

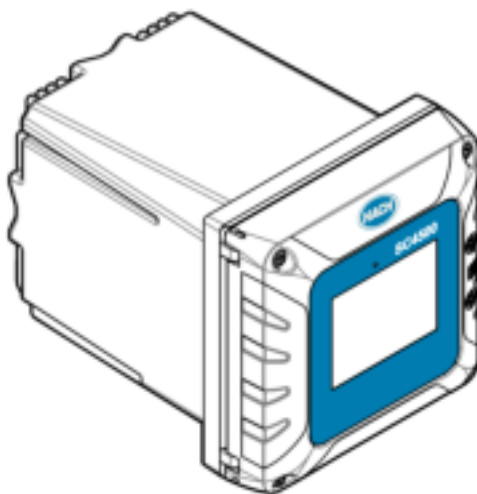


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SC4500

05/2021, Edition 1

User Manual



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Section 1 Specifications

Specifications are subject to change without notice.

Specification	Details
Dimensions (W x H x D)	½ DIN-144 x 144 x 192 mm (5.7 x 5.7 x 7.6 in.)
Enclosure	UL50E type 4X, IEC/EN 60529–IP 66, NEMA 250 type 4X Metal enclosure with a corrosion-resistant finish
Weight	1.7 kg (3.7 lb) (Controller weight without optional modules)
Pollution degree	4
Installation category	II
Protection class	I, connected to protective earth
Power requirements	AC controller: 100–240 VAC ±10%, 50/60 Hz; 1 A (50 VA with 8W sensor load, 100VA with 28W sensor load) DC controller: 18–28 VDC; 2.5 A (12W with 9W sensor load, 36W with 20 W sensor load)
Operating temperature	–20 to 60 °C (–4 to 140 °F) (8 W (AC)/9 W (DC) sensor load) –20 to 45 °C (–4 to 113 °F) (28 W (AC)/20 W (DC) sensor load) Linear derating between 45 and 60 °C (–1.33 W/°C)
Storage temperature	–20 to 70 °C (–4 to 158 °F)
Relative humidity	0 to 95%, non-condensing
Altitude	2000 m (6562 ft) maximum
Display	3.5-inch TFT color display with capacitive touchpad
Measurement	Two device, digital SC connectors
Relays (high voltage)	Two relays (SPDT); Wire gauge: 0.75 to 1.5 mm ² (18 to 16 AWG) AC controller Maximum switching voltage: 100–240 VAC Maximum switching current: 5 A Resistive/1 A Pilot Duty Maximum switching power: 1200 VA Resistive/360 VA Pilot Duty DC controller Maximum switching voltage: 30 VAC or 42 VDC Maximum switching current: 4 A Resistive/1 A Pilot Duty Maximum switching power: 125 W Resistive/28 W Pilot Duty
Analog inputs (optional) ³	One 0–20 mA (or 4–20 mA) analog input on each analog input module
Analog outputs (optional) ³	Five 0–20 mA (or 4–20 mA) analog outputs on each analog output module ¹
Digital communication (optional) ³	Profibus DPV1 module, Modbus TCP, PROFINET module, EtherNet/IP™ ² module

¹ Refer to the module documentation for additional information.

Note: Install only one module in one of the available slots.

² EtherNet/IP is a trademark of OVIDA Inc.

Specification	Details
Network connection ³	LAN version (optional): Two Ethernet connectors (10/100 Mbps), M12 female D-coding connector; Cellular version and WiFi version (optional) ⁴
USB port	Used for data download and software upload. The controller records approximately 20,000 data points for each connected sensor.
Compliance information	CE, ETL certified to UL and CSA safety standards (with all sensor types), FCC, ISED, KC, RCM, EAC, UKCA, SABS, C ₊ (Morocco)
Warranty	1 year (EU: 2 years)

Section 2 General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

2.1 Safety information

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of hazard information

▲ DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.
▲ WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
▲ CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.
NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

³ Dependent on controller configuration.

⁴ An external USB box WiFi is necessary for network connection on WiFi versions. An external USB box cellular is necessary for network connection on cellular versions.

	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	This symbol indicates the presence of devices sensitive to Electro-static Discharge (ESD) and indicates that care must be taken to prevent damage with the equipment.
	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

2.1.3 Compliance and certification

⚠ CAUTION

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Canadian Radio Interference-Causing Equipment Regulation, ICES-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe A répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

2.2 Product overview



⚠ DANGER

Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.

NOTICE

Network and access point security is the responsibility of the customer that uses the wireless instrument. The manufacturer will not be liable for any damages, inclusive however not limited to indirect, special, consequential or incidental damages, that have been caused by a gap in, or breach of network security.

NOTICE

Perchlorate Material—Special handling may apply. Refer to www.dtsc.ca.gov/hazardouswaste/perchlorate. This perchlorate warning applies only to primary batteries (provided singly or installed on this equipment) when sold or distributed in California, USA.

NOTICE

The controller is supplied with a protection foil installed on the display. Make sure to remove the protection foil before the controller is used.

The SC4500 is a 2-channel controller for digital analytical devices (e.g., sensors and analyzers). Refer to [Figure 1](#).

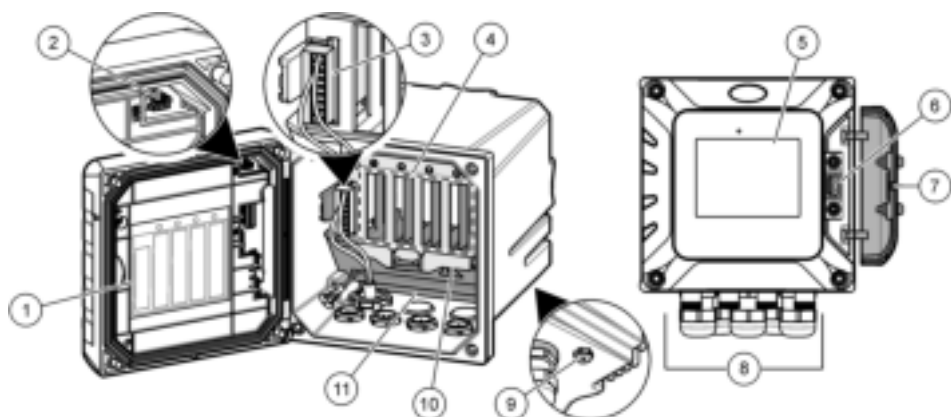
The controller shows sensor measurements and other data on the display, can transmit analog and digital signals, and can interact with and control other devices through outputs and relays. Outputs, relays, sensors and modules are configured and calibrated through the user interface on the front of the controller or remotely for network connected controllers. The controller connects to Claros with a cellular network⁵, WiFi network⁵ or through LAN connection. The Prognosys diagnostic system⁵ shows the status of maintenance tasks and gives the status of the instrument condition.

The instrument display is a touch screen. The instrument enclosure has a protective vent in the bottom. Do not cover or remove the protective vent. Replace the protective vent if damage is seen.

Note: The controller has two Ethernet ports for LAN connectivity or for Modbus TCP/IP based fieldbus communication with PLC/SCADA. Refer to .

The controller is available with optional expansion modules. Refer to [Optional expansion modules](#) on page 7.

Figure 1 Product overview



1 Label for module installation	7 USB cover
2 USB connection for external USB box (WiFi or cellular connection)	8 Electrical connections and fittings
3 Expansion module ⁵	9 Protective vent
4 Additional expansion module slots	10 Cover for module installation
5 Touchpad display	11 High-voltage barrier
6 USB connection for data download and firmware update	

2.2.1 Optional expansion modules

The controller is available with optional expansion modules:

- 4–20 mA output module—Used for analog signaling or to control other external devices.
Note: Only one module can be connected.
- Profibus DP interface module—Used to connect the controller to a Profibus DP (decentralized peripherals) network. Profibus DP is used to operate sensors and actuators with a centralized controller in production (factory) automation applications.
- 4–20 mA input module—Lets the controller accept one external analog signal (0–20 mA or 4–20 mA).
Note: Only two input devices⁶ can be connected to the controller at the same time. Refer to the module documentation for additional information.
- EtherNet/IP module—The controller can connect to a PLC through Industrial Ethernet Protocol including a EtherNet/IP solution. Line, Star and Ring topologies are available.
- PROFINET module—The controller can connect to a PLC through the Industrial Ethernet Protocol, which includes a PROFINET solution. Line, Star and Ring topologies are available.

