



# Hamilton Transmitter H210X

## Quick Start Guide

**REF**

111011882/00

2026-02-06

**HAMILTON** 



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The user is solely responsible for the calibration, maintenance, and regular replacement of the sensors. For critical sensor applications, Hamilton recommends the use of backup measuring points to avoid consequential damage. The user is responsible for taking appropriate precautions in the event of sensor failure.

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# Document History

| Manual revision No. | Date of issue | Change summary                                                        |
|---------------------|---------------|-----------------------------------------------------------------------|
| 00                  | February 2026 | The first release of the Hamilton Transmitter H210X Quick Start Guide |

# Preface

This manual/guide is part of a documentation suite that includes the following documents:

Table 1. Hamilton Transmitter H210X documentation suite

| Document title                                                          | Description                                                                                                                                                                                                                                                       | Document REF |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Hamilton Trans-mitter H210X<br><i>Quick Start Guide</i><br>(this guide) | Provides a summary of important information about the Hamilton Transmitter H210X. The Quick Start Guide is supplied with the transmitter.<br><br>The Quick Startup Guide does not replace the official Operating Instructions for the Hamilton Transmitter H210X. | 111011882    |
| Hamilton Trans-mitter H210X<br><i>Operating Instructions</i>            | Provides detailed information about installing and setting up the Hamilton Transmitter H210X, as well as additional technical information.<br><br>The Operating Instructions is only available online together with other relevant information.                   | 111011880    |

## Conventions used in this guide/manual

Safety messages are displayed as follows:

|                                                                                                    |                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>WARNING</b> | Alerts the user to the risk of injury, death, or other severe adverse reactions associated with the correct or incorrect use of the device.                                                       |
|  <b>CAUTION</b> | Alerts the user to the possibility of a problem with the device associated with its use or misuse, such as device malfunction, device failure, damage to the device, or damage to other property. |
| <b>NOTICE</b>                                                                                      | Emphasizes information of particular importance.                                                                                                                                                  |

In tables and some descriptive text, safety messages are indicated as follows:

**⚠ WARNING!**

**⚠ CAUTION!**

**! NOTICE!**

#### Graphics or illustrations used in this manual

- The graphics or illustrations used in this manual are for illustrative purposes only.
- The colors used in the graphics or illustrations may not be an exact representation of the actual product.

#### In this manual:

- Some figures use callouts in a white circle with a blue border.
  - ①: These figures may have an associated legend table or may describe a single item legend in the title of the figure. Callouts may be numerical or alphabetic. Callouts are unrelated to any nearby procedures and refer only to the figures themselves and their associated legend.
- Some figures use small dark blue callouts.
  - A: These callouts show the sequence of steps. They are not related to the numbering of any associated procedure.

#### Documentation download

The complete operating instructions and downloads can be found here from the Hamilton Process Analytics website (<https://www.hamiltoncompany.com/process-analytics/h210x>).

Scan the QR code to access the operating instructions and other relevant documentation or information.



# 1 Safety Precautions and Hazards

This chapter provides safety information and electrical safety precautions and hazards about the Hamilton Transmitter H210X.

## WARNING

### Electrical safety precautions:

- Personnel can be exposed to dangerous voltages during installation and maintenance of the Hamilton Transmitter H210X
  - Electrical installation must be in accordance with the National Electrical Code (ANSI/National Fire Protection Agency-70) and/or any other national or local codes.
  - The transmitter is protected throughout by double insulation
  - Do not open the transmitter while the circuit is live. Disconnect the main power, wired to separate power source before you service the transmitter.
  - Make sure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified personnel.
  - Keep power supply/signal wiring at least 6 ft. (2 m) away from heavy electrical equipment.
  - Keep the sensor and output signal wiring separate from loop power wiring.
  - Non-metallic cable strain reliefs do not provide grounding between the conduit connections. Use grounding type bushings and jumper wires.
  - Make sure that the transmitter is connected and properly grounded through a three-wire power source.
  - Install transmitter as specified in the Quick Start Guide and as per the applicable local and national standards. Connect all associated products to the correct electrical and pressure sources.
  - The operator is responsible for the configuration and correct use of the transmitter.
  - Install all protective equipment covers and safety ground leads after installation.
  - Operate the transmitter only when the front panel is in place and fastened.
  - Disconnect and lock out the transmitter power before you connect the power supply.
-

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## Electrostatic ignition hazard

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### WARNING

#### Electrostatic discharge hazard:

- The plastic enclosure, except the front panel, can create an electrostatic ignition hazard. The surface resistivity of the non-metallic enclosure materials is greater than 1 GΩ.
  - To prevent electrostatic charge build-up, you must adhere to the following cleaning requirements:
    - ▶ **Approved cleaning:** Clean the enclosure only with a damp cloth.
    - ▶ **Prohibited actions:** Do not rub the transmitter surfaces.
    - ▶ **Prohibited materials:** Do not clean the transmitter with solvents or a dry cloth.
- 

### WARNING

#### Physical access:

- Unauthorized personnel can potentially cause significant damage to and/or incorrectly configure the transmitter. This could be intentional or unintentional and must be prevented.
  - Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect the end users' assets. This is applies to all systems used within the facility.
- 

### CAUTION

#### ***Only use original spare parts or accessories:***

*Only use original spare parts or accessories when a replacement or repair is necessary. Tampering or unauthorized substitution of parts can affect the performance of the transmitter and safe operation of your process.*

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## Enclosure and sealing specifications

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### NOTICE

#### Protection rating limitations:

When you install the device, note the following limitations for the panel-mount gasket:

- **Enclosure rating:** The enclosure is rated to IP66 and protection classes II and III.
  - **Gasket limitation:** The panel-mount gasket is not tested for IP66 or protection Classes II and III.
  - **Installation requirement:** Make sure that the installation environment considers this limitation. The specified protection ratings apply only to the enclosure, not to the gasket.
- 

### NOTICE

#### Requirement for Universal HART® Communicator:

If a 475 Universal HART® Communicator is used with the transmitter, the software within the 475 may require modification. If a software modification is required, contact Hamilton Technical Support for assistance (see Chapter 4).

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## 2 Installation

This chapter provides information and instructions on how to mount the Hamilton Transmitter H210X, prepare the prepare the conduit openings, including the various mounting options with the corresponding assembly drawings.

### General installation information

#### CAUTION

##### **Transmitter installation requirements:**

- *Install the transmitter with a sun shield or out of direct sunlight and areas with extreme temperatures.*
- *Install the transmitter in an area where vibrations, electromagnetic, and radio frequency interference are minimized or absent.*
- *Maintain a minimum distance of 0.30 m between the transmitter, sensor wiring, and high voltage conductors. The installation location should allow for easy access to the transmitter and the sample conditioning system.*
- *The transmitter housing has six 12.7 mm conduit openings. Use separate conduit openings for the power/output cable, the sensor cable, and the other sensor cable as needed (pH input for free chlorine with continuous pH correction).*
- *Use weatherproof cable glands to keep moisture out of the transmitter. If using a conduit, seal the connections on the transmitter housing to prevent moisture from entering the transmitter.*
- *Install cable gland fittings and plugs as required to seal all six enclosure openings on the transmitter housing. The USB port cover must be fully installed on the front panel to ensure the correct sealing of the transmitter.*

### 2.1 Unpack and inspect the transmitter

1. Inspect the shipment for damage. If the shipment is damaged, contact Hamilton Technical Support (see Chapter 4).
2. Unpack the packaging and inspect the contents for damage and missing parts. Make sure that all item listed on the on packing list are present. If items are missing, contact Hamilton Technical Support (see Chapter 4).

#### NOTICE

##### **Order verification:**

Verify that you have received the correct model and options from your purchase order and the Quick Start Guide supplied covers your model and options. If not, contact Hamilton Technical Support (see Chapter 4).

## 2.2 Assembly: Mounting options

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### NOTICE

#### **Transmitter mounting options:**

The transmitter supports three primary installation methods: panel mounting, pipe mounting, and surface mounting. Specific mounting hardware and accessories required for these options are listed in Table 5-5: *Mounting Accessories*..

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### NOTICE

#### **Assembly drawing units:**

The assembly drawing units for the dimensions are given in millimeters (mm).

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## Panel mount

Figure 2-1. Hamilton Transmitter H210X mounting option: Panel mount - front view [1/3]

