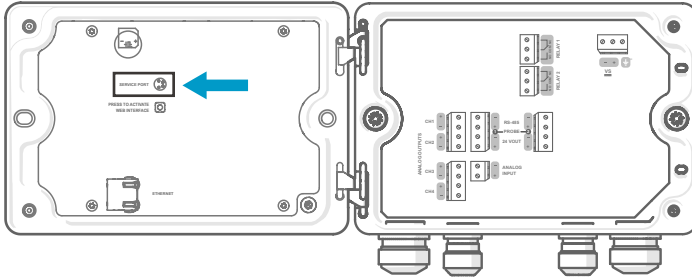
Terminal	Function	Wire color in standard Vaisala cables	Wire color in Vaisala refractometer cables	Notes
RS-485-	RS-485-	White	Green	Max. wire size: 2.5 mm <sup>2</sup> (14 AWG)
RS-485+	RS-485+	Black	Yellow	
24 VOUT -	Power GND and RS-485 common	Blue	White	
24 VOUT +	Positive supply voltage to probe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

### 3.3.8 Service port connection

Service port is used to connect Indigo80 handheld indicator to the transmitter. The service port is located on the inside of the transmitter cover.

To connect Indigo80 to the Indigo500 transmitter, use M12 - M8 service cable 1.5 m (4.9 ft) (Vaisala item code 262195).





### 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 must do that before connecting the probe to the transmitter. To configure the probe, you can use the free Vaisala Insight PC software. For more information, see your probe's user guide and visit [www.vaisala.com/insight](http://www.vaisala.com/insight).



If your transmitter was delivered with preconfigured analog outputs, make sure that you connect the measurement devices accordingly. See the label inside the transmitter enclosure for the correct order of the measurement devices.

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.

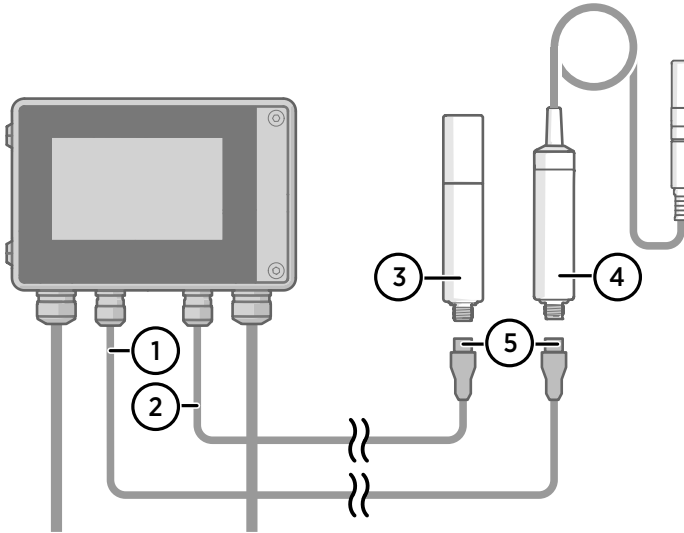


Figure 18 Connecting measurement devices to Indigo500

- 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 \(page 107\)](#)

### 3.4.1 Temperature compensation

Temperature compensation is a functionality introduced in software version 1.1.0. 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 configuration code (set at the factory), or it can be activated using the Insight software and service cable (Vaisala part number 242659 or USB-2).

Output parameters that are dependent on temperature measurement (such as relative humidity) are unavailable whenever 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 the temperature compensation function is enabled. If TMP1 is disconnected and temperature compensation is not manually turned off, a NaN value is returned. Disconnecting TMP1 will invalidate the temperature and relative humidity outputs of the heated HMP7.

Temperature compensation setting is usable only when HMP7 is connected to probe 1 connection terminal and TMP1 is connected to probe 2 connection terminal. It does not affect any other probe combinations. When the probes are connected, the temperature compensation automatically turns on. The temperature output of HMP7 is equal to TMP1 temperature, when heating function is activated. Make sure HMP7 and TMP1 probes are in the same environment to get the most accurate relative humidity measurement values.

The compensation can be manually turned off.

#### More information

- [Disabling temperature compensation on touchscreen \(page 88\)](#)
- [Disabling temperature compensation in web interface \(page 99\)](#)

## 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 status
- View notifications from transmitter and connected probes
- Configure transmitter settings, outputs, and inputs

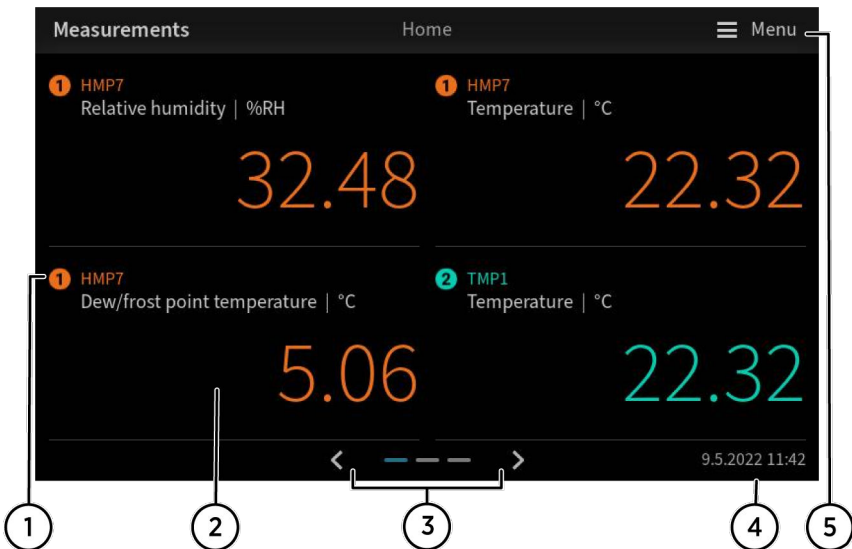


Figure 19 **Measurements** view on touchscreen

- 1 Color coded icons to indicate the selected probe.
- 2 Slots for 1 to 4 configurable measurement parameters.
- 3 Switch between the three **Home** views:
  - **Measurements** view: 1 to 4 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.
- 4 Date and time.
- 5 Access the configuration menu, where you can configure the transmitter's settings and outputs and manage notifications.

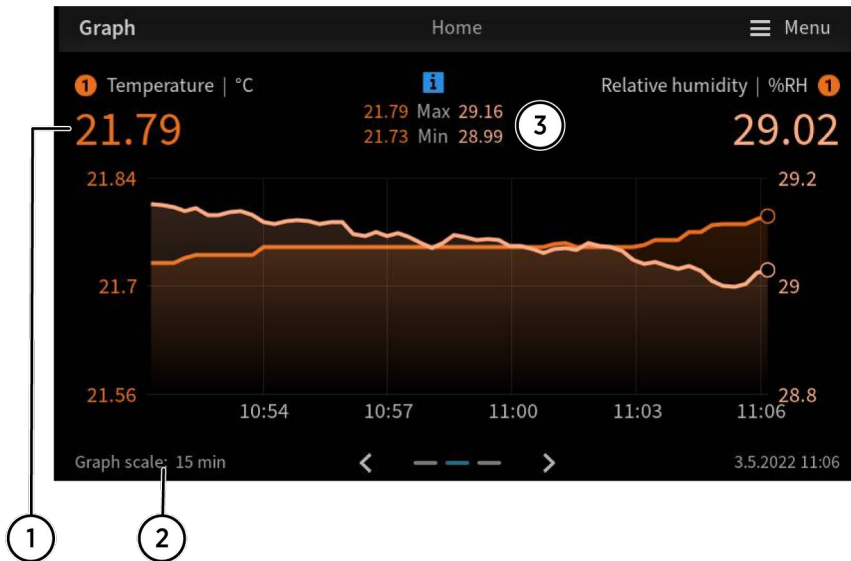


Figure 20 Graph view on touchscreen

- 1 Slots for 1 to 2 configurable measurement parameters.
- 2 **Graph scale:** Time scale of the graph.
- 3 **Graph data statistics:** View the maximum and minimum values observed during the time scale of the graph.

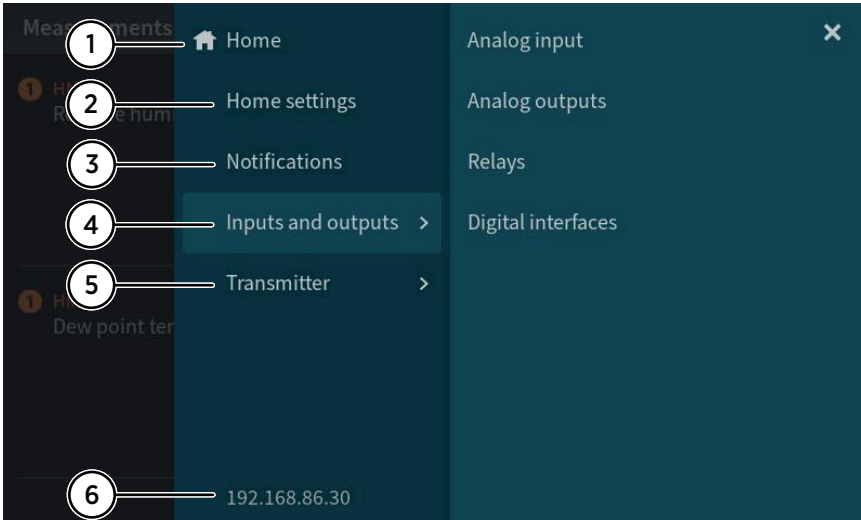



Figure 21 Configuration menu on touchscreen

- 1  **Home:** Return to **Home** views.
- 2 **Home settings:** Configure **Home** views.
- 3 **Notifications:** View all the notifications that are currently active.
- 4 **Inputs and outputs:** Configure analog input, analog outputs, relays, Modbus TCP/IP, and service port.
- 5 **Transmitter:** Configure transmitter settings.
- 6 Current IP address of the transmitter.

#### More information

- [Starting up transmitter using touchscreen display \(page 58\)](#)
- [Accessing configuration menu \(page 78\)](#)
- [Configuring home views on touchscreen \(page 78\)](#)

## 4.1.1 Graph data statistics

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

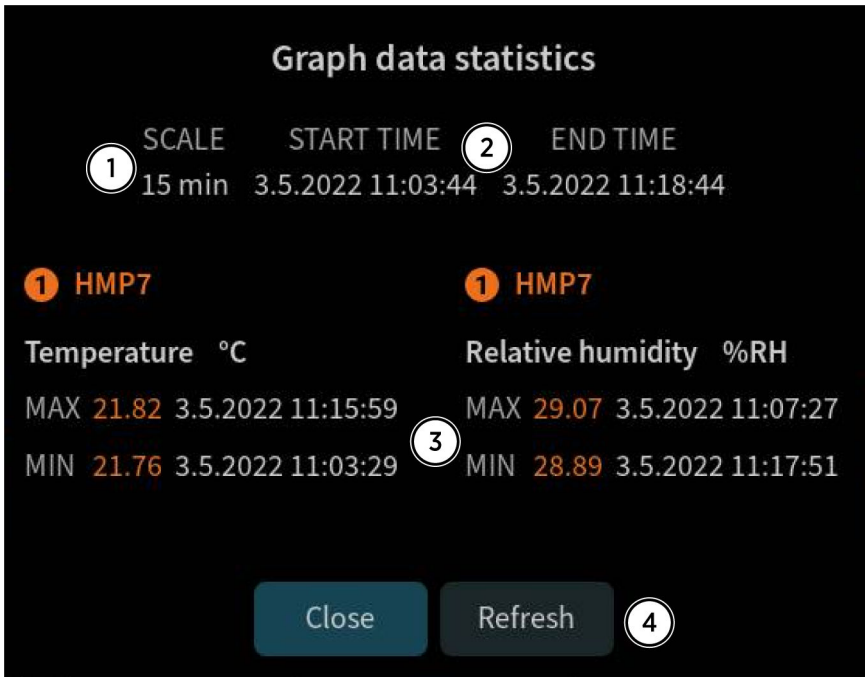


Figure 22 **Graph data statistics** view on touchscreen

- 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**.

## 4.2 Web interface and main views



Figure 23 Web interface and main views

- 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 **Notifications:** View all notifications.
- 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 Time
- 7 Change user interface theme, password and language, and log out.
- 8 Add measurement parameters to the **Measurements** view.



