

User Guide

Indigo500 Series Transmitters
Indigo510, Indigo520



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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-J	September 2021	<p>Updated content to include Indigo510 transmitter.</p> <p>Added sections:</p> <ul style="list-style-type: none"> • Recycling (page 92) <p>Updated sections:</p> <ul style="list-style-type: none"> • Safety (page 20) • Introduction to Indigo500 Series Transmitters (page 11) • Indigo500 basic features and options (page 11) • Indigo500 transmitter parts (page 12) • Cable gland and conduit options (page 13) • LED indicator (non-display transmitter) (page 15) • Output options (page 16) • Wiring (page 31) • Power supply terminals and lead-through – PELV option (page 31) • Analog outputs (page 17) • Attaching probes (page 38) • Unit identification of transmitter and probes (page 79) • Specifications (page 88) • Unit IDs (page 95) • Function codes (page 95) • Device identification objects (page 95) • Measurement data registers (page 96)

Document code	Date	Description
M212287EN-H	July 2021	<p>Applicable from software version 1.7.0 onward.</p> <p>Changed publication name to Indigo500 Series Transmitters User Guide.</p> <p>Added sections:</p> <ul style="list-style-type: none"> • LED indicator (non-display transmitter) (page 15) • Connecting to web interface with a direct connection between transmitter and computer (page 51) <p>Updated sections:</p> <ul style="list-style-type: none"> • Related manuals (page 9) • Introduction to Indigo500 Series Transmitters (page 11) • Indigo500 basic features and options (page 11) • Indigo500 transmitter parts (page 12) • Cable gland and conduit options (page 13) • Touchscreen display (page 15) • Output options (page 16) • Analog outputs (page 17) • Safety (page 20) • Mounting (page 24) • Power supply terminals and lead-through – AC (mains) power option (page 32) • Web interface and main views (page 43) • Specifications (page 88) • Device identification objects (page 95)
M212297EN-G	April 2021	<p>Applicable from software version 1.5.0 onward.</p> <p>Added sections:</p> <ul style="list-style-type: none"> • BARO-1 barometer module (page 18) • Testing analog outputs on touchscreen (page 66) • Testing analog outputs in web interface (page 73) • Modbus registers (page 96) • Measurement data registers (page 96) <p>Updated sections:</p> <ul style="list-style-type: none"> • Trademarks (page 9) • Data logging (page 19) • Configuring analog outputs on touchscreen (page 63) • Configuring analog outputs in web interface (page 72) • Updating transmitter software version (page 82) • Transmitter options, operating environment and compliance information in Specifications (page 88)

1.2 Related manuals

Table 2 Related manuals

Document code	Name
M212290EN	<i>Vaisala Indigo500 Series Quick Guide</i>

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 and the Indigo510 transmitter has 1 probe connection. Both transmitters are available in 2 models: one with a touchscreen display, and a non-display model with an LED status indicator.

For more information on Indigo500 transmitter models, see www.vaisala.com/indigo.

2.1.1 Probe compatibility

Vaisala Indigo500 Series Transmitters are the most versatile option for use with Indigo compatible probes such as:

- Humidity and temperature probes: HMP1, HMP3, HMP4, HMP5, HMP7, HMP8, HMP9, TMP1
- Dew point probes: DMP5, DMP6, DMP7, DMP8
- CO₂ probes: GMP251, GMP252
- Vaporized hydrogen peroxide probes: HPP271, HPP272
- MMP8 moisture in oil probe

2.2 Indigo500 basic features and options

- Universal transmitter for Vaisala Indigo compatible probes
- Indigo510 supports 1 detachable probe
- Indigo520 supports 2 detachable probes simultaneously
- Data logging feature
- Touchscreen display for real-time data viewing and configuration (non-display model also available)
- IP66 and NEMA 4 rated metal enclosure
- Indigo510: 2 configurable analog outputs
- Indigo520: 4 configurable analog outputs (not available with PoE option)
- Indigo520: 2 configurable relays (not available with PoE option)
- Indigo520: Barometer module for barometric pressure measurement (optional module)
- Installation options:
 - Wall mounting
 - Wall mounting with adapter plate (retrofit to replace Vaisala 330 Series Transmitters such as HMT330)
 - DIN rail with adapter
 - Pole mounting
- Power supply for Indigo510:
 - Protective extra-low voltage (PELV) version: 11 ... 35 V DC, 24 V AC ±15 % 50/60 Hz

- Power supply options for Indigo520:
 - Protective extra-low voltage (PELV) version: 15 ... 35 V DC, 24 V AC ± 20 %
 - AC (mains) power version: 100 ... 240 V AC 50/60 Hz
 - Power over Ethernet (PoE) version: 50 V DC PoE+, IEEE 802.3at PD

2.3 Indigo500 transmitter parts

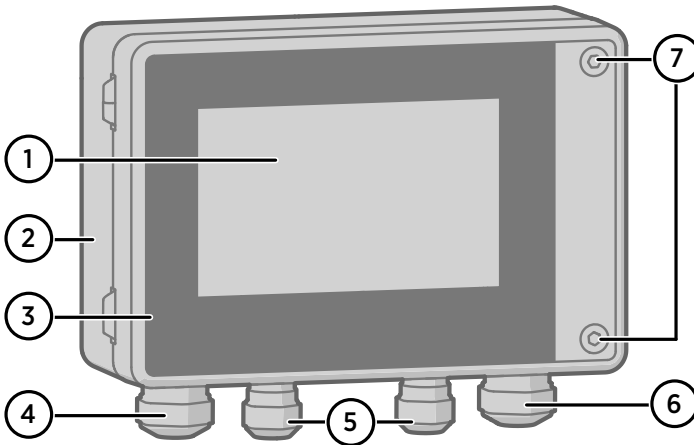


Figure 1 Indigo520 transmitter parts

- 1 Touchscreen display (non-display model also available)
- 2 Transmitter base
- 3 Transmitter cover
- 4 Cable gland for Ethernet cable and optional analog output cable (M20×1.5 lead-through)
- 5 Cable gland for probe 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

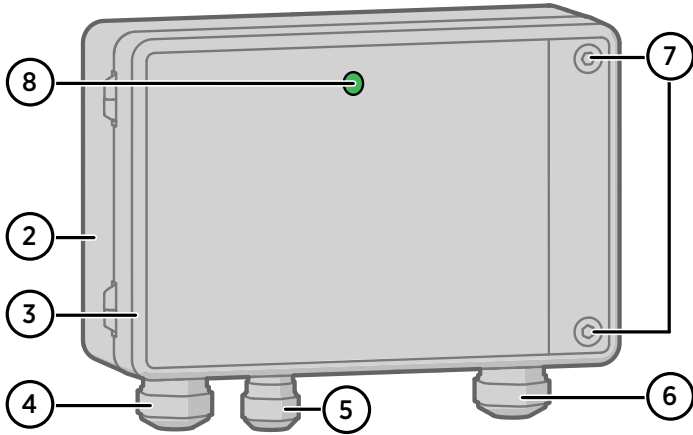


Figure 2 Indigo510 transmitter parts, non-display version

- 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 probe 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.

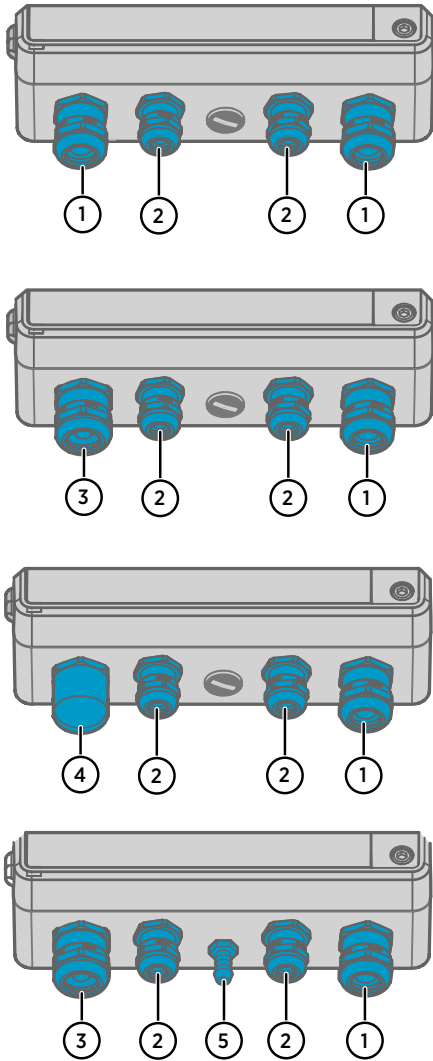


Figure 3 Indigo520 cable gland and conduit options, example configurations

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

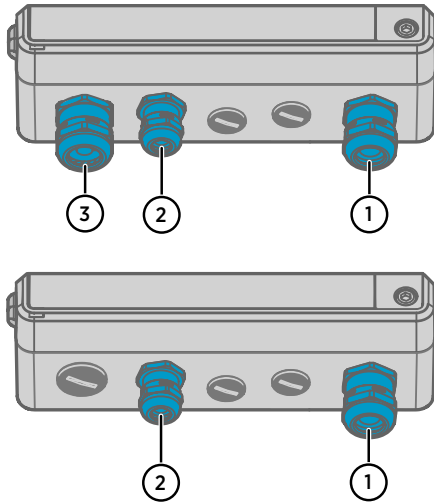


Figure 4 Indigo510 cable gland options, example configurations

- 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 \(page 92\)](#)

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 ... 4 measurement parameters at the same time, as well as graphs for 1 ... 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 and relays.

The display window is made of strengthened glass.

More information

- [Touchscreen display and main views \(page 41\)](#)
- [Starting up transmitter using touchscreen display \(page 45\)](#)

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 ... 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 \(page 43\)](#)
- [Starting up transmitter using web interface \(page 49\)](#)
- [Updating transmitter software version \(page 82\)](#)

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 \(page 63\)](#)
- [Configuring analog outputs in web interface \(page 72\)](#)

2.7.2 Digital output

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

More information

- [Enabling Modbus TCP/IP on touchscreen \(page 70\)](#)
- [Enabling Modbus TCP/IP in web interface \(page 76\)](#)
- [Modbus overview \(page 79\)](#)
- [Modbus reference \(page 95\)](#)
- [Modbus registers \(page 96\)](#)

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 \(page 67\)](#)
- [Configuring relays in web interface \(page 75\)](#)

2.8 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. At least software version 1.2.0 is required.

