User Guide

Indigo 500 Series Transmitters
Indigo 520

VAISALA

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1. About this document

1.1 Version information

This document provides detailed instructions for installing, using, and maintaining Vaisala Indigo 520 transmitters.

Document code	Date	Description
M212287EN-A	May 2020	First version.

1.2 Related manuals

Document code	Name
M212290EN	*Indigo 520 Quick Guide*

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® is a registered trademark of Vaisala Oyj.

Modbus® is a registered trademark of Schneider Automation Inc.

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2. Product overview

2.1 Introduction to Indigo 500 Series Transmitters

Vaisala Indigo 500 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 Indigo 520 transmitter has 2 probe connections and a touchscreen display.

For more information on Indigo 500 transmitter models, see www.vaisala.com/indigo.

2.1.1 Probe compatibility

Vaisala Indigo 500 Series Transmitters are the most versatile option for use with Indigo compatible smart probes such as:

- Humidity and temperature probes: HMP3, HMP4, HMP5, HMP7, HMP8, HMP9, and TMP1
- Dew point probes: DMP5, DMP6, DMP7, DMP8
- CO_2 probes: GMP251, GMP252
- Vaporized hydrogen peroxide probes: HPP271, HPP272
- MMP8 moisture in oil probe

2.2 Indigo 520 basic features and options

- Universal transmitter for Vaisala Indigo compatible probes
- Supports 2 detachable probes simultaneously
- Touchscreen display for real-time data viewing and configuration
- IP66 and NEMA 4 rated metal enclosure
- 4 configurable analog outputs (not available with PoE option)
- 2 configurable relays (not available with PoE option)
- Ethernet connection with web interface for remote access
- Modbus TCP/IP protocol
- 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 options:
  - Protective extra-low voltage (PELV) version: 15 ... 35 VDC, 24 VAC ±20 %
  - AC (mains) power version: 100 ... 240 VAC 50/60 Hz
  - Power over Ethernet (PoE) version: 50 VDC PoE+, IEEE 802.3at PD

2.3 Indigo 520 transmitter parts
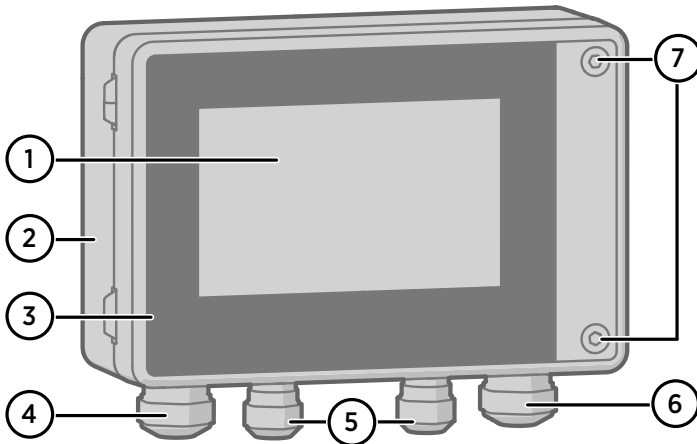
1   Touchscreen display
2   Transmitter base
3   Transmitter cover
4   Cable gland for Ethernet cable and optional analog output cable (M20×1.5 lead-through)
5   Cable glands for probe connection cables (M16×1.5 lead-throughs)
6   Cable gland for optional relay cable and power cable in the PELV and AC (mains) power
     supply options (M20×1.5 lead-through)
7   Hex screws for opening the cover

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.
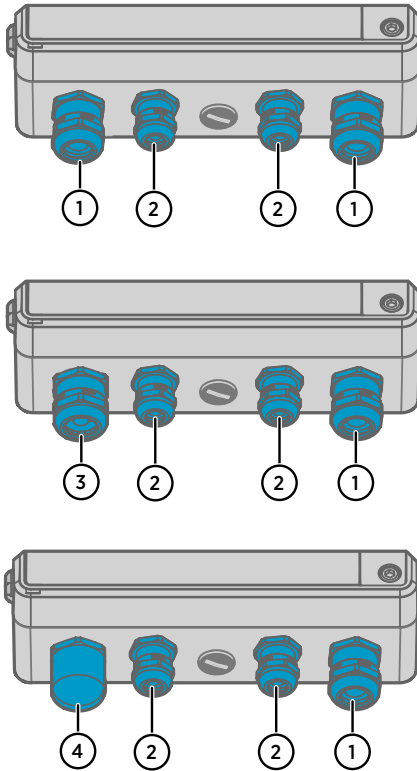
Figure 1   Indigo 520 cable gland and conduit options, example configurations

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

More information

‣ Spare parts and accessories (page 72)

2.4 Touchscreen display

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 chemically strengthened glass.

More information

‣ Touchscreen display and main views (page 31)
‣ Starting up transmitter using touchscreen display (page 34)

2.5 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.

More information

‣ Web interface and main views (page 33)
‣ Starting up transmitter using web interface (page 38)
‣ Updating transmitter software version (page 64)

2.6 Output options

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

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

2.6.1 Analog outputs

The 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.

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

More information

‣ Configuring analog outputs on touchscreen (page 49)
‣ Configuring analog outputs in web interface (page 57)

2.6.2 Digital output

The transmitter supports the Modbus TCP/IP communication protocol (over Ethernet).

More information

‣ Enabling Modbus TCP/IP on touchscreen (page 55)
‣ Enabling Modbus TCP/IP in web interface (page 60)

2.6.3 Relays

The 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.

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

More information

‣ Configuring relays on touchscreen (page 52)
‣ Configuring relays in web interface (page 58)

2.7 Ethernet connection

The transmitter provides 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.

More information

‣ Configuring network connection on touchscreen (page 35)
‣ Configuring network connection in web interface (page 43)

2.8 Safety

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.

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, or decreased equipment lifetime.

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.

2.8.1 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.

2.9 Regulatory compliances

This product complies with the following performance and environmental test standards:

This product is in compliance with the Australian RCM regulation and with the following European Union directives:

- Low-voltage directive 2014/35
- EMC directive 2014/30

2.9.1 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 of the receiver.
- 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.

2.9.2 Canada ICES-003 compliance statement

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

Cet appareil numerique de la classe B est conforme a la norme NMB-003 du Canada.

3. Installation

3.1 Opening and closing transmitter cover

Hex key (4 mm)

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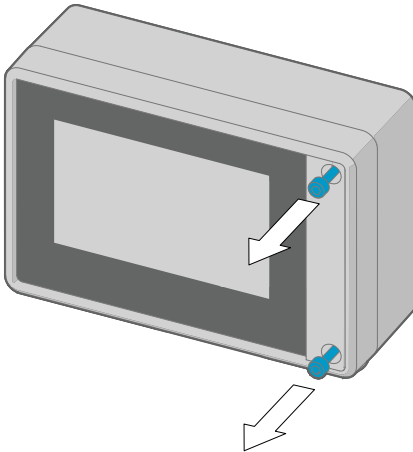
2. Open the transmitter cover.
3. When you close the transmitter cover, tighten the hex screws to 4.5 Nm.