**More information**

- [Starting up transmitter using web interface \(page 66\)](#)
- [Configuring web interface home view \(page 89\)](#)

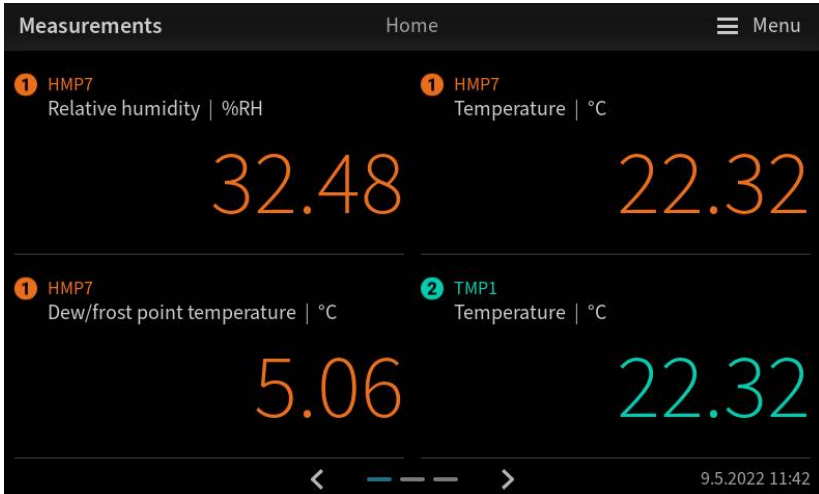
## 5. Start-up

### 5.1 Starting up transmitter using touchscreen display

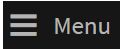
- ▶ 1. Remove the plastic protection cover on the touchscreen display.
- 2. Power up the transmitter.

Powering up takes some minutes.

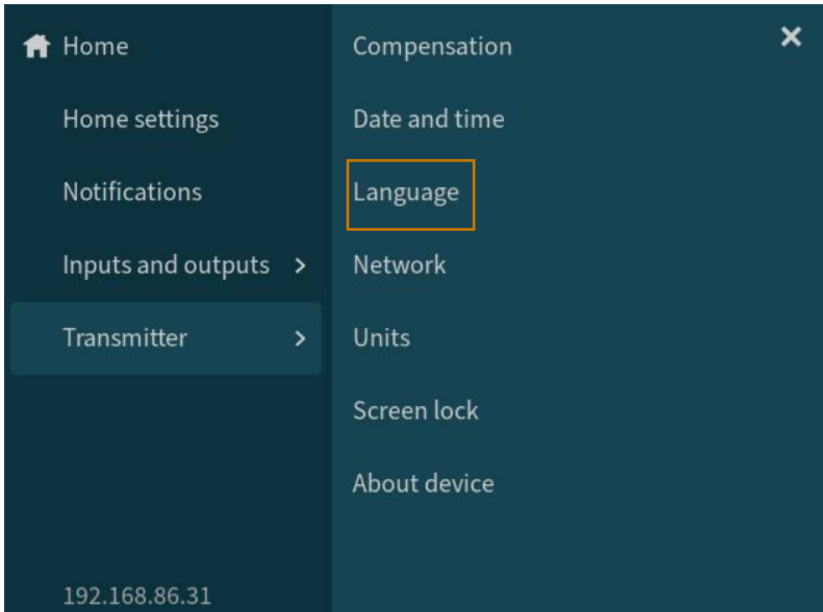
After the power-up, the **Measurements** view opens, showing the 2 preferred measurement parameters from each connected probe.



- 3. Select the configuration menu symbol at the upper right 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:

- **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.

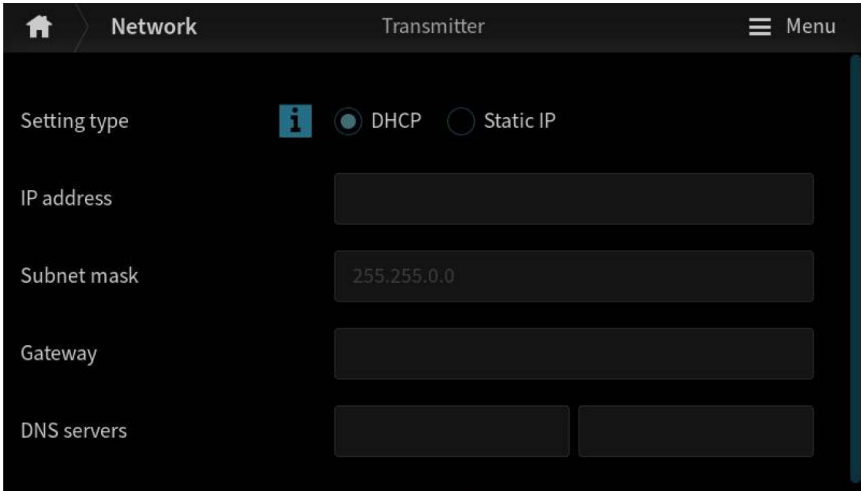
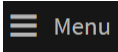


Figure 24 Network settings on touchscreen

- ▶ 1. Make sure that the Ethernet cable is connected to the transmitter.  
The Ethernet connector's LED lights up.
2. Select the configuration menu symbol at the upper right 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. Scroll to the end of the screen and select **Apply** to save your changes.

## 5.1.2 Setting date and time on touchscreen

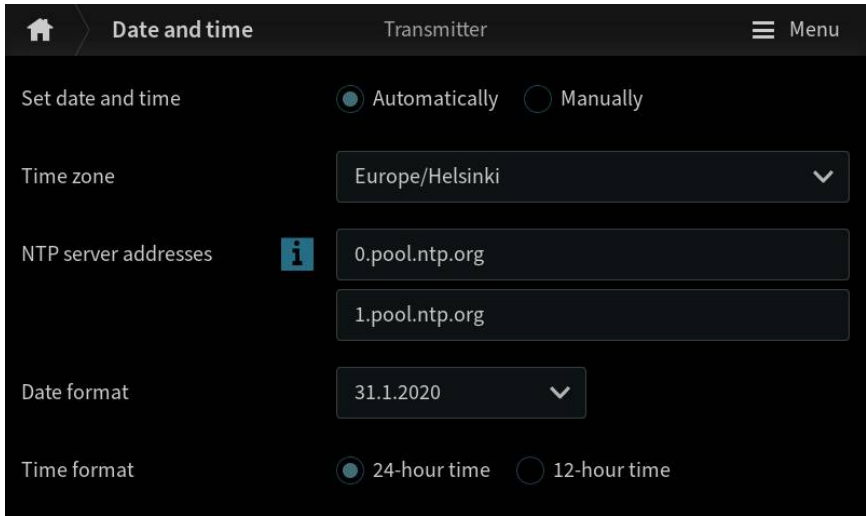
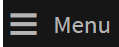


Figure 25 Date and time settings on touchscreen



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**.

1. Select the configuration menu symbol at the upper right 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. Select **Time zone**.
  - c. In **NTP server addresses**, 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.

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

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



#### More information

- [Data logging \(page 25\)](#)
- [Configuring home views on touchscreen \(page 78\)](#)
- [Configuring analog outputs on touchscreen \(page 80\)](#)
- [Configuring relays on touchscreen \(page 85\)](#)
- [Enabling Modbus TCP/IP on touchscreen \(page 88\)](#)

## 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.

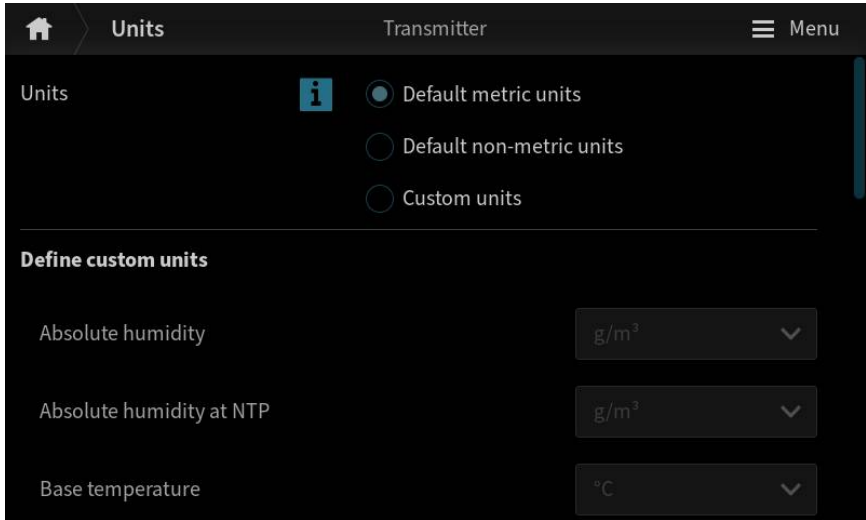
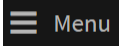


Figure 26 Units settings on touchscreen

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.



2. Select **Transmitter > Units**.
3. Select the unit type: **default metric**, **default non-metric**, 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, and select **Select**.

### 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.

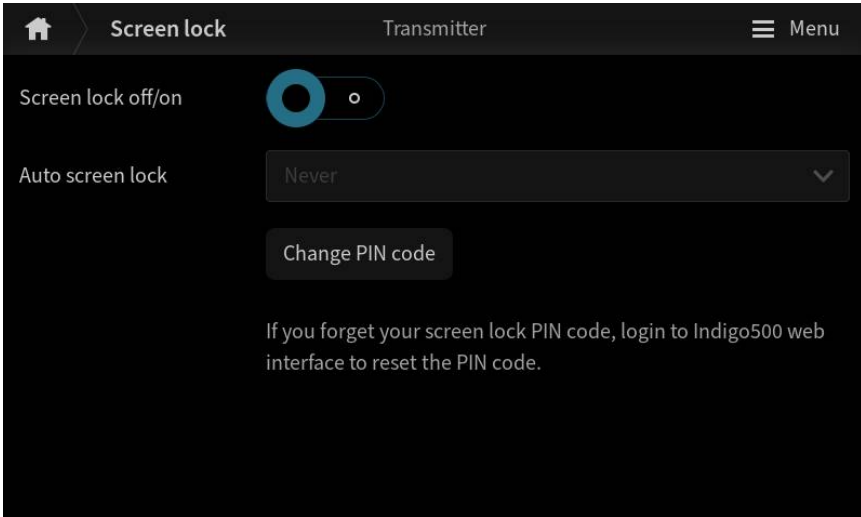
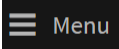


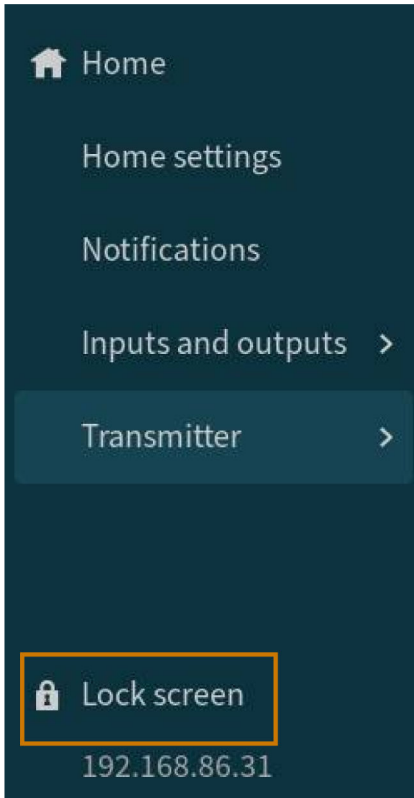
Figure 27 **Screen lock** configuration menu on touchscreen

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.  

2. Select **Transmitter > Screen lock**.
3. In **Screen lock off/on**, set screen lock on.  
**Change PIN code** view opens.
4. In **Change PIN code**, enter a 6-digit PIN code and select **Ok**



5. In **Auto screen lock**, select the time period after which the configuration menu will be automatically locked.

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



6. If you want to change the PIN code, select **Change PIN code**. Type in the new PIN code and select **Ok**.
7. If you want to turn the screen lock off, in **Screen lock off/on**, set screen lock off.




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

#### More information

- [Resetting PIN code in web interface \(page 76\)](#)

## 5.2 Starting up transmitter using web interface

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 67).

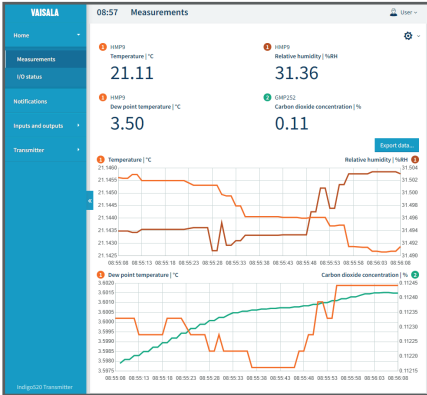



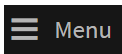
Figure 28 Web interface, **Measurements** view

### 5.2.1 Connecting to web interface

 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 symbol at the upper right 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 59).

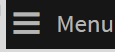
If you have already configured the network connection, you can move to [step 5](#).

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, at the bottom left corner of the configuration menu



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



- 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.