The barometer is equipped with a pressure port which is ideal for 3 ... 4 mm internal diameter tubing. If you want to attach 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.

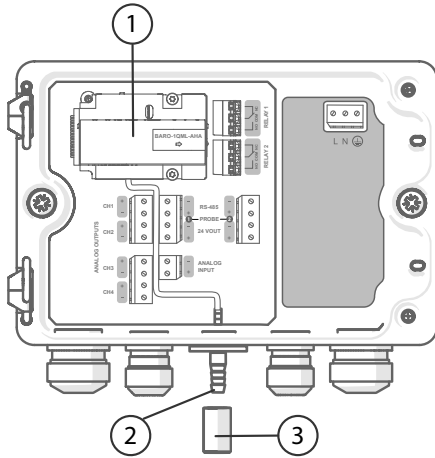


Figure 5 Indigo520 with optional BARO-1 barometer module, example configuration

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

2.9 Data logging

Data logging is a functionality introduced in software version 1.3.0. Data logging collects data automatically into the memory of the transmitter. The data logger records currently only measurement data. The data is logged every 2 minutes as an arithmetic average of valid measurement points between the 2-minute interval, for a maximum of 30 days. When the memory is full the data recording will not stop. Instead, the oldest data is overwritten. Recorded data does not disappear from the memory when the power is switched off. Collected data can be exported to CSV file format in the web interface.

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

Example of logged data:

```
2020-12-08T04:01:17Z,Probe 1,Absolute humidity,6.532,g/m3
```

2020-12-08T04:01:17Z	Timestamp (Z = UTC time zone)
Probe 1	Source
Absolute humidity	Measurement parameter (in English)
6.532	Measurement value
g/m ³	Measurement unit



If a timestamp is missing, no valid measurement points were available during the 2-minute logging period.

More information

- [Enabling data logging on touchscreen \(page 70\)](#)
- [Enabling data logging in web interface \(page 77\)](#)
- [Exporting logged data \(page 77\)](#)

2.10 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 \(page 46\)](#)
- [Configuring network connection in web interface \(page 55\)](#)

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



CAUTION! Attach only Vaisala Indigo compatible probes to the transmitter.



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 cords by inadequately rated cords.



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.

2.11.1 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.

2.12 Regulatory statements

2.12.1 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.

2.12.2 Canada ICES-003 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.

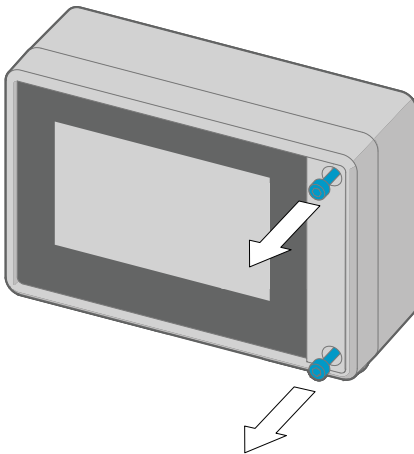
3. Installation

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)

- DIN rail mounting
- Pole mounting

3.2.1 Standard wall mounting



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

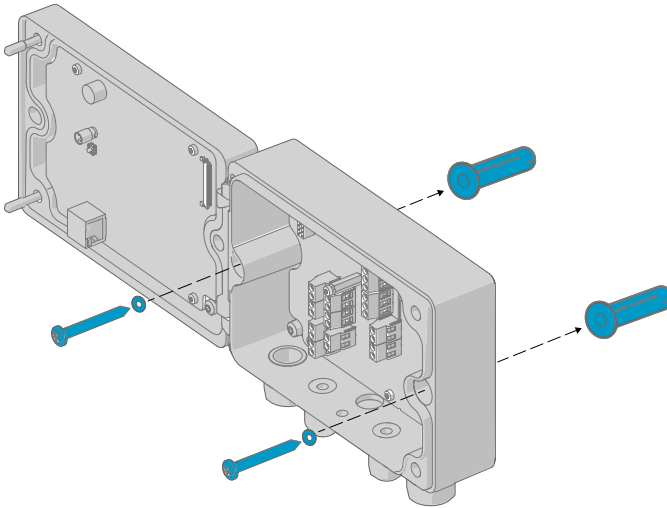


Figure 6 Standard wall mounting

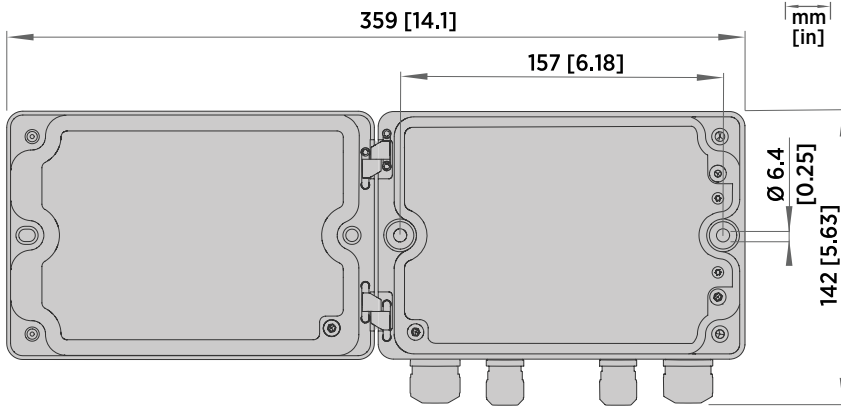


Figure 7 Transmitter mounting dimensions

- ▶ 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.

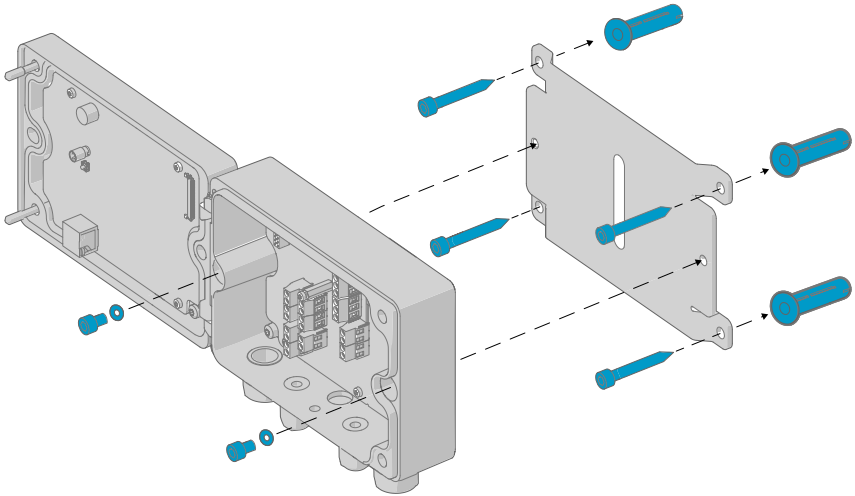


Figure 8 Wall mounting with adapter plate

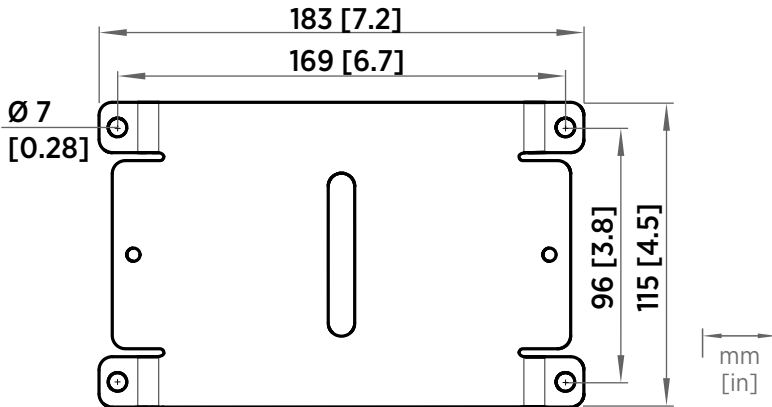


Figure 9 Adapter plate dimensions

- ▶ 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 DIN rail mounting



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

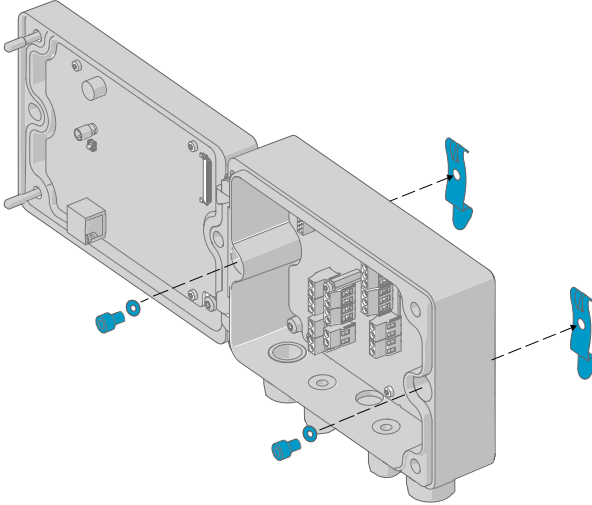


Figure 10 Attaching DIN rail clip fasteners

- ▶ 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.

3.2.4 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.

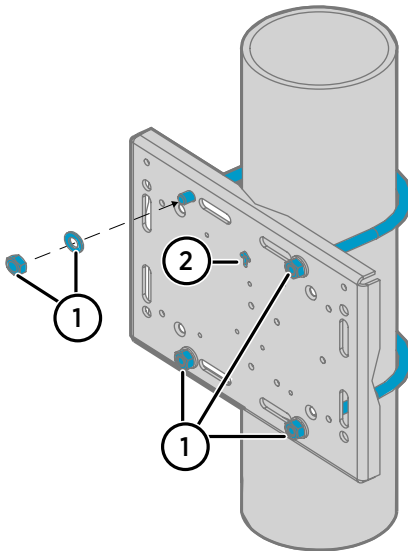


Figure 11 Attaching mounting plate to fixing brackets - vertical pole mounting

- 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.