3.2 Mounting

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

- Hex key (4 mm), provided
- Crosshead screwdriver
- Drill with Ø 8 mm drill bit
- Screws (2 pcs), provided
- Washers (2 pcs), provided
- Wall plugs (2 pcs), provided
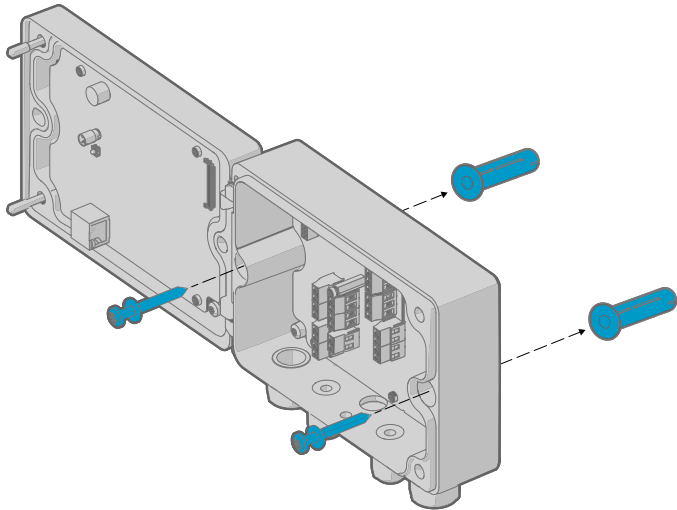
Figure 2   Standard wall mounting
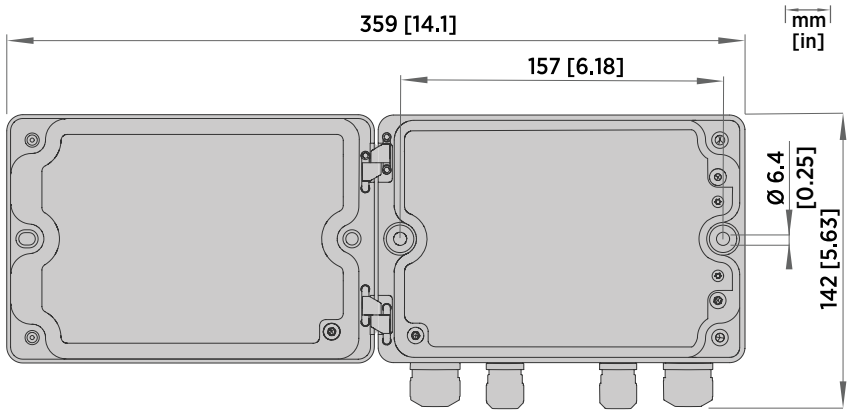
Figure 3   Transmitter mounting dimensions

1. Open the 2 hex screws on the cover of the transmitter using a 4-mm hex 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

- Hex keys (4 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 Indigo 500 transmitter to replace a Vaisala 330 series transmitter in the exact same location.
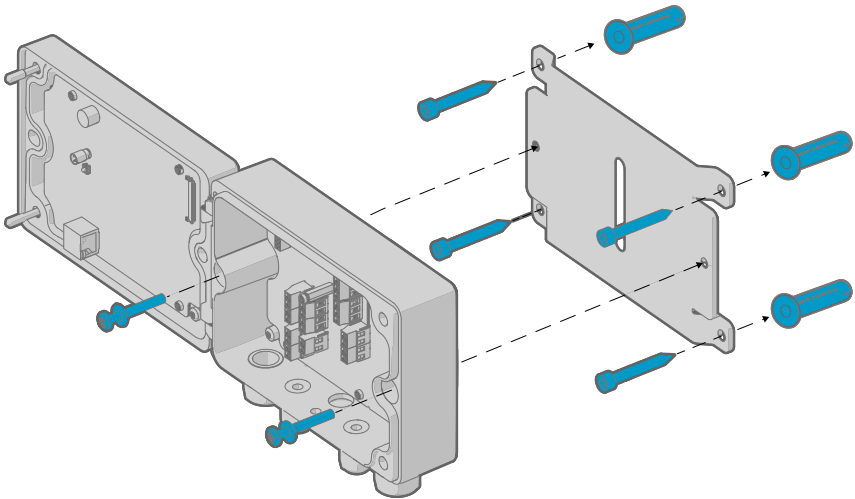
Figure 4   Wall mounting with adapter plate
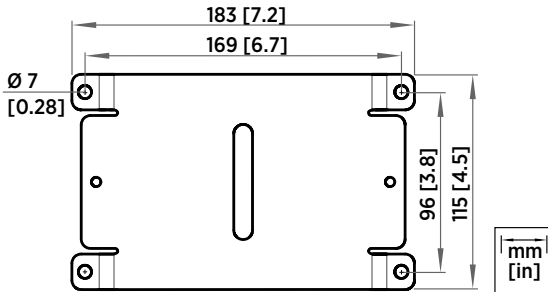
Figure 5   Adapter plate dimensions

▶   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 hex key.

3. Open the transmitter cover.

4. Attach the transmitter to the adapter plate using 2 × 14-mm screws and a 5-mm hex key.
   Place nylon washers under the screws to protect the surface of the transmitter.

3.2.3 DIN rail mounting

• Hex keys (4 and 5 mm), provided	• Washers (2 pcs), provided
• Screws 14 mm (2 pcs), provided	• DIN rail clip fasteners (2 pcs), provided
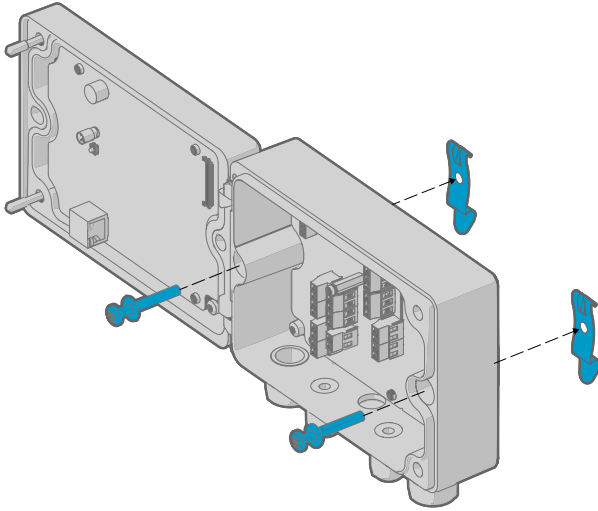
Figure 6   Attaching DIN rail clip fasteners

▶ 1. Open the 2 hex screws on the cover of the transmitter using a 4-mm hex 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 hex 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

- Hex 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.
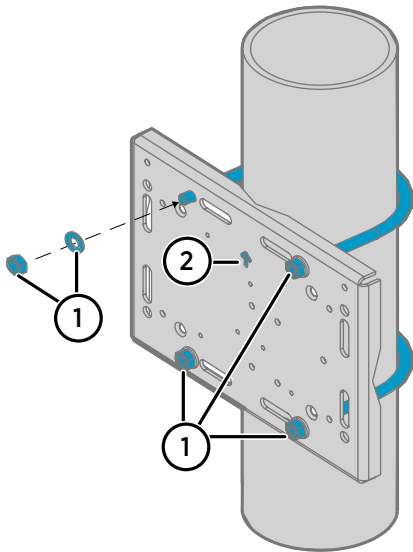
Figure 7   Attaching mounting plate to fixing brackets - vertical pole mounting