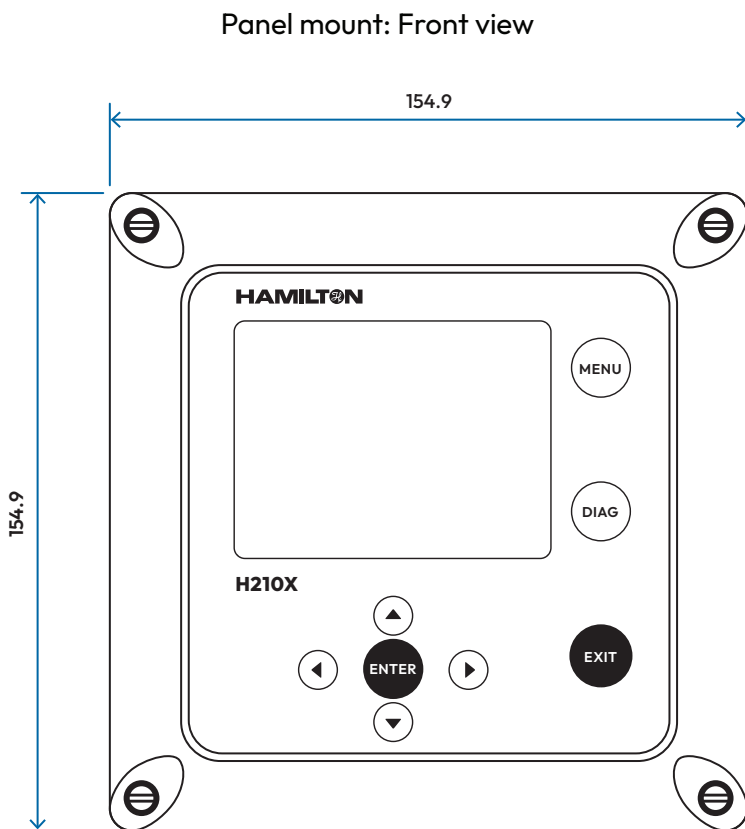
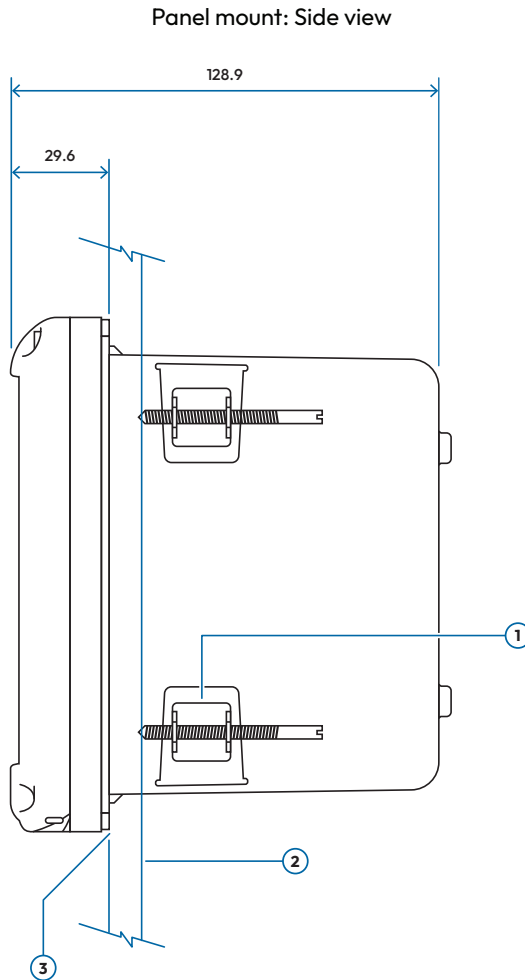


Figure 2-2. Hamilton Transmitter H210X mounting option: Panel mount - side view [2/3]



- |                                                                                                                                                                             |                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <p>1 Mounting accessories provided with the Hamilton Transmitter H210X:</p> <ul style="list-style-type: none"> <li>• 4 x Mounting brackets</li> <li>• 4 x Screws</li> </ul> | <p>3 Panel mount gasket</p> |
| <p>2 Panel supplied by third-party. Maximum thickness: <b>9.52 mm</b></p>                                                                                                   |                             |

Figure 2-3. Hamilton Transmitter H210X mounting option: Panel mount - bottom view showing conduit openings [3/3]

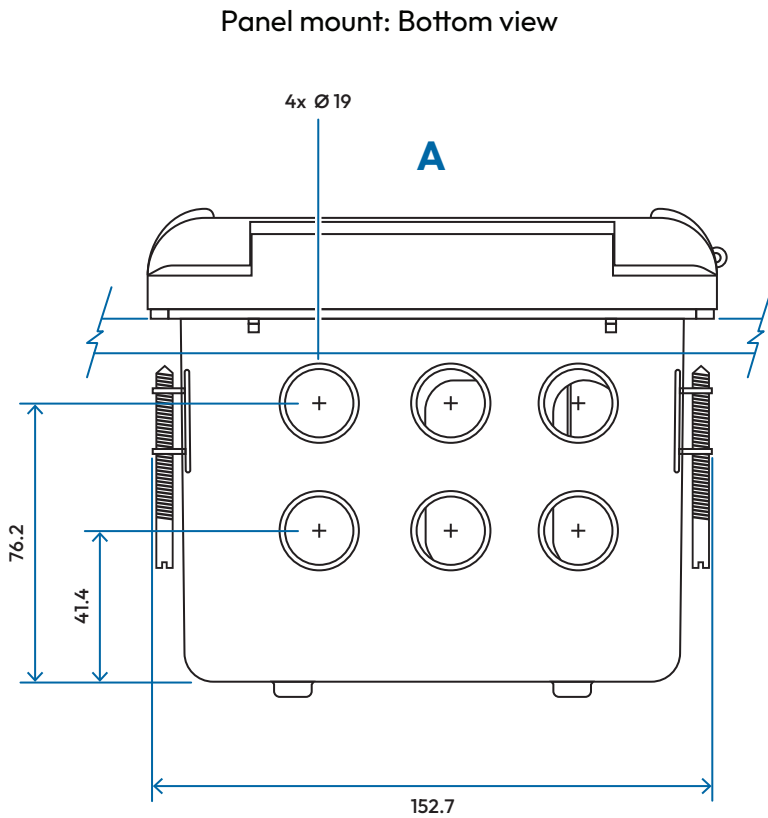
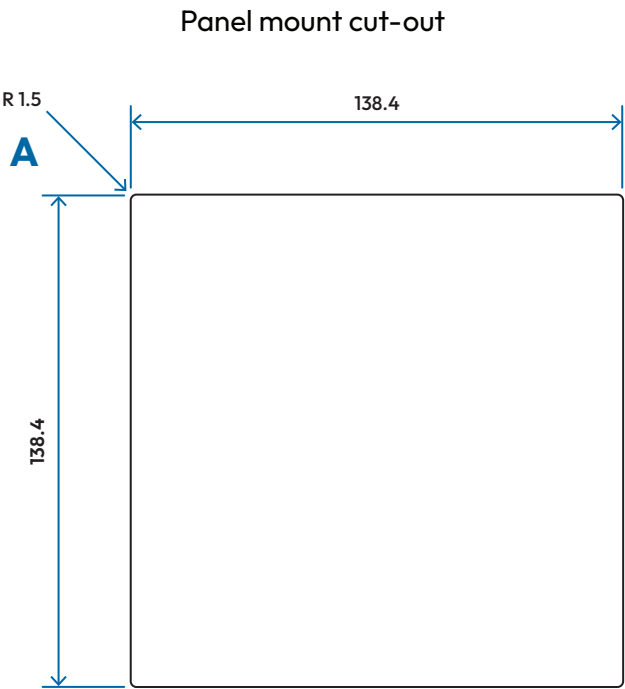


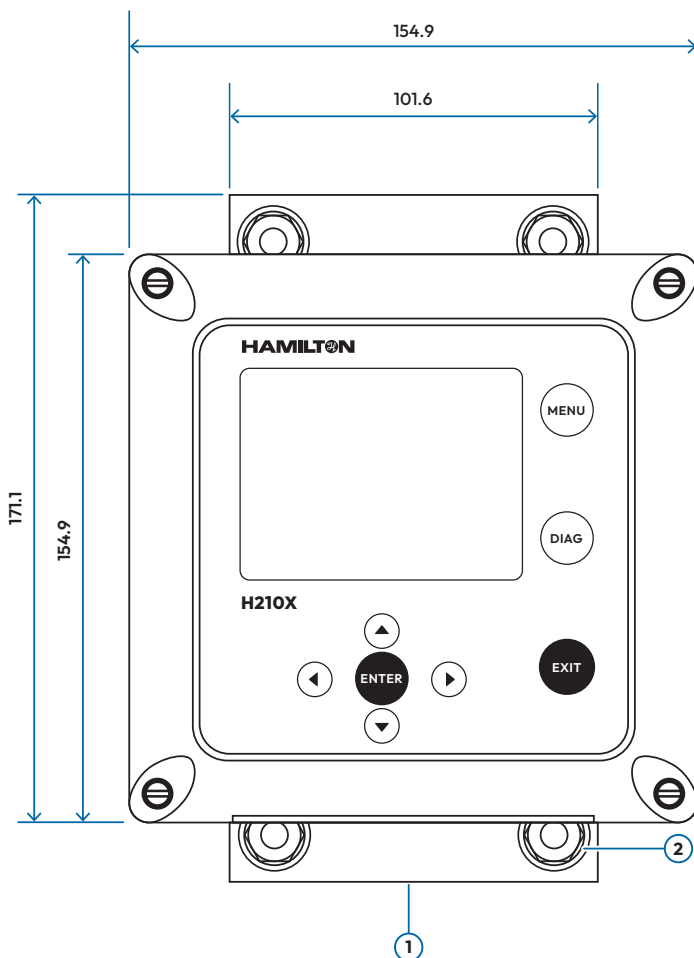
Figure 2-4. Overview of the panel cut-out



## Wall mount

Figure 2-5. Hamilton Transmitter H210X mounting option: Wall mount - front view [1/2]