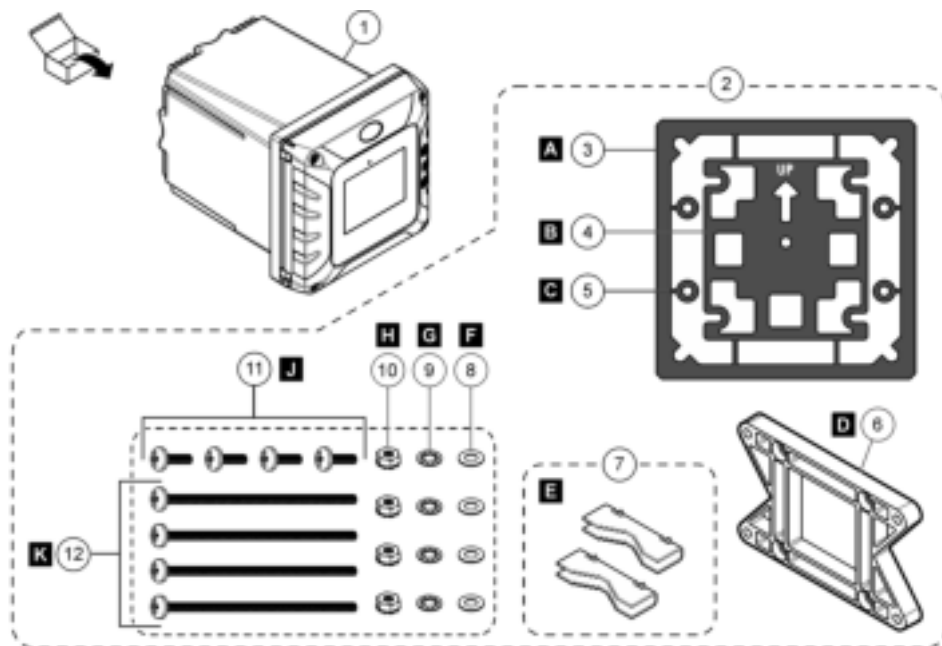
⁵ Dependent on controller configuration. The expansion modules are factory-installed based on controller configuration.

⁶ Input devices are mA input modules or digital sensors.

2.3 Product components

Make sure that all components have been received. Refer to [Figure 2](#). If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 2 Product components



1 SC4500 controller	7 Mounting foot (mounting bracket inserts) (2x)
2 Mounting hardware	8 Flat washer, ¼-inch ID (4x)
3 Sealing gasket for panel mount, Neoprene	9 Lock washer, ¼-inch ID (4x)
4 Vibration isolation gasket for pipe mount	10 Keps hexnut, M5 x 0.8 (4x)
5 Vibration isolation washer for pipe mount (4x)	11 Pan head screws, M5 x 0.8 x 15 mm (4x)
6 Bracket for wall and pipe mounting ⁷	12 Pan head screws, M5 x 0.8 x 100 mm (4x) ⁸

Section 3 Installation



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

⁷ A bracket for panel mounting is available as an optional accessory. Refer to [Replacement parts and accessories](#) on page 49.

⁸ Used for variable diameter pipe mount installations.

3.1 Installation guidelines

⚠ DANGER



Electrical shock hazard. Externally connected equipment must have an applicable country safety standard assessment.

NOTICE

Do not install the controller in an environment with a caustic atmosphere without a protective enclosure. A caustic atmosphere will cause damage to electronic circuitry and components.

NOTICE

Do not install the controller outdoors in an environment that receives direct sunlight or UV radiation or damage to the controller can occur. Install the optional UV protection screen with sunroof to prevent damage from UV exposure when installed outdoors in direct sunlight.

Note: (Network and Claros version only) Make sure that your IT department has approval for the installation and commissioning of the device. Administrator rights are not necessary. The email address "No-reply@hach.com" sends the setup email and "donotreply@hach.com" sends the system notifications that are necessary for the installation. Add the two email addresses to the safe senders list to make sure to receive mails from these senders. Hach does not send a request to confirm that the sender is not a robot.

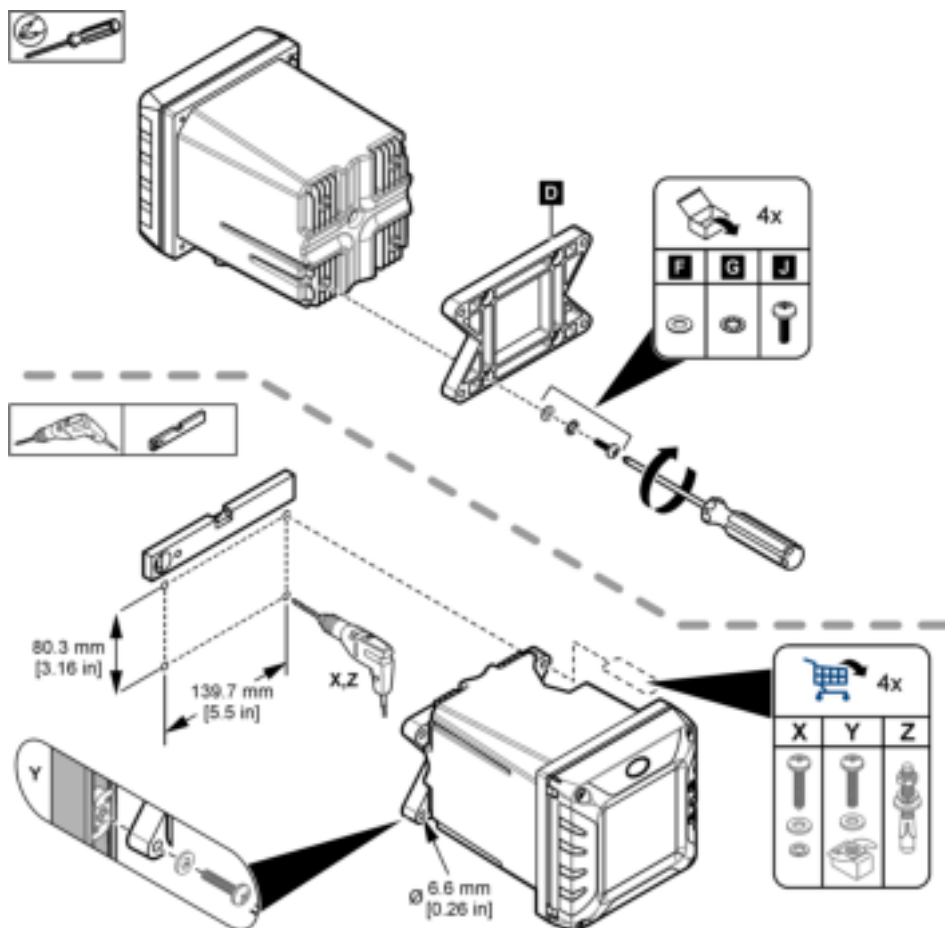
- Install the controller in a location where the power disconnect device for the controller is easily operated.
- Attach the controller upright and level on a flat, vertical surface.
- As an alternative, attach the instrument to a panel, vertical pole or horizontal pole.
- Make sure that the device is in a location where there is sufficient clearance around it to make connections and to do maintenance tasks.
- Make sure that there is a minimum of 16 cm (6.30 in.) of clearance for the enclosure doors to open.
- Install the instrument in a location with minimum vibration.
- The optional holder for mobile phones is recommended for all installations.
- The optional sunroof or the optional UV protection screen with sunroof is recommended for all outdoor installations.
- Give protection to computers or other connected equipment that may not have equivalent environmental ratings based on the enclosure rating of the equipment.
- Obey specified ambient ratings on the internal side of panels for panel mount installations.
- Make sure that the maximum power rating is correct for the ambient temperature.