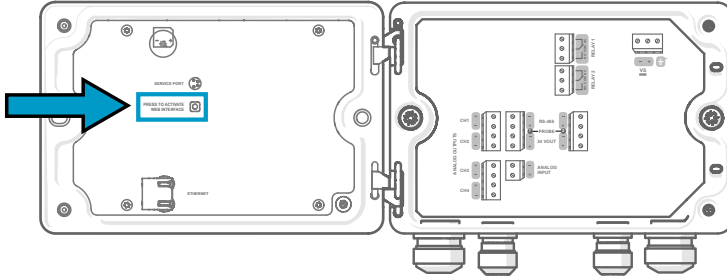
- ▶ 1. Open the 2 hex screws on the cover of the transmitter using a 4-mm Allen key.
2. Open the transmitter cover.
3. Connect the Ethernet cable from the transmitter to the computer.
4. Power up the transmitter.

Powering up takes some minutes.

5. Press the **PRESS TO ACTIVATE WEB INTERFACE** button with a pointed object to enable the use of configuration mode IP.

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 and Internet > Ethernet > Unidentified network > IP settings > Edit** (this path may vary depending on your computer and settings).
  - a. Select **Manual**.
  - b. In **IPv4**, set the IPv4 connection on.
  - c. In **IP address**, enter an address that **differs from the transmitter's IP address** by its last digit.  
 Example: **192.168.5.21**
  - d. Depending on your computer, enter either **255.255.255.0** in **Subnet mask** or **24** in **Subnet prefix length**.
  - e. If you're using a Windows operating system: in **Gateway**, enter **192.168.5.1**.
  - f. Click **Save**.
7. Open a web browser. In the address field, enter **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.

### 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.



Figure 29 User creation page

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.

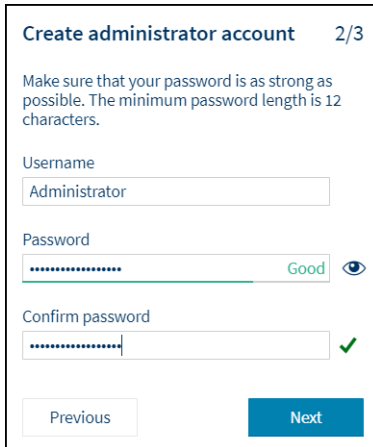
- ▶ 1. In the **User creation** page, select **Continue**.
2. Type the activation code, and select **Activate**. Then select **Next**.

The activation code is printed on a label inside the transmitter enclosure. Use a 4-mm Allen key to open the transmitter cover. A label with the activation code is also provided in the accessory bag.



If you use the web interface with Firefox, make sure your device's time settings are correct. Incorrect device time settings will prevent the use of the activation code.


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




**Create administrator account** 2/3

Make sure that your password is as strong as possible. The minimum password length is 12 characters.

Username  
Administrator

Password  
..... Good 


Confirm password  
..... 

Previous Next

4. 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



**VAISALA**  
Indigo520

**Login**

Username  
.....

Password  
..... 

Log in

[Vaisala Privacy Policy](#)

- ▶ 1. Type a username.

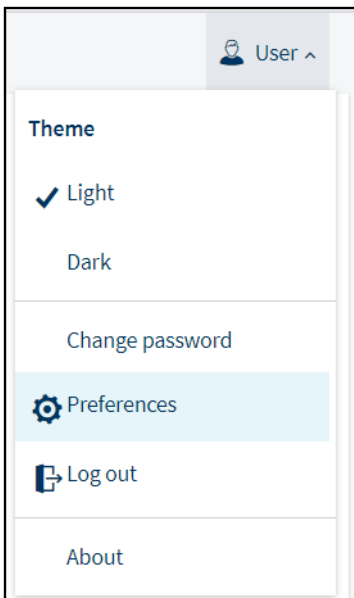
2. Type a password.
3. Select **Log in**.

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

## 5.2.5 Changing language in web interface

- ▶ 1. Log in to the web interface.
- 2. The default language of the web interface is English. If you want to use another language, select it in **User > Preferences**.

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



## 5.2.6 Configuring network connection in web interface



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

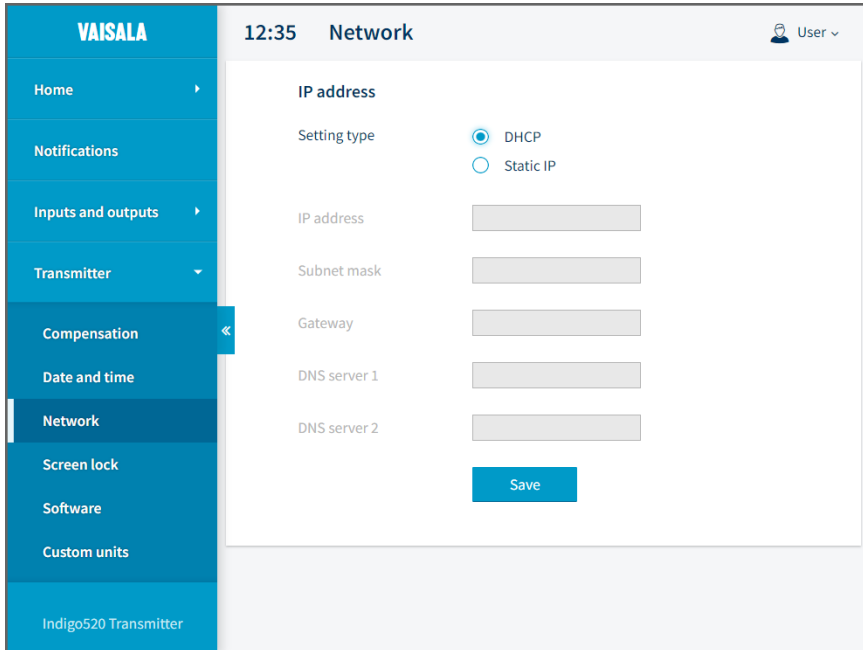


Figure 30 Network settings in web interface

- ▶ 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 **Save**.

### 5.2.7 Setting date and time in web interface



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

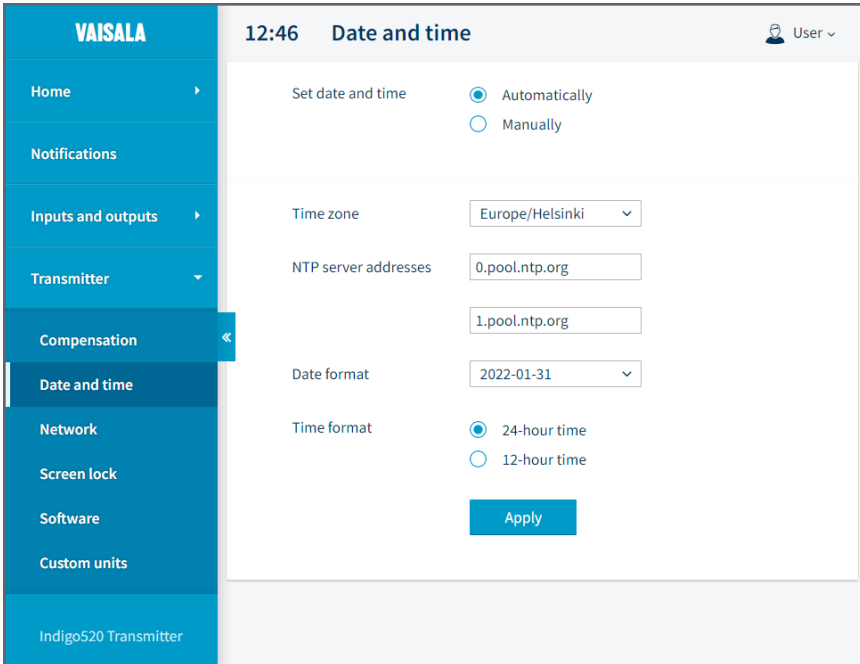


Figure 31 Date and time settings in web interface



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**.

- ▶ 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 **NTP server addresses**, 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.

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

#### More information

- [Data logging \(page 25\)](#)
- [Configuring web interface home view \(page 89\)](#)
- [Configuring analog outputs in web interface \(page 90\)](#)
- [Configuring relays in web interface \(page 95\)](#)
- [Enabling Modbus TCP/IP in web interface \(page 98\)](#)

## 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 **User > Preferences**.
3. 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.
4. To define the units for the measurement parameters one-by-one, select **Transmitter > Custom units**.  
Select the units from the drop-down lists for each parameter.
5. Select **Apply**.

## 5.2.9 Finishing start up

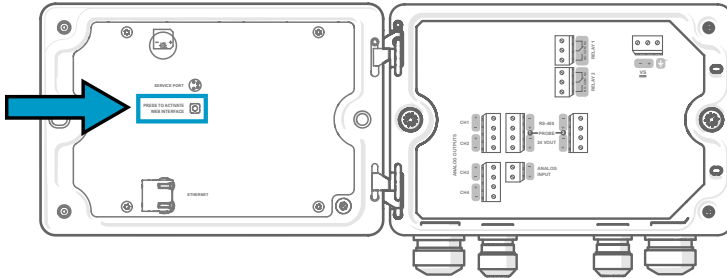


Follow these instructions only if you have connected to web interface with a direct connection between transmitter and computer.



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

- ▶ 1. When you are ready with the start up and have done the necessary configurations, press the **PRESS TO ACTIVATE WEB INTERFACE** button again to disable the use of configuration mode IP.



The LED next to the button shuts down. The Ethernet cable can be disconnected.

### 5.2.10 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.

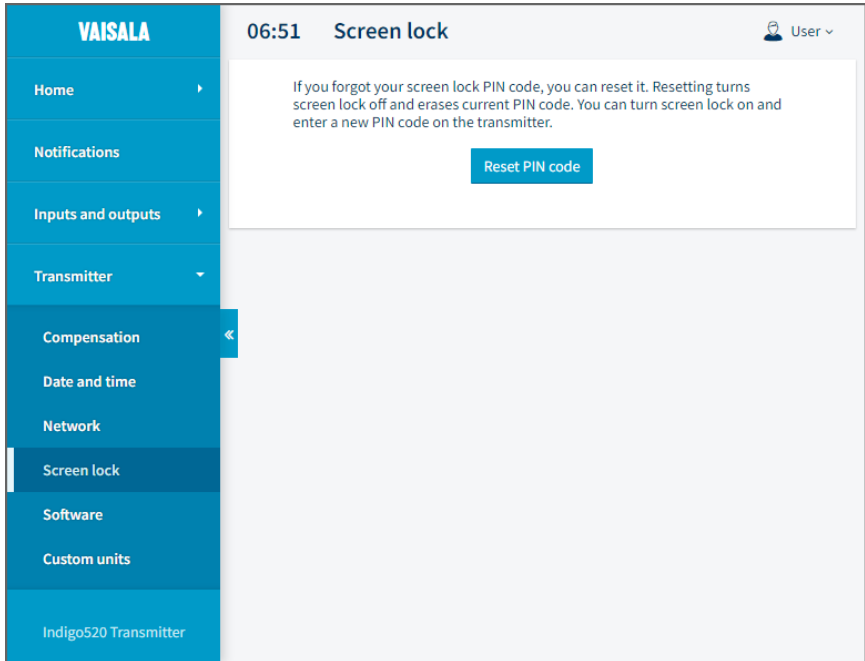


Figure 32 Screen lock view in web interface

- ▶ 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 **Ok**.  
Screen lock is now turned off and the PIN code is erased.


You can turn screen lock on and enter a new PIN code on the transmitter.

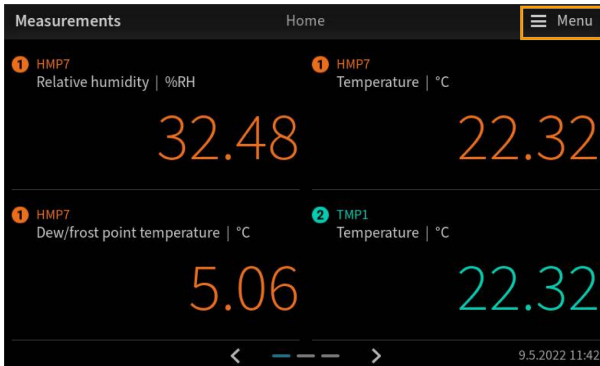
#### More information

- [Configuring screen lock on touchscreen \(page 63\)](#)

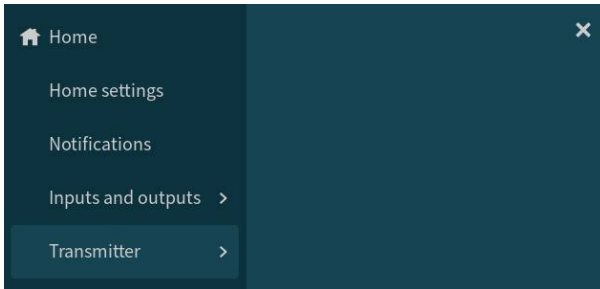
## 6. Configuring transmitter using touchscreen display

### 6.1 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 right corner of the screen.



The configuration menu opens.