### Wall mount: Front view

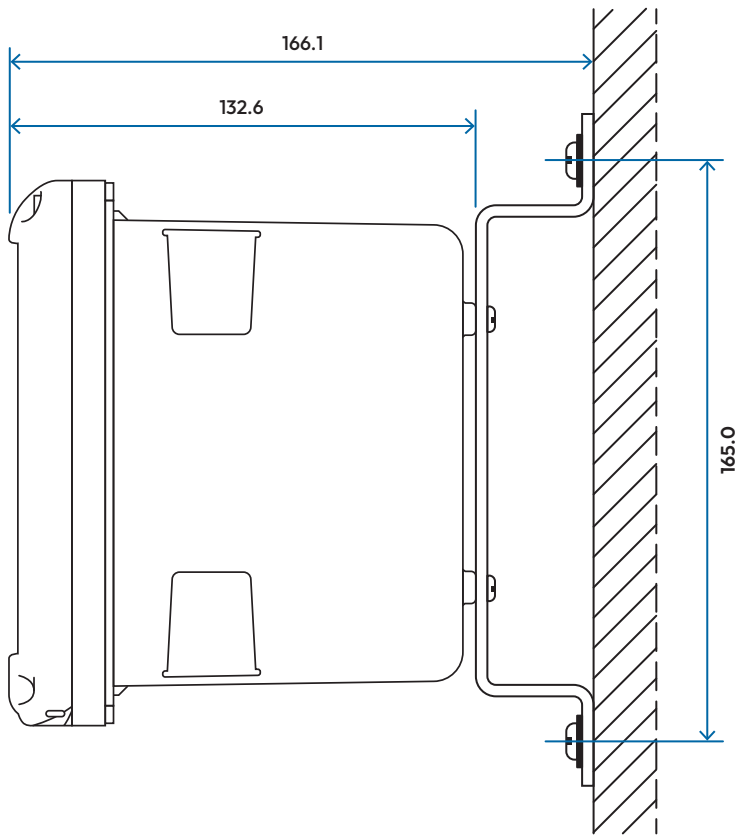


1 Mounting bracket

2 4 x Mounting screws for the bracket

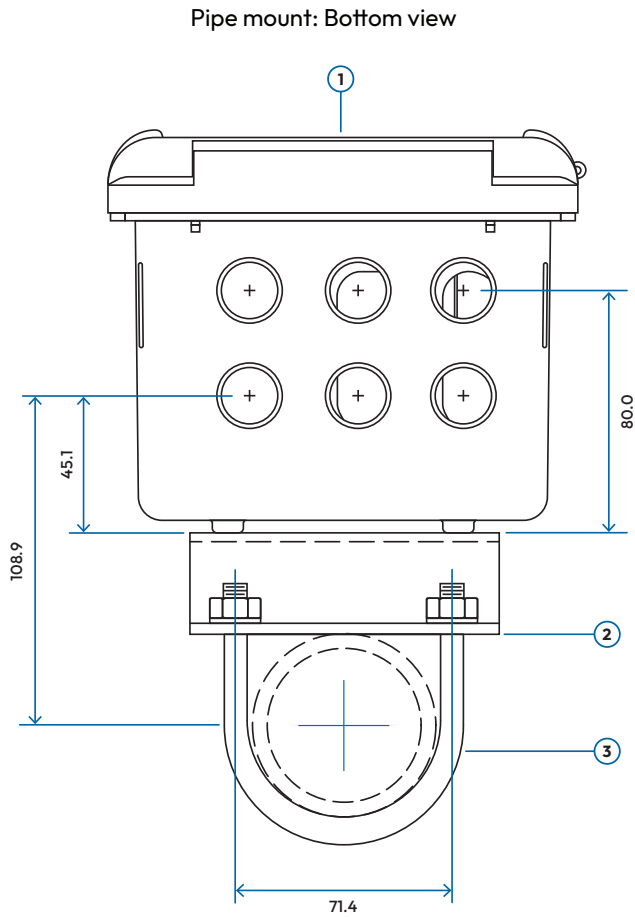
Figure 2-6. Hamilton Transmitter H210X mounting option: Wall mount - side view [2/2]

Wall mount: Side view



## Pipe mount

Figure 2-7. Hamilton Transmitter H210X mounting option: Pipe mount - bottom view [1/2]



1 Front panel

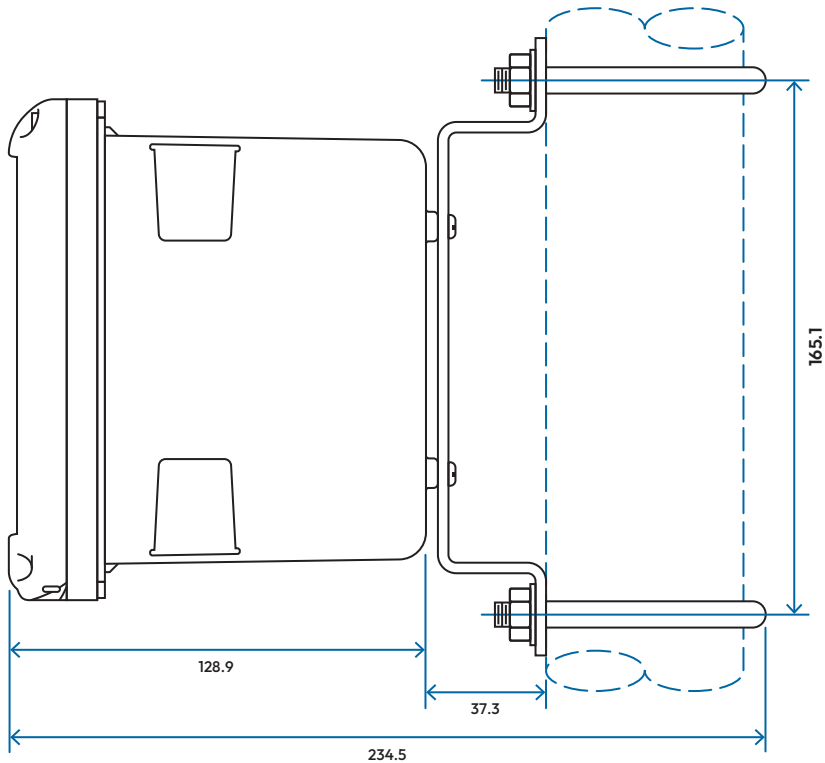
3 Two sets of U-bolts

**ⓘ NOTICE!** Applicable for pipes with a diameter (Max.) of 50.8 mm.

2 Pipe mounting bracket for pipe  
**ⓘ NOTICE!** Applicable for pipes with a diameter (Max.) of 50.8 mm.

Figure 2-8. Hamilton Transmitter H210X mounting option: Pipe mount - bottom view [2/2]

### Pipe mount: Side view



#### Preparing the conduit openings

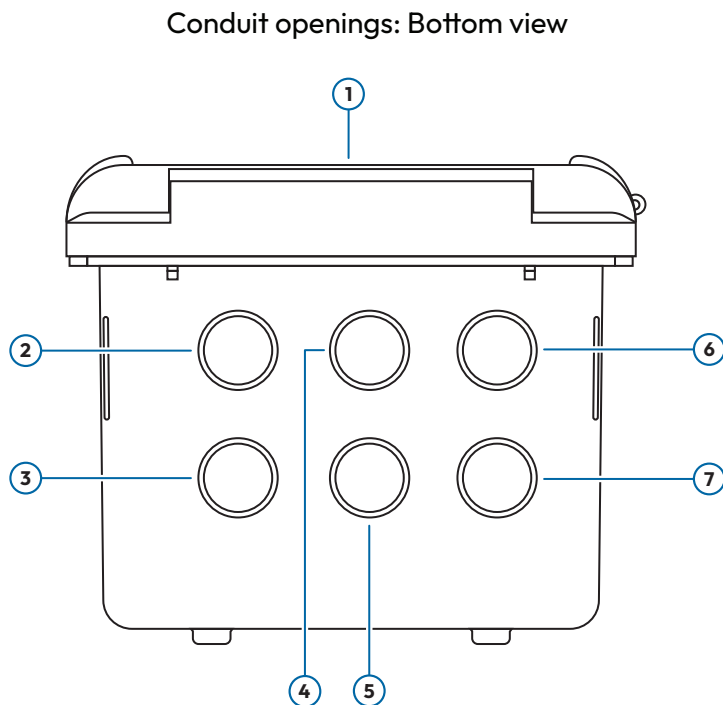
There are six conduit openings in all configurations of the transmitter.

#### NOTICE

##### Transmitter openings protection:

The openings on the transmitter housing are covered with blanking plugs before shipment.

Figure 2-9. Overview of the conduit openings the transmitter housing (bottom view)



- |   |                    |   |                |
|---|--------------------|---|----------------|
| 1 | Front panel/keypad | 5 | 4-20 mA/HART®  |
| 2 | Power cables       | 6 | Sensor 2 cable |
| 3 | Alarm relay cables | 7 | Spare opening  |
| 4 | Sensor 1 cable     |   |                |

### Cable gland fittings, conduit fittings, and ingress protection

#### **⚠ CAUTION**

#### ***Cable gland fittings and plugs:***

*Always use the correct cable gland fittings and plugs for the wire and cable installations.*

 **CAUTION****Watertight fittings and hubs compliance:**

*Use watertight fittings and hubs that comply with your requirements. Connect the conduit hub to the conduit before attaching the fitting to the transmitter.*

The conduit openings accept 13 mm conduit fittings or PG 13.5 cable glands. To keep the transmitter housing watertight, you must block all unused openings with Type 4X or IP66 conduit plugs.

To maintain ingress protection for outdoor use, you must seal all unused conduit holes with suitable conduit plugs.

## 2.3 Wiring

All wiring connections are located on the main circuit board. The front panel is hinged at the bottom. The panel swings down for easy access to the wiring locations.

## 2.4 HART® power supply: Current loop wiring

**NOTICE****Effective power/signal wiring:**

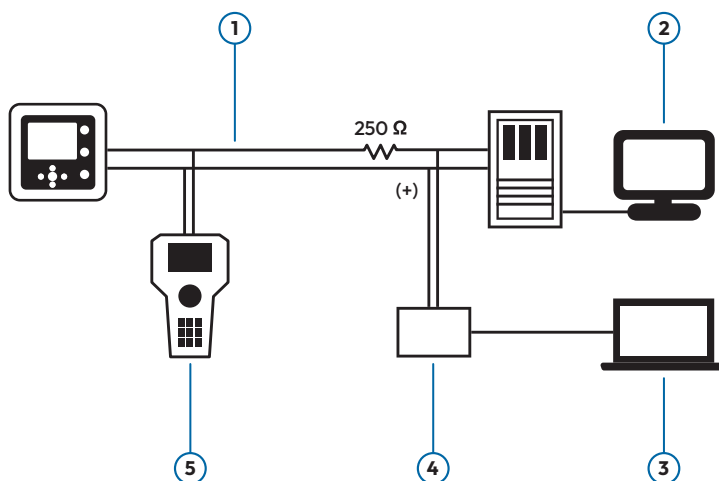
Run the power/signal wiring through the opening nearest TB-2 (see Figure 2-10).