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.
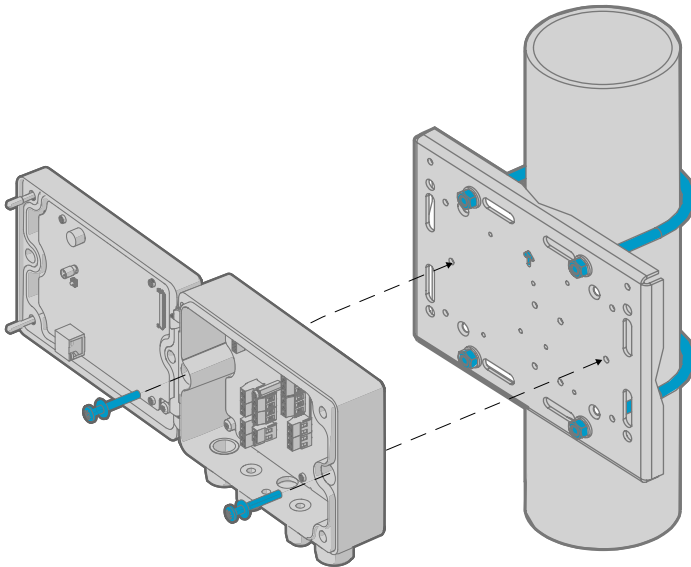
Figure 8   Attaching transmitter to mounting plate - vertical pole mounting

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

> ℹ 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 hex key.

3. Open the transmitter cover.

4. Attach the transmitter to the mounting plate using 2 × 14-mm screws and a 5-mm hex key. Place nylon washers under the screws to protect the surface of the transmitter.

3.3 Wiring

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

> 🛠 • Hex key (4 mm) for opening the transmitter cover
> • Open-ended spanners 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
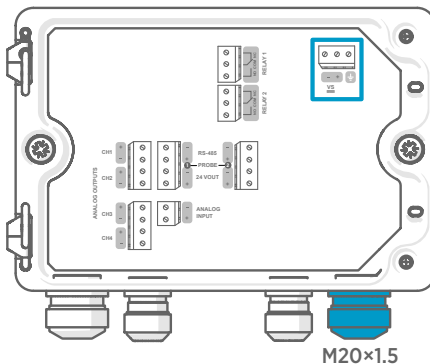
M20×1.5

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 3   PELV power supply input terminals

Terminal	Function	Notes
⏚	Power supply ground	
VS+	Positive supply voltage	15 … 35 VDC or 24 VAC ±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.
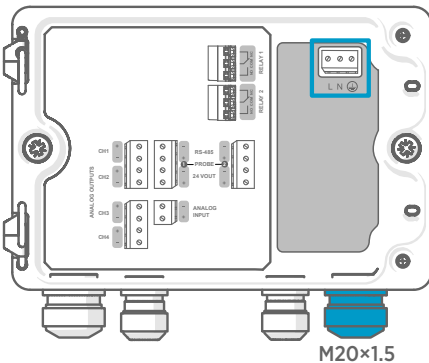
M20×1.5

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 4   AC power supply input terminals

Terminal	Function	Notes
⏚	Power supply ground	
L	Line	100 … 240 VAC 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:
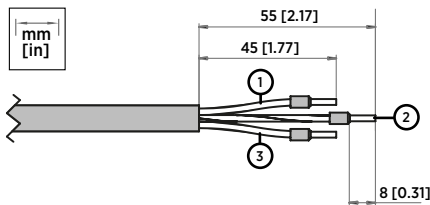
Figure 9   Example of stripped AC (mains) power cable

1   Line wire
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.

M20×1.5
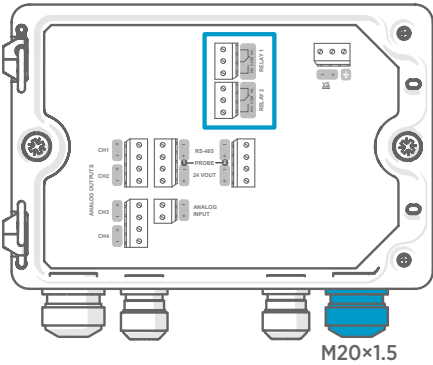
Relays are not available in transmitters that are powered with Power over Ethernet (PoE).

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

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

Table 5   Output terminals for relay 1 and relay 2

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

3.3.4 Analog output terminals and lead-through

Before connecting wires or cables, make sure that the transmitter is powered off.
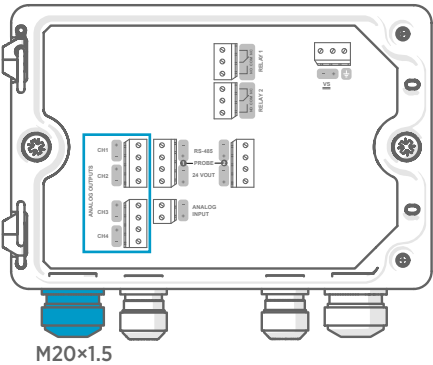
M20×1.5

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 6   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

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.
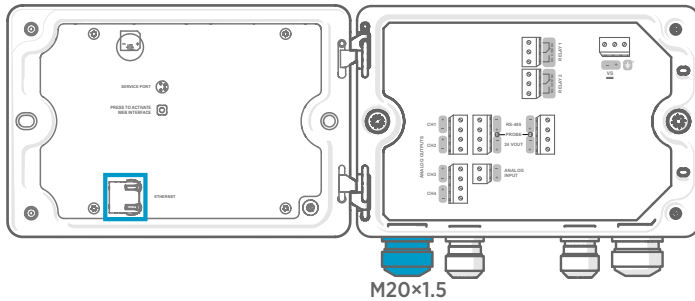
M20×1.5

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

> ℹ️ 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.
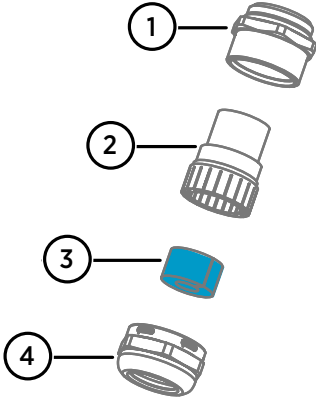
Figure 10   M20×1.5 cable gland with split bushing

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

3.3.6 Probe connection terminals and lead-throughs

Before connecting wires or cables, make sure that the transmitter is powered off.
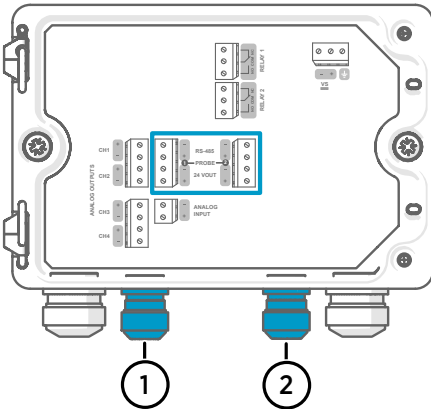
For the M16×1.5 cable glands ordered together with the transmitter from Vaisala, the cable diameter is 2.0 … 6.0 mm (0.08 … 0.24 in). Tightening torque for the cable gland is 6 Nm.

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

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

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.

> ℹ 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.