### 6.2 Configuring home views on touchscreen

You can select how many measurement parameters you want to see in the following **Home** views on the touchscreen display:

- **Measurements** view
- **Graph** view

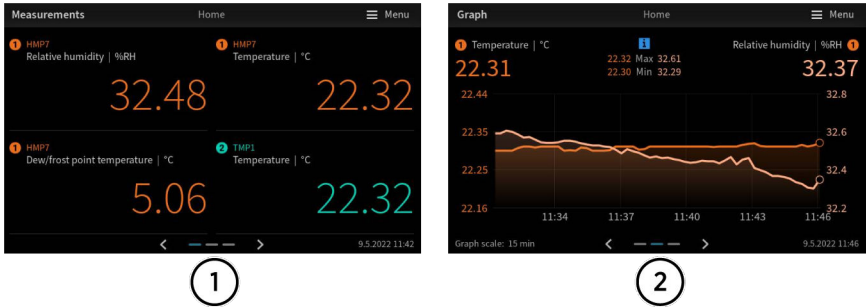


Figure 33 Configurable Home views on touchscreen

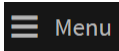
- 1 **Measurements** view with slots for 1 to 4 measurement parameters
- 2 **Graph** view with graphs for 1 to 2 measurement parameters



You can navigate between the views by using the left and right arrows at the bottom of the touchscreen.

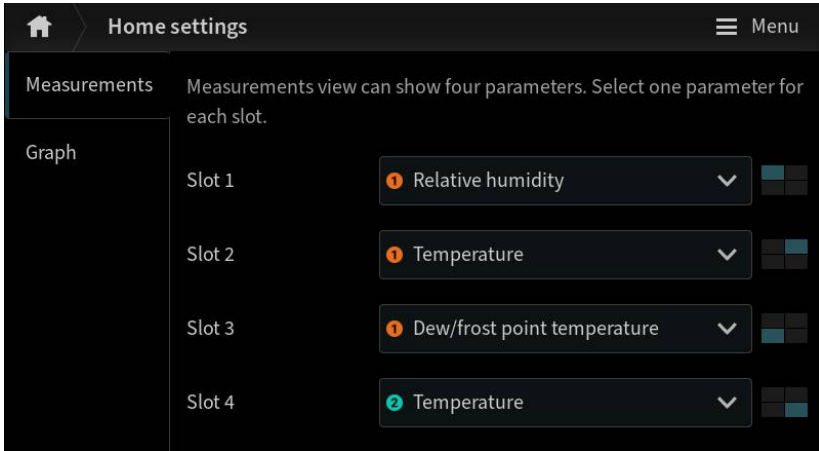
Before you start, make sure that the probes you want to use are connected to the transmitter.

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.




2. Select **Home settings**.

3. In the **Measurements** tab, in **Slot 1 ... 4**, select which parameters are shown in the different slots in the **Measurements** view.



4. In the **Graph** tab, define what is shown in the **Graph** view:
  - a. In **Slot 1 ... 2**, select the parameters to show on the graph.
  - b. In **Graph scale**, select the time scale for the graph.



To see the changes you made, return to the **Home** views by selecting .

## 6.3 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 transmitter has 4 analog current (mA) or voltage (V) outputs.

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



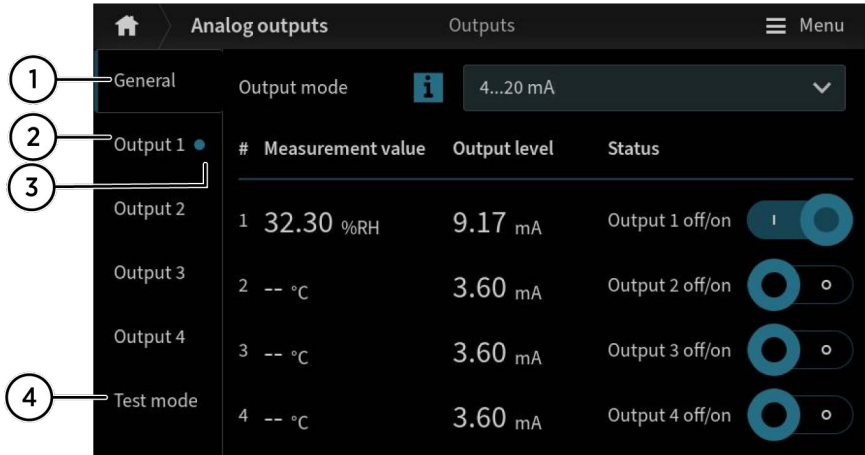
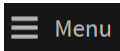


Figure 34 **Analog outputs** configuration menu on touchscreen, **General** tab active

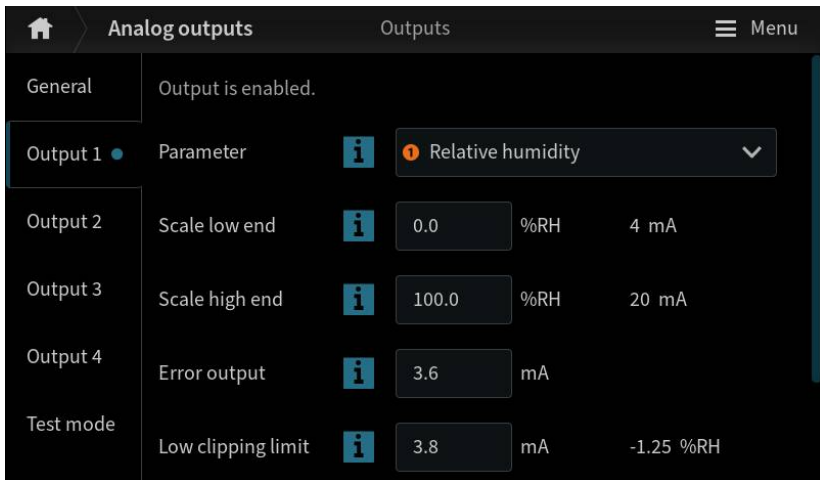
- 1 The **General** tab contains the settings that are common for all analog output channels.
- 2 The **Output 1 ... 4** tabs contain individual settings for each analog output channel.
- 3 A circle next to the channel name indicates that the channel is on.
- 4 The **Test mode** tab contains the settings for testing each analog output channel.

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.




2. Select **Inputs and outputs > Analog outputs**.
3. In **General > Output mode** select the current or voltage range for the outputs.
4. In the tabs **Output 1 ... 4**, select the output channel you want to configure.

5. Configure the analog output channel settings:
  - a. In **Parameter**, select the probe and the measurement parameter that controls the output channel. The unit of the parameter is set automatically.
  - b. In **Scale low end** and **Scale high end**, define the lower and upper ends of the measurement scale for the chosen output parameter.
  - c. In **Error output**, define the output level indicating that the device is in error state.
  - d. In **Low clipping limit**, define the point (in mA below the output range) when the output is clipped due to being out of range.
  - e. In **High clipping limit**, define the point (in mA or V above the output range) when the output is clipped due to being out of range.



6. If the output channel is off, in the **General** tab, set the output channel on.
7. Repeat [step 3](#) ... [step 6](#) 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

- [Testing analog outputs on touchscreen \(page 83\)](#)

### 6.3.1 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

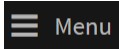
To configure the analog output, use the following values:

- In the **General** tab:
  - **Output mode:** 4 ... 20 mA
- In the **Output 1** tab:
  - **Output off/on:** Set output off to edit settings.
  - **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
  - **Output off/on:** Set output on to activate settings.

### 6.3.2 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.

1. Select the configuration menu symbol at the upper right corner of the touchscreen.



2. Select **Inputs and outputs > Analog outputs**.
3. In **General > Output mode** select the current or voltage range for the outputs.
4. In the **Test mode** tab, configure test mode settings.
  - a. In **Test mode**, set the test mode on for the analog output you want to test.
  - b. In **Force output to**, enter the current level that you want the transmitter to output or choose **Output error** to use the transmitter's error state output level.
5. Read the analog output and verify that the output is correct.
6. After verifying the output, go back to **Menu > Inputs and outputs > Analog outputs > Test mode** and turn the test mode off.
7. Repeat [step 3](#) ... [step 6](#) 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 \(page 80\)](#)

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

The Indigo520 transmitter has 1 analog current (mA) input.

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

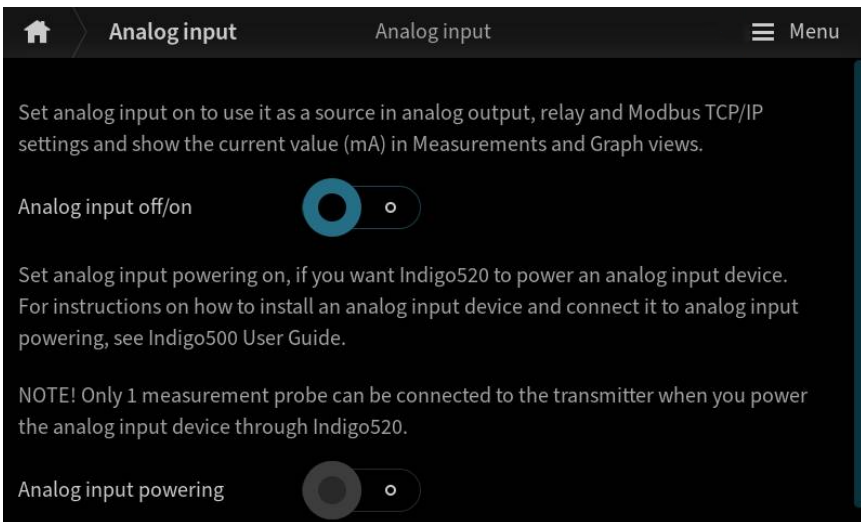



Figure 35 **Analog input** configuration menu on touchscreen

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.
 

Menu
2. Select **Inputs and outputs > Analog input**.

3. In **Analog input off/on**, set analog input on.
4. To power your analog input device through Indigo520, in **Analog input powering**, set analog input powering on.



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.

## 6.5 Configuring relays on touchscreen



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

The 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.

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

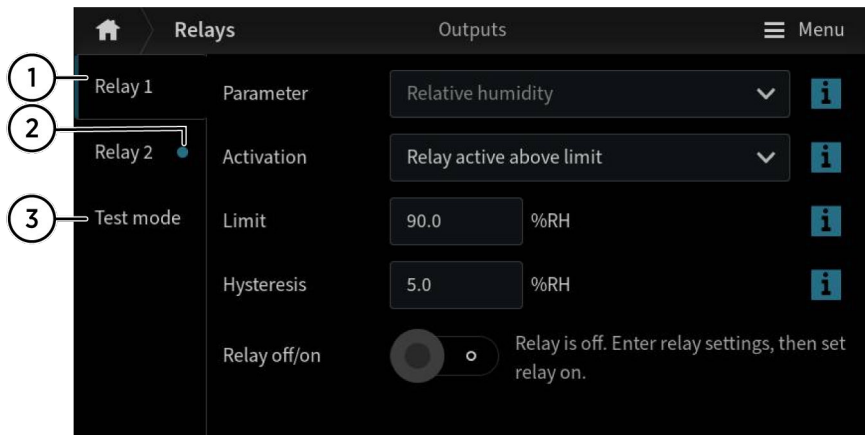
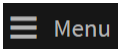


Figure 36 **Relays** configuration menu on touchscreen, **Relay 2** tab active


- 1 The **Relay 1 ... 2** tabs contain individual settings for each relay.
- 2 A circle next to the relay name indicates that the relay is on.
- 3 The **Test mode** tab contains the settings for testing each relay.

1. Select the configuration menu symbol at the upper right corner of the touchscreen.



2. Select **Inputs and outputs > Relays**.
3. Select the relay you want to configure: **Relay 1** or **Relay 2**.
4. Configure the relay settings:
  - a. In **Relay off/on**, set the relay off to edit settings.
  - b. In **Parameter**, select the probe and the measurement parameter that controls the relay.
  - c. In **Activation**, select whether the relay activates above or below the activation/deactivation limit.
  - d. In **Limit**, define the limit which the measured parameter value must reach for the relay to activate/deactivate.
  - e. In **Hysteresis**, define 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.
  - f. In **Relay off/on**, set the relay on.
5. Repeat **step 3** ... **step 4** 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.

## 6.5.1 Relay configuration example

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). To configure the relay, use the following values:

- **Relay off/on**: Set relay off to edit settings.
- **Parameter**: Relative humidity
- **Activation**: Active above limit
- **Limit**: 90
- **Hysteresis**: 5
- **Relay off/on**: Set relay on to activate settings.

## 6.5.2 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.

Table 11 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 12 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 

### 6.5.3 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.

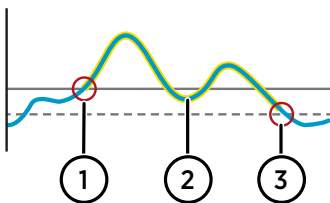


Figure 37 Behavior of relay that activates above limit, with hysteresis

- 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.