**For optimum EMI/RFI protection:** **CAUTION****Wiring separation guidelines: Preventing electrical interference**

*Do not run power supply/signal wiring in the same conduit or cable tray with loop power lines. Keep the power supply/signal wiring at least 2 m away from heavy electrical equipment.*

1. Use shielded power/signal cable and ground the shield at the power supply.
2. Use a metal cable gland and make sure that the shield has good electrical contact with the gland.
3. Use the metal backing plate when attaching the gland to the transmitter housing. Note that the power/signal cable can also be enclosed in an earth-grounded metal conduit.

Figure 2-10. Hamilton Transmitter H210X setup: System block diagram



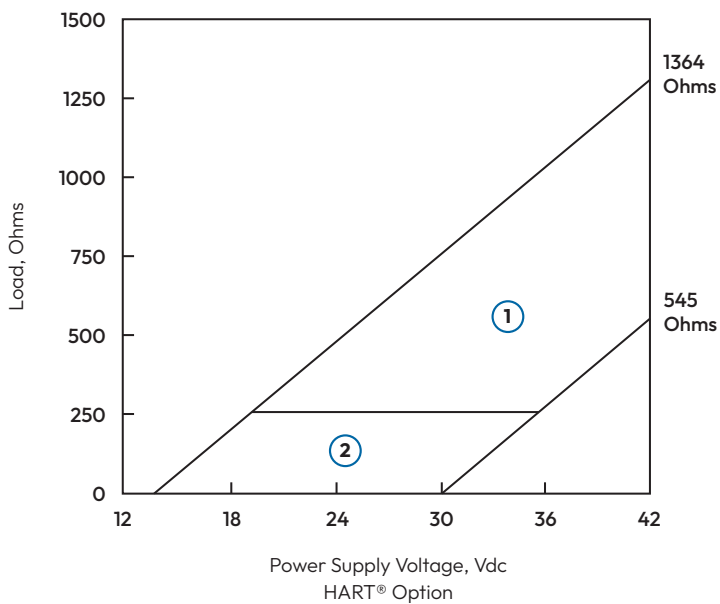
- |   |                         |   |                    |
|---|-------------------------|---|--------------------|
| 1 | 4-20 mA and HART signal | 4 | Bridge             |
| 2 | Control system          | 5 | Field communicator |
| 3 | Computer                |   |                    |

## 2.5 HART® power supply and load requirements

The load and power supply requirements for HART® communication are detailed in Figure 2-11. The power supply must be at least **17.5 Vdc** to ensure a **12.7 Vdc** "lift off" voltage at the transmitter terminals for digital communication. It must also be able to cover the voltage drop across the cable and the required **250 Ω** load resistor.

During the first 80 milliseconds of start-up, the power supply must provide a surge current of approximately **24 mA** to provide a **22 mA** current. The maximum power supply voltage is **42.0 Vdc** for standard installations and **30.0 Vdc** for intrinsically safe installations.

Figure 2-11. Overview of HART® power supply and load requirements



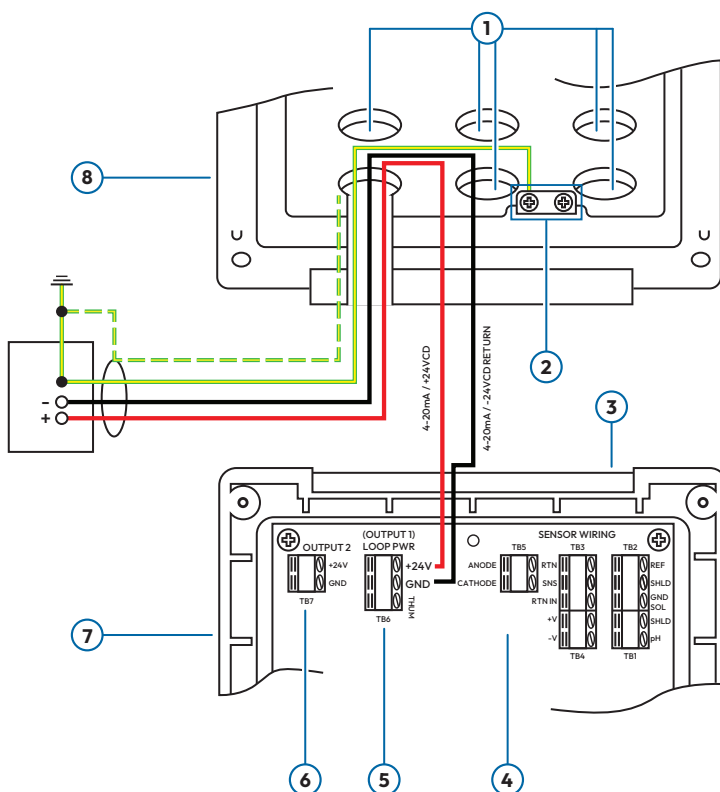
- 1 With HART® communication
- 2 Without HART® communication

2.6 HART® power / current output wiring

Hamilton Transmitter H210X are configured with two 4-20 mA current outputs as default. Current output 1 is the HART® communications channel. Current output 2 is available to report process temperature measured by the temperature sensing element or resistance temperature device (RTD) within the sensor.

Wiring locations for the outputs are on the main board, which is mounted on the hinged door of the Hamilton Transmitter H210X . Wire the output leads to the correct position on the main board using the lead markings (positive (+) / negative (-)) on the board (see Figure 2-12).

Figure 2-12. Overview of the Hamilton Transmitter H210X wiring for HART® loop power



- |   |                                                             |   |                                                                                      |
|---|-------------------------------------------------------------|---|--------------------------------------------------------------------------------------|
| 1 | Install blanking plugs in all empty openings                | 5 | TB5 / Emerson wireless THUM adapter terminal is only used for wireless installations |
| 2 | Ground/earth clamp                                          | 6 | TB7: Output 2 requires external DC power                                             |
| 3 | Front panel hinge                                           | 7 | Front panel                                                                          |
| 4 | Hamilton Transmitter H210X HART circuit board for pH sensor | 8 | Transmitter housing (rear)                                                           |

## 2.7 Wire the sensor to the transmitter

To wire the sensor to the transmitter, follow these steps:

### CAUTION

#### **Sensor and power wiring precautions:**

*Keep sensor and output signal wiring separate from loop power wiring. Do not feed the sensor and power wiring in the same conduit or close together in a cable tray.*

1. Wire the sensor cables to the main board according to the cable locations marked on the board.
2. For Hamilton pH Sensors, use the compatible Hamilton VP8 sensor cable for safe connection.
3. Follow the wiring diagrams in the sensor manual to complete the wiring.
4. Carefully route and secure excess sensor cable through the cable gland.

### 2.7.1 Wire a pH/ORP Sensor to the transmitter

To wire a pH/ORP Sensor to the transmitter, follow these steps:

### CAUTION

#### **Solution ground requirements:**

*To ensure the correct reference potential for accurate measurement, the connection to the Solution Ground terminal depends on your sensor's configuration:*

- *If the sensor does not have a solution ground: You must install a jumper (bridge) between the Reference (**REF**) terminal and the Solution Ground terminal.*
- *If the sensor includes a solution ground (**GND SOL**): The jumper is not required. In this case, the Solution Ground terminal must be connected to the process solution ground to maintain correct electrical continuity.*

Refer to Figure 2-13 for the wiring overview of the pH/OPR Sensor.

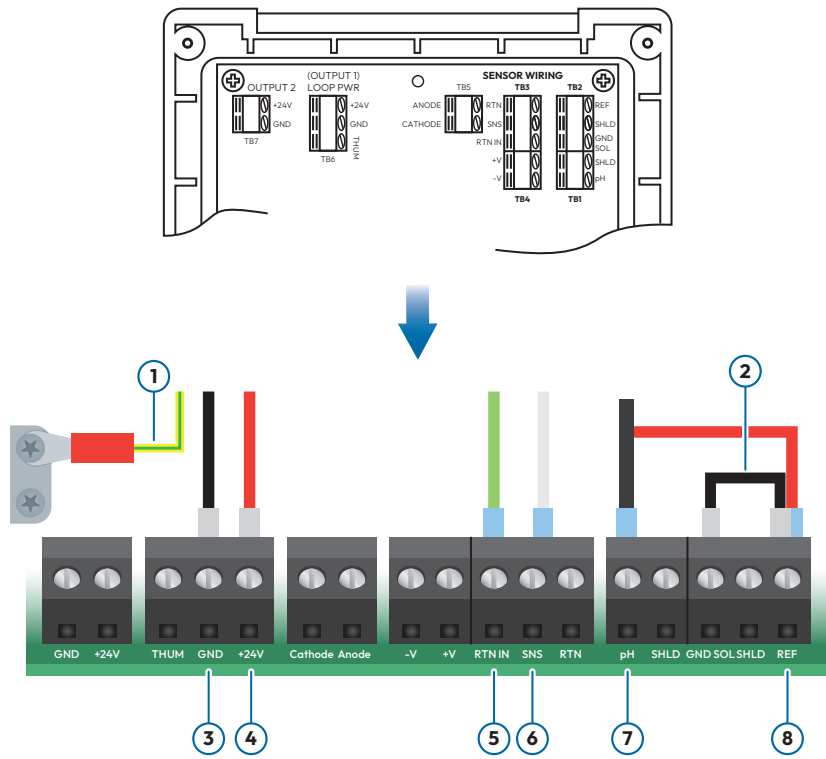
### NOTICE

#### **Sensor wiring precautions and applicable terminals:**

- If ground lead is present, terminate it to green ground screw inside the rear housing.
- TB5, TB6, and TB7 are not used for pH/ORP sensor wiring.