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.
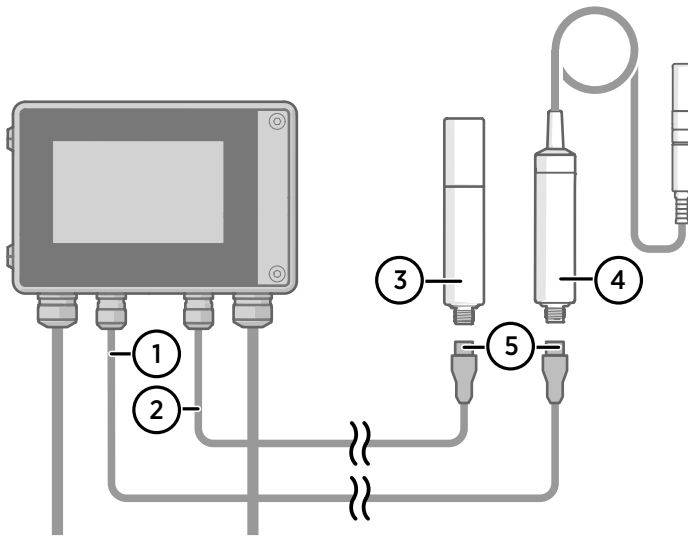
Figure 11   Attaching probes to transmitter using probe cable connector

1   Probe connection cable, probe 1
2   Probe connection cable, probe 2
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 63)

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
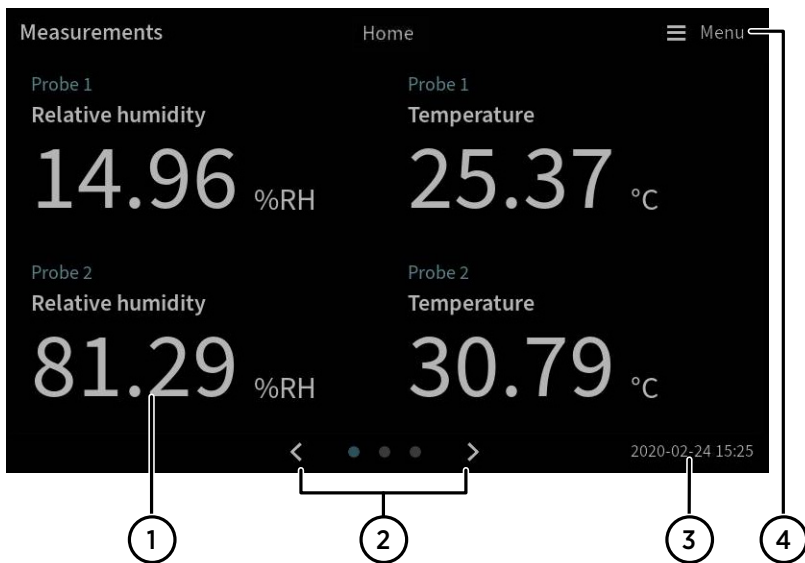
Figure 12 **Measurements** (**Home**) view on touchscreen

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.
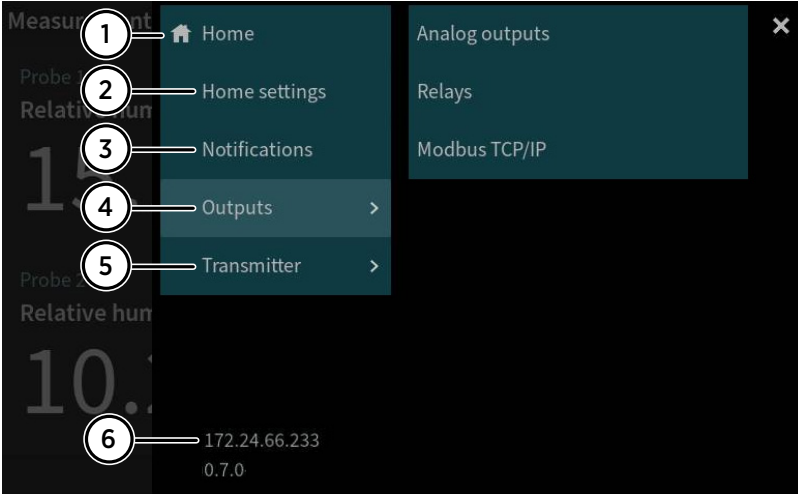
Figure 13   Configuration menu on touchscreen

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 34)
‣   Accessing configuration menu (page 47)
‣   Configuring home views on touchscreen (page 48)

4.2 Web interface and main views
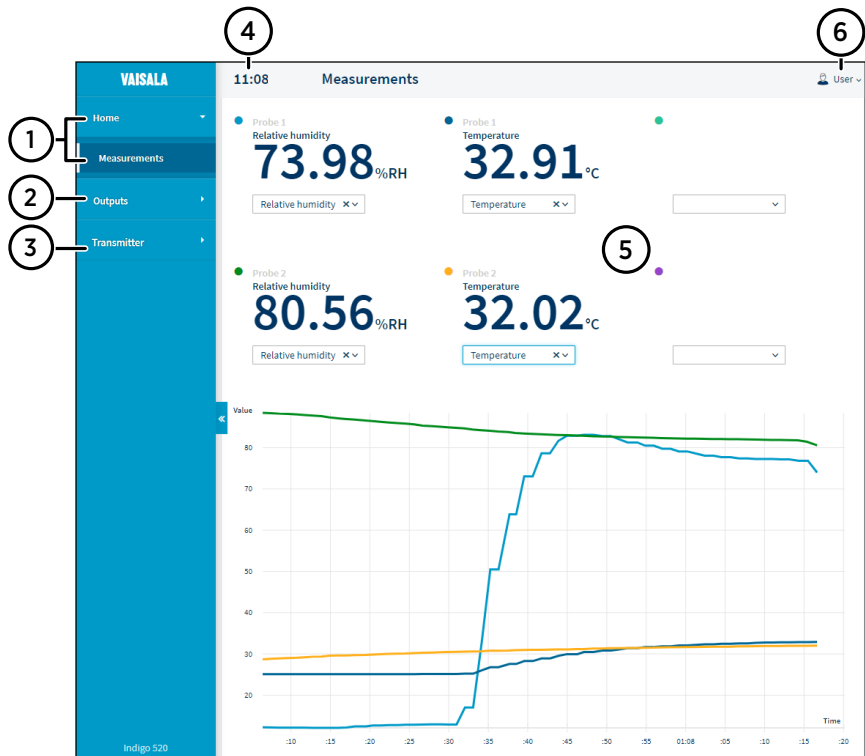
Figure 14   Web interface and main views

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

More information

‣ Starting up transmitter using web interface (page 38)
‣ Configuring web interface home view (page 56)