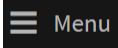
## 6.6 Enabling Modbus TCP/IP on touchscreen

- ▶ 1. Select **Menu > Transmitter > Network**.
- 2. Make sure that **Network off/on** is set on, and that the network settings are set 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**, set Modbus read on.
- 5. To enable writing on the Modbus registers of the transmitter and devices connected to it, in **Modbus TCP/IP write**, set Modbus write on.

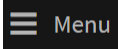
### More information

- ▶ [Modbus overview \(page 105\)](#)

## 6.7 Enabling service port on touchscreen

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.  

- 2. Select **Inputs and outputs > Digital interfaces**.
- 3. In **Service port**, set the service port on.

## 6.8 Disabling temperature compensation on touchscreen

- ▶ 1. Select the configuration menu symbol at the upper right corner of the touchscreen.  

- 2. Select **Transmitter > Compensation**.
- 3. In **Temperature compensation off/on**, set compensation off.

### More information

- ▶ [Temperature compensation \(page 51\)](#)



## 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.

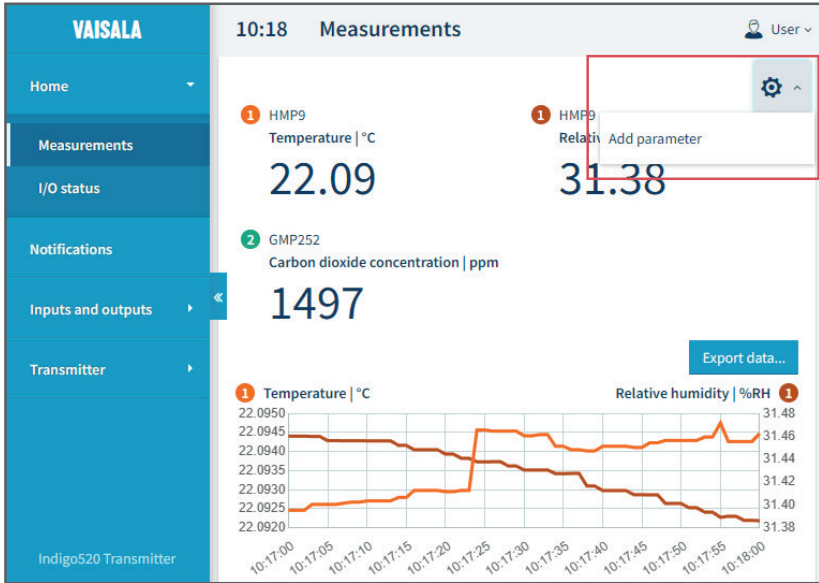
- ▶ 1. Connect to the web interface.
- ▶ 2. Log in to the web interface.

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

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

You can freely select the probe 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 analog outputs in web interface



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

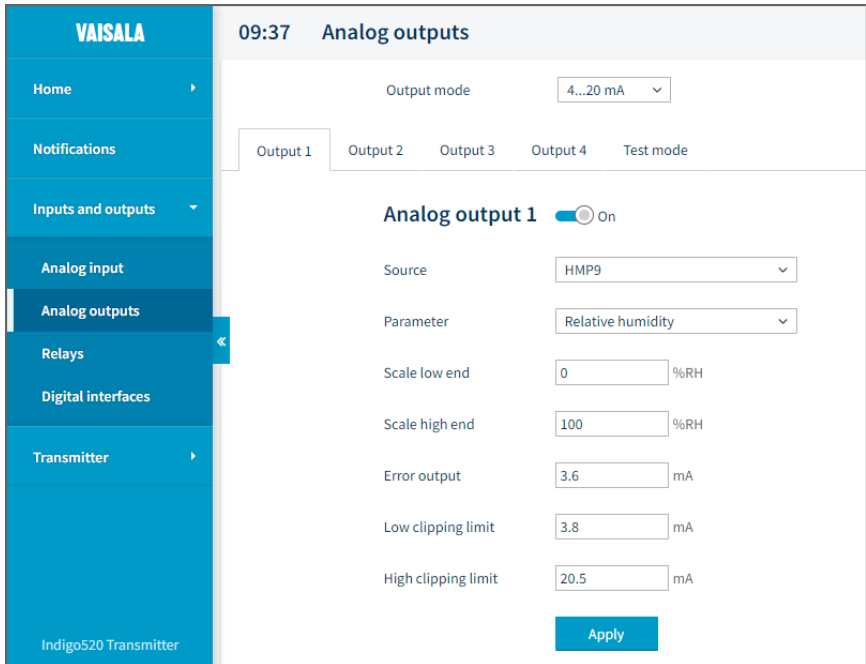


Figure 38 **Analog outputs** configuration menu in web interface

- ▶ 1. Connect to the web interface.
2. Log in to the web interface as an administrator user.
3. Select **Inputs and outputs > Analog outputs**.
4. In **Output mode**, select the current or voltage range for the outputs.
5. In the tabs **Output 1 ... 4**, select the output channel you want to configure.

6. Configure the analog output channel settings:
  - a. In **Output off/on**, set the output channel off to edit settings.
  - b. In **Source**, select the source for the measurement parameter that controls the output channel.
  - c. In **Parameter**, select the measurement parameter that controls the output channel.
  - d. In **Scale low end** and **Scale high end**, define the lower and upper ends of the measurement scale for the chosen output parameter.
  - e. In **Error output**, define the output level indicating that the device is in error state.
  - f. In **Low clipping limit**, define the point (in mA below the output range) when the output is clipped due to being out of range.
  - g. In **High clipping limit**, define the point (in mA or V above the output range) when the output is clipped due to being out of range.
  - h. Select **Apply**.
7. Repeat [step 5](#) ... [step 6](#) for all the analog output channels you want to use.

#### More information

- [Analog output configuration example \(page 83\)](#)
- [Testing analog outputs in web interface \(page 92\)](#)

## 7.2.1 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.

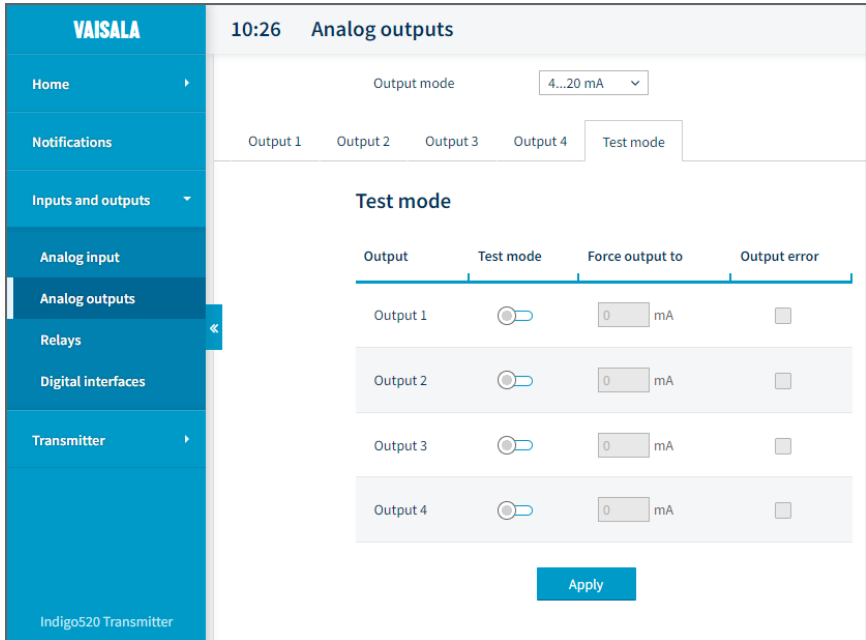


Figure 39 Analog outputs test mode in web interface

- ▶ 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. In the **Test mode** tab, configure test mode settings.
  - a. In **Test mode**, set the test mode on for the analog output you want to test.
  - b. In **Force output to**, enter the current level that you want the transmitter to output or choose **Output error** to use the transmitter's error state output level.
6. Select **Apply**.
7. Read the analog output and verify that the output is correct.
8. After verifying the output, go back to **Inputs and outputs > Analog outputs > Test mode** and turn the test mode off.
9. Repeat [step 5](#) ... [step 8](#) for all the analog output channels you want to test.

#### More information

- ▶ [Configuring analog outputs in web interface \(page 90\)](#)

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

The Indigo520 transmitter has 1 analog current (mA) input.

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

The screenshot displays the Vaisala web interface for configuring the analog input. On the left is a blue sidebar with a menu containing: Home, Notifications, Inputs and outputs (expanded), Analog input (selected), Analog outputs, Relays, Digital interfaces, Transmitter, and Indigo520 Transmitter. The main content area is titled '10:28 Analog input'. It contains the following text: 'Set analog input on to use it as a source in analog output, relay and Modbus TCP/IP settings and show the current value (mA) in Measurements and Graph views.' Below this is a toggle switch for 'Analog input off/on' which is currently set to 'Off'. Further down, it says: 'Set analog input powering on, if you want Indigo520 to power an analog input device. For instructions on how to install an analog input device and connect it to analog input powering, see Indigo500 User Guide.' This is followed by a note: 'NOTE! Only 1 measurement probe can be connected to the transmitter when you power the analog input device through Indigo520.' Below the note is another toggle switch for 'Analog input powering' which is also set to 'Off'. At the bottom right of the configuration area is a grey 'Apply' button.

Figure 40 **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. In **Analog input off/on**, set analog input on.

- To power your analog input device through Indigo520, in **Analog input powering**, set analog input powering on.

## 7.4 Configuring relays in web interface



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

Figure 41 **Relays** 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 > Relays**.
4. Select the relay you want to configure: **Relay 1** or **Relay 2**.

5. Configure the relay settings:
  - a. In **Relay off/on**, set the relay off to edit settings.
  - b. In **Source**, select the source for the measurement parameter that controls the relay.
  - c. In **Parameter**, select the measurement parameter that controls the relay.
  - d. In **Activation**, select whether the relay activates above or below the activation/deactivation limit.
  - e. In **Limit**, define the limit which the measured parameter value must reach for the relay to activate/deactivate.
  - f. In **Hysteresis**, define 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.
  - g. In **Relay off/on**, set the relay on.
  - h. Select **Apply**.
6. Repeat [step 4](#) ... [step 5](#) for all the relays you want to use.

#### More information

- [Relay configuration example \(page 86\)](#)
- [Relay wiring and relay activation mode \(page 86\)](#)
- [Relay hysteresis \(page 87\)](#)
- [Testing relays in web interface \(page 97\)](#)



## 7.4.1 Testing relays in web interface

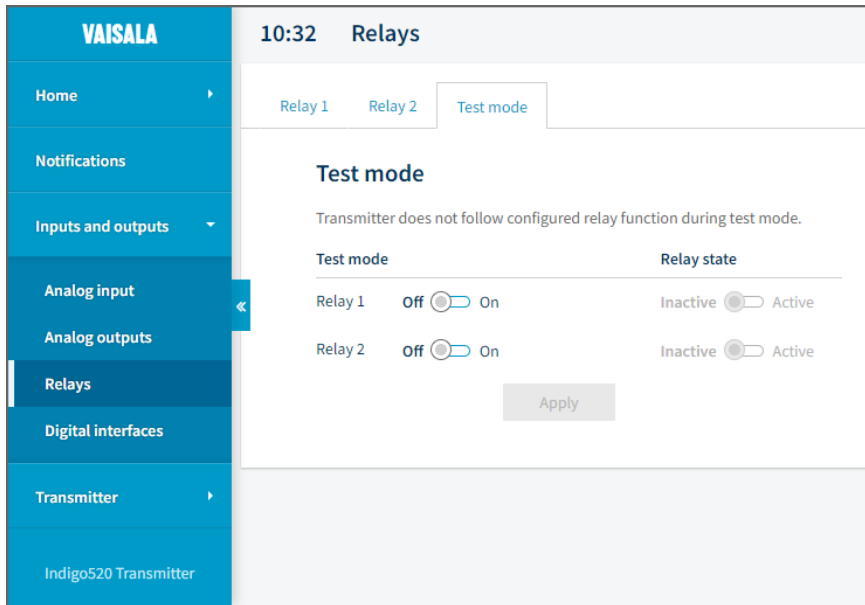


Figure 42 Relays test mode in web interface

- ▶ 1. Connect to the web interface.
2. Log in to the web interface as an administrator user.
3. Select **Inputs and outputs > Relays**.
4. In the **Test mode** tab, configure test mode settings.
  - a. In **Test mode**, turn the test mode on for the relay you want to test.
  - b. In **Relay state**, activate the relay.
5. Select **Apply**.
6. After verifying the output, go back to **Inputs and outputs > Relays > Test mode** and turn the test mode off.
7. Repeat [step 4](#)...[step 6](#) for all the relays you want to test.

## 7.5 Enabling Modbus TCP/IP in web interface



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. 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**, set Modbus read on.
7. To enable writing on the Modbus registers of the transmitter and devices connected to it, in **Modbus TCP/IP write**, set Modbus write on.
8. Select **Apply**.