1. Wire **GND** to the **Ground** terminal.
2. Wire **+24 V** to the **Power Supply** terminal.
3. Wire **TB3/RTD** to the **Return, Sense, and RTD** Input terminals.
4. Wire **TB2/Reference** and **Solution Ground** to the **Reference Input, Reference Shield, and Solution Ground** terminals.
5. If a preamplifier is present, wire **TB4** to the **+volts** and **-volts** terminals.
6. Wire **TB1/pH Input** to the **pH Shield** and **pH Input** terminals.

Figure 2-13. Wiring a pH Sensor to the Hamilton Transmitter H210X terminal board



- |   |                                                                |   |                                                   |
|---|----------------------------------------------------------------|---|---------------------------------------------------|
| 1 | Ground/earth cable shield connected to the transmitter housing | 5 | Return input (RTN IN) for a power/signal terminal |
| 2 | Jumper connection                                              | 6 | Sense (SNS) terminal                              |
| 3 | Ground terminal                                                | 7 | pH sensor terminal                                |
| 4 | Power supply voltage: +24 V                                    | 8 | Reference (REF) terminal                          |

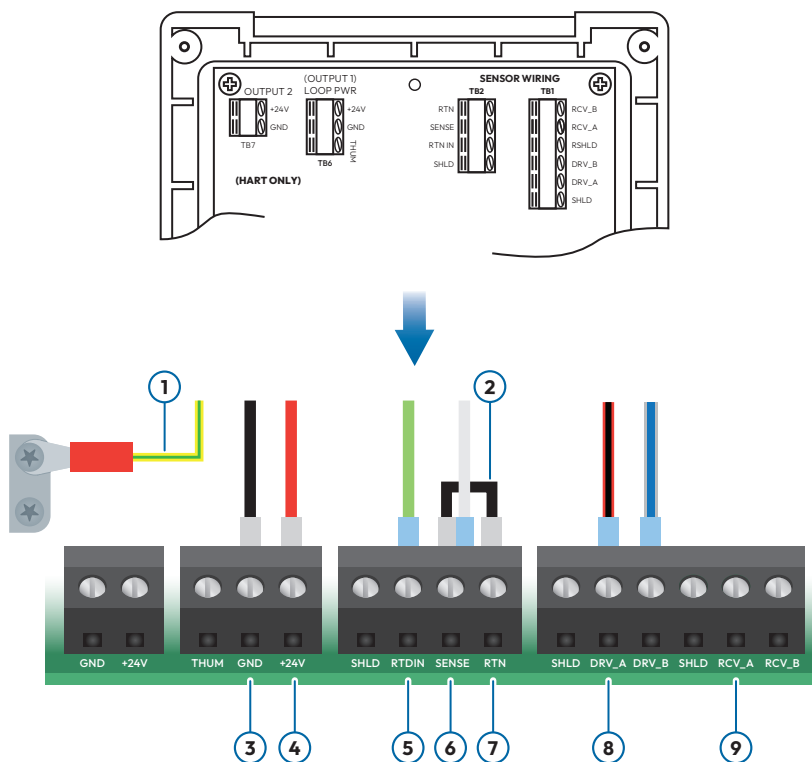
## 2.7.2 Wire a Conductivity Sensor to the transmitter

To wire a Conductivity Sensor with 2-Pole Electrodes to the transmitter, follow these steps:

Refer to Figure 2-14 for the wiring overview of the Conductivity Sensor with 2-Pole Electrodes.

1. Wire **GND** to the **Ground** terminal.
2. Wire **+24 V** to the **Power Supply** terminal.
3. Wire **TB2/RTD** to the **Return, Sense, RTD IN, Shield** to the terminals.
4. Wire **TB1/Conductivity** to the **Drive A (DRV\_A)** and **Receive A (RCV\_A)** terminals.

Figure 2-14. Wiring a Conductivity Sensor with 2-Pole Electrodes to the Hamilton Transmitter H210X terminal board



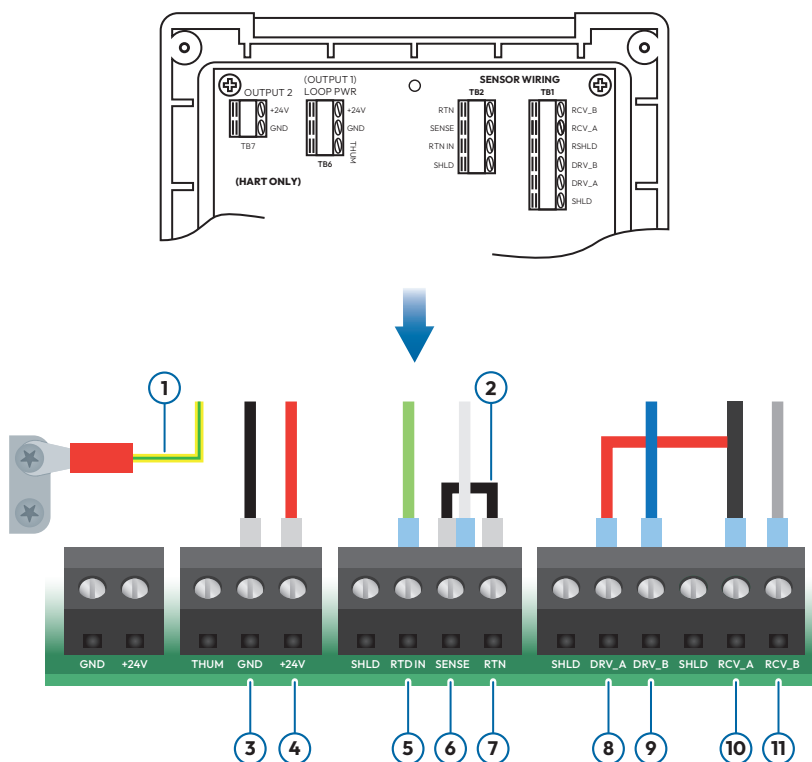
- |   |                                                                |   |                                      |
|---|----------------------------------------------------------------|---|--------------------------------------|
| 1 | Ground/earth cable shield connected to the transmitter housing | 6 | Sense (SNS) terminal                 |
| 2 | Jumper connection                                              | 7 | Return (RTN) power/signal connection |
| 3 | Ground terminal                                                | 8 | Drive A (DRV_A) terminal             |
| 4 | Power supply voltage: +24 V                                    | 9 | Receive A (RCV_A) terminal           |
| 5 | Return input (RTN IN) for a power/signal terminal              |   |                                      |
- 

**To wire a Conductivity Sensor with 4-Pole Electrodes to the transmitter, follow these steps:**

Refer to Figure 2-15 for the wiring overview of the Conductivity Sensor with 4-Pole Electrodes.

1. Wire **GND** to the **Ground** terminal.
2. Wire **+24 V** to the **Power Supply** terminal.
3. Wire **TB2/RTD** to the **Return,, Sense, RTD IN, Shield** to the terminals.
4. Wire **TB1/Conductivity** to the **Drive A (DRV\_A)** and **Receive A (RCV\_A)** terminals.
5. Wire **TB1/Conductivity** to the **Drive B (DRV\_B)** and **Receive B (RCV\_B)** terminals.

Figure 2-15. Wiring a Conductivity Sensor with 4-Pole Electrodes to the Hamilton Transmitter H210X terminal board



- |   |                                                                |    |                                      |
|---|----------------------------------------------------------------|----|--------------------------------------|
| 1 | Ground/earth cable shield connected to the transmitter housing | 7  | Return (RTN) power/signal connection |
| 2 | Jumper connection                                              | 8  | Drive A (DRV_A) terminal             |
| 3 | Ground terminal                                                | 9  | Drive B (DRV_B) terminal             |
| 4 | Power supply voltage: +24 V                                    | 10 | Receive A (RCV_A) terminal           |
| 5 | Return input (RTN IN) for a power/signal terminal              | 11 | Receive B (RCV_B) terminal           |
| 6 | Sense (SNS) terminal                                           |    |                                      |

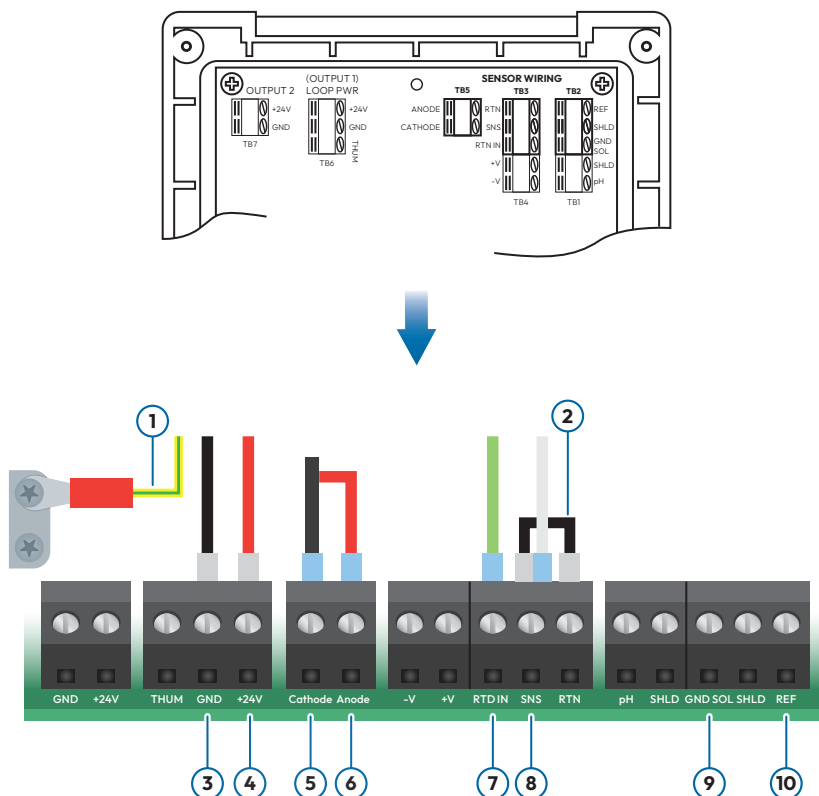
### 2.7.3 Wire an Oxygen Sensor to the transmitter

To wire an Oxygen Sensor to the transmitter, follow these steps:

Refer to Figure 2-16 for the wiring overview of the Oxygen Sensor.