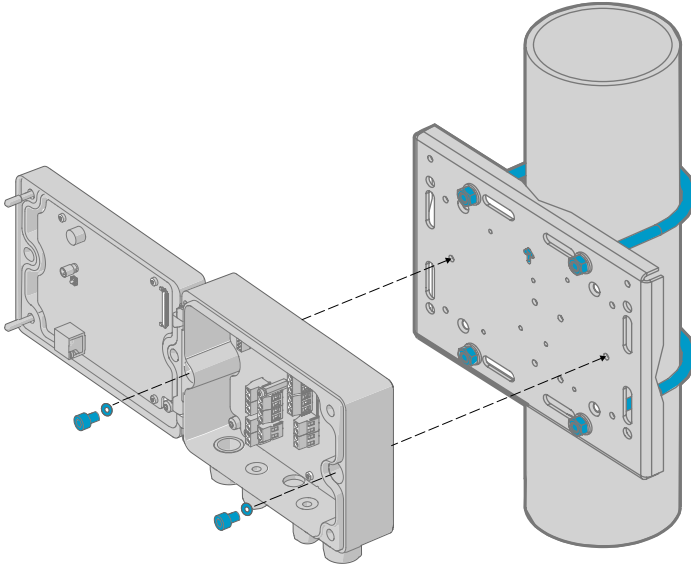


Figure 12 Attaching transmitter to mounting plate - vertical pole mounting

- ▶ 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.

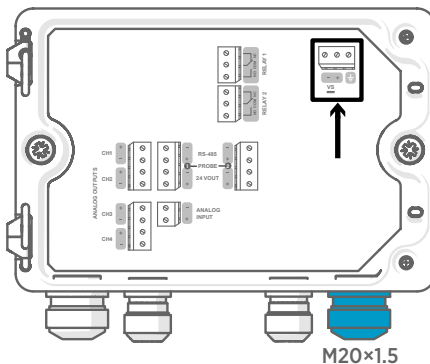


- Allen key (4 mm) for opening the transmitter cover
- Open-ended wrenches of sizes 17 mm, 19 mm, 22 mm and 24 mm
- Flat head screwdriver
- Cable glands as required by your application (available from Vaisala)
- Cables as required by your application (probe connection cables and power cables are available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

3.3.1 Power supply terminals and lead-through – PELV option




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



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 4 PELV power supply input terminals

Terminal	Function	Notes
	Power supply ground	
VS+	Positive supply voltage	15 ... 35 V DC or 24 V AC \pm 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.



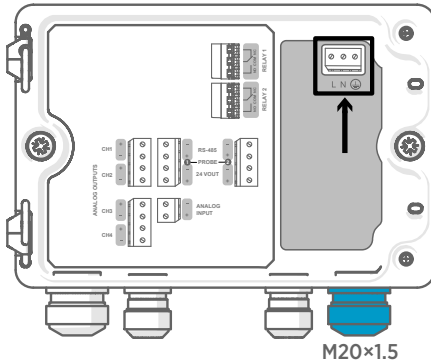
CAUTION! Do not modify the unit or use it in ways not described in the documentation. Improper modification or use may lead to safety hazards, equipment damage, failure to perform according to specification, decreased equipment lifetime, or the warranty becoming void.



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 cords by inadequately rated cords.



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 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



- Cable stripping tool

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

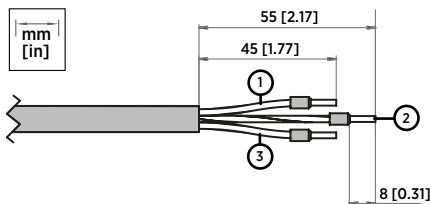



Figure 13 Example of stripped AC (mains) power cable

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

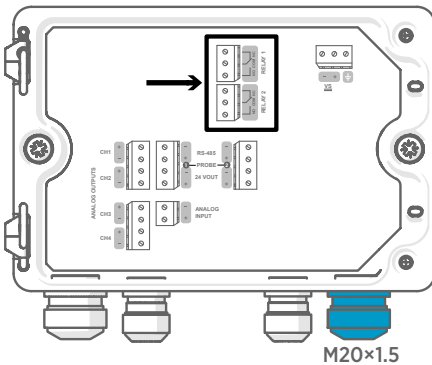


CAUTION! Make sure that the grounding wire is longer than the line and neutral wires. Under mechanical stress, the grounding wire must be the last to disconnect from the protective ground terminal.

- 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 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 Output terminals for relay 1 and relay 2

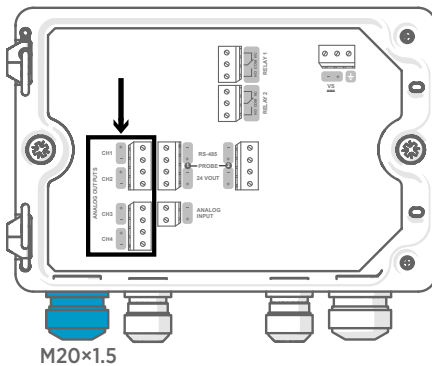
Terminal	Function	Notes
COM	Relay 1 or 2 common	Terminals in PELV power supply version: <ul style="list-style-type: none"> • Type: Screw terminals • Max. wire size: 2.5 mm² (14 AWG) Terminals in AC (mains) power supply version: <ul style="list-style-type: none"> • Type: Push-in spring connection • Max. wire size: 1.5 mm² (16 AWG), solid wires or ferrules recommended
NO	Relay 1 or 2 normally open	
NC	Relay 1 or 2 normally closed	

3.3.4 Analog output terminals and lead-through

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

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

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



For the M20×1.5 cable gland ordered together with the transmitter from Vaisala, the cable diameter is 5.0 ... 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 7 Analog output terminals

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

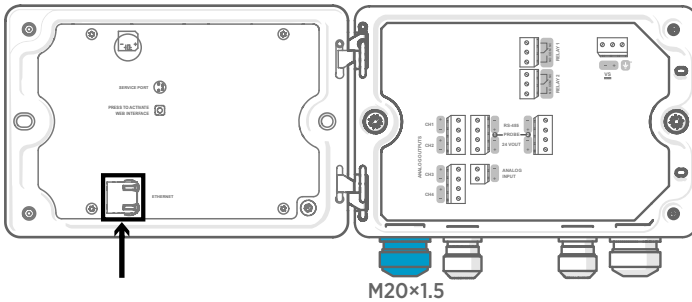
3.3.5 Ethernet connector and lead-through



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.

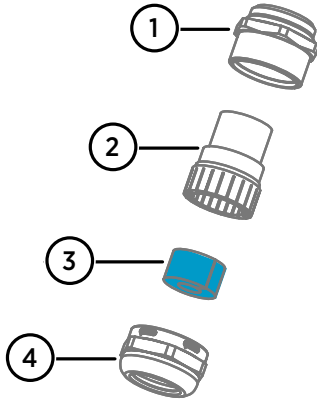
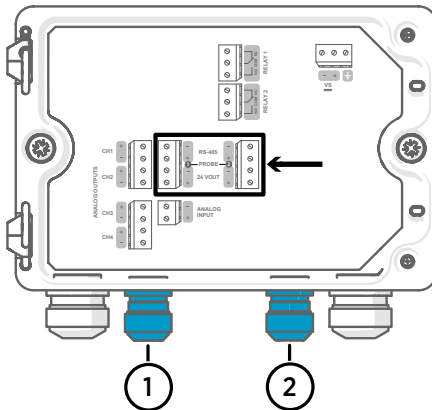


Figure 14 M20x1.5 cable gland with split bushing

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

3.3.6 Probe connection terminals and lead-throughs

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



For the M16x1.5 cable glands ordered together with the transmitter from Vaisala, the cable diameter is 2.0 ... 6.0 mm (0.08 ... 0.24 in). Tightening torque for the cable gland is 6 Nm.

The recommended maximum length of the probe cable is 30 m (98 ft).

- 1 Probe 1 lead-through, M16x1.5
- 2 Probe 2 lead-through, M16x1.5

Table 8 Connection terminals for probe 1 and probe 2

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

3.3.7 Verifying tightness of cable glands

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 Attaching probes



CAUTION! Attach only Vaisala Indigo compatible probes to the transmitter.



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



If you want to configure the probe settings, such as purge interval, you must do that before attaching 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.



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

When the probe connection cables have been wired to the transmitter, you can attach and detach probes both when the transmitter power is on and when it is off. If the power is on while you attach or detach a probe, the transmitter shows a notification about the probe. If you have configured the transmitter to use outputs, the transmitter also notifies you of the state of the outputs.

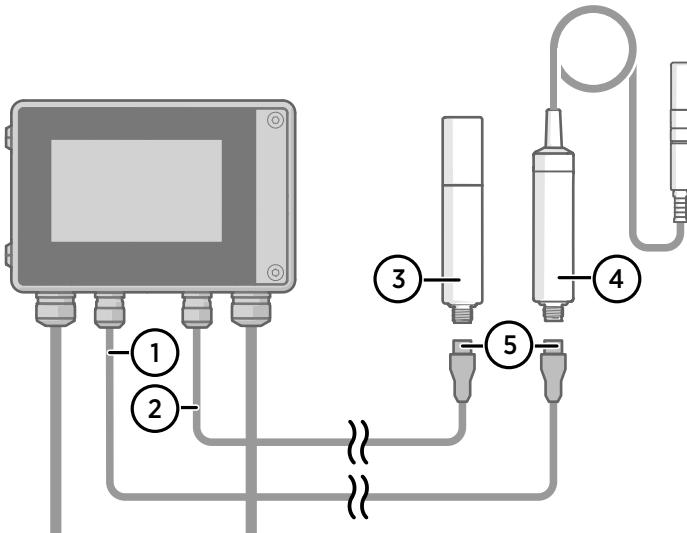


Figure 15 Attaching probes to transmitter using probe cable connector

- 1 Probe connection cable, probe 1
- 2 Probe connection cable, probe 2 (dual-probe support in Indigo520)
- 3 Probe to be connected as probe 2 (GMP252 example)
- 4 Probe to be connected as probe 1 (HMP7 example)
- 5 Probe cable connector (5-pin M12)



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

More information

- [Replacing probes \(page 81\)](#)

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.