3.2 Mechanical installation

3.2.1 Attach the instrument to a wall

Attach the controller upright and level on a flat, vertical surface. Make sure that the wall mounting is able to hold 4 times the weight of the equipment. Refer to the illustrated steps in [Figure 3](#) and [Product components](#) on page 8 for the necessary mounting hardware.

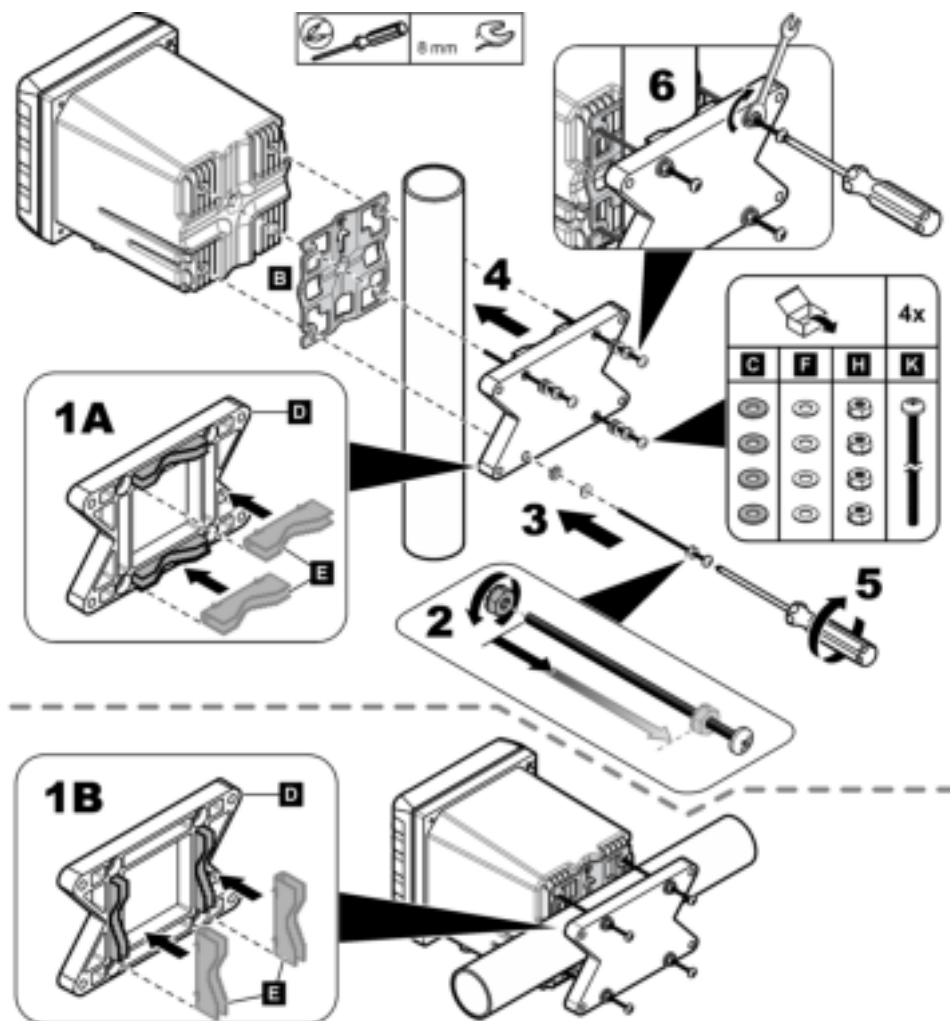
Figure 3 Wall mounting



3.2.2 Attach the instrument to a pole

Attach the controller upright to a pole or pipe (horizontal or vertical). Make sure that the pipe diameter is 19 to 65 mm (0.75 to 2.5 in.) Refer to the illustrated steps in [Figure 4](#) and [Product components](#) on page 8 for the necessary mounting hardware.

Figure 4 Pole mounting

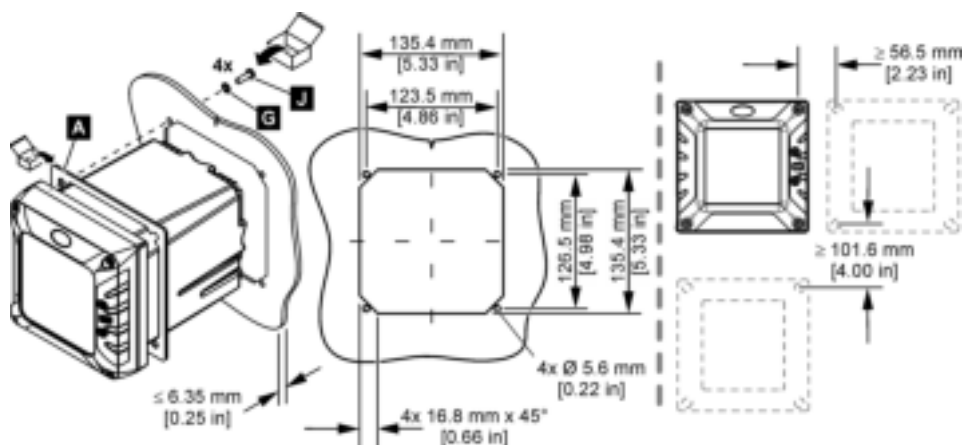


3.2.3 Install the instrument in a panel

A rectangular hole is necessary for panel installation. Use the supplied sealing gasket for panel mount as a template to cut the hole in the panel. Make sure to use the template in the up position to install the controller vertical. Refer to [Figure 5](#).

Note: If using the bracket (optional) for panel mounting, push the controller through the hole in the panel and then slide the bracket over the controller on the back side of the panel. Use the four 15 mm pan head screws (supplied) to attach the bracket to the controller and secure the controller to the panel.

Figure 5 Panel mounting dimensions



3.3 Electrical installation

3.3.1 Electrical connectors and fittings

Figure 6 shows the electrical connectors and fittings on the instrument. To keep the environmental rating of the enclosure, make sure that there is a plug in the strain relief fittings that are not used and a connector cap on the unused connectors.

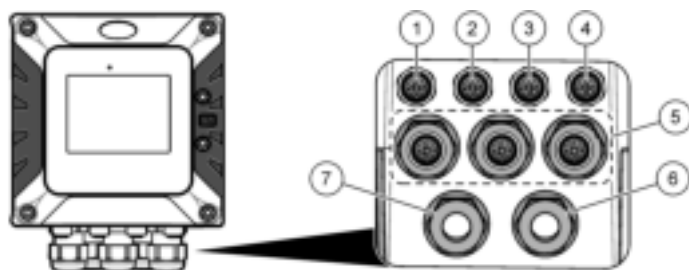
Based on the controller configuration, the controller has:

- Ethernet connectors (LAN) to give internet access to the controller through a customer network.
- Ethernet connectors for Industrial Ethernet Protocols: EtherNet/IP or PROFINET.
- Digital SC connectors for digital SC sensors, digital gateways and analyzers.

A color code identifies the connectors. The LAN connectors are green. The EtherNet/IP or PROFINET connectors are yellow. The Digital SC sensor connectors are black. Refer to Table 1 for the applicable options for each connector and fitting.

Note: The controller is supplied without strain relief fittings installed. The user must supply the necessary strain reliefs. Refer to Replacement parts and accessories on page 49.

Figure 6 Electrical connectors and fittings



1 Ethernet connector (optional) for LAN port 1 or EtherNet/IP or PROFINET connector	5 Strain relief fitting for USB box and modules: Analog inputs/outputs, Profibus DP
2 Ethernet connector (optional) for LAN port 2 or EtherNet/IP or PROFINET connector	6 Power cord (or conduit hub) ⁹
3 Digital SC connector: Sensor 1. Optional: Analog sensor connection to mA input	7 Strain relief fitting for high voltage relay
4 Digital SC connector: Sensor 2. Optional: Analog sensor connection to mA input	

Table 1 Options for each connector and fitting

Item in Figure 6	1 ¹⁰	2	Option ¹¹	3	4	5	6	7
Digital SC sensor				X	X			
4-20 mA input				X	X			
4-40 mA output						X		
Profibus DP						X		
USB Box						X		
LAN + LAN	■	■	Split / Chaining					
LAN + Modbus TCP	■	■	Mix IEP					
EtherNet/IP	■	■	IEP only					
LAN + EtherNet/IP	■	■	Mix IEP					
PROFINET	■	■	IEP only					
LAN + PROFINET	■	■	Mix IEP					
High voltage relay								X
Power supply							X	

⁹ The power cord is factory-installed based on the controller configuration.