1. Wire **GND** to the **Ground** terminal.
2. Wire **+24 V** to the **Power Supply** terminal.
3. Wire **TB5/Anode** and **Cathode** to the **Anode** and **Cathode** terminals.
4. Wire **TB3/RTD** to the **Return**, **Sense**, and **RTD IN** terminals.
5. Wire **TB2/Ground Solution** to the **Ground Solution** and **REF** terminals.

Figure 2-16. Wiring an Sensor to the Hamilton Transmitter H210X terminal board



- |   |                                                                |    |                                                                                                                         |
|---|----------------------------------------------------------------|----|-------------------------------------------------------------------------------------------------------------------------|
| 1 | Ground/earth cable shield connected to the transmitter housing | 6  | Anode terminal                                                                                                          |
| 2 | Jumper connection                                              | 7  | RTD (Resistance Temperature Detector) terminal: Measures the change in electrical resistance in relation to temperature |
| 3 | Ground terminal                                                | 8  | Sense (SNS) terminal                                                                                                    |
| 4 | Power supply voltage: +24 V                                    | 9  | Ground solution (GND SOL) terminal                                                                                      |
| 5 | Cathode terminal                                               | 10 | Reference (REF) terminal                                                                                                |

## 2.8 Sensor cables

Always use Hamilton recommended sensor cables for safe connection and system operation. The sensor cables are available in different lengths to order (see Sections 2.8.1, 2.8.2, and 2.8.3).

### 2.8.1 Recommended cable: VP6 open-end cable

These cables are recommended for use with traditional (non-Arc) products like pH/ORP, polarographic DO, and 2/4 pole Conducell conductivity sensors. These products use analog (mV, nA) output signals, with the measurement signal transmitted through a single coaxial cable. VP6 cables feature a slightly thicker outer insulation jacket, making them suitable for use in rugged environments.

Sensors with VP6 connector head will have 6 gold Contact Pins as shown in the Figure 2-17. The measurement pins are always labeled as A and B, located on either side of the keyed notch. Table 2-1 provides an overview of the VP6 cable Pin description and assignment with the corresponding sensor.

Figure 2-17. VP6 connector head of the sensor with six gold contact pins.

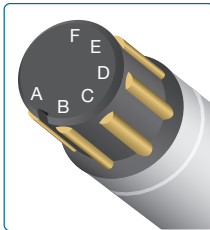


Table 2-1. Overview of the VP6 cable Pin assignment with the corresponding sensor

| Wire color & description     | VP Pin  | pH / Redox       | OxyFerm VP / OxyGold | Conducell UPW   | Conducell 4UxF |
|------------------------------|---------|------------------|----------------------|-----------------|----------------|
| Black trans-parent coax cure | A       | pH/Redox         | Cathode              | Inner Electrode | High Potential |
| Red wire                     | B       | Reference        | Anode                | Inner Electrode | High Current   |
| Grey wire                    | C       | –                | –                    | Outer Electrode | Low Potential  |
| Blue wire                    | D       | Liquid Earth     | Ground               | Outer Electrode | Low Current    |
| White wire                   | E       | Pt 100 / Pt 1000 | NTC 22 k Ohm         | Pt 1000         | Pt 1000        |
| Green wire                   | F       | Pt 100 / Pt 1000 | NTC 22 k Ohm         | Pt 1000         | Pt 1000        |
| Green/yellow wire            | Housing | Shield           | Shield               | Shield          | Shield         |

A detailed overview of the various sensor cables with the corresponding part numbers (REFs) that you can use for your order can be found in the Section 5.2.

## 2.8.2 VP8 double coaxial / open-end cable

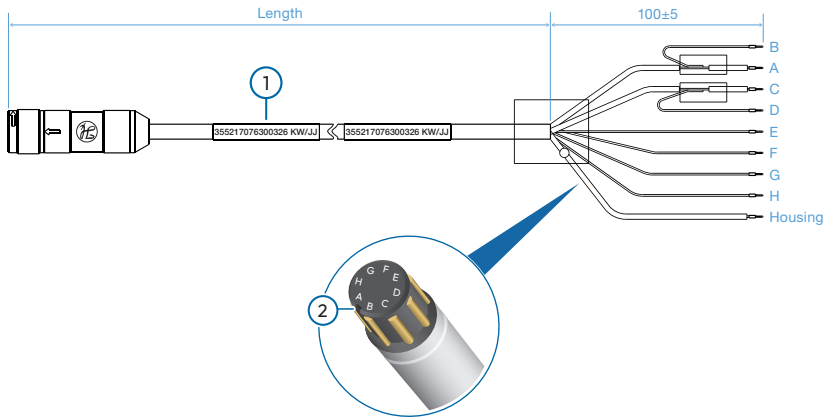
### NOTICE

#### Cable requirement for VisiFerm-RS485 ECS:

The VP8 double coaxial / open-end cable is necessary for the VisiFerm-RS485 ECS connection. This cable provide the extra power required to operate the optical sensor.

Figure 2-18 shows an example of the VP8 double coaxial / open-end cable connected to an Arc sensor.

Figure 2-18. Overview of the VP8 double coaxial / open-end cable



1 VP8 double coaxial / open-end cable

2 Notch on the VP8 head serves

**! NOTICE!** The notch indicates the position of the pin and prevents incorrect connection with the sensor cable connector.

Table 2-2. Overview of the VP8 cable Pin description and assignment with the corresponding sensor

| Wire color & description     | VP Pin  | VisiFerm ECS (ECS mode) | OxyFerm VP / OxyGold | pH / Redox       |
|------------------------------|---------|-------------------------|----------------------|------------------|
| Black trans-parent coax core | A       | Cathode (ECS Mode)      | Cathode              | pH / Redox       |
| Black coax shield            | B       | Anode (ECS Mode)        | Anode                | Reference        |
| Red transparent coax core    | C       | Power: +24 VDC          | Guard                | –                |
| Red coax shield              | D       | Power: Ground           | Ground               | Liquid earth     |
| White                        | E       | NTC 22 k Ohm            | NTC 22 k Ohm         | Pt 100 / Pt 1000 |
| Green                        | F       | NTC 22 k Ohm            | NTC 22 k Ohm         | Pt 100 / Pt 1000 |
| Yellow                       | G       | RS-485 (A)              | –                    | –                |
| Brown                        | H       | RS-485 (B)              | –                    | –                |
| Yellow/green                 | Housing | Shaft                   | Shield               | Shield           |

### NOTICE

#### Conductivity Sensor cable recommendation:

Do not use the VP8 double coaxial / open-end cable with Conductivity Sensors. This cable type is not recommended because its shielding or capacitance characteristics can interfere with the high-precision AC conductivity measurement signal and result in inaccurate readings.

#### Cables ordering information

A detailed overview of the various sensor cables with the corresponding part numbers (REFs) that you can use for your order can be found in the Section 5.2.

### 2.8.3 K8 cable

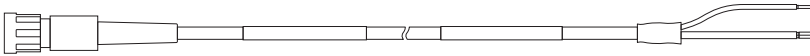
#### K8 connector characteristics

K8 connectors are typically used with conventional pH/ORP (Oxidation-Reduction Potential) Sensors that do not feature temperature compensation. These connectors have a two-pin design consisting of a center core and an outer metal threaded connection. The K8 connector employs a two-pole design:

- **Pole 1:** The center core.
- **Pole 2:** The outer metallic threaded connection.

This design allows the K8 cable to transmit the electrical signal measured by the pH/ORP Sensors but does not accommodate the separate temperature element signal required for automatic temperature compensation. For ordering information, see Section 5.2.

Figure 2-19. Overview of the K8 cable with open-end wiring



### 2.8.4 S7 cable

#### S7 connector characteristics

The S7 connector is a specialized, traditional connector primarily used on pH Sensors. Sensors with S7 connector lack temperature compensation. This means the reading from the sensor must be manually adjusted for changes in process temperature. The S7 connector does not have mounting threads. For ordering information, see Section 5.2.

#### CAUTION

##### ***S7 connector recess precaution: Moisture risk***

*S7 connectors have a recessed design. Due to this, care must be taken to avoid moisture getting trapped in the recession, as this could lead to a short circuit.*

Figure 2-20. Overview of the S7 cable with open-end wiring



## 3 Startup the transmitter

To startup the Hamilton Transmitter H210X, follow these steps:

### WARNING

#### Installation and operation: Safety precautions and hazards

Observe and adhere to all safety precautions and Hazards during installation and operation of the Hamilton Transmitter H210X (see Chapter 1).

1. Wire sensor(s) to the signal boards (see Chapter 2).
2. Connect the current output, alarm relay, and power connections.
3. Once all the connections are secured and verified, apply DC power to the transmitter.

### NOTICE

#### First power up of the transmitter:

- When the transmitter is powered up for the first time, a Quick Start screens will appear.
- Follow the Quick Start workflow in Figure 3-1 to complete the set up of the transmitter.

### 3.1 Navigating the display: User interface

The transmitter has a large display which shows the measurement readout and temperature in large digits and up to four additional process variables or diagnostic parameters at the same time (see Figure 3-2). You can customize the displayed variables to meet your requirements. This is called **Display Format**.