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

- [Enabling temperature compensation on touchscreen \(page 70\)](#)
- [Enabling temperature compensation in web interface \(page 77\)](#)

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 and outputs

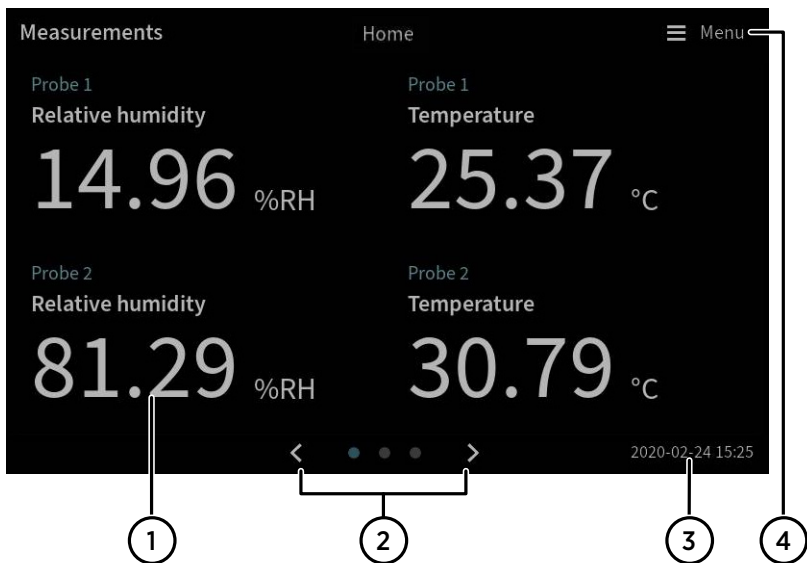


Figure 16 Measurements view on touchscreen

- 1 Slots for 1 ... 4 configurable measurement parameters
- 2 Switch between the three **Home** views:
 - **Measurements** view: 1 ... 4 configurable measurement parameters
 - **Graph** view: 1 ... 2 configurable measurement parameters
 - **Outputs and relays** view: Status of all connected analog outputs and relays
- 3 Date and time
- 4 Access the configuration menu, where you can configure the transmitter's settings and outputs and manage notifications.

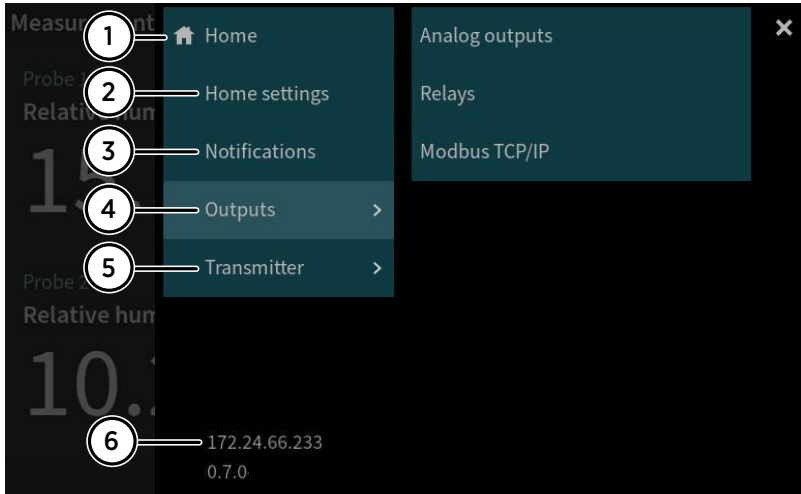



Figure 17 Configuration menu on touchscreen

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

More information

- [Starting up transmitter using touchscreen display \(page 45\)](#)
- [Accessing configuration menu \(page 61\)](#)
- [Configuring home views on touchscreen \(page 62\)](#)

4.2 Web interface and main views

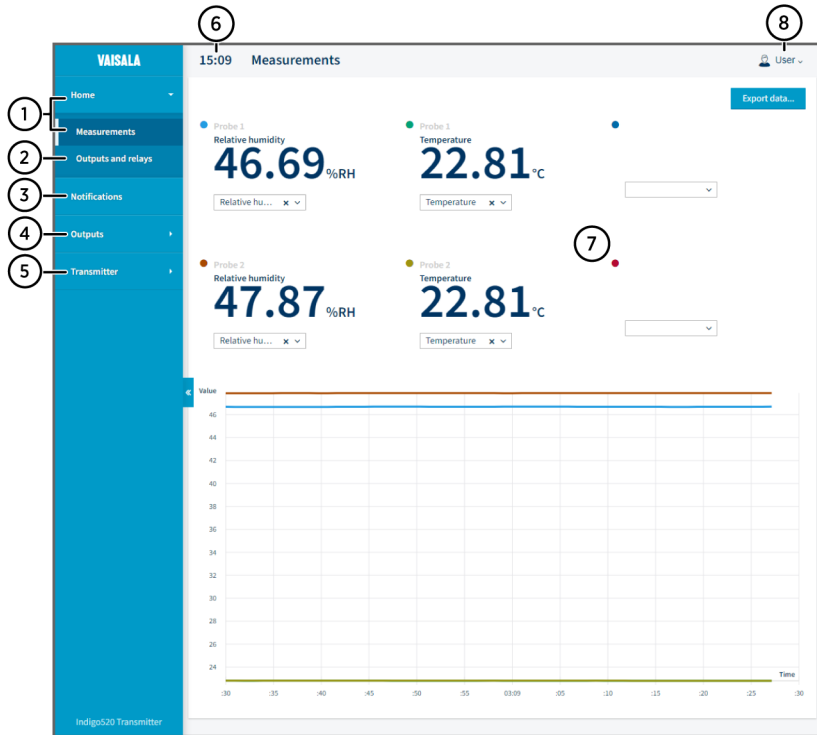


Figure 18 Web interface and main views

- 1 **Home > Measurements:** View live measurement data numerically and graphically. Add and remove measurement parameters (1 ... 6).
- 2 **Home > Outputs and relays:** View the status of outputs and relays.
- 3 **Notifications:** View all notifications.
- 4 **Outputs:** Configure analog outputs, relays, and Modbus TCP/IP (**Administrator** user level only).
- 5 **Transmitter:** Configure transmitter settings and update transmitter software (**Administrator** user level only).
- 6 Time
- 7 Display area for measurement data and contents of the views
- 8 Change user interface theme, password and language, and log out.

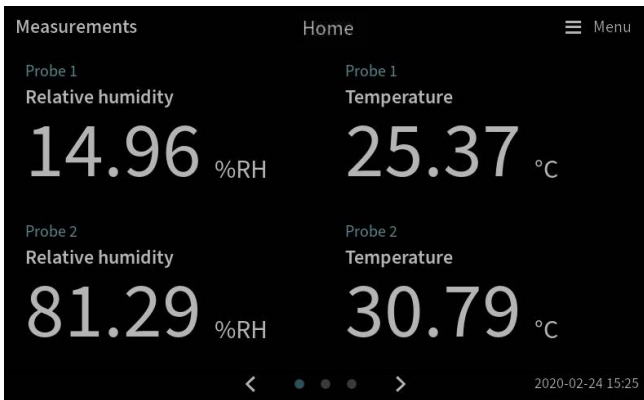
More information

- [Starting up transmitter using web interface \(page 49\)](#)
- [Configuring web interface home view \(page 71\)](#)

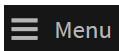
5. Start-up

5.1 Starting up transmitter using touchscreen display

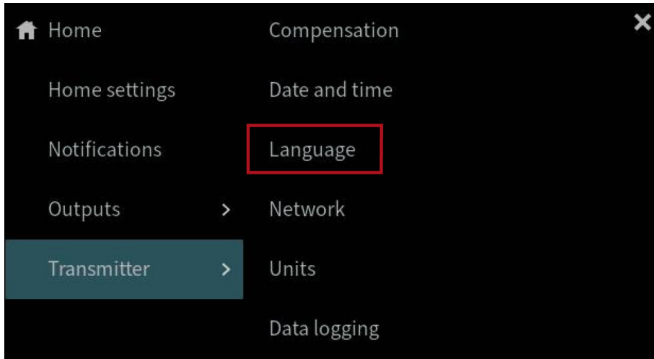
- ▶ 1. Remove the plastic protection cover on the touchscreen display.
2. Power up the transmitter.
Powering up takes some minutes.
After the power-up, the **Measurements** view opens, showing the 2 preferred measurement parameters from each connected probe.



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**

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.

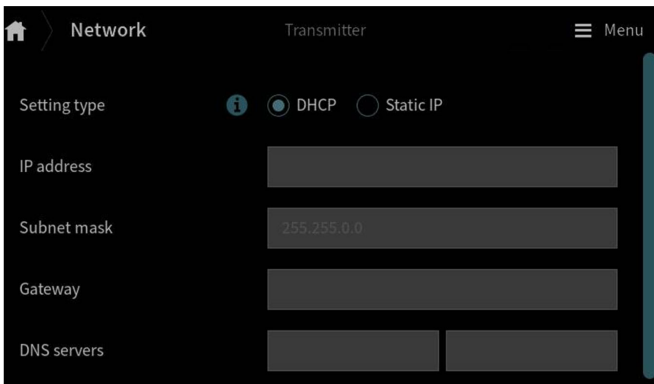


Figure 19 Network settings on touchscreen

- ▶ 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.

☰ Menu
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

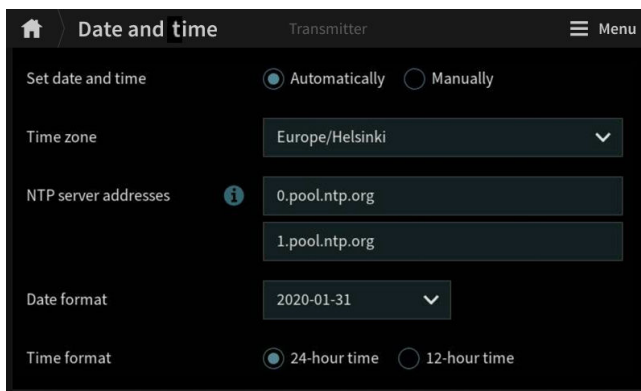
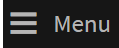


Figure 20 Date and time settings on touchscreen



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

- [Configuring home views on touchscreen \(page 62\)](#)
- [Configuring analog outputs on touchscreen \(page 63\)](#)
- [Configuring relays on touchscreen \(page 67\)](#)
- [Enabling Modbus TCP/IP on touchscreen \(page 70\)](#)

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.