¹⁰ A color code identifies the connectors. The LAN connectors are green. The EtherNet/IP or PROFINET connectors are yellow.

¹¹ Refer to [LAN connection](#) on page 25 for Ethernet port configuration options.

3.3.2 Electrostatic discharge (ESD) considerations

NOTICE



Potential Instrument Damage. Delicate internal electronic components can be damaged by static electricity, resulting in degraded performance or eventual failure.

Refer to the steps in this procedure to prevent ESD damage to the instrument:

- Touch an earth-grounded metal surface such as the chassis of an instrument, a metal conduit or pipe to discharge static electricity from the body.
- Avoid excessive movement. Transport static-sensitive components in anti-static containers or packages.
- Wear a wrist strap connected by a wire to earth ground.
- Work in a static-safe area with anti-static floor pads and work bench pads.

3.3.3 Power connections

⚠ DANGER



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

⚠ DANGER



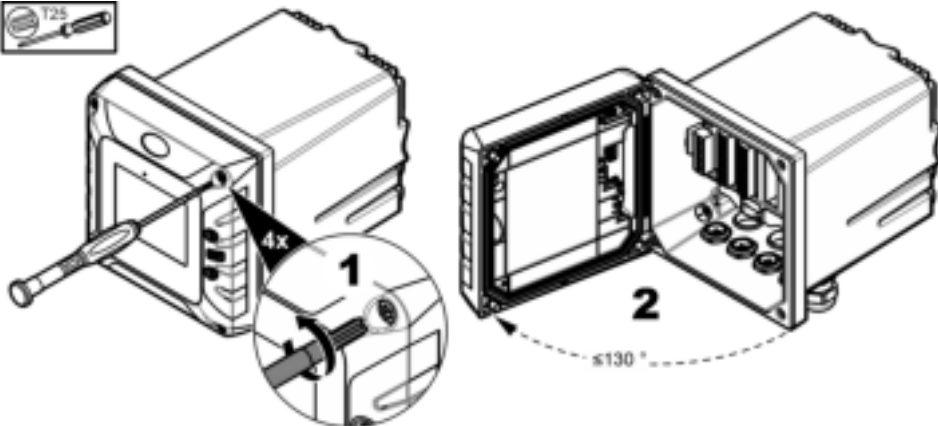
Electrocution hazard. Always remove power to the instrument before making electrical connections.

If the controller does not have an installed power cord, connect power with conduit or a power cord. Refer to the sections that follow to connect power with conduit or a power cord.

3.3.3.1 Open the controller cover

Open the controller cover to get access to the wiring connections. Refer to [Figure 7](#).

Figure 7 Open the controller

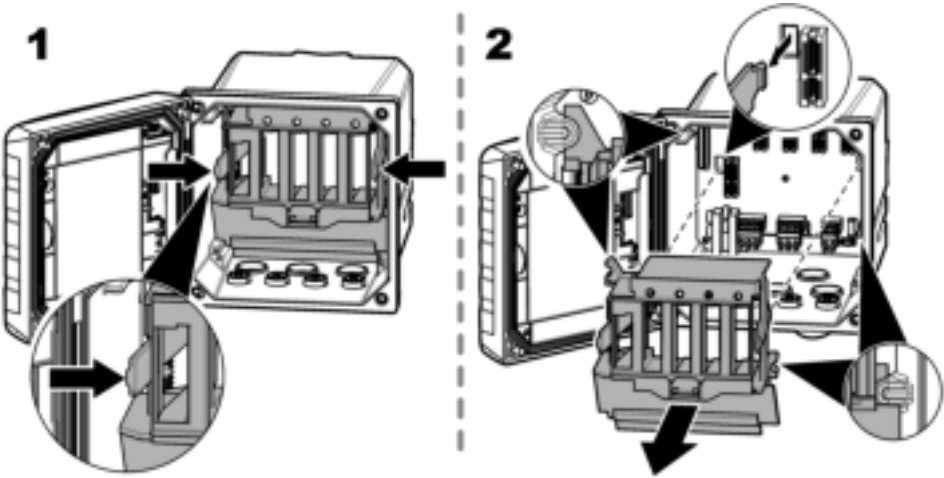


3.3.3.2 Remove the high-voltage barrier

High-voltage wiring for the controller is located behind a high-voltage barrier in the controller enclosure. Do not remove the barrier while power is supplied to the controller. Make sure that the barrier is installed before power is supplied to the controller.

Remove the high-voltage barrier to get access to the high-voltage wiring. Refer to [Figure 8](#).

Figure 8 High-voltage barrier



3.3.3.3 Wiring for power

⚠ DANGER	
	Electrocution hazard. Protective Earth Ground (PE) connection is required.
⚠ DANGER	
	Electrical shock and fire hazards. Make sure to identify the local disconnect clearly for the conduit installation.
⚠ WARNING	
	Potential Electrocution Hazard. If this equipment is used outdoors or in potentially wet locations, a Ground Fault Interrupt device must be used for connecting the equipment to its mains power source.
⚠ WARNING	
	Electrocution hazard. The local disconnection means must disconnect all the electrical current-carrying conductors. Mains connection must keep supply polarity. The separable plug is the disconnect means for cord connected equipment.
⚠ WARNING	
	Electrical shock and fire hazards. Make sure that the user-supplied power cord and non-locking plug meet the applicable country code requirements.

⚠ WARNING



Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

NOTICE

Install the device in a location and position that gives easy access to the disconnect device and its operation.

The controller can be purchased as either a 100-240 VAC powered model or a 18-28 VDC powered model. Follow the appropriate wiring instructions for the purchased model.

Supply power to the instrument with conduit or a power cable. Make sure that a circuit breaker with sufficient current capacity is installed in the power line. The circuit breaker size is based on the wire gauge used for installation.

For installation with conduit:

- Install a local disconnect for the instrument within 3 m (10 ft) of the instrument. Put a label on the disconnect that identifies it as the main disconnect device for the instrument.
- Rated for at least 90 °C (194 °F) and applicable to the installation environment
- For permanent connections use only solid wires. Use cable dimensions between 0.75 to 1.5 mm² (18 to 16 AWG). Flexible wires must have a crimped ferrule or pin type terminal on the end.
- Connect equipment in accordance with local, state or national electrical codes.
- Connect the conduit through a conduit hub that holds the conduit securely and seals the enclosure when tightened.
- If metal conduit is used, make sure that the conduit hub is tightened so that the conduit hub connects the metal conduit to safety ground.
- The DC power source that supplies power to the DC controller must maintain voltage regulation within the specified 18-28 VDC voltage limits. The DC power source must also provide adequate protection against surges and line transients.

For installation with a power cable, make sure that the power cable is:

- Less than 3 m (10 ft) in length
- Rated sufficient for the supply voltage and current.
- Rated for at least 90 °C (194 °F) and applicable to the installation environment
- Not less than 0.75 mm² (18 AWG) with applicable insulation colors for local code requirements. Flexible wires must have a crimped ferrule or pin type terminal on the end.
- A power cable with a three-prong plug (with ground connection) that is applicable to the supply connection
- Connected through a cable gland (strain relief) that holds the power cable securely and seals the enclosure when tightened
- Does not have a locking type device on the plug

3.3.3.4 Connect conduit or a power cord

NOTICE

The manufacturer recommends the use of manufacturer-supplied electrical components, such as power cord, connectors and strain relief fittings.

NOTICE



Make sure that the cable sheath goes through the inner side of the enclosure to keep the environmental rating of the enclosure.