The intuitive menu system allows access to Calibration, Hold (of current outputs), Programming, and Display functions. In addition, a dedicated DIAG button is available to provide access to useful operational information on the installed sensor(s) and problematic conditions that might occur. When a fault condition appears, the display flashes **Fault** and/or **Warning**. Help screens (context sensitive) are displayed for most Faults and Warnings conditions to guide you through troubleshooting.

During calibration and programming, key presses cause different displays to appear. The displays are self-explanatory and guide you step-by-step through the procedure.

A Quick Start screen will appear after the first power up. The following Quick Start operating tips are useful for navigation through the Hamilton Transmitter H210X menu (see Figures 3-1 and 3-3):

### Quick Start operating tips

- A highlighted field shows the position of the cursor.
- To move the cursor **Left** or **Right**, use the keys to the left or right of the **ENTER** key. .
- To scroll **UP** or **DOWN** or to increase or decrease the value of a digit, use the keys above and below the **ENTER** key. Use the **Left** or **Right** keys to move the decimal point.
- Press **ENTER** to store a setting. Press **EXIT** to leave without storing the changes. Press **EXIT** during Quick Start to return the display to the initial startup screen, then select the required **Language** and press the **ENTER** key.
- Select a measurement parameter, the press **ENTER**.

## Quick start workflow

Figure 3-1. Quick start flow diagram for the Hamilton Transmitter H210X setup

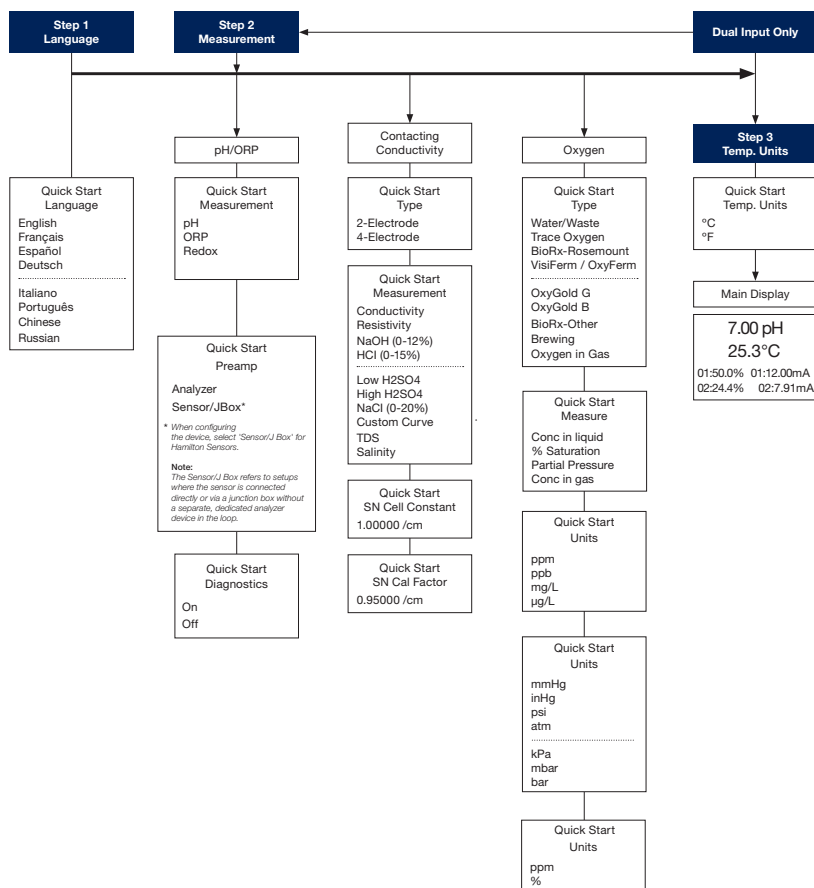
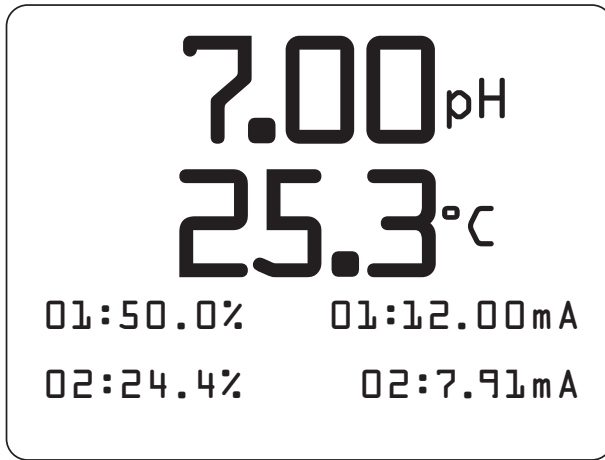
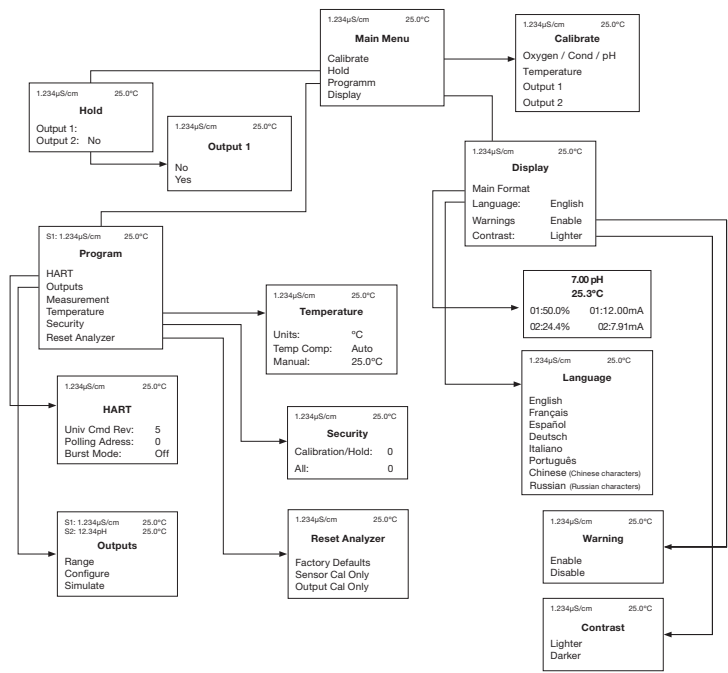


Figure 3-2. Overview of the Hamilton Transmitter H210X user interface



Menu overview

Figure 3-3. Hamilton Transmitter H210X menu overview



## 3.2 Transmitter keypad

There are four function keys and four selection keys on the Hamilton Transmitter H210X keypad

### Function keys

Four top-level menu items appear when you press **MENU** key:

- **Calibrate:** Calibrate the attached sensor(s) and analog output(s).
- **Hold:** Suspend analog output(s).
- **Program:** Program outputs, measurements, temperature, and security. You can also use the **Hold** key to reset the transmitter.
- **Display:** Use to select/set Program Display Format, Language, warnings, and Contrast.

Press **MENU** key to display the Main Menu screen. Press **MENU** followed by **EXIT** to display the main display

Press the **DIAG** key to display active faults and warnings and detailed information about the transmitter and sensor diagnostics, including:

- Faults
- Warnings
- Sensor information
- Out 1 and Out 2
- Current values
- Model configuration string
- Instrument software version.

Press **DIAG** on Sensor 1 or Sensor 2 to display useful diagnostics and information (if applicable):

- Measurement
- Sensor type
- Raw signal value
- Cell constant
- Zero offset
- Temperature
- Temperature offset
- Selected measurement range

- Cable resistance
- Temperature sensor resistance
- Software version.

Press **ENTER** key to store numbers and settings, and change the display to the next screen.

Press **EXIT** to return to the previous screen without storing changes.

### Selection keys

The selection keys (**Up**, **Down**, **Left**, and **Right**) are located around the **ENTER** key. Use the selection keys to move the cursor to all areas while navigating through the menu.

The selection keys are used to...

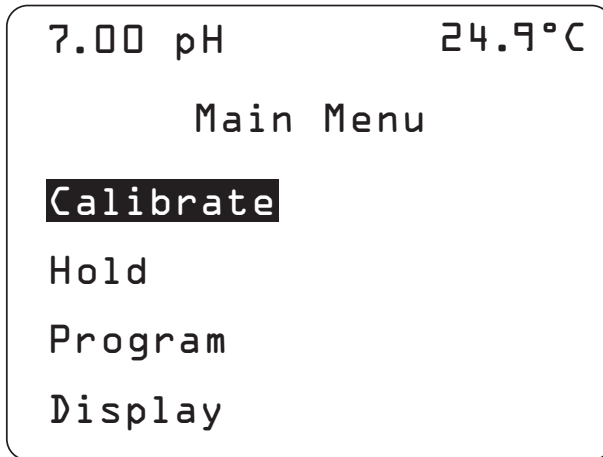
- Select items on the menu screen.
- Scroll up and down the menu lists.
- Enter or edit numeric values.
- Move the cursor to the right or left.
- Select measurement units during operation.

## 3.3 Main display

The transmitter displays the following information including icons:

- Primary reading
- Temperature
- Up to four secondary readings
- An error and warning banner
- Digital communication icon.

Figure 3-4. Overview of the Hamilton Transmitter H210X main display



#### Process measurement

One process variable and process temperature are displayed by default. For all configurations, the upper display area shows the live process variable, and the center display area shows the temperature (default screen settings).

#### Secondary values

Up to four secondary values are displayed in quadrants in the lower half of the screen.. You can program all four secondary value positions to any parameter available to be displayed.