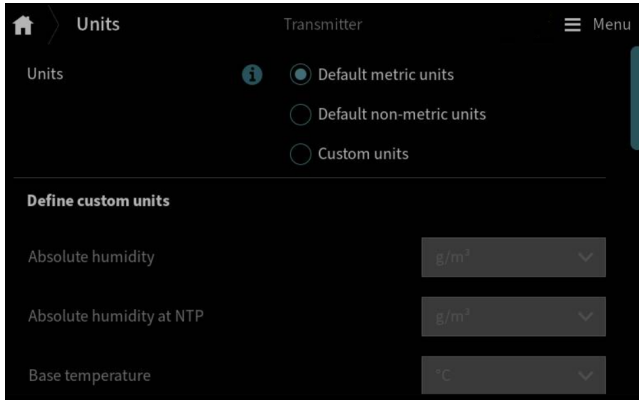


Figure 21 Units settings on touchscreen

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

☰ Menu
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**.

5.2 Starting up transmitter using web interface

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



Start up the non-display transmitter model using instructions in chapter [Connecting to web interface with a direct connection between transmitter and computer \(page 51\)](#).

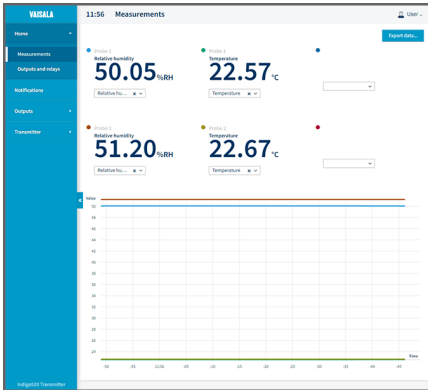


Figure 22 Web interface, **Measurements** view

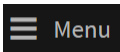
5.2.1 Connecting to web interface



Computer with:

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

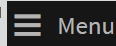
1. Connect your computer to the same network as the transmitter.
2. Power up the transmitter.
Powering up takes some minutes.
3. Select the configuration menu symbol at the upper right corner of the touchscreen.



4. In **Transmitter > Network**, configure the network connection.
For instructions on configuring the network connection, see [Configuring network connection on touchscreen \(page 46\)](#).
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



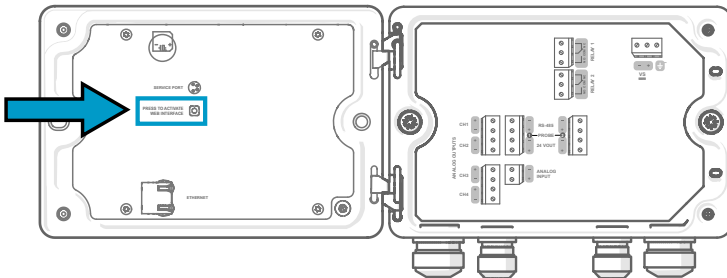
Your web browser may give a certificate error, but you can safely proceed to the transmitter's IP address. You are next prompted to log in or create users.

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.

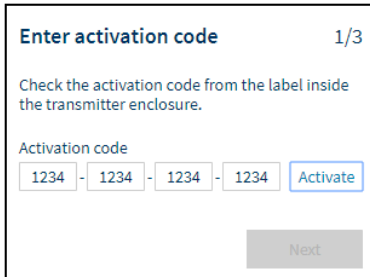


Figure 23 User creation page

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 screenshot shows a web form titled "Enter activation code" with a progress indicator "1/3" in the top right corner. Below the title, there is a blue instruction: "Check the activation code from the label inside the transmitter enclosure." Underneath, the text "Activation code" is followed by four input fields, each containing the number "1234", separated by hyphens. To the right of these fields is a blue "Activate" button. At the bottom right of the form is a grey "Next" button.

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

Password
 Good 

Confirm password
 

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
 

[Vaisala Privacy Policy](#)

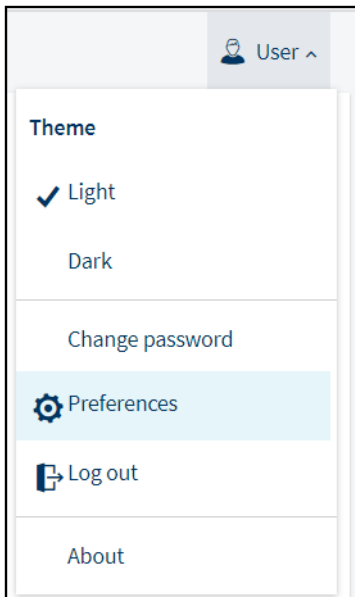
1. Type a username.
2. Type a password.

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.

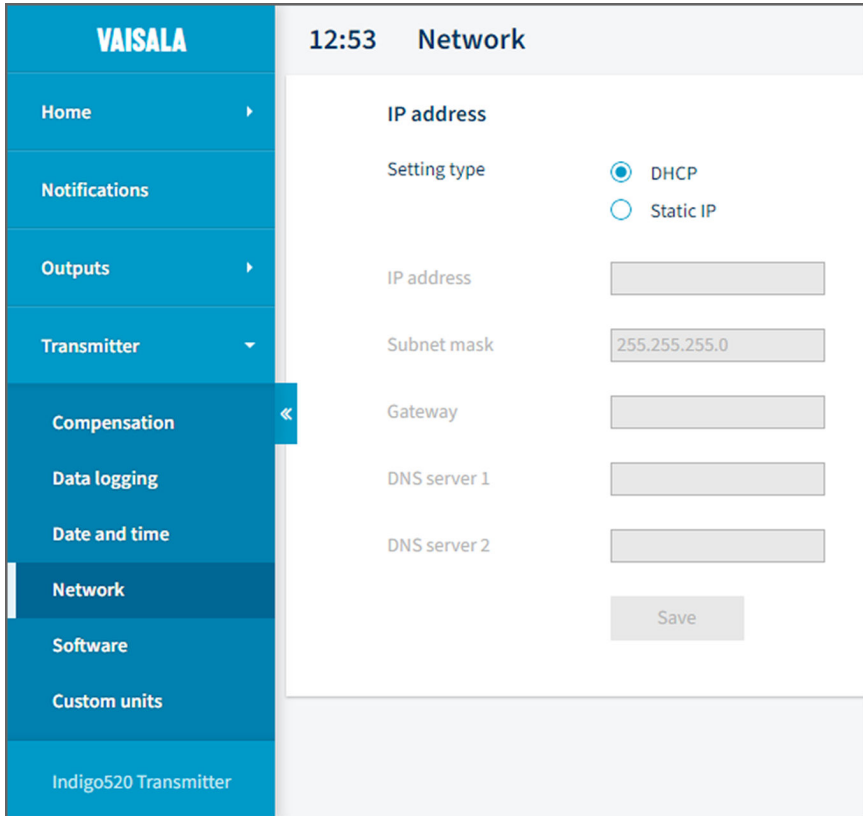


Figure 24 Network settings in web interface

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.

- 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 server 1 ... 2

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

- Select **Save**.

5.2.7 Setting date and time in web interface



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

VAISALA

12:54 **Date and time**

Home ▶

Notifications

Outputs ▶

Transmitter ▼

Compensation ◀

Data logging

Date and time

Network

Software

Custom units

Indigo520 Transmitter

Set date and time Automatically
 Manually

Time zone ▼

NTP server addresses

Date format ▼

Time format 24-hour time
 12-hour time

Apply

Figure 25 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

- [Configuring web interface home view \(page 71\)](#)
- [Configuring analog outputs in web interface \(page 72\)](#)
- [Configuring relays in web interface \(page 75\)](#)
- [Enabling Modbus TCP/IP in web interface \(page 76\)](#)

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

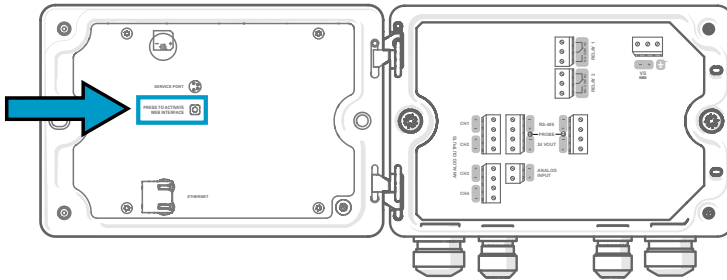


Follow these instructions only if you have connected to web interface with a direct connection between transmitter and computer.



- 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.

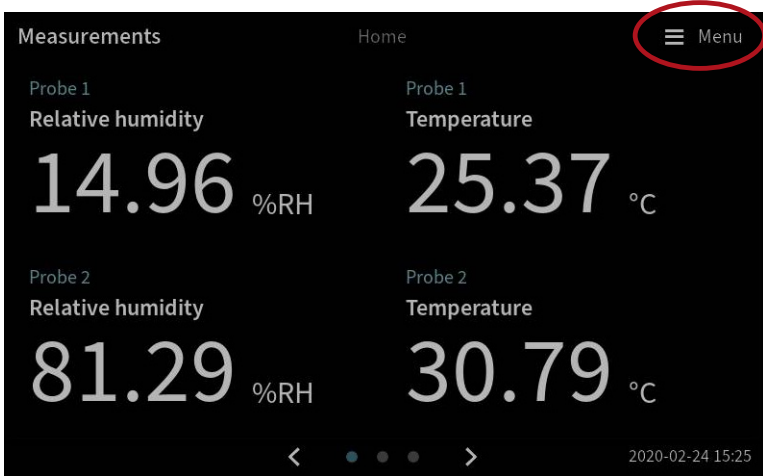


The LED next to the button shuts down. The Ethernet cable can be disconnected.