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** (**Home**) view opens, showing the 2 preferred measurement parameters from each connected probe.
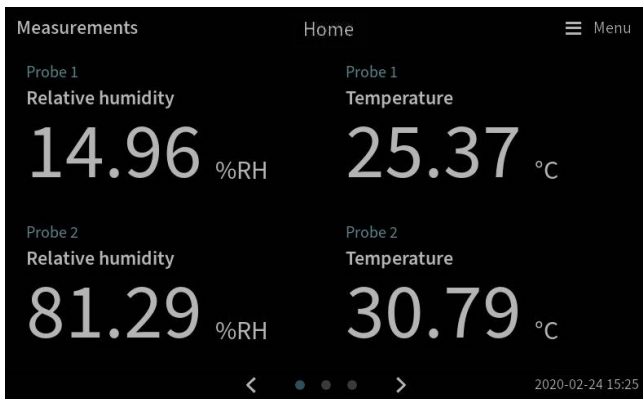
3. Select the configuration menu symbol at the upper right corner of the touchscreen.
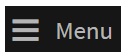
4. The default language of the user interface is English. If you want to use another language, select it in **Transmitter > Language**.
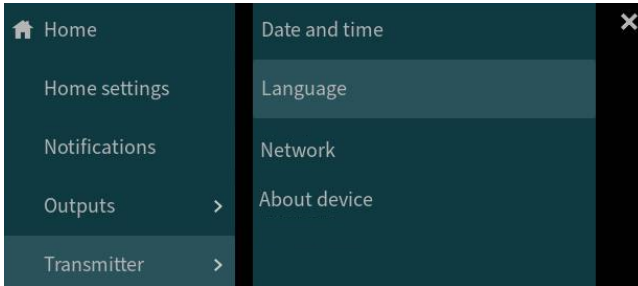
Your transmitter is now ready for operation. You can next go through these additional settings:

- **Date and time**
- **Network**

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.
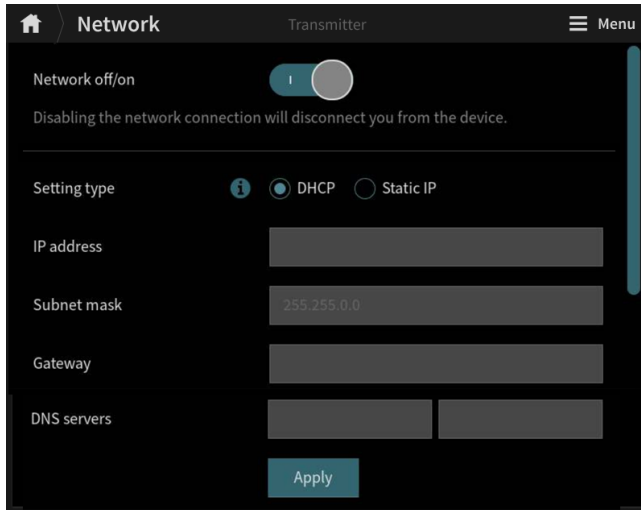
Figure 15   Network settings on touchscreen

1. Make sure that the Ethernet cable is connected to the transmitter.
   The Ethernet connector's LED lights up.

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

3. Select **Transmitter > Network**.

4. Make sure that **Network off/on** is set on.

5. 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.

6. 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.

7. Scroll to the end of the screen and select **Apply** to save your changes.

5.1.2 Setting date and time on touchscreen
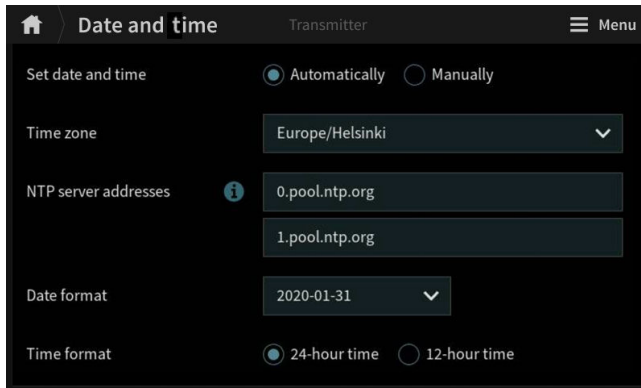
Figure 16   Date and time settings on touchscreen

> 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.
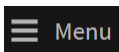
2. Select **Transmitter > Date and time**.

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.

    > **i** 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 appears at the lower right corner of the touchscreen.

More information

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.

Figure 17   Web interface, **Measurements** (**Home**) 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. If you are connecting the transmitter directly to your computer, connect the Ethernet cable from the transmitter to the computer.

> For a direct connection between the transmitter and your computer to work, also make sure that the devices are in the same subnet and that your computer has a static IP address.

2. Power up the transmitter.
   Powering up takes some minutes.

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

   ☰ Menu
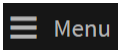
4. In **Transmitter > Network**, configure the network connection. If you have already configured the network connection, you can move to step 5.

5. Open a web browser. In the address field, type **https://<transmitter's IP address>:8443**.
   - Example: **https://172.24.65.229:8443**

   ![info icon] You can see the IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu ☰ Menu .
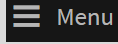
Your web browser may give a certificate error, but you can safely proceed to the transmitter's IP address. You are next prompted to log in or create users.

5.2.2 Creating web interface users

![tools icon] Hex key (4 mm) 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.
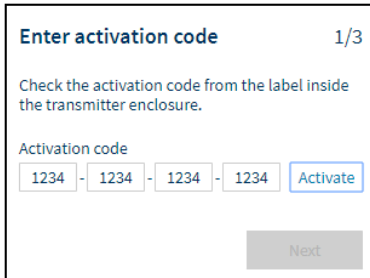
Figure 18   **User creation** page

The web interface has 2 user levels:

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

▶ 1. In the **User creation** page, select **Continue**.

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

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

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

4. Create a username and password for the **Guest** user (optional), and select **Finish**.
   The web interface restarts. After the restart, you can log in using the credentials you just created.

5.2.3 Logging in to web interface

1. Type a username.

2. Type a password.

3. Select **Log in**.
   The web interface opens in the **Measurements** (**Home**) view.

5.2.4 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.
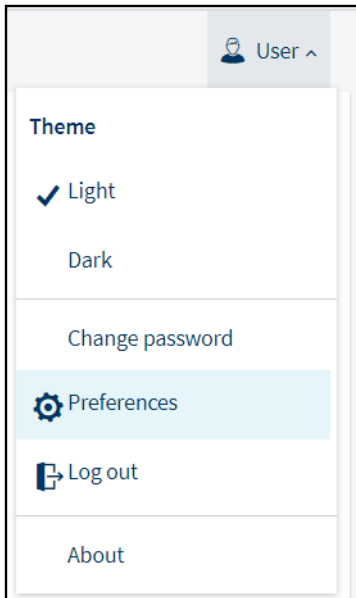
5.2.5 Configuring network connection in web interface

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

Figure 19   Network settings in web interface

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

2. Select **Transmitter > Network**.

3. Select the setting type:
   - Select **DHCP** if the transmitter is in a network that assigns network settings automatically.
   - Select **Static IP** to configure network settings manually.

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

   IP address
   The four part network ID of the transmitter.

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

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

   DNS server 1 ... 2
   Public computer server that translates the domain name of the transmitter into an IP address.

5. Select **Save**.

5.2.6 Setting date and time in web interface

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

Figure 20   Date and time settings in web interface

> ℹ️ 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.