### More information

- [Modbus overview \(page 105\)](#)

## 7.6 Enabling service port in web interface



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. Select **Inputs and outputs > Digital interfaces**.
4. In **Service port**, set the service port on.
5. Select **Apply**.

## 7.7 Disabling temperature compensation in web interface



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. Select **Transmitter > Compensation**.
- 4. In **Temperature compensation off/on**, set compensation off.
- 5. Select **Apply**.

### More information

- ▶ [Temperature compensation \(page 51\)](#)

## 7.8 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 ... 90 min.

- ▶ 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**.

- In **Export data**, select the log you want to export.

**Export data** ✕

Export logged data from Indigo500 to a CSV file (.csv). Indigo500 is storing data to multiple logs using different sample rates. Length of the log depends on the sample rate and the amount of logged parameters.

**Select a log to export**

**Sample data**

5 seconds, at least 14 days of data

**Averaged value with min. and max. values**

10 minutes, at least 90 days of data

1 hour, at least 1 year of data

6 hours, at least 2 years of data

24 hours, at least 10 years of data

**i** 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 ... 90 min.

**Export** **Cancel**

- Select **Export**.

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

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



### More information

- [Data logging \(page 25\)](#)

## 8. Using transmitter with Indigo80 and PR53

### 8.1 Indigo80 handheld indicator



Connecting to Indigo80 is possible from software version 1.14.3 onward.

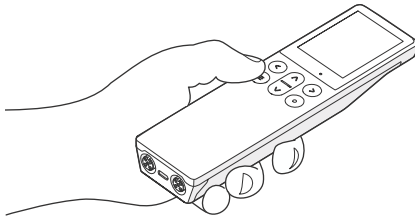



Figure 43 Indigo80 handheld indicator

Vaisala Indigo80 Handheld Indicator is a portable diagnostics tool that accommodates up to two Vaisala Indigo-compatible probes or transmitters 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
- 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 transmitter settings (for example, display mode)
- Configure the connected probes' features and settings. The available features and settings depend on the probe model and firmware version.

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 to Indigo80 handheld indicator



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



**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 and EMC properties of the transmitter can be affected when the service port is open.

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

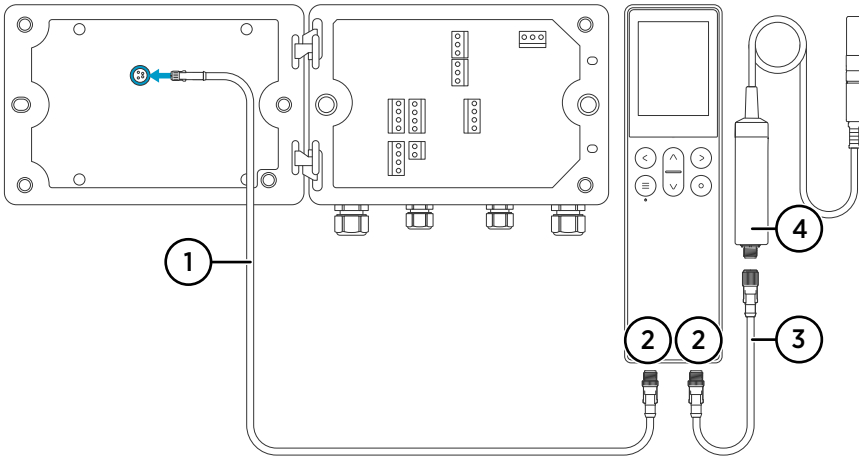
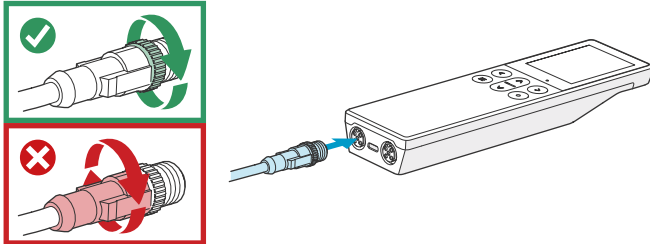


Figure 44 Connecting Indigo500 transmitter to Indigo80 handheld indicator


- 1 M12 - M8 service cable
- 2 M12-5F ports on the bottom of Indigo80 for connecting compatible Vaisala devices. Ports are labeled ① and ②.
- 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.
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. 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.

## 8.2 PR53 process refractometers

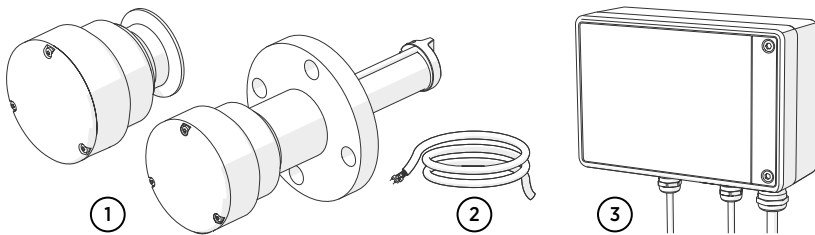


Figure 45 PR53 process refractometer with Indigo520

- 1 Vaisala Polaris™ Process Refractometers
- 2 Interconnecting cables
- 3 Vaisala Indigo520 transmitter

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 the 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 the Indigo520 transmitter, your transmitter needs to be ordered PR53-compatible. It is not possible to connect a refractometer to Indigo510 transmitters.

## 8.2.1 Connecting to PR53 process refractometers

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

- ▶ 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](https://docs.vaisala.com).

- 4. Connect the wires inside the transmitter, see [Probe connection terminals and lead-throughs \(page 48\)](#).



## 9. Modbus

### 9.1 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 \(page 88\)](#)
- [Enabling Modbus TCP/IP in web interface \(page 98\)](#)

### 9.2 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 13 Unit IDs of transmitter and probes

Device	Unit ID
Transmitter with barometer module	240
Measurement device connected to probe 1 connection terminal	241
Measurement device to probe 2 connection terminal	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 \(page 126\)](#)

# 10. Maintenance and troubleshooting

## 10.1 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<sub>2</sub>O<sub>2</sub> (6000 ppm), non-condensing
- Alcohol-based cleaning agents such as ethanol and IPA (70 % Isopropyl Alcohol, 30 % water)
- Ca(ClO)<sub>2</sub> (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.

## 10.2 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 must do that before connecting the probe to the transmitter. To configure the probe, you can use the free Vaisala Insight PC software. For more information, see your probe's user guide and visit [www.vaisala.com/insight](http://www.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 \(page 49\)](#)

## 10.3 Updating transmitter software version

You can update the transmitter software through the web interface.



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



Data logging feature has changed. Installing software version 1.13 or later to replace software version 1.12 or earlier removes all previously logged data.



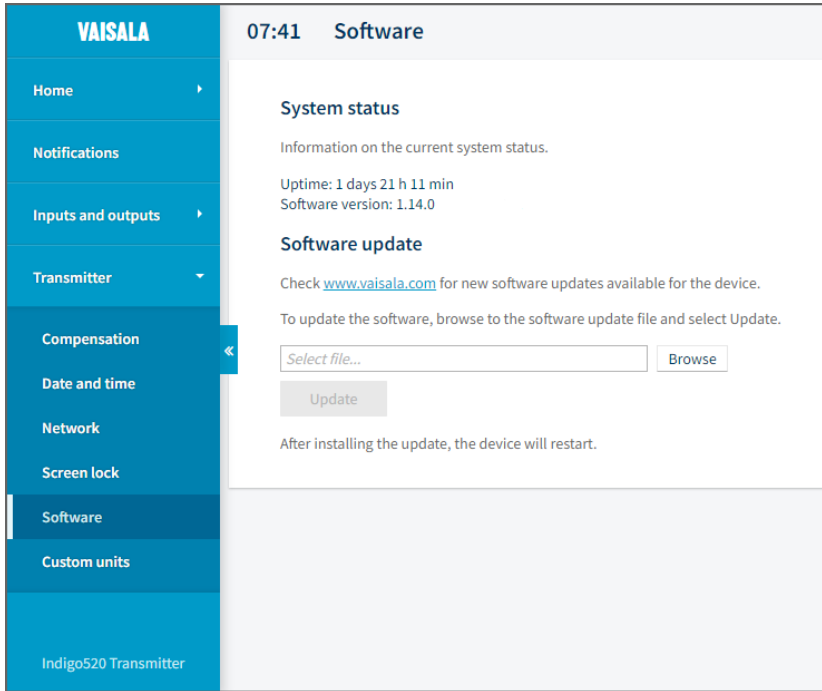
A factory reset is needed after updating to an older software version.

Before you start:

- Make sure that you have the software update file locally on your computer. You can download the file from <https://www.vaisala.com/en/lp/indigo500-software-download>.
- 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.

- In **Transmitter > Software**, select **Browse**, and browse to the software update file.



- 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 \(page 66\)](#)
- [Logging in to web interface \(page 70\)](#)

## 10.4 Restoring factory default settings

You can restore all device settings to the factory default settings. This will take some minutes.

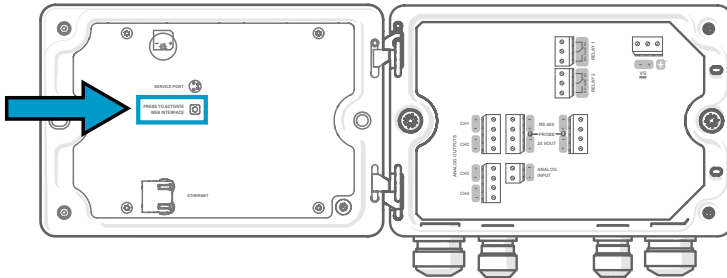


**CAUTION!** A factory reset deletes all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays. When you connect to the web interface the next time, you will be prompted to give the activation code and create new users.



- 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 pressing the **PRESS TO ACTIVATE WEB INTERFACE** button while you power up the transmitter. Keep pressing the button until the LED next to the button lights up.



The transmitter restarts.



If the transmitter asks you to calibrate the touchscreen display after the restart, touch the requested crosshair positions on the touchscreen carefully and as accurately as possible.



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 \(page 31\)](#)
- [Connecting to web interface \(page 66\)](#)
- [Creating web interface users \(page 68\)](#)
- [Logging in to web interface \(page 70\)](#)

## 10.5 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.

<b>Problem: A power outage occurred.</b>	
<b>Possible cause:</b>	<b>Solution:</b>
	<p>Wait for the transmitter to power up again. This will take some minutes.</p> <p>When the transmitter powers up, it will continue to show measurements just like before the power outage.</p> <p>To access the web interface again:</p> <ol style="list-style-type: none"> <li>1. Check the current IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu.</li> <li>2. Reconnect to the web interface using the current IP address.</li> </ol>

<b>Problem: You cannot access the web interface login page.</b>	
<b>Possible cause:</b>	<b>Solution:</b>
If the transmitter's IP address is assigned via DHCP, the IP address may have changed, for example, because the transmitter has been restarted.	<ol style="list-style-type: none"> <li>1. Check the current IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu.</li> <li>2. Reconnect to the web interface using the current IP address.</li> </ol>
If the transmitter is using a static IP address, there may be something wrong with the static network settings.	<p>Check the static network settings on the touchscreen.</p> <ul style="list-style-type: none"> <li>• Menu path on touchscreen: <b>Menu &gt; Transmitter &gt; Network</b></li> </ul>

Problem: You cannot access the web interface login page.	
The Ethernet cable may be disconnected from the transmitter.	<ol style="list-style-type: none"> <li>1. Open the transmitter cover.</li> <li>2. If the Ethernet connector's green light is not blinking, reconnect the Ethernet cable.</li> <li>3. Check the current IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu.</li> <li>4. Reconnect to the web interface using the current IP address.</li> </ol>

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 <b>Modbus off/on</b> setting may be off.	<p>Make sure that <b>Modbus off/on</b> is set on.</p> <ul style="list-style-type: none"> <li>• Menu path on touchscreen: <b>Menu &gt; Inputs and outputs &gt; Modbus TCP/IP</b></li> <li>• Menu path in web interface: <b>Inputs and outputs &gt; Modbus TCP/IP</b></li> </ul>

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.	<p>Set the transmitter's time on the touchscreen so that browsers will be able to create a valid browser session.</p> <ul style="list-style-type: none"> <li>• Menu path on touchscreen: <b>Menu &gt; Transmitter &gt; Date and time</b></li> </ul>
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.

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.



<b>Problem: There is no measurement data from the connected probe.</b>	
<b>Possible cause:</b>	<b>Solution:</b>
The probe may be disconnected from the transmitter.	<ol style="list-style-type: none"> <li>1. If the connected probe has a status indicator, check its color.</li> <li>2. If the indicator is off, make sure that the probe is properly connected to the probe cable connector.</li> <li>3. If the indicator is red, check the probe sensor. If the sensor is faulty, replace it.</li> <li>4. If the indicator is blinking green, restart the transmitter.</li> <li>5. If the problem still persists, contact Vaisala.</li> </ol>
The probe sensor may be faulty.	