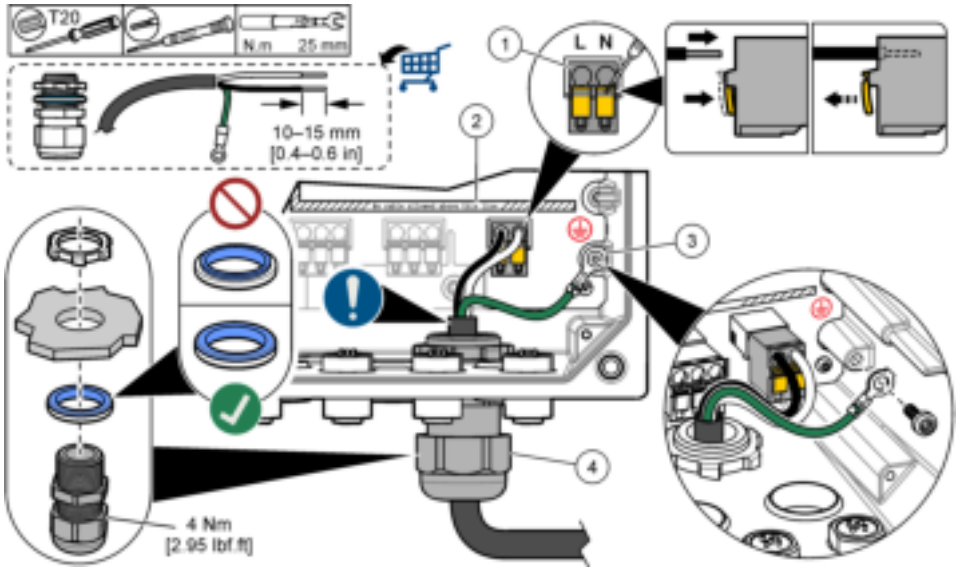
The controller can be wired for line power by hard-wiring in conduit or wiring to a power cord. Regardless of the wire used, the connections are made at the same terminals.

The power cable plug is used to connect and disconnect power to the controller. For installation in conduit, the installed local disconnect is used to connect and disconnect power to the controller.

Refer to [Figure 9](#) and [Table 2](#) or [Table 3](#) to connect conduit or a power cord. Insert each wire into the appropriate terminal until the insulation is seated against the connector with no bare wire exposed. Tug gently after insertion to make sure that there is a secure connection. If necessary, remove the connector from the PCBA for easier wiring of the terminals.

Note: Make sure that all of the cables stay below the cable limit line printed on the PCBA to prevent interferences with the high-voltage barrier. Refer to [Figure 9](#).

Figure 9 Connect conduit or a power cord



1 AC and DC power terminal	3 Protective earth ground
2 Cables limit: do not put cables above the line.	4 Conduit hub (or strain relief fitting for power cord)

Table 2 Wiring information—AC power

Terminal	Description	Color—North America	Color—EU
L	Hot (Line 1)	Black	Brown
N	Neutral (N)	White	Blue
	Protective earth ground	Green	Green with yellow stripe

Table 3 Wiring information—DC power

Terminal	Description	Color—North America	Color—EU
L	+24 VDC	Red	Red
N	24 VDC return	Black	Black
	Protective earth ground	Green	Green with yellow stripe

3.3.4 Connect the high-voltage relays

⚠ DANGER	
	Electrocution hazard. Always remove power to the instrument before making electrical connections.
⚠ WARNING	
	Potential Electrocution Hazard. Power and relay terminals are designed for only single wire termination. Do not use more than one wire in each terminal.
⚠ WARNING	
	Potential fire hazard. Do not daisy-chain the common relay connections or jumper wire from the mains power connection inside the instrument.
⚠ WARNING	
	Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.
⚠ CAUTION	
	Fire hazard. Relay loads must be resistive. Always limit current to the relays with an external fuse or breaker. Obey the relay ratings in the Specifications section.
NOTICE	
	Make sure that the cable sheath goes through the inner side of the enclosure to keep the environmental rating of the enclosure.

The instrument has two non-powered relays, each with a single-pole change-over contact. For AC controllers, the wiring compartment is not made for voltage connections more than 264 VAC.

The relay terminals are located behind a high-voltage barrier in the controller enclosure. Do not remove the barrier while power is supplied to the relay terminals. Do not supply power to the relay terminals when the barrier is not installed.

Connect each relay to a control device or an alarm device as necessary. Refer to [Figure 10](#) and [Table 4](#) to connect the relays. Refer to [Configure the high voltage relays](#) on page 31 to configure the trigger condition for each relay.

Refer to [Specifications](#) on page 3 for the relay specifications. The relays are isolated from each other and the low-voltage input/output circuitry.

The largest gauge wire the power and relay plugs are rated for 1.5 mm² (16 AWG). The relay terminals accept 0.75 to 1.5 mm² (18 to 16 AWG) wire (as determined by load application). Use wire with an insulation rating of 300 VAC or higher. Insert each wire into the appropriate terminal until the insulation is seated against the connector with no bare wire exposed. Tug gently after insertion to make sure that there is a secure connection. If necessary, remove the connector from the PCBA for easier wiring of the terminals. Flexible wires must have a crimped ferrule or a pin type terminal on the end.

Note: Make sure that all of the cables stay below the cable limit line printed on the PCBA to prevent interferences with the high-voltage barrier.

The current to the relay contacts must be 5 A (resistive only load), 1250 VA 125 W (resistive only load) or less. Make sure to have a second switch available to remove power from the relays locally in case of an emergency or for maintenance.

For AC controllers, use the relays at high voltage. For DC controllers, use the relays at low voltage. Refer to [Specifications](#) on page 3 for the relay specifications. Do not configure a combination of both high and low voltage.

Relay terminal connections to the mains circuit in permanent connection applications must have insulation rated for a minimum of 300 V, 90 °C (194 °F). Terminals connected to the mains circuit with a power cord connection must be double insulated and rated 300 V, 90 °C (194 °F) at both the inner and outer insulation levels.

Figure 10 Connect the relays

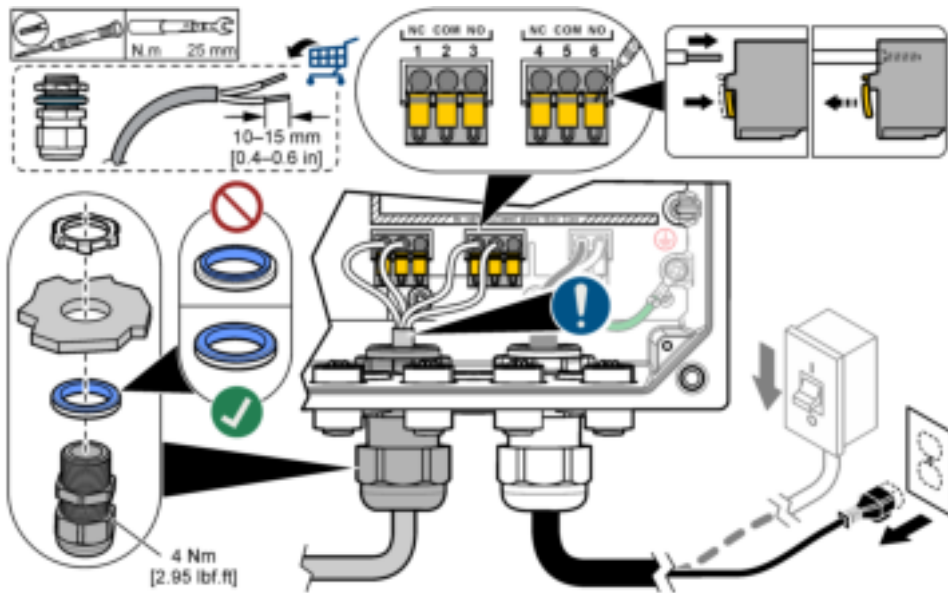


Table 4 Wiring information—relays

Terminal	Description	Terminal	Description
1	Relay 2, NC	4	Relay 1, NC
2	Relay 2, common	5	Relay 1, common
3	Relay 2, NO	6	Relay 1, NO

NC = normally closed; NO = normally open

3.3.5 Install an expansion module

⚠ WARNING



Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

Expansion modules with analog outputs, analog inputs and Profibus communication are available for the controller. Refer to the documentation supplied with the module for additional information.

3.4 Close the cover

⚠ DANGER



Electrocution hazard. High voltage wiring for the controller is connected behind the high voltage barrier in the controller enclosure. The barrier must remain in place except when installing modules, or when a qualified installation technician is wiring for power, relays or analog and network cards.