> ℹ️ 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

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.
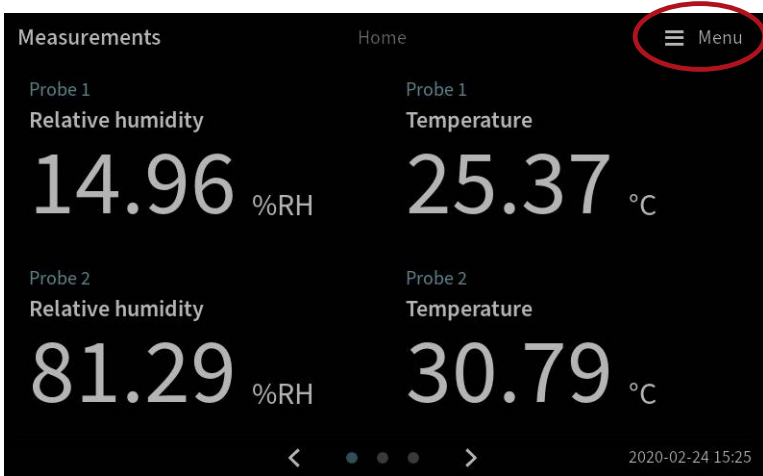
The configuration menu opens.
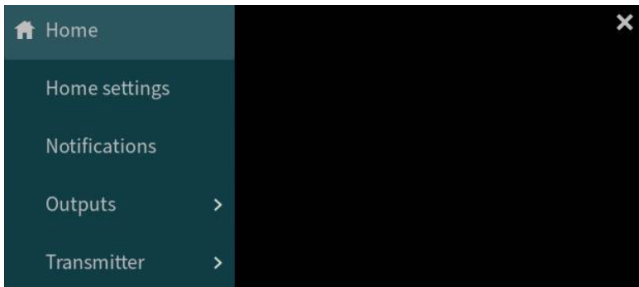
6.2 Configuring home views on touchscreen

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

- **Measurements** view
- **Graph** view
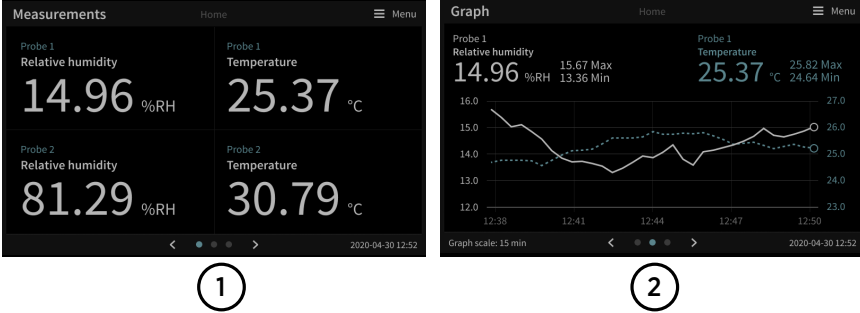
Figure 21   Configurable **Home** views on touchscreen

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.
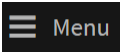
2. Select **Home settings**.

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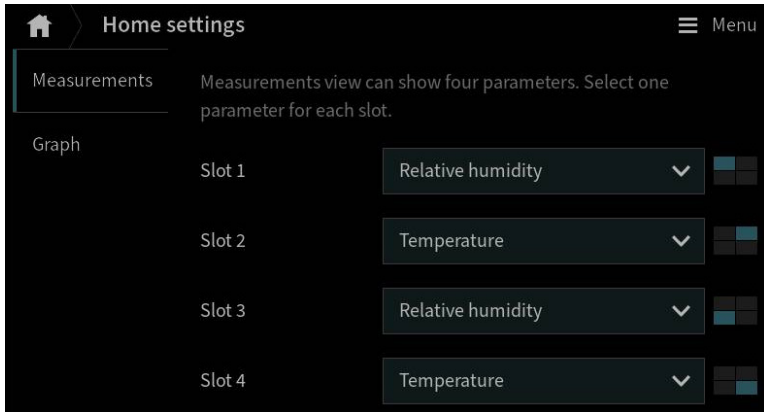
4. In the **Graph** tab, define what is shown in the **Graph** view:

    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

> 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.
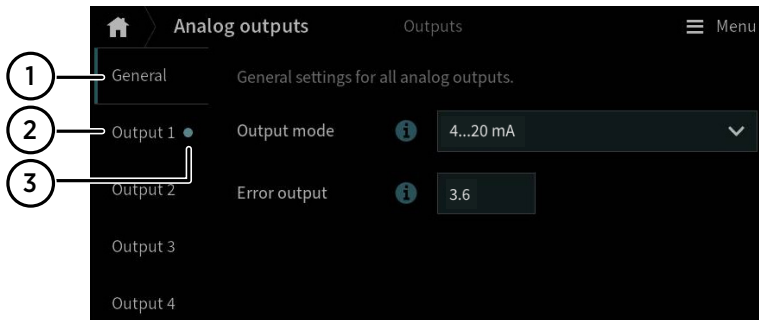
Figure 22   **Analog outputs** configuration menu on touchscreen, **General** tab active

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.

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

≡ Menu
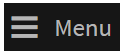
   2. Select **Outputs > Analog outputs**.

   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 **Error output**, define the output level indicating that the device is in error state or that the measurement outside the defined measurement scale.

   4. In the tabs **Output 1 ... 4**, select the output channel you want to configure.

5. Configure the analog output channel settings:

   a. In **Output off/on**, set the output channel off to edit settings.

   b. In **Parameter**, select the probe and the measurement parameter that controls the output channel. The unit of the parameter is set automatically.

   c. In **Scale low end** and **Scale high end**, define the lower and upper ends of the measurement scale for the chosen output parameter.

   d. Set the output channel on.
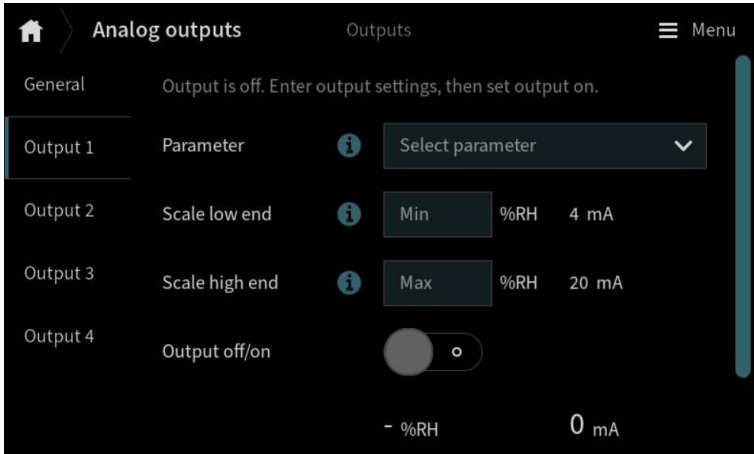
6. Repeat step 4 … step 5 for all the analog output channels you want to use.

> 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.

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
    - **Error output**: 3.6
- 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
    - **Output off/on**: Set output on to activate settings.

6.4 Configuring relays on touchscreen

ℹ️ 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.
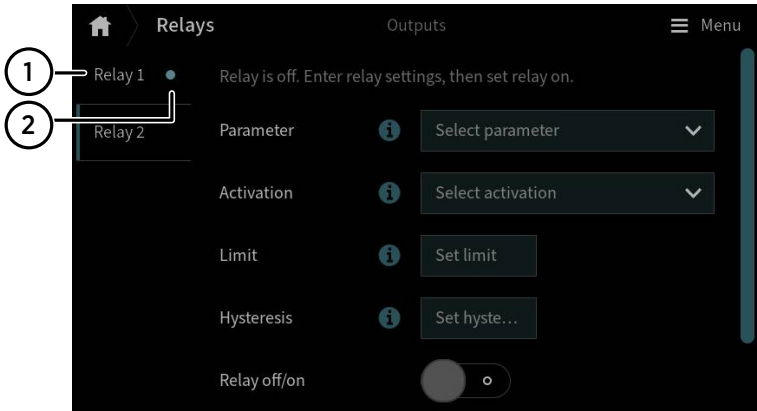
Figure 23   **Relays** configuration menu on touchscreen, **Relay 2** tab active

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.