<b>Problem: Analog input is not available.</b>	
<b>Possible cause:</b>	<b>Solution:</b>
You have not updated your transmitter's software.	Ensure you have updated to a software version that supports analog input.

<b>Problem: Analog input shows incorrect values.</b>	
<b>Possible cause:</b>	<b>Solution:</b>
If you have an external power source, the ground potential may have differences.	Use probe 2 connection terminal as power source.

<b>Problem: Analog input is not showing any values.</b>	
<b>Possible cause:</b>	<b>Solution:</b>
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 \(page 31\)](#)
- [Analog input terminals and lead-through \(page 45\)](#)
- [Connecting to web interface \(page 66\)](#)
- [Creating web interface users \(page 68\)](#)
- [Logging in to web interface \(page 70\)](#)
- [Configuring analog input on touchscreen \(page 84\)](#)
- [Configuring analog input in web interface \(page 94\)](#)
- [Updating transmitter software version \(page 108\)](#)
- [Restoring factory default settings \(page 110\)](#)

## 11. Technical data

### 11.1 Indigo510 specifications

Table 14 Indigo510 transmitter options

Property	Description/Value
Display	<ul style="list-style-type: none"> <li>• Capacitive touchscreen display</li> <li>• No display (indicator LED) <sup>1)</sup></li> </ul>
Powering	Protective extra-low voltage (11 ... 35 V DC, 24 V AC ± 15% 50/60 Hz)

1) *Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.*

Table 15 Indigo510 operating environment

Property	Description/Value
For use in wet locations	Yes
Operating humidity	0 ... 100 %RH
Maximum operating altitude	4000 m (13 123 ft)
IP rating	IP66: Dust-tight. Protected from powerful water jets from any direction. <sup>1)</sup>
<b>Operating temperature</b>	
With display	-20 ... +60 °C (-4 ... +140 °F)
Without display	-40 ... +60 °C (-40 ... +140 °F)
<b>Storage temperature</b>	
With display	-30 ... +60 °C (-22 ... +158 °F)
Without display	-40 ... +60 °C (-40 ... +140 °F)

1) *Evaluated by Eurofins, not by UL.*

Table 16 Indigo510 inputs and outputs

Property	Description/Value
<b>Operating power</b>	

Property	Description/Value
Protective extra-low voltage (PELV)	11 ... 35 V DC, 24 V AC $\pm 15\%$ 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	$\geq +80\text{ }^{\circ}\text{C}$ ( $+176\text{ }^{\circ}\text{F}$ )
<b>Typical current consumption at +20 °C (+68 °F) (<math>U_{in}</math> 24 V DC) <sup>1)</sup></b>	
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
<b>Analog outputs</b>	
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 <sup>2</sup> (14 AWG)
Accuracy of analog outputs at +20 °C (+68 °F)	$\pm 0.05\%$ full scale
Temperature dependence	$\pm 0.005\%$ / $^{\circ}\text{C}$ full scale
External loads:	
Current outputs	$R_L < 500\ \Omega$
0 ... 1 V output	$R_L > 2\ \text{k}\Omega$
0 ... 5 V and 0 ... 10 V outputs	$R_L > 10\ \text{k}\Omega$
<b>Ethernet interface</b>	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)

1) For the current consumption of the connected measurement device, see the device's documentation, available at [docs.vaisala.com](https://docs.vaisala.com).

Table 17 Indigo510 compliance

Property	Description/Value
EU directives and regulations	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Electrical safety	IEC/EN 61010-1
Type approvals	DNV GL certificate no. TAA000032M
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	UL Listed (USA and Canada)
FCC compliance	FCC Part 15, Class B

Table 18 Indigo500 Series mechanical specifications

Property	Description/Value
UL 50E (NEMA) rating	NEMA 4: Hose down and splashing water, NEMA 250-2014 Type 4
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)
<b>Cable diameters for cable glands</b>	
M20×1.5 glands	5.0 ... 9.0 mm (0.20 ... 0.31 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 19 Indigo500 Series user interfaces

Property	Description/Value
User interfaces	Web interface for remote use, optional touchscreen display
Supported languages	English, Chinese, French, German, Japanese, Spanish
Optional display	5" capacitive touchscreen

Property	Description/Value
Integrated data logging capabilities	Non-volatile memory, at least 10 years' storage with 24 h interval logging

Table 20 Indigo-compatible probes

Measurement type	Probe models
Humidity and temperature	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature	TMP1
Dew point	DMP5, DMP6, DMP7, DMP8
Carbon dioxide	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Table 21 Other Indigo510 compatible devices

Device or series	Models
MHT410 Moisture, Hydrogen and Temperature Transmitter	MHT410
Indigo80 Handheld Indicator	Indigo80

## 11.2 Indigo520 specifications

Table 22 Indigo520 transmitter options

Property	Description/Value
Display	<ul style="list-style-type: none"> <li>• Capacitive touchscreen display</li> <li>• No display (indicator LED)<sup>1)</sup></li> </ul>
Powering	<ul style="list-style-type: none"> <li>• Protective extra-low voltage (15 ... 35 V DC, 24 V AC ± 20%)</li> <li>• AC (mains) power (100 ... 240 V AC 50/60 Hz)</li> <li>• Power over Ethernet (no analog outputs or relays)</li> </ul>

1) Recommended when the transmitter is exposed to direct UV light, and for outdoor installations and high-humidity environments.

Table 23 Indigo520 measurement performance

Property	Description/Value
<b>Barometric pressure</b> (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
Pressure units	hPa, mbar, kPa, Pa, inHg, mmH2O, mmHg, torr, psia

Table 24 Indigo520 operating environment

Property	Description/Value
For use in wet locations	Yes
Operating humidity	0 ... 100 %RH
Maximum operating altitude, AC (mains) power	3000 m (9843 ft)
Maximum operating altitude, protective extra-low voltage (PELV) and Power over Ethernet (PoE)	4000 m (13 123 ft)
IP rating	IP66: Dust-tight. Protected from powerful water jets from any direction. <sup>1)</sup>
<b>Operating temperature</b>	
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)
<b>Storage temperature</b>	

Property	Description/Value
With display	-30 ... +60 °C (-22 ... +158 °F)
Without display	-40 ... +60 °C (-40 ... +140 °F)

1) Evaluated by Eurofins, not by UL.

Table 25 Indigo520 inputs and outputs

Property	Description/Value
<b>Operating power <sup>1)</sup></b>	
Protective extra-low voltage (PELV) version	15 ... 35 V DC, 24 V AC $\pm 20\%$ 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	$\geq +80$ °C (+176 °F)
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
Power over Ethernet version <sup>2)</sup>	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
<b>Typical current consumption at +20 °C (+68 °F) (<math>U_{in}</math> 24 V DC) <sup>3)</sup></b>	
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
<b>Analog input</b>	
Available ranges	4 ... 20 mA
Resolution	6 $\mu$ A

Property	Description/Value
Display resolution	0.01 mA
Accuracy	±0.05 mA
Input impedances	200 Ω
Isolation	Isolated from power supply
Overload protection	40 mA max. (reverse polarity protected)
<b>Analog outputs</b>	
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 <sup>2</sup> (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	$R_L < 500 \Omega$
0 ... 1 V output	$R_L > 2 \text{ k}\Omega$
0 ... 5 V and 0 ... 10 V outputs	$R_L > 10 \text{ k}\Omega$
<b>Relay outputs</b>	
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 <sup>2</sup> (14 AWG)
Max. wire size in AC (mains) version	1.5 mm <sup>2</sup> (16 AWG)
<b>Ethernet interface</b>	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)

- 1) *The power supply option is selected when ordering the transmitter.*
- 2) *Transmitter shall be supplied by a Power Sourcing Equipment (PSE) unit which fulfils the requirements of IEEE802.3at specifications.*
- 3) *For the current consumption of the connected measurement device, see the device's documentation, available at [docs.veaisala.com](https://docs.veaisala.com).*



Table 26 Indigo520 compliance

Property	Description/Value
EU directives and regulations	EMC Directive (2014/30/EU) Low Voltage Directive (2014/35/EU) RoHS Directive (2011/65/EU) amended by 2015/863
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Electrical safety	IEC/EN 61010-1
Type approvals	DNV GL certificate no. TAA000032M
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	UL Listed (USA and Canada)
FCC compliance	FCC Part 15, Class B

Table 27 Indigo500 Series mechanical specifications

Property	Description/Value
UL 50E (NEMA) rating	NEMA 4: Hose down and splashing water, NEMA 250-2014 Type 4
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)
<b>Cable diameters for cable glands</b>	
M20×1.5 glands	5.0 ... 9.0 mm (0.20 ... 0.31 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 28 Indigo500 Series user interfaces

Property	Description/Value
User interfaces	Web interface for remote use, optional touchscreen display
Supported languages	English, Chinese, French, German, Japanese, Spanish

Property	Description/Value
Optional display	5" capacitive touchscreen
Integrated data logging capabilities	Non-volatile memory, at least 10 years' storage with 24 h interval logging

Table 29 Indigo-compatible probes

Measurement type	Probe models
Humidity and temperature	HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9
Temperature	TMP1
Dew point	DMP5, DMP6, DMP7, DMP8
Carbon dioxide	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Table 30 Other Indigo520 compatible devices

Device or series	Models
MHT410 Moisture, Hydrogen and Temperature Transmitter	MHT410
Polaris™ Process Refractometers <sup>1)</sup>	PR53AC, PR53AP, PR53GC, PR53GP, PR53M, PR53SD, PR53W
Indigo80 Handheld Indicator	Indigo80

1) *Compatible with transmitters ordered with software configuration "L" for process refractometers.*

## 11.3 Spare parts and accessories

Table 31 Indigo500 Series accessories

Item	Item code
Adapter plate	DRW252186SP
Installation kit for pole or pipeline	215108
Installation kit with weather shield	215109
Indigo500 spatter guard	ASM214526
<b>Probe connection cables</b>	

Item	Item code
Probe connection cable, 0.3 m (approx. 12 in), open end <sup>1)</sup>	CBL210896-03MSP
Probe connection cable, 1 m (approx. 3 ft 3 in), open end <sup>1)</sup>	CBL210896-1MSP
Probe connection cable, 3 m (approx. 9 ft 10 in), open end <sup>1)</sup>	CBL210896-3MSP
Probe connection cable, 5 m (approx. 16 ft 5 in), open end <sup>1)</sup>	CBL210896-5MSP
Probe connection cable, 10 m (approx. 32 ft 10 in), open end <sup>1)</sup>	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 32 Indigo500 Series spare parts

Item	Item code
Cable gland, M20×1.5, 5.0 ... 9.0 mm (0.20 ... 0.35 in)	ASM213670SP
Cable gland with split bushing, M20×1.5 <sup>1)</sup>	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.*

## 11.4 Recycling



Recycle all applicable material.



Disposal of Vaisala products is to be done according to local laws and regulations. We encourage end-users to segregate the products from other waste at end-of-life and use best available recycling practices to minimize related environmental impacts.

Almost all of the parts in our products can be recovered as material or energy. If applicable, Vaisala recommends removing the battery unit before recycling the rest of the device as typical electronic waste. The battery unit can be recycled separately in accordance with local waste management practices and regulations. Integrated small sized batteries are typically left in place and removed by professionals at the recycling facilities.