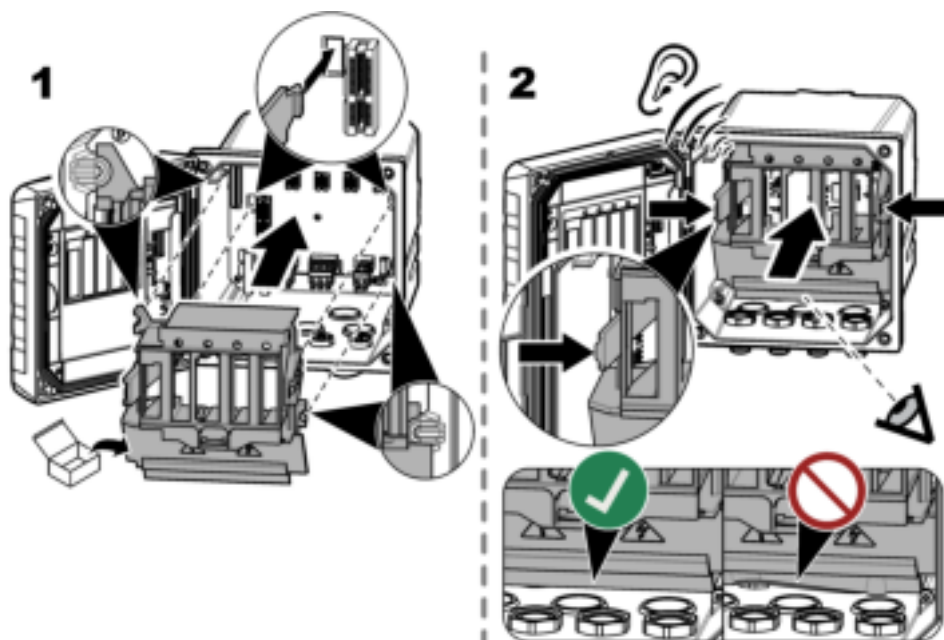
NOTICE

Close the controller cover and make sure that the cover screws are tight to keep the environmental rating of the enclosure.

After the power connections are made, install the high-voltage barrier. Make sure that the high-voltage barrier is correctly put on the enclosure guides and fixed to the main PCBA. Make sure that the lower part of the high-voltage barrier (soft rubber lip) is correctly installed and has no deformation. Refer to [Figure 11](#).

Close the controller cover. Tighten the cover screws with a maximum torque of 2.26 Nm (20 lbf-in). Refer to [Figure 7](#) on page 14.

Figure 11 Install the high voltage barrier

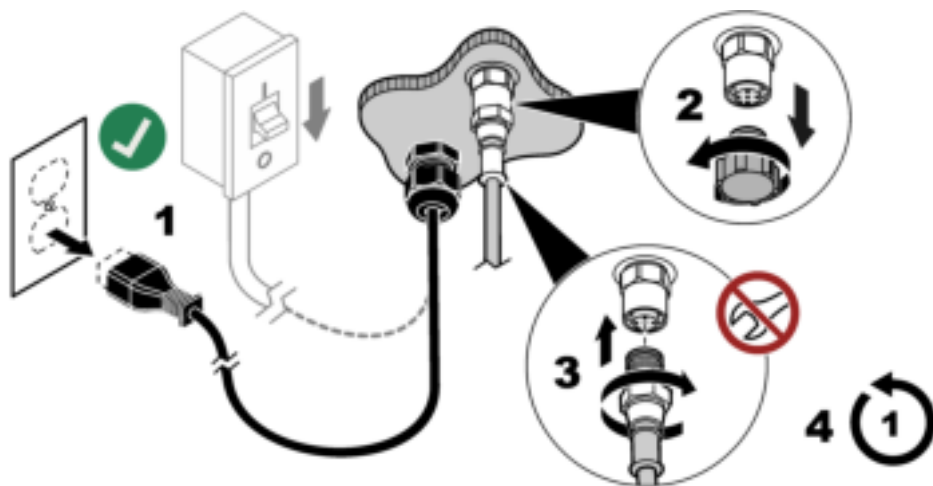


3.5 Connect measurement devices

Connect digital devices (e.g., sensors and analyzers) to the device connectors on the instrument. Refer to [Figure 12](#). Keep the device connector caps for future use.

Make sure that the device cables do not cause a trip hazard and do not have sharp bends.

Figure 12 Connect a device



Section 4 User interface and navigation

NOTICE

Do not use writing tips of pens or pencils or other sharp objects to make selections on the screen or damage to the screen will occur.

Figure 13 shows an overview of the home screen. Refer to Table 5 for the descriptions of the icons in the display.

The instrument display is a touchscreen. Only use a clean, dry finger tip to navigate the functions of the touchscreen. To prevent unwanted touches, the screen is automatically lock after a period of inactivity. Touch the screen and swipe up to set the screen back to operation again.

Note: Go to the General configuration menu to disable the Screen lock setting or to set the Waiting time for the inactivity period.

Figure 13 Main screen



1 Measurement window: shows a device data, push on the tile to show the device detail window.	4 Prognosis icon (optional)
2 Diagnostic bar: shows system messages and alarm conditions, push on the bar to see the system errors and warnings. Shows pending tasks and information about the system	5 Carousel icon: swipe on the screen to left or right to show other screen views.
3 Status bar	

Table 5 Icon descriptions

Icon	Description	Icon	Description
	Push to show the Main menu.		3G/4G signal strength. Shows when a USB box with a cellular modem is connected to the controller.
	Claros connection		USB connection. Shows when a USB flash drive is connected to the controller. Blinks when there is data transmission.
	WiFi connection. Shows when a USB box with a WiFi adapter is connected to the controller.		Remote user. Shows when a remote user is connected to the controller.
	Screen lock. Shows when the screen is locked. ¹² Swipe up to unlock the screen.		Push to enter a submenu or go back to the previous menu.
	When in a sub menu, push to go to the main screen.		

4.1 Measurement window

The main screen shows the measurement window. The carousel icon shows at the bottom of the main screen when there are other screen views available. Each screen view has one, two or four measurement windows, based on the connected sensors and the parameters of each sensor. The controller automatically fills the measurement windows to show all of the information for the connected devices. The measurement window shows the data that follows:

- Name, value, parameter and unit of the measurement device

¹² The Screen lockoption is enabled by default.

Note: Measurement devices are the connected SC sensors or 4-20 mA inputs modules. Measurement devices are also other remote sensors or instruments when the controller connects to a network or Claros.

- Sensor errors and warnings. If the measurement window background color is amber, there is a warning for the sensor. If the measurement window background color is red, there is an error for the sensor. A small icon shows when the error or warning is in a different screen view. Swipe left or right to go the screen with the error or warning, or push the icon to go directly to the device detail window. When the sensor is not in operation, the inactive condition shows on the measurement window.
- Prognosys (if available). The Prognosys icon shows when there is no issue or maintenance planned, or if maintenance is due or scheduled. Go to the device detail window to see more Prognosys information.
- The task in operation (maintenance or calibration task)