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

≡ Menu
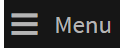
2. Select **Outputs > Relays**.

3. Select the relay you want to configure: **Relay 1** or **Relay 2**.

4. Configure the relay settings:

   a. In **Relay off/on**, set the relay off to edit settings.

   b. In **Parameter**, select the probe and the measurement parameter that controls the relay.

   c. In **Activation**, select whether the relay activates above or below the activation/deactivation limit.

   d. In **Limit**, define the limit which the measured parameter value must reach for the relay to activate/deactivate.

   e. In **Hysteresis**, define a buffer value for relay deactivation. With hysteresis, an activated relay switches off only when the measured value crosses the relay activation/deactivation limit and the additional buffer value.

   f. 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 8   Relay wiring: Normally open (NO)

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

Table 9   Relay wiring: Normally closed (NC)

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

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.
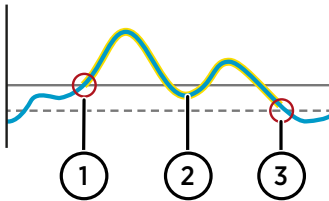
Figure 24   Behavior of relay that activates above limit, with hysteresis

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 61)

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** (**Home**) view of the web interface.

> ℹ️ 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.
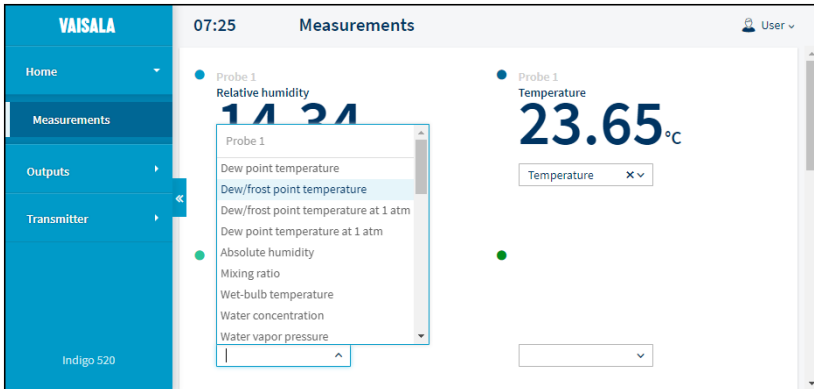
7.2 Configuring analog outputs in web interface

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

Figure 25   **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 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 **Error output**, define the output level indicating that the device is in error state or that the measurement outside the defined measurement scale.

    c. Select **Apply**.

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. Set the output channel on.

   f. 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 52)

7.3 Configuring relays in web interface

You need **Administrator** user rights for this task.
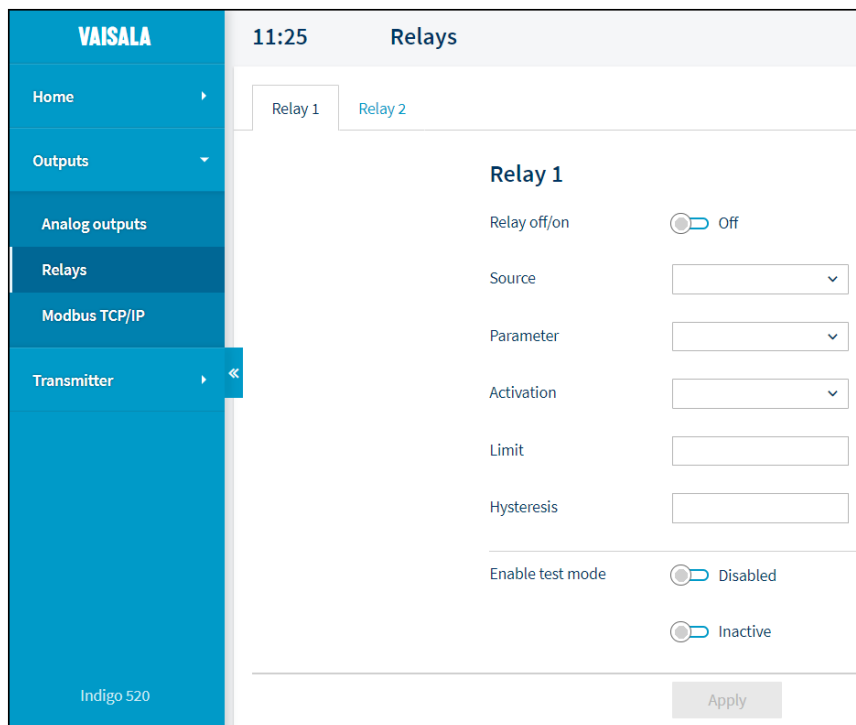
Figure 26   **Relays** configuration menu in web interface

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

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

8. Modbus

8.1 Modbus overview

The transmitter supports 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 55)
‣ Enabling Modbus TCP/IP in web interface (page 60)

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 10   Unit IDs of transmitter and probes

Device	Unit ID
Transmitter	240
Probe connected to port 1	241
Probe connected to port 2	242

The unit IDs of the connected probes identify the probes based on the port 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`.

If you send a request to a port without a connected probe, the transmitter responds with the exception code `Gateway Path Unavailable`.

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

More information

‣ Modbus reference (page 73)

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.

> **i** 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:

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

> **i** 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.

> **i** 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 29)

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. You can get the software update file from www.vaisala.com/downloads.
- 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 **Choose file**, and browse to the software update file.
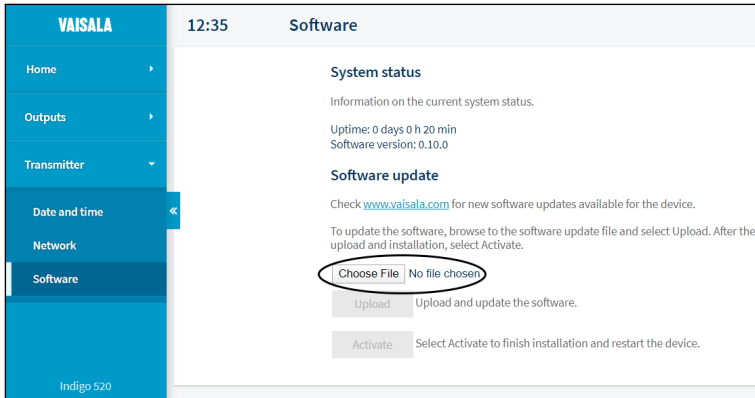
4. Select **Upload** when the button becomes active.
   Uploading takes some minutes.
5. Select **Activate** when the button becomes active.
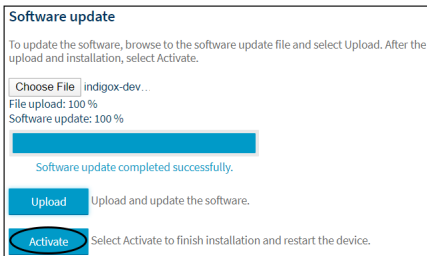
The transmitter restarts. After the restart, you can see the updated software version under **System status**.