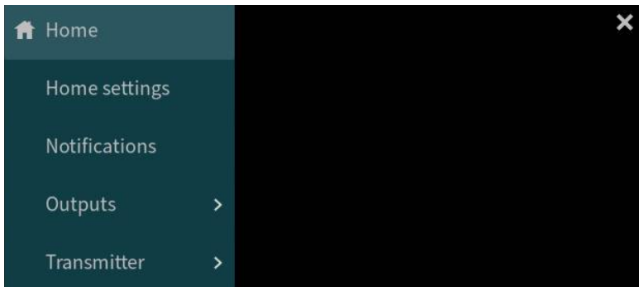
6. Configuring transmitter using touchscreen display

6.1 Accessing configuration menu

- ▶ 1. 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

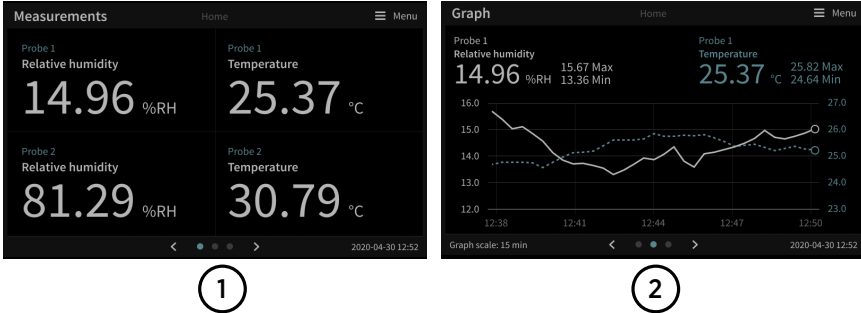


Figure 26 Configurable **Home** views on touchscreen

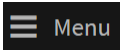
- 1 **Measurements** view with slots for 1 ... 4 measurement parameters
- 2 **Graph** view with graphs for 1 ... 2 measurement parameters



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

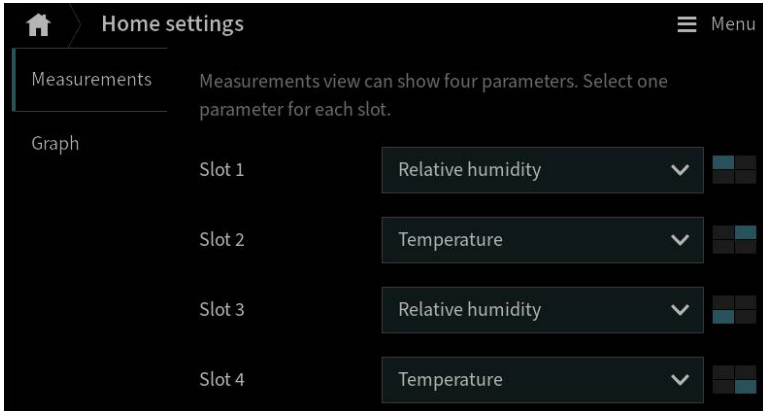
Before you start, make sure that the probes you want to use are connected to the transmitter.

- ▶ 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.

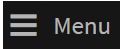
Before you start, make sure that the probes you want to use are connected to the transmitter.



Figure 27 **Analog outputs** configuration menu on touchscreen, **General** tab active

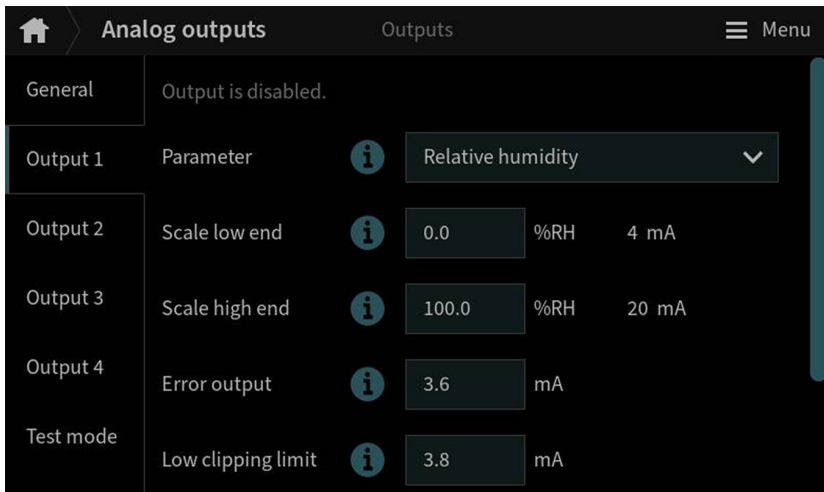
- 1 The **General** tab contains the settings that are common for all analog output channels.
- 2 The **Output 1 ... 4** tabs contain individual settings for each analog output channel.
- 3 A circle next to the channel name indicates that the channel is on.
- 4 The **Test mode** tab contains the settings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

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




2. Select **Outputs > Analog outputs**.
3. In the **General** tab, define the settings that are common for all analog outputs:
 - a. In **Output mode**, select the current or voltage range for the outputs.
 - b. In **Output 1 ... 4 off/on**, set the output channel off to edit settings.
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. 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 **Outputs and relays** view.

More information

- [Testing analog outputs on touchscreen \(page 66\)](#)

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

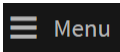
To configure the analog output, use the following values:

- 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 **Outputs > Analog outputs**.
3. In the **General** tab, define the settings that are common for all analog outputs:
 - a. In **Output mode**, select the current or voltage range for the outputs.
 - b. In **Output 1 ... 4 off/on**, set the output channel off to edit settings.
4. In the **Test mode** tab, configure test mode settings.
 - a. In **Test mode**, turn 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 > 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 **Outputs and relays** view.

More information

- [Configuring analog outputs on touchscreen \(page 63\)](#)

6.4 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.

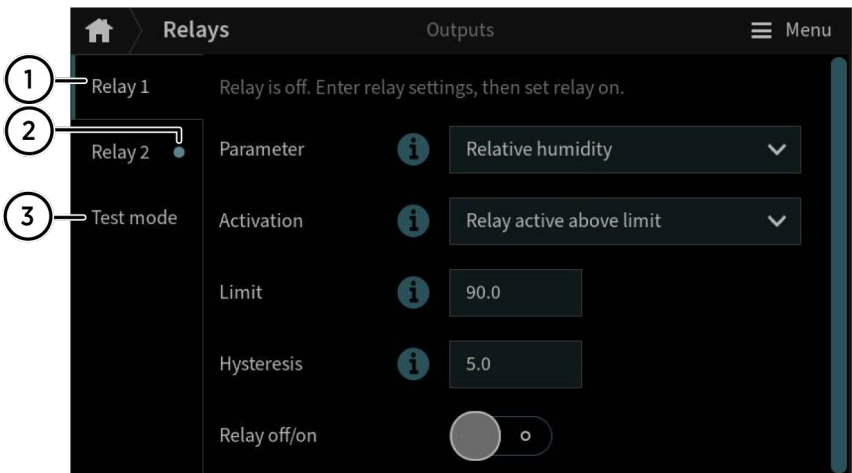
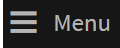


Figure 28 **Relays** configuration menu on touchscreen, **Relay 2** tab active


- 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 **Outputs > Relays**.
3. Select the relay you want to configure: **Relay 1** or **Relay 2**.
4. Configure the relay settings:
- In **Relay off/on**, set the relay off to edit settings.
 - In **Parameter**, select the probe and the measurement parameter that controls the relay.
 - In **Activation**, select whether the relay activates above or below the activation/deactivation limit.
 - In **Limit**, define the limit which the measured parameter value must reach for the relay to activate/deactivate.
 - 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.
 - 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 **Outputs and relays** view.

6.4.1 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.

6.4.2 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 9 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 10 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 

6.4.3 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.

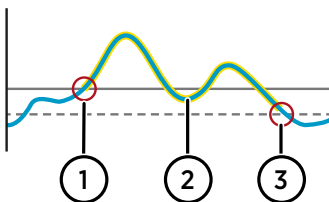


Figure 29 Behavior of relay that activates above limit, with hysteresis

- 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.

6.5 Enabling Modbus TCP/IP on touchscreen

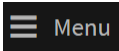
- ▶ 1. Select **Menu > Transmitter > Network**.
2. Make sure that **Network off/on** is set on, and that the network settings are set correctly.
3. Select **Menu > Outputs > Modbus TCP/IP**.
4. In **Modbus off/on**, set Modbus on.

More information

- [Modbus overview \(page 79\)](#)

6.6 Enabling temperature compensation on touchscreen

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



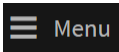
2. Select **Transmitter > Compensation**.
3. In **Temperature compensation off/on**, set compensation off.

More information

- [Temperature compensation \(page 40\)](#)

6.7 Enabling data logging on touchscreen

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



2. Select **Transmitter > Data logging**.
3. In **Data logging off/on**, set data logging on.

More information

- [Data logging \(page 19\)](#)
- [Exporting logged data \(page 77\)](#)

7. Configuring transmitter using web interface

7.1 Configuring web interface home view

You can select how many measurement parameters (1 ... 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. In the dropdown lists, 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.

7.2 Configuring analog outputs in web interface



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

The screenshot displays the Vaisala web interface for configuring analog outputs. The left sidebar contains the following menu items: Home, Notifications, Outputs, Analog outputs (selected), Relays, Modbus TCP/IP, and Transmitter. The main content area is titled '12:11 Analog outputs' and shows the configuration for 'Output 1'. The 'Output mode' is set to '4...20 mA'. Below this, there are tabs for 'Output 1', 'Output 2', 'Output 3', 'Output 4', and 'Test mode'. The 'Analog output 1' configuration includes: 'Output off/on' (On), 'Source' (Probe 2), 'Parameter' (Relative humidity), 'Scale low end' (0 %RH), 'Scale high end' (100 %RH), 'Error output' (3.6 mA), 'Low clipping limit' (3.8 mA), and 'High clipping limit' (20.5 mA). An 'Apply' button is located at the bottom right of the configuration area.

Figure 30 **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 **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 \(page 66\)](#)
- [Testing analog outputs in web interface \(page 73\)](#)

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.