Figure 14 Measurement window and device detail screen

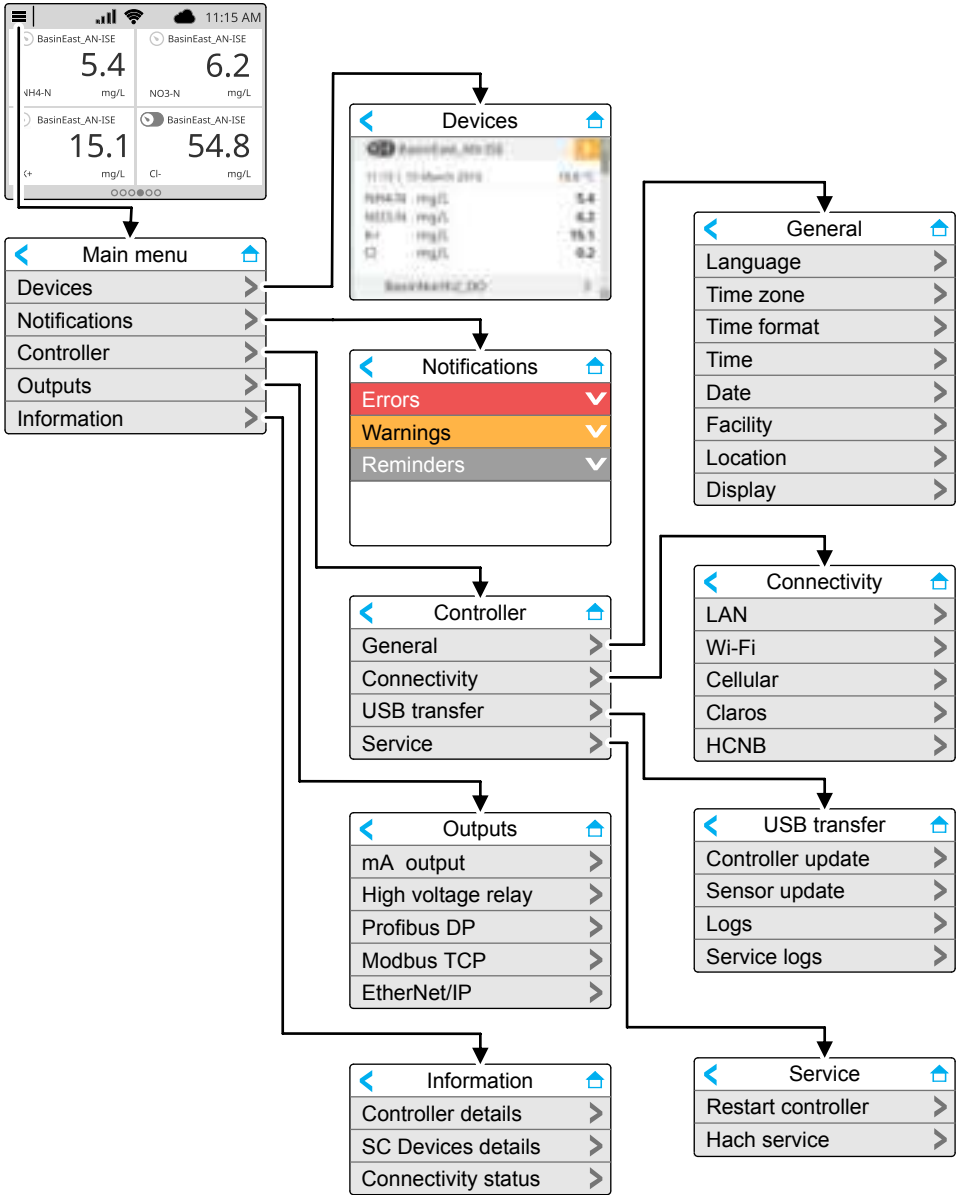


1	Sensor error	6	Measured value
2	Device parameter	7	Device detail screen
3	Units	8	Task
4	Sensor warning	9	Error or warning in a different screen view.
5	Device name		

Section 5 Startup

Connect the power cord to an electrical outlet with protective earth ground or set the circuit breaker for the controller to on.

5.1 Menu structure



5.2 Enter initial settings

At initial startup, follow the prompts on the display to set up the language, the date, the time and network information. Refer to [Configure the controller settings](#) on page 25 to change the settings.

Section 6 Operation

6.1 Configure the controller settings

Set the controller language, time, date, facility, location and display options.

1. Push the main menu icon, then select Controller > General.
2. Select and configure each option.

Option	Description
Language	Sets the language that shows on the controller display and in the log files.
Time zone	Sets the time zone. Select the Region and City for the time zone. Note: When the controller is connected to Claros, Time zone setting is disabled.
Time format	Sets the time format: 12 h (default) or 24 h.
Time	Sets the time.
Date	Sets the date.
Date format	Sets the date format: dd/mm/yyyy or mm/dd/yyyy (default)
Facility	Sets the name of the facility (32 characters maximum). Default: not selected
Location	Sets the name of the location (32 characters maximum). Default: controller serial number
Display	Sets the display options: • Screen lock—When set to on (default), the screen automatically locks after the inactivity period. When the screen is locked, the touchscreen is disabled and there are no active areas in the display. Touch the screen and swipe up to set the screen back to on. Note: The manufacturer strongly recommends not to disable the Screen lock setting. The Screen lock setting prevents unwanted touches on the screen (especially in outdoor installations). • Waiting time—Sets the inactivity period, after which the controller locks the screen. Options: 1, 3, 5, 10 or 15 minutes

6.2 Connect the instrument to a network

Based on instrument configuration, the instrument can connect to a network with internet connectivity for configuration and operation. Based on the version, the controller connects to the internet with a cellular network, WiFi network or a LAN connection.

6.2.1 LAN connection

The controller is supplied with two Ethernet connectors based on the controller configuration. Regardless of the supplied controller, the user must configure the Ethernet ports to the applicable option.

Note: An Ethernet port upgrade may be necessary based on the controller configuration. Refer to the documentation supplied with the upgrade kit.

1. Use a user-supplied Ethernet cable (M12 to RJ45)¹³ to connect the controller to a device with internet connection. Refer to [Electrical connectors and fittings](#) on page 12.
2. Push the main menu icon, then select Controller > Connectivity > LAN > Ethernet ports.

¹³ Refer to [Replacement parts and accessories](#) on page 49.

3. Enter the settings.

Option	Description
None 	The controller does not have Ethernet ports or the Ethernet ports are not configured. The controller is supplied with the option None by default. Note: When the controller configuration is set back to the factory settings, all of the LAN connection settings are lost and the Ethernet ports are set back to None.
Chaining 	The two Ethernet ports are configured for LAN connectivity. When selected, the LAN port configuration setting shows on the LAN menu. The two Ethernet ports have the same port configuration. Select this option to share the internet connection with other controllers (daisy chain topology) or to connect the controller to Claros and HCNB through the Ethernet cable.
Split 	One Ethernet port is configured for LAN connectivity and the other Ethernet port is configured for a separate LAN or Modbus TCP. When selected, the Lan port 1 configuration and Lan port 2 configuration settings show on the LAN menu. The two Ethernet ports have different port configurations. Select the Split option to have different controller connections to Claros and fieldbus (Modbus TCP or HCNB).
Mix IEP 	One Ethernet port is configured for LAN connectivity and the other Ethernet port is configured for IEP ¹⁴ . When selected, the LAN port configuration setting shows on the LAN menu. Select this option to use port 1 for LAN connectivity and port 2 for IEP (compatible with EtherNet/IP or PROFINET star topology).
IEP only 	The two Ethernet ports are configured for IEP. The two ports are used for EtherNet/IP or PROFINET with chain, ring or star topology.

4. Push SAVE.

5. When applicable, select LAN port configuration. Enter the settings as follows:

- If the customer network supports Dynamic Host Configuration Protocol (DHCP), set the option to on (default) to get an IP address automatically. The display shows the MAC address of the selected port.
- If the customer network does not support DHCP, set the option to off and complete the settings with IP addresses supplied by the network administrator. Enter the correct settings based on the network topology: IP address, Netmask, Default gateway and DNS address.
- When Chaining is selected, the LAN server option shows on the LAN port configuration menu. Set the LAN server to on to share the internet connection with other controllers through LAN connectivity.

6. Select APPLY.

6.2.2 WiFi network connection

An external USB box WiFi with a WiFi adapter is necessary to connect the controller to a WiFi network. Refer to the documentation supplied with the USB box WiFi for more information about the WiFi installation. Follow all WiFi module manufacturer recommendations and guidance.

If the controller connects to the internet with a WiFi network, do the steps that follow:

- Push the main menu icon, then select Controller > Connectivity > Wi-Fi.
- Set the Wi-Fi connectivity button to on. A list of available access points shows.
- Select Network to set the applicable WiFi access point. If necessary, enter the correct credentials. The WiFi connectivity currently accepts the authentication methods that follows: User name and Wi-Fi password.
 - WEP: Not recommended. The WEP authentication method has low security.

¹⁴ Based on the controller configuration. Make sure that a PROFINET or EtherNet/IP module is installed in the controller.