> 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

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.

> ✖️ Hex key (4 mm)

▶ 1. Power off the transmitter.

2. Open the 2 hex screws on the cover of the transmitter using a 4-mm hex 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.
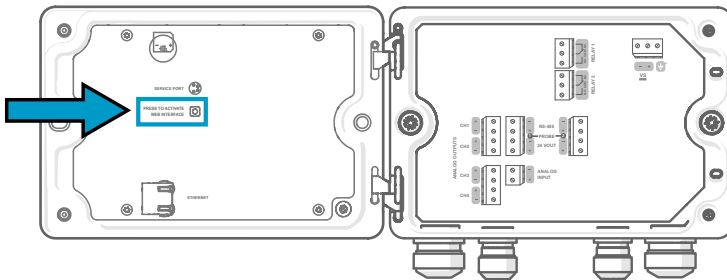
The transmitter restarts.

> ℹ️ 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.

> ℹ️ 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.
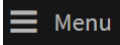
More information
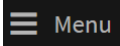
‣ Opening and closing transmitter cover (page 17)
‣ Connecting to web interface (page 39)
‣ Creating web interface users (page 40)
‣ Logging in to web interface (page 42)

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:**
	Wait for the transmitter to power up again. This will take some minutes.
	When the transmitter powers up, it will continue to show measurements just like before the power outage.
	To access the web interface again:
	1. Check the current IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu ≡ Menu
	2. Reconnect to the web interface using the current IP address.

Problem: You cannot access the web interface login page.	
Possible cause:	**Solution:**
The **Network off/on** setting on the touchscreen may be off.	1. Make sure that the **Network off/on** setting on the touchscreen is on.
	• Menu path on touchscreen: **Menu > Transmitter > Network**
If the transmitter's IP address is assigned via DHCP, the IP address may have changed, for example, because the transmitter has been restarted.	2. Check the current IP address of the transmitter on the touchscreen, at the bottom left corner of the configuration menu ≡ Menu
	3. Reconnect to the web interface using the current IP address.

Problem: You cannot access the web interface login page.	
If the transmitter is using a static IP address, there may be something wrong with the static network settings.	Check the static network settings on the touchscreen. • Menu path on touchscreen: **Menu > Transmitter > Network**
The Ethernet cable may be disconnected from the transmitter.	1. Open the transmitter cover. 2. If the Ethernet connector's green light is not blinking, reconnect the Ethernet cable. 3. Check the current IP address of the transmitter on the touchscreen, 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. • 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. • 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.	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.
The probe sensor may be faulty.	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.

More information

10. Technical data

10.1 Specifications

Table 11   Transmitter options

Property	Specification
Display	• Touchscreen display
Powering	• Protective extra low voltage (15 ... 35 VDC, 24 VAC ± 20%) • AC (mains) power (100 ... 240 VAC 50/60 Hz) • Power over Ethernet (no analog outputs or relays)

Table 12   Operating environment

Property	Specification
Operating temperature	−20 ... +55 °C (−4 ... +131 °F)
Storage temperature	−40 ... +70 °C (−40 ... 158 °F)
Operating humidity	0 ... 100 %RH
Maximum operating altitude	3000 m (9843 ft)

Table 13   Inputs and outputs

Property	Specification
Operating power	
Protective extra low voltage (PELV) version [1]	15 ... 35 VDC, 24 VAC ±20 %, max. current 2 A
	Fuse size for power supply: 3 A
AC (mains) power version [1]	100 ... 240 VAC 50/60 Hz, max. current 1 A
	Fuse size for power supply: 10 A
Power over Ethernet version [1]	50 VDC, 600 mA PoE+, IEEE 802.3 at PD
	Fuse size for power supply: 2 A
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

Property	Specification
External loads:	
Current outputs	$R_L < 500\ \Omega$
0 ... 1 V output	$R_L > 2\ k\Omega$
0 ... 5 V and 0 ... 10 V outputs	$R_L > 10\ k\Omega$
Max. wire size	$2.5\ mm^2$ (14 AWG)
Accuracy of analog outputs at +20 °C	±0.05 % full scale
Temperature dependence	±0.005 % / °C full scale
Relay outputs	
Number and type of relays	2 pcs, SPDT
Max. switching power, current, voltage	30 W, 1 A, 40 VDC / 28 VAC
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 14   Compliance

Property	Specification
Safety standard	IEC/UL/EN 61010-1
EMC compliance	EN 61326-1, Industrial Environment
FCC compliance	FCC Part 15 Compliance Statement for Class B Unintentional Radiators

Table 15   Mechanical specifications

Property	Specification
Housing classification	IP66, NEMA 4, IK08, DIN EN ISO 11997-1: Cycle B
Housing material	AlSi10Mg (DIN 1725)
Display window material	Chemically strengthened glass (IK08)
Weight	1.5 kg (3.3 lbs)

Property	Specification
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 Spare parts and accessories

Table 16   Accessories

Item	Item code
Adapter plate	DRW252186SP
Installation kit for pole or pipeline	215108
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 17   Spare parts

Item	Item code
Cable gland, M20×1.5, 5.0 ... 8.0 mm	ASM213670SP
Cable gland with split bushing, M20×1.5 [1]	262632SP
Cable gland, M16×1.5, 2.0 ... 6.0 mm	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*

Appendix A. Modbus reference

A.1 Unit IDs

Table 18   Unit IDs of transmitter and probes

Device	Unit ID
Transmitter	240
Probe connected to port 1	241
Probe connected to port 2	242

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

A.2 Function codes

Table 19   Modbus function codes

Function code (decimal)	Function code (hexadecimal)	Name	Notes
03	03_{hex}	Read Holding Registers	Can be used only for reading probe registers, for example, measurement results, using unit ID 241 or 242. See the connected probe's Modbus documentation for a probe-specific register list.
43 / 14	$2B_{hex}$ / $0E_{hex}$	Read Device Identification	Can be used only for reading transmitter identification information using unit ID 240.

A.3 Device identification objects

Table 20   Device identification objects

Object id (decimal)	Object id (hexadecimal)	Object name	Example contents
0	00_{hex}	VendorName	"Vaisala"
1	01_{hex}	ProductCode	"INDIGO520"

Object id (decimal)	Object id (hexadecimal)	Object name	Example contents
2	02$_{hex}$	MajorMinorVersion	"1.2.3" Software version of the device.
3	03$_{hex}$	VendorUrl	"http://www.vaisala.com/"
4	04$_{hex}$	ProductName	"INDIGO520 Transmitter"
128	80$_{hex}$	SerialNumber [1]	"K0710040"

1)   *Vaisala-specific device identification object.*

A.4 Modbus communication examples

Reading RH value from HMP4 probe connected to the transmitter as Probe 1

> **i** 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$_{hex}$	Value of first register (least significant word)
00$_{hex}$	Number of 16-bit registers to read (2)	E1$_{hex}$	
02$_{hex}$		41$_{hex}$	Value of second register (most significant word)
		F4$_{hex}$	

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

Communication description	
Register address	1 (1-based Modbus register number) = 0000$_{hex}$ (0-based register address used in actual communication) based on the Modbus Reference in *HMP4 User Guide*
Data format	2 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

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.

Recycling

Recycle all applicable material.

Follow the statutory regulations for disposing of the product and packaging.

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