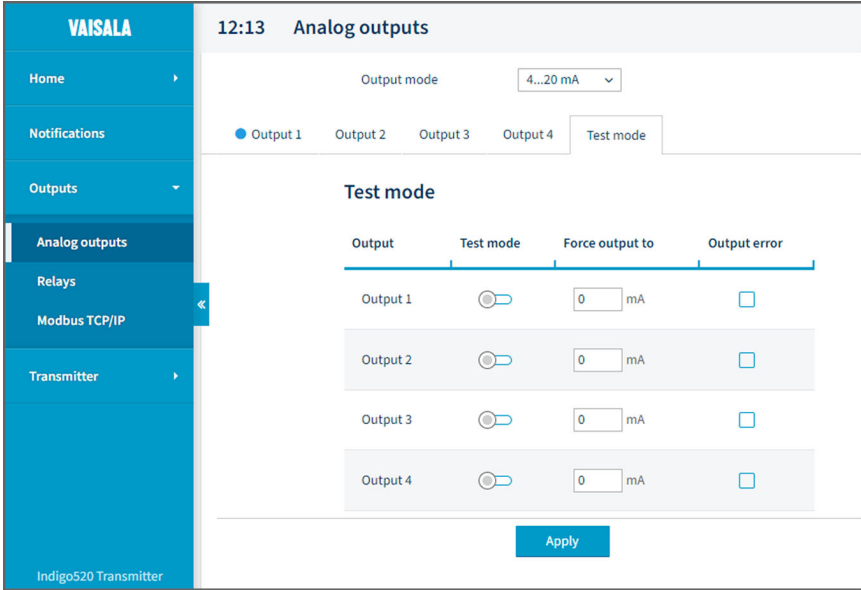


Figure 31 Analog outputs test mode in web interface

- ▶ 1. Connect to the web interface.
2. Log in to the web interface as an administrator user.
3. Select **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**, turn 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 **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 \(page 72\)](#)

7.3 Configuring relays in web interface



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

The screenshot shows the VAISALA web interface. On the left is a blue navigation sidebar with the following menu items: Home, Notifications, Outputs, Analog outputs, Relays (highlighted), Modbus TCP/IP, and Transmitter. The main content area is titled '12:16 Relays' and contains two tabs: 'Relay 1' (selected) and 'Relay 2'. Under the 'Relay 1' tab, the configuration options are:

- Relay off/on: Off
- Source: (dropdown)
- Parameter: (dropdown)
- Activation: (dropdown)
- Limit: %RH
- Hysteresis: %RH
- Enable test mode: Disabled
- Inactive

At the bottom right of the configuration area is a blue 'Apply' button. The bottom of the sidebar shows 'Indigo520 Transmitter'.

Figure 32 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 **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. 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 \(page 68\)](#)
- [Relay wiring and relay activation mode \(page 68\)](#)
- [Relay hysteresis \(page 69\)](#)

7.4 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 **Outputs > Modbus TCP/IP**.
6. In **Modbus off/on**, set Modbus on.
7. Select **Apply**.

More information

- [Modbus overview \(page 79\)](#)

7.5 Enabling 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 \(page 40\)](#)

7.6 Enabling data logging 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 > Data logging**.
- 4. In **Data logging off/on**, set data logging on.
- 5. Select **Apply**.

More information

- [Data logging \(page 19\)](#)
- [Exporting logged data \(page 77\)](#)

7.7 Exporting logged data

The data logging feature must be enabled before exporting data.

- ▶ 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** at the upper right corner of the **Measurements** view.
4. Select **Export**.

More information

- [Data logging \(page 19\)](#)
- [Enabling data logging on touchscreen \(page 70\)](#)
- [Enabling data logging in web interface \(page 77\)](#)

8. Modbus

8.1 Modbus overview

Indigo500 transmitters support the Modbus TCP/IP communication protocol (over Ethernet). The transmitter and the connected probes are treated as separate Modbus slaves, 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 \(page 70\)](#)
- [Enabling Modbus TCP/IP in web interface \(page 76\)](#)

8.2 Unit identification of transmitter and probes

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

Table 11 Unit IDs of transmitter and probes

Device	Unit ID
Transmitter with barometer module	240
Probe connected to probe 1 connection terminal	241
Probe connected to probe 2 connection terminal	242

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

If the probe 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 \(page 95\)](#)

9. Maintenance and troubleshooting

9.1 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 Indigo. Do not spray anything directly on the probe connected to Indigo, since that may deposit impurities on the sensor.

Chemical tolerance

The following chemicals can be used to clean Indigo:

- H₂O₂ (6000 ppm), non-condensing
- Alcohol-based cleaning agents such as ethanol and IPA (70 % Isopropyl Alcohol, 30 % water)
- Ca(ClO)₂ (calcium hypochlorite) max. 0.5 %
- QAC (quaternary ammonium cations) max. 0.5 %



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

9.2 Replacing probes



CAUTION! Attach only Vaisala Indigo compatible probes to the transmitter.



If you want to configure the probe settings, such as purge interval, you must do that before attaching 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.

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).

The 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. Outputs will give an error notification, which will disappear when the new probe is detected.
- 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 outputs for the new probe.

More information

- [Attaching probes \(page 38\)](#)

9.3 Updating transmitter software version

You can update the transmitter software via the web interface.



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

Before you start:

- Make sure that you have the software update file locally on your computer. Contact helpdesk@vaisala.com to get the software update file.
- If your transmitter does not have a network connection, make sure that both the transmitter and the computer connected to it are set to use static network settings.

- ▶ 1. Connect to the web interface.
2. Log in to the web interface as an administrator user.

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

The screenshot shows the Vaisala web interface. On the left is a blue sidebar with navigation items: Home, Notifications, Outputs, Transmitter, Compensation, Data logging, Date and time, Network, Software (highlighted), Custom units, and Indigo520 Transmitter. The main content area is titled '12:55 Software'. It contains a 'System status' section with the text 'Information on the current system status.' and 'Uptime: 6 days 21 h 22 min' and 'Software version: 1.7.0-NIGHTLY-626'. Below that is a 'Software update' section with the text 'Check www.vaisala.com for new software updates available for the device.' and 'To update the software, browse to the software update file and select Update.' There is a 'Select file...' input field, a 'Browse' button, and an 'Update' button. At the bottom of the update section, it says 'After installing the update, the device will restart.'

4. Select **Update**.
Updating takes some minutes.

The transmitter restarts. After the restart, you will be prompted to log in again. You can see the updated software version under **Software System status**.



If the transmitter's IP address is assigned via DHCP, the transmitter may get a new IP address upon restarting. To continue using the web interface, reconnect using the transmitter's new IP address.

More information

- [Connecting to web interface \(page 50\)](#)
- [Logging in to web interface \(page 54\)](#)

9.4 Restoring factory default settings

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

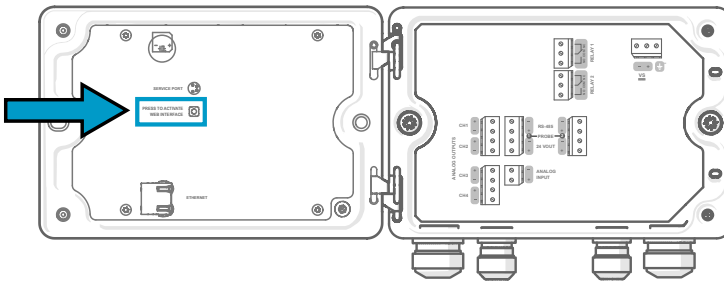


CAUTION! A factory reset deletes all current settings of the device. After the factory reset, you need to reconfigure the settings, including outputs and relays. When you connect to the web interface the next time, you will be prompted to give the activation code and create new users.



- 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 \(page 24\)](#)
- [Connecting to web interface \(page 50\)](#)
- [Creating web interface users \(page 52\)](#)
- [Logging in to web interface \(page 54\)](#)

9.5 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 attached to the transmitter, you can also check the probe diagnostics and status with the Insight software and Modbus status registers. For probe-specific register information, see the connected probe's Modbus documentation.

Problem: A power outage occurred.	
Possible cause:	Solution:
	<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"> 1. Check the current IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu. 2. Reconnect to the web interface using the current IP address.

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

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

Problem: There is no Modbus TCP/IP connection.	
Possible cause:	Solution:
Check the possible causes for the web interface login page problem above.	Check the solutions for the web interface login page problem above.
The Modbus off/on setting may be off.	Make sure that Modbus off/on is set on. <ul style="list-style-type: none"> • Menu path on touchscreen: Menu > Outputs > Modbus TCP/IP • Menu path in web interface: Outputs > Modbus TCP/IP

Problem: Logging in to the web interface fails.	
Possible cause:	Solution:
The transmitter's time has not been set correctly. Some browsers do not accept valid browser sessions if the transmitter's time is significantly different from the browser's time.	Set the transmitter's time on the touchscreen so that browsers will be able to create a valid browser session. <ul style="list-style-type: none"> • Menu path on touchscreen: Menu > Transmitter > Date and time
You have forgotten your web interface password.	Restore factory default settings and reconnect to the web interface. When you reconnect, you will be prompted to give the activation code and create new users and passwords.

Problem: The web interface does not show the same contents as the touchscreen display.	
Possible cause:	Solution:
You have changed a setting on the touchscreen, but the change is not shown in the web interface before you refresh the web page.	Refresh the web page.

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

More information

- [Opening and closing transmitter cover \(page 24\)](#)
- [Connecting to web interface \(page 50\)](#)
- [Creating web interface users \(page 52\)](#)
- [Logging in to web interface \(page 54\)](#)
- [Restoring factory default settings \(page 83\)](#)

10. Technical data

10.1 Specifications

Table 12 Transmitter options

Property	Description/Value
Display	<ul style="list-style-type: none"> • Touchscreen display • No display (indicator LED)
Powering, Indigo520 transmitter	<ul style="list-style-type: none"> • Protective extra-low voltage (15 ... 35 V DC, 24 V AC \pm 20%) • AC (mains) power (100 ... 240 V AC 50/60 Hz) • Power over Ethernet (no analog outputs or relays)
Powering, Indigo510 transmitter	Protective extra-low voltage (11 ... 35 V DC, 24 V AC \pm 15% 50/60 Hz)

Table 13 Operating environment

Property	Description/Value
Operating temperature	Indigo520 with display $-20 \dots +55 \text{ }^{\circ}\text{C}$ ($-4 \dots +131 \text{ }^{\circ}\text{F}$) Indigo510 with display $-20 \dots +60 \text{ }^{\circ}\text{C}$ ($-4 \dots +140 \text{ }^{\circ}\text{F}$) Without display $-40 \dots +60 \text{ }^{\circ}\text{C}$ ($-40 \dots +140 \text{ }^{\circ}\text{F}$) ¹⁾
Storage temperature	With display $-30 \dots +60 \text{ }^{\circ}\text{C}$ ($-22 \dots +158 \text{ }^{\circ}\text{F}$) Without display $-40 \dots +60 \text{ }^{\circ}\text{C}$ ($-40 \dots +140 \text{ }^{\circ}\text{F}$)
For use in wet locations	Yes
Operating humidity	0 ... 100 %RH
Maximum operating altitude	3000 m (9843 ft)
IP rating	IP66: Dust-tight. Protected from powerful water jets from any direction. ²⁾