#### Fault and Warning banner

If the transmitter detects a problem with itself or the sensor, an **Error** or **warning** message appears at the bottom of the display. The error requires immediate attention. A warning indicates a problematic condition or impending failure. For troubleshooting assistance, press **DIAG** key.

### Formatting the main display

You can program the main display screen to display primary process variables, secondary process variables, and diagnostic data.

**To format the main display, follow these steps:**

1. Press **MENU** key.
2. Scroll down to **Display** > press **ENTER** key to highlight Main Format, then press the **ENTER** key again to confirm the selection.
3. The process value of **Sensor 1** is highlighted in inverse video. Use the selection keys to navigate to the screen areas you want to program > press **Enter** key.
4. Choose the required display parameter or diagnostic for each of the four display sections in the lower half of the screen.
5. Continue to navigate and program all required screen selections. Press **MENU** key > **EXIT** key to finish. The screen will return to the main display.

## 3.4 Menu system

The transmitter uses a scroll and select menu system. Pressing the **MENU** key at any time opens the top-level menu including **Calibrate**, **Hold**, **Program**, and **Display** functions.

To find a menu item, scroll with the **Up** and **Down** keys until the item is highlighted. Continue to scroll and select menu items until the required function is selected.

To select the item, press the **ENTER** key. To return to a previous menu level or to enable the main live display, press the **EXIT** key repeatedly. To return immediately to the main display from any menu level, then press **MENU** key > **EXIT** key.

**The selection keys have the following functions:**

- The **Up** key (above the **ENTER** key) increments numerical values, moves the decimal point one place to the right, or selects units of measurement
- The **Down** key (below the **ENTER** key) decrements numerical values, moves the decimal place one place to the left, or selects units of measurement.
- The **Left** key (left of the **ENTER** key) moves the cursor to the left.
- The **Right** key (right of the **ENTER** key) moves the cursor to the right.

During all menu displays (except main display format and Quick Start), the live process measurement and temperature value are displayed in the top two lines of the upper display area. This conveniently allows display of the live values during important calibration and programming operations. Menu screens will time out after two minutes of inactivity and return to the main live display.

### Example: Setting up the pH Sensor measurement

1. For pH measurement, select preamplifier location.
  - Select **Analyzer** to use the integral preamplifier in the transmitter
  - Select **Sensor/J-Box** if your sensor is SMART or has an integral preamplifier or if you are using a remote preamplifier located in a junction box.
2. Select the unit of measurement if applicable.
3. Select the required temperature unit: °F or °C. The main display appears and the outputs are assigned to default values.
4. To change the output settings, scale the 4-20 mA current outputs, change measurement-related settings from the default values, and enable pH diagnostics, press the **MENU** key. > select **Program** and follow the on-screen instructions to the appropriate menu.
5. To reset the transmitter to factory defaults, select **Program** from the **Main Menu**, then scroll to **Reset**.

## 4 Request for Technical Support

If a problem persists after you have attempted to correct it, contact Hamilton Technical Support via email ([contact.pa.ch@hamilton.ch](mailto:contact.pa.ch@hamilton.ch)) or phone (+41-58-610-10-10).

## 5 Ordering Information

This chapter provides an overview of the different types of Hamilton Transmitter H210X, spares and accessories that are available to order.

For repairs or replacements, contact your local Hamilton representative or Hamilton Technical Support (see Chapter 4).

### 5.1 Hamilton Transmitter H210X family

Table 5-1. Hamilton Transmitter H210X product family: Ordering information

| REF No. (Ordering code) | Product description                                       | Compatible sensor type |
|-------------------------|-----------------------------------------------------------|------------------------|
| 10174809-11             | Hamilton Transmitter H210X with pH Sensor board           | pH                     |
| 10174809-21             | Hamilton Transmitter H210X with Conductivity Sensor board | Conductivity           |
| 10174809-31             | Hamilton Transmitter H210X with Oxygen Sensor board       | Dissolved Oxygen       |

### 5.2 Accessories

#### S7 cable

For pH sensors with standard (S7) connector. The transmitter side no connector (open-end). Best suited for use with transmitters or devices with open wiring terminals.

Table 5-2. S7 cable for pH Sensor / Hamilton Transmitter H210X with open wiring terminals

| REF    | Product description                                                            | Specification |        |
|--------|--------------------------------------------------------------------------------|---------------|--------|
|        |                                                                                | Diameter      | Length |
| 355072 | S7 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 1 m    |
| 355066 | S7 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 5 m    |
| 355080 | S7 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 10 m   |

K8 cable

For pH sensors with standard (S7) connector. The transmitter side no connector (open-end). Best suited for use with transmitters or devices with open wiring terminals.

Table 5-3. K8 cable for pH Sensor / Hamilton Transmitter H210X with open wiring terminals

| REF    | Product description                                                            | Specification |        |
|--------|--------------------------------------------------------------------------------|---------------|--------|
|        |                                                                                | Diameter      | Length |
| 355153 | K8 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 1 m    |
| 355154 | K8 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 3 m    |
| 355155 | K8 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 5 m    |
| 355156 | K8 cable with open-end for pH sensors / transmitter with open wiring terminals | 5 mm          | 10 m   |

T82/D4 cable

For oxygen sensors with T82/D4 connector, for example, OxyFerm Sensor. The transmitter side no connector (open-end). Best suited for use with transmitters or devices with open wiring terminals.

Table 5-4. T82/D4 cable for Oxygen Sensor / Hamilton Transmitter H210X with open wiring terminals

| REF    | Product description                                                                                | Specification |        |
|--------|----------------------------------------------------------------------------------------------------|---------------|--------|
|        |                                                                                                    | Diameter      | Length |
| 355087 | T82/D4 cable with open-end for Electrochemical DO Sensors / transmitter with open wiring terminals | 5 mm          | 1 m    |
| 355088 | T82/D4 cable with open-end for Electrochemical DO Sensors / transmitter with open wiring terminals | 5 mm          | 3 m    |
| 355089 | T82/D4 cable with open-end for Electrochemical DO Sensors / transmitter with open wiring terminals | 5 mm          | 5 m    |
| 355311 | T82/D4 cable with open-end for Electrochemical DO Sensors / transmitter with open wiring terminals | 5 mm          | 10 m   |

Mounting accessories

Table 5-5. Hamilton Transmitter H210X mounting accessories

| REF      | Product description                 |
|----------|-------------------------------------|
| 10174806 | H110 / H210X pipe/wall mount kit    |
| 10174807 | H110 / H210X panel mount kit        |
| 10174808 | H110 / H210X gasket for panel mount |

## 6 Approvals and Certifications

This chapter provides information about the approvals and certifications issued for the Hamilton Transmitter H210X.

### 6.1 European Directive information

The latest copy of the EU Declaration of Conformity for the Hamilton Transmitter H210X can be found on the Hamilton Process Analytics website (<https://www.hamiltoncompany.com/process-analytics-sensors>).

### 6.2 Europe

#### Europe: ATEX/UKEX intrinsically safe

Table 6-1. Overview of ATEX/UKEX intrinsically safe certificates, standards, and markings (Europe)

| Europe: CSA intrinsically safe certificates, standards, and markings |                                                                                                                               |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>ATEX Certificate:</b>                                             | SGS25ATEX0097X                                                                                                                |
| <b>Standards:</b>                                                    | <ul style="list-style-type: none"> <li>• EN IEC 60079-0:2018</li> <li>• EN 60079-11:2012</li> </ul>                           |
| <b>Markings:</b>                                                     |  II 1 G Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +65°C) |

#### Special conditions for safe use (X)

| Special Conditions for Safe Use (X)                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|
| The plastic enclosure, excluding the front panel, may constitute a potential electrostatic ignition risk and must only be cleaned with a damp cloth. |

### 6.3 International

International: IECEx intrinsically safe

Table 6-2. Overview of IECEx intrinsically safe certificates, standards, and markings (International)

| International: IECEx intrinsically safe certificates, standards, and markings |                                                                                                |
|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Certificate:                                                                  | IECEx SGS 25.0046X                                                                             |
| Standards:                                                                    | <ul style="list-style-type: none"><li>• IEC 60079-0:2017</li><li>• IEC 60079-11:2011</li></ul> |
| Markings:                                                                     | Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +65°C)                                                           |

Special conditions for safe use (X)

| Special Conditions for Safe Use (X)                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|
| The plastic enclosure, excluding the front panel, may constitute a potential electrostatic ignition risk and must only be cleaned with a damp cloth. |

Ex protection and compliance

To maintain safety and certification of the system in hazardous environments, you must adhere to the following requirements:

- **Certification and compatibility**
  - **Regulatory adherence:** All conditions described in Certificates **SGS25ATEX0097X** and **IECEx SGS 25.0046X** must be adhered to at all times.
  - **Operator responsibility:** The operator is responsible for making sure that all system components are certified for the applicable hazardous area and are compatible with each other.
- **Operational constraints**
  - **Intrinsically safe circuits:** If a sensor is connected, even temporarily, to a non-intrinsically safe electrical circuit, the sensor loses its **ATEX** and **IECEx** certification.
  - **Environmental impact:** Do not expose the connection system to direct and intense vapor or dust. Such exposure can cause damage or create safety risks.









More information and free software simulation:  
[www.hamiltoncompany.com/process-analytics](http://www.hamiltoncompany.com/process-analytics)



# HAMILTON®



## Hamilton Europe, Asia & Africa

Via Crusch 8, 7402 Bonaduz, Switzerland

☎ +41 (0)58 610 10 10

[contact.pa.ch@hamilton.ch](mailto:contact.pa.ch@hamilton.ch)

## Website & Contact Details:

Web: [www.hamiltoncompany.com](http://www.hamiltoncompany.com)

☎ USA: 800 648 5950

☎ Europe: +41 58 610 10 10



To find a representative in your area, please visit [www.hamiltoncompany.com](http://www.hamiltoncompany.com)