- b. WPA2 Personal / PSK: Standard authentication. Enter the Wi-Fi password to access the network.
- c. WPA2 Enterprise: Authentication for enterprise networks. Enter the enterprise credentials, User name and Wi-Fi password, to access the network.

4. Select APPLY.

6.2.3 Cellular network connection

Note: Only for Claros connection.

The external USB box cellular is necessary to connect the controller to a mobile network. Refer to the documentation supplied with the USB box cellular for installation instructions.

6.2.3.1 Configuration with Hach Cellular (Telenor) SIM

If the controller connects to the internet with the factory installed SIM card and the default Hach data plan (Telenor), do the steps that follow:

1. Push the main menu icon, then select Controller > Connectivity > Cellular.
2. Set the Cellular connectivity button to on.
3. Select APPLY.

Note: Make sure that the SIM card is not locked. If necessary, use the SIM PIN setting to enter the SIM card PIN.

4. After a maximum of 5 minutes, examine the signal strength that shows on the display. The cloud icon shows a correct connection.

6.2.3.2 Configuration with customer supplied SIM

To change the SIM card and connect the controller to the internet with a cellular network through a customer supplied data plan, do the steps that follow:

1. Install a user-supplied Micro SIM card. Refer to the documentation supplied with the USB box cellular for more information about the cellular network installation.

Note: Follow all the cellular manufacturer recommendations and guidance.

2. Push the main menu icon, then select Controller > Connectivity > Cellular.
3. Make sure that the Cellular connectivity button is set to on.
4. Enter the settings.

Option	Description
Provider	Sets the Provider name (Access Point Name). Select Telenor (NA/Verizon network) for the default settings or Other to set a provider.
APN	Shows the provider name. When Other is selected on the Provider setting, enters the name of the provider.
SIM PIN	SIM card PIN
User name	User name
Password	User password
Internet sharing	Set to on to share the internet connection with other controllers

5. Select APPLY and wait until a confirmation message shows on the display.
6. After a maximum of 5 minutes, examine the signal strength that shows on the display. The cloud icon shows a correct connection.

6.3 Configure the SC sensors or analog inputs

The controller is supplied with two digital SC connectors based on the controller configuration. Use the SC connectors to connect sensors or analog inputs to the controller (optional).

Note: Make sure that a 4-20 mA input module is installed in the controller. Refer to the documentation supplied with the module.

Note: To upgrade a one-channel controller to a two-channel controller, install a new SC connector. Refer to the documentation supplied with the connector upgrade kit.

Connected devices show on the main screen and in the Devices menu. When the controller connects to a network or Claros, the devices of the network also show. Configure the connected devices as follows:

1. On the main screen, select one measurement window to go to the device detail screen. As an alternative, push the main menu icon, then select Devices. A list of all of the available devices shows.
2. Select one device and select Device menu.
3. Configure the device parameters based on the device type (e.g., sensor, instrument, mA input, etc.). Refer to the documentation supplied with the device.
4. If the device is a 4-20 mA input module, select mA input and configure the settings that follow:

Option	Description
Calibration	Sets the calibration options for the 4-20 mA input module. • 1-point value correction • 2-point value correction • Calibration options • Reset to default calibration
Settings	• Name—Sets the name that identifies the mA input card. • Edit parameter—Selects the parameter type and unit. • Display range—Sets the value that shows on the display for the 0-20 mA or 4-20 mA. • Signal average—Sets a time in seconds that the controller records the measured input currents. The input current value is the average value of the recorded input currents during the configured time. • Display resolution—Sets the resolution of the values shown. Options: XXXX, XXX.X, XX.XX or X.XXX. • Select scale—Sets the input current range. Options: 0-20 mA or 4-20 mA. • Data log interval—Sets the data log interval. Options: 5 seconds, 30 seconds, 1 minute, 2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes or 60 minutes. • Reset—Sets the configuration back to the factory settings.

Maintenance Shows maintenance tasks for the connected device.

6.4 Connect a USB flash drive (optional)

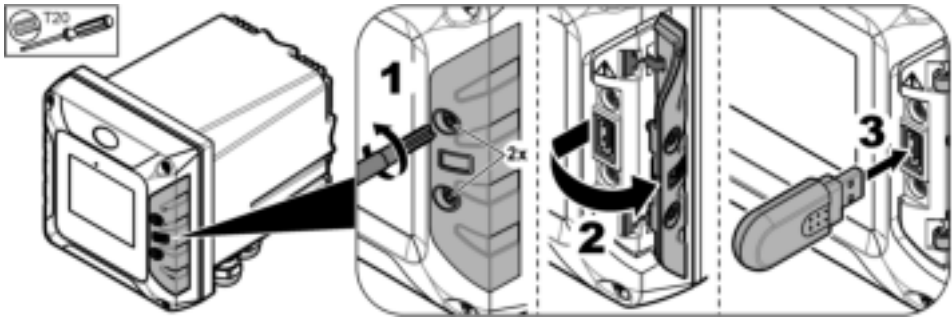


⚠ WARNING
Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

If necessary for data download or firmware update, connect a USB flash drive to the front panel in the controller. Make sure that the USB flash drive is formatted with FAT32 and has a minimum of

350 Mb capacity. Refer to [Figure 15](#). After the USB flash drive is removed, close the slot cover and tighten the cover screws. Tighten the cover screws with a maximum torque of 1.4 Nm (12.4 in./lb).

Figure 15 USB flash drive connection



6.4.1 Data download

The controller records in an internal memory the data that follows:

- Approximately 20,000 data points, diagnostics data and an event log of all of the connected sensors and modules
- Diagnostic data

Use a USB flash drive to download data from the controller. As an alternative, use the Claros user interface to download the data from the controller¹⁵.

1. Connect a USB flash drive to the controller. Refer to [Connect a USB flash drive \(optional\)](#) on page 28.
2. Make sure that the USB icon shows on the main screen.
***Note:** If the controller does not find a connected USB flash drive or the icon shows grey, refer to [Troubleshooting](#) on page 46.*
3. Push the main menu icon, then select Controller > USB transfer.
4. Select an option.

Option	Description
Logs	Downloads data of the connected sensors and module.
Service logs	Downloads diagnostic data.

5. If Logs is selected, select the sensors and modules from which the controller will download the data.
6. When the download is complete, remove the USB flash drive.
***Note:** The USB icon in the front panel flashes to show data transmission. Wait until the icon stays on to remove the USB flash drive.*
7. Close the USB cover.

¹⁵ Based on the controller model. Service logs are not available from Claros user interface.

6.4.2 Install controller firmware updates

Make sure that the controller has the latest firmware. Use a USB flash drive to update the controller firmware. As an alternative, use the Claros user interface to update the controller firmware¹⁶.

1. Visit www.hach.com and download .zip file with the latest software version for the instrument.

Note: To identify the software version installed, push the main menu icon, then select Information > Controller details.

2. Unpack the ZIP file and save the files to your PC.
3. Copy the .swu file to the root folder of the USB flash drive. Make sure that the .swu file is more than 300 Mb.
4. Connect the USB flash drive to the controller. Refer to [Connect a USB flash drive \(optional\)](#) on page 28.
5. Make sure that the USB icon shows on the main screen.

Note: If the controller does not find a connected USB flash drive or the USB icon is grey, refer to [Troubleshooting](#) on page 46.

6. Push the main menu icon, then select Controller > USB transfer > Controller update.
Updates the controller software and firmware.
7. Follow the instructions on the screen to install the firmware update.
8. When the update is complete, a message shows on the display. Remove the USB flash drive.
Note: If there is an error during the firmware update, a message shows on the display. Refer to [Troubleshooting](#) on page 46.
9. Close the USB cover.

6.4.3 Install sensor firmware updates

Make sure that the connected SC sensors have the latest firmware. Use a USB flash drive to update the SC sensors firmware. As an alternative, use the Claros user interface to update the sensor firmware¹⁷.

1. Visit www.hach.com and download the latest software version for the connected SC sensors.

Note: To identify the software version installed, push the main menu icon, then select Information > SC Devices details.

2. Copy the file to the root folder of the USB flash drive.

Make sure that the files are in the correct folder. Installation files must be in:

D [USB drive unit]:\HACH