1) *Operating temperature without display with barometer module $-40 \dots +55 \text{ }^{\circ}\text{C}$ ($-40 \dots +131 \text{ }^{\circ}\text{F}$).*

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

Table 14 Inputs and outputs

Property	Description/Value
Indigo520 operating power	
Protective extra-low voltage (PELV) version ¹⁾	15 ... 35 V DC, 24 V AC $\pm 20\%$ 50/60 Hz, max. current 2 A Fuse size for power supply: 3 A
PELV power cable temp. rating	$\geq +80\text{ }^{\circ}\text{C}$ (+176 $^{\circ}\text{F}$)
AC (mains) power version ¹⁾	100 ... 240 V AC 50/60 Hz, max. current 1 A Fuse size for power supply: 10 A
Power over Ethernet version ¹⁾	50 V DC, 600 mA PoE+, IEEE 802.3 at PD Fuse size for power supply: 2 A
Indigo510 operating power	
Protective extra-low voltage (PELV)	11 ... 35 V DC, 24 V AC $\pm 15\%$ 50/60 Hz, max. current 2 A
PELV power cable temp. rating	$\geq +80\text{ }^{\circ}\text{C}$ (+176 $^{\circ}\text{F}$)
Indigo520 analog outputs	
Number of analog outputs	4, galvanically isolated from power supply
Selectable voltage output types	0 ... 1 V, 0 ... 5 V, 0 ... 10 V, scalable
Selectable current output types	4 ... 20 mA, 0 ... 20 mA, scalable
Max. wire size	2.5 mm ² (14 AWG)
Accuracy of analog outputs at +20 $^{\circ}\text{C}$ (+68 $^{\circ}\text{F}$)	$\pm 0.05\%$ 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	$R_L > 10\ \text{k}\Omega$
Indigo510 analog outputs	
Number of analog outputs	2, galvanically isolated from power supply
Selectable voltage output types	0 ... 1 V, 0 ... 5 V, 0 ... 10 V, scalable
Selectable current output types	4 ... 20 mA, 0 ... 20 mA, scalable
Max. wire size	2.5 mm ² (14 AWG)
Accuracy of analog outputs at +20 $^{\circ}\text{C}$ (+68 $^{\circ}\text{F}$)	$\pm 0.05\%$ full scale
Temperature dependence	$\pm 0.005\%$ / $^{\circ}\text{C}$ full scale

Property	Description/Value
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	$R_L > 10 \text{ k}\Omega$
Indigo520 relay outputs	
Number and type of relays	2 pcs, SPDT
Max. switching power, current, voltage	30 W, 1 A, 40 V DC / 28 V AC
Max. wire size in PELV version	2.5 mm ² (14 AWG)
Max. wire size in AC (mains) version	1.5 mm ² (16 AWG)
Ethernet interface	
Supported standards	10BASE-T, 100BASE-TX
Connector	8P8C (RJ45)
Supported protocols	Modbus TCP/IP (port 502), HTTPS (port 8443)

1) The power supply option is selected when ordering the transmitter.

Table 15 Compliance

Property	Description/Value
Indigo520 EU directives	EMC Directive (2014/30/EU) Low Voltage Directive (2014/35/EU) RoHS Directive (2011/65/EU) amended by 2015/863
Indigo510 EU directives	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) amended by 2015/863
EMC compatibility	IEC/EN 61326-1, industrial environment CISPR 32 / EN 55032, Class B
Electrical safety	IEC/EN 61010-1
Indigo520 compliance marks	CE, China RoHS, FCC, RCM
Indigo510 compliance marks	CE, China RoHS, FCC, RCM, UKCA
Listing marks	Canada (SGS), US (SGS)
FCC compliance	FCC Part 15, Class B

Table 16 Mechanical specifications

Property	Description/Value
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)
Cable diameters for cable glands	
M20×1.5 glands	5.0 ... 8.0 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)

10.2 Compatible probes and devices

Table 17 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
CO ₂	GMP251, GMP252
Vaporized hydrogen peroxide	HPP271, HPP272
Moisture in oil	MMP8

Table 18 Other compatible devices

Device or series	Models
MHT410 Moisture, Hydrogen and Temperature Transmitter	MHT410

10.3 Spare parts and accessories

Table 19 Accessories

Item	Item code
Adapter plate	DRW252186SP
Installation kit for pole or pipeline	215108
Installation kit with weather shield	215109
Probe connection cables	
Probe connection cable, 1 m	CBL210896-1MSP
Probe connection cable, 3 m	CBL210896-3MSP
Probe connection cable, 5 m	CBL210896-5MSP
Probe connection cable, 10 m	CBL210896-10MSP

Table 20 Spare parts

Item	Item code
Cable gland, M20×1.5, 5.0 ... 8.0 mm (0.20 ... 0.31 in)	ASM213670SP
Cable gland with split bushing, M20×1.5 ¹⁾	262632SP
Cable gland, M16×1.5, 2.0 ... 6.0 mm (0.08 ... 0.24 in)	ASM213671SP
Conduit fitting, M20×1.5 for NPT1/2" conduit	214780SP

1) With 7-mm (0.28 in) hole for cable and 14-mm (0.55 in) hole for 8P8C (RJ45) connector to pass through.

10.4 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.

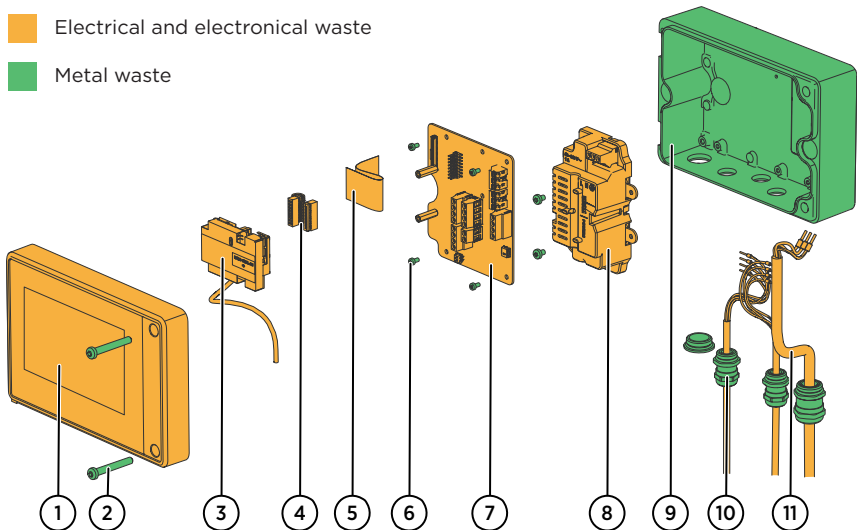


Figure 33 Materials for recycling

Table 21 Materials for recycling

Part	Material	Recycling	
Device parts			
1	Top enclosure	Aluminium 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 electronical waste
8	Power-2 module	Various materials	Electrical and electronical waste
9	Bottom enclosure	Aluminium alloy	Metal waste
10	Cable glands	Nickel-plated brass	Metal waste
11	Cables	Various materials	Electrical and electronical waste

Appendix A. Modbus reference

A.1 Unit IDs

Table 22 Unit IDs of transmitter and probes

Device	Unit ID
Transmitter (including 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 23 Modbus function codes

Function code (decimal)	Function code (hexadecimal)	Name	Notes
03	03 _{hex}	Read Holding Registers	Can be used for reading pressure value using unit ID 240, and for reading probe registers, for example, measurement results, using unit ID 241 or 242. ¹⁾
43 / 14	2B _{hex} / 0E _{hex}	Read Device Identification	Can be used only for reading transmitter identification information using unit ID 240.

¹⁾ See the connected probe's Modbus documentation for a probe-specific register list.

A.3 Device identification objects

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

Table 24 Device identification objects

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

1) *Vaisala-specific device identification object.*

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_{hex} 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, using unit ID 240.

Table 25 Floating point measurement data registers (read-only)

Register number	Address	Register description	Data format	Unit
43	002A _{hex}	Barometric pressure	32-bit float	hPa
	002B _{hex}			

Table 26 Integer measurement data registers (read-only)

Register number	Address	Register description	Data format	Scale factor	Offset	Unit
278	0115 _{hex}	Barometric pressure	16-bit signed integer	10	0	hPa

A.5 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 _{hex}	Transaction identifier	00 _{hex}	Transaction identifier
01 _{hex}		01 _{hex}	
00 _{hex}	Protocol identifier	00 _{hex}	Protocol identifier
00 _{hex}		00 _{hex}	
00 _{hex}	Length (6)	00 _{hex}	Length (7)
06 _{hex}		07 _{hex}	
F1 _{hex}	Unit identifier (probe 1)	F1 _{hex}	Unit identifier (probe 1)
03 _{hex}	Function (Read Holding Registers)	03 _{hex}	Function (Read Holding Registers)
00 _{hex}	Register address	04 _{hex}	Number of data bytes
00 _{hex}		7A _{hex}	
00 _{hex}	Number of 16-bit registers to read (2)	E1 _{hex}	Value of first register (least significant word)
02 _{hex}		41 _{hex}	
		F4 _{hex}	Value of second register (most significant word)

Communication description	
Transaction identifier	Any number identifying the response and the corresponding request on a Modbus TCP/IP transaction
Protocol identifier	0 (Modbus Protocol) as specified for Modbus TCP/IP
Length	Number of remaining bytes in the frame starting from the unit identifier
Register number	1 (1-based Modbus register number) = 0000 _{hex} (0-based register address used in actual communication) based on the Modbus Reference in <i>HMP4 User Guide</i>
Data format	Two 16-bit Modbus registers interpreted as IEEE 754 binary32 floating point value, least significant word first
Returned value	41F47AE1 _{hex} , which is binary32 representation of 30.56 (%RH)

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.

- Vaisala Online Store at 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.

Warranty

For standard warranty terms and conditions, see 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. 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.

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