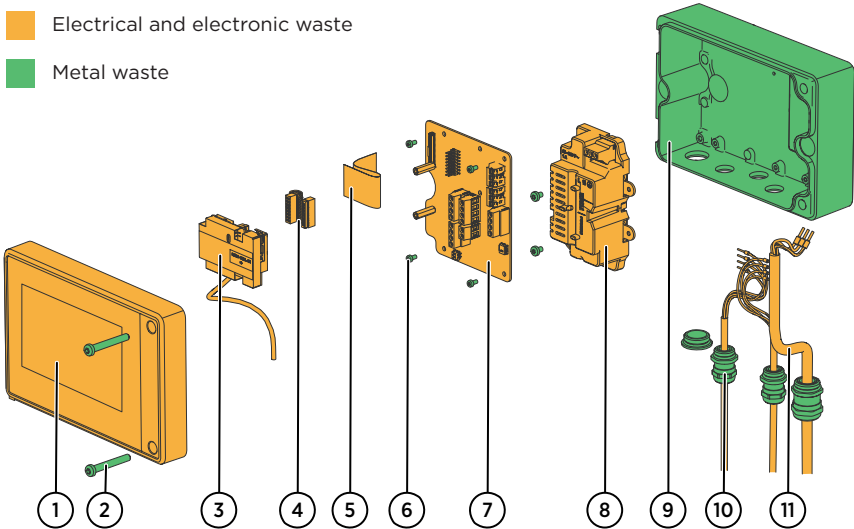


Figure 46 Materials for recycling

Table 33 Materials for recycling

Part	Material	Recycling	
Device parts			
1	Top enclosure	Aluminum alloy	Electrical and electronic waste
2	Screws	Stainless steel	Metal waste
3	Barometer module	Various materials	Electrical and electronic waste
4	Ribbon cable	Various materials	Electrical and electronic waste
5	Flat flex ribbon cable	Various materials	Electrical and electronic waste

Part		Material	Recycling
6	Screws	Stainless steel	Metal waste
7	PCB	Stainless steel A4	Electrical and electronic waste
8	Power-2 module	Various materials	Electrical and electronic waste
9	Bottom enclosure	Aluminum alloy	Metal waste
10	Cable glands	Nickel-plated brass	Metal waste
11	Cables	Various materials	Electrical and electronic waste

## Appendix A. Modbus reference

### A.1 Unit IDs

Table 34 Unit IDs of transmitter and probes

Device	Unit ID
Transmitter (including analog input, analog outputs, relays, and optional barometer module)	240
Probe connected to probe 1 connection terminal	241
Probe connected to probe 2 connection terminal	242



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

### A.2 Function codes

Table 35 Modbus function codes

Function code (decimal)	Function code (hexadecimal)	Name	Notes
03	03 <sub>hex</sub>	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. <sup>1)</sup>
43 / 14	2B <sub>hex</sub> / 0E <sub>hex</sub>	Read Device Identification	Can be used only for reading transmitter identification information using unit ID 240.

<sup>1)</sup> 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 masters 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 master 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

Some 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 36 Interpretation of 16-bit signed integer values

Value (decimal)	Value (hexadecimal)	Description
0 ... 32766	0000 <sub>hex</sub> ... 7FFE <sub>hex</sub>	Value in range 0 ... 32766
32767	7FFF <sub>hex</sub>	Value is 32767 or larger
32768	8000 <sub>hex</sub>	Value is not available
32769	8001 <sub>hex</sub>	Value is -32767 or smaller
32770 ... 65535	8002 <sub>hex</sub> ... FFFF <sub>hex</sub>	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 0<sub>hex</sub> 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 37 Floating point measurement data registers (read-only)

Register number	Register address	Register description	Data format	Unit
43	002A <sub>hex</sub>	Barometric pressure	32-bit float	hPa
53	0034 <sub>hex</sub>	Actual current level of analog input (mA)	32-bit float	mA
55	0036 <sub>hex</sub>	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 38 Integer measurement data registers (read-only)

Register number	Register address	Register description	Data format	Scale factor	Offset	Unit
278	0115 <sub>hex</sub>	Barometric pressure	16-bit signed integer	10	0	hPa
283	011A <sub>hex</sub>	Actual level of analog input	16-bit signed integer	1000	0	mA
284	011B <sub>hex</sub>	Validated level of analog input or 8000 <sub>hex</sub> (-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 39 Status registers (read-only)

Register number	Register address	Register description	Data format	Value
513	0201 <sub>hex</sub>	Barometer status	16-bit unsigned integer	0000 <sub>hex</sub> OK 0020 <sub>hex</sub> Value locked 0080 <sub>hex</sub> Sensor failure

Table 40 Error flags (read-only)

Register number	Address	Register description	Data format	Value
514	0202 <sub>hex</sub>	Barometer error flags	16-bit unsigned integer	0000 <sub>hex</sub> OK 0004 <sub>hex</sub> Pressure out of range 0008 <sub>hex</sub> Pressure measurement error 0010 <sub>hex</sub> Manufactory error 0020 <sub>hex</sub> Module type not defined 0100 <sub>hex</sub> F meas 0400 <sub>hex</sub> Temperature meas 0800 <sub>hex</sub> Info 2nd bank checksum 1000 <sub>hex</sub> Info 1st bank checksum 2000 <sub>hex</sub> Checksum error of current settings 4000 <sub>hex</sub> User setting bank checksum 8000 <sub>hex</sub> 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 0014<sub>hex</sub> if pressure is out of range (0004<sub>hex</sub>) and a manufactory error (0010<sub>hex</sub>) are present simultaneously.

### A.4.3 Configuration registers

Registers in this appendix can be used only for transmitter using analog output and transmitters using relays, using unit ID 240.

Table 41 Modbus configuration data registers

Register number	Address	Description	Data format	Read/write	Value
<b>Analog output 1</b>					
1793	0700 <sub>hex</sub>	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	0701 <sub>hex</sub>	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
1795	0702 <sub>hex</sub>	Scale low end	32-bit float	Read/write	NaN if not set
1797	0704 <sub>hex</sub>	Scale high end	32-bit float	Read/write	NaN if not set
1799	0706 <sub>hex</sub>	Error output	32-bit float	Read/write	NaN if not set
1801	0708 <sub>hex</sub>	Low clipping limit	32-bit float	Read/write	NaN if not set
1805	070C <sub>hex</sub>	High clipping limit	32-bit float	Read/write	NaN if not set
1809	0710 <sub>hex</sub>	Output level	32-bit float	Read	
1811	0712 <sub>hex</sub>	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
<b>Analog output 2</b>					

Register number	Address	Description	Data format	Read/write	Value
2049	0800 <sub>hex</sub>	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	0801 <sub>hex</sub>	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
2051	0802 <sub>hex</sub>	Scale low end	32-bit float	Read/write	NaN if not set
2053	0804 <sub>hex</sub>	Scale high end	32-bit float	Read/write	NaN if not set
2055	0806 <sub>hex</sub>	Error output	32-bit float	Read/write	NaN if not set
2057	0808 <sub>hex</sub>	Low clipping limit	32-bit float	Read/write	NaN if not set
2061	080C <sub>hex</sub>	High clipping limit	32-bit float	Read/write	NaN if not set
2065	0810 <sub>hex</sub>	Output level	32-bit float	Read	
2067	0812 <sub>hex</sub>	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
<b>Analog output 3</b>					
2305	0900 <sub>hex</sub>	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	0901 <sub>hex</sub>	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
2307	0902 <sub>hex</sub>	Scale low end	32-bit float	Read/write	NaN if not set
2309	0904 <sub>hex</sub>	Scale high end	32-bit float	Read/write	NaN if not set
2311	0906 <sub>hex</sub>	Error output	32-bit float	Read/write	NaN if not set

Register number	Address	Description	Data format	Read/write	Value
2313	0908 <sub>hex</sub>	Low clipping limit	32-bit float	Read/write	NaN if not set
2317	090C <sub>hex</sub>	High clipping limit	32-bit float	Read/write	NaN if not set
2321	0910 <sub>hex</sub>	Output level	32-bit float	Read	
2323	0912 <sub>hex</sub>	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
<b>Analog output 4</b>					
2561	0A00 <sub>hex</sub>	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	0A01 <sub>hex</sub>	Output parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
2563	0a02 <sub>hex</sub>	Scale low end	32-bit float	Read/write	NaN if not set
2565	0A04 <sub>hex</sub>	Scale high end	32-bit float	Read/write	NaN if not set
2567	0A06 <sub>hex</sub>	Error output	32-bit float	Read/write	NaN if not set
2569	0A08 <sub>hex</sub>	Low clipping limit	32-bit float	Read/write	NaN if not set
2573	0A0C <sub>hex</sub>	High clipping limit	32-bit float	Read/write	NaN if not set
2577	0A10 <sub>hex</sub>	Output level	32-bit float		
2579	0A12 <sub>hex</sub>	Force output level	32-bit float	Read/write	NaN = force off, otherwise output level
<b>Relay 1</b>					
3073	0C00 <sub>hex</sub>	Mode	16-bit signed integer	Read/write	0 = off 1 = above setpoint 2 = below setpoint

Register number	Address	Description	Data format	Read/write	Value
3074	0C01 <sub>hex</sub>	Parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
3075	0C02 <sub>hex</sub>	Active above	32-bit float	Read/write	Same as 0x04, NaN if not set
3077	0C04 <sub>hex</sub>	Active below	32-bit float	Read/write	Same as 0x02, NaN if not set
3079	0C06 <sub>hex</sub>	Hysteresis	32-bit float	Read/write	NaN if not set
3082	0C09 <sub>hex</sub>	Output state	16-bit signed integer		0 = disabled 1 = active 2 = inactive
3083	0C0A <sub>hex</sub>	Force output	16-bit signed integer	Read/write	0 = normal mode 1 = active 2 = force inactive
<b>Relay 2</b>					
3329	0D00 <sub>hex</sub>	Mode	16-bit signed integer	Read/write	0 = off 1 = above setpoint 2 = below setpoint
3330	0D01 <sub>hex</sub>	Parameter	16-bit signed integer	Read/write	Guiding register in the 240 address space
3331	0D02 <sub>hex</sub>	Active above	32-bit float	Read/write	Same as 0x04, NaN if not set
3333	0D04 <sub>hex</sub>	Active below	32-bit float	Read/write	Same as 0x02, NaN if not set
3335	0D06 <sub>hex</sub>	Hysteresis	32-bit float	Read/write	NaN if not set
3338	0D09 <sub>hex</sub>	Output state	16-bit signed integer		0 = disabled 1 = active 2 = inactive

Register number	Address	Description	Data format	Read/write	Value
3339	0D0A <sub>hex</sub>	Force output	16-bit signed integer	Read/write	0 = normal mode 1 = active 2 = force inactive

## A.5 Device identification objects

Device identification objects in this appendix can be used only for transmitters, using unit ID 240.

Table 42 Device identification objects

Object ID (decimal)	Object ID (hexadecimal)	Object name	Example contents
0	00 <sub>hex</sub>	VendorName	"Vaisala"
1	01 <sub>hex</sub>	ProductCode	"INDIGO5X0"
2	02 <sub>hex</sub>	MajorMinorVersion	"1.2.3" Software version of the device.
3	03 <sub>hex</sub>	VendorUrl	"http://www.vaisala.com/"
4	04 <sub>hex</sub>	ProductName	"Indigo5X0 Transmitter"
128	80 <sub>hex</sub>	SerialNumber <sup>1)</sup>	"K0710040"

1) *Vaisala-specific device identification object.*

## A.6 Exception responses

Table 43 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 8000<sub>hex</sub> 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
00 <sub>hex</sub>	Transaction ID	00 <sub>hex</sub>	Transaction ID
01 <sub>hex</sub>		01 <sub>hex</sub>	
00 <sub>hex</sub>	Protocol ID	00 <sub>hex</sub>	Protocol ID
00 <sub>hex</sub>		00 <sub>hex</sub>	
00 <sub>hex</sub>	Length (6)	00 <sub>hex</sub>	Length (7)
06 <sub>hex</sub>		07 <sub>hex</sub>	
F1 <sub>hex</sub>	Unit ID (probe 1)	F1 <sub>hex</sub>	Unit ID (probe 1)
03 <sub>hex</sub>	Function (Read Holding Registers)	03 <sub>hex</sub>	Function (Read Holding Registers)
00 <sub>hex</sub>	Register address	04 <sub>hex</sub>	Number of data bytes
00 <sub>hex</sub>		7A <sub>hex</sub>	Value of first register (least significant word)
00 <sub>hex</sub>	Number of 16-bit registers to read (2)	E1 <sub>hex</sub>	Value of second register (most significant word)
02 <sub>hex</sub>		41 <sub>hex</sub>	
		F4 <sub>hex</sub>	

#### Communication description

Transaction identifier	Any number identifying the response and the corresponding request on a Modbus TCP/IP transaction
------------------------	--------------------------------------------------------------------------------------------------

Communication description	
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) = 0000 <sub>hex</sub> (0-based register address used in actual communication) based on the Modbus reference in <a href="#">HMP Series with MMP8 and TMP1 User Guide (M212022EN)</a>
Data format	Two 16-bit Modbus registers interpreted as IEEE 754 binary32 floating point value, least significant word first
Returned value	41F47AE1 <sub>hex</sub> , which is binary32 representation of 30.56 (%RH)



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## Maintenance and calibration services



Vaisala offers comprehensive customer care throughout the life cycle of our measurement instruments and systems. Our factory services are provided worldwide with fast deliveries. For more information, see [www.vaisala.com/calibration](http://www.vaisala.com/calibration).

- Vaisala Online Store at [store.vaisala.com](http://store.vaisala.com) is available for most countries. You can browse the offering by product model and order the right accessories, spare parts, or maintenance and calibration services.
- To contact your local maintenance and calibration expert, see [www.vaisala.com/contactus](http://www.vaisala.com/contactus).

## Warranty

For standard warranty terms and conditions, see [www.vaisala.com/warranty](http://www.vaisala.com/warranty).

Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

## Technical support



Contact Vaisala technical support at [helpdesk@vaisala.com](mailto:helpdesk@vaisala.com). Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see [www.vaisala.com/support](http://www.vaisala.com/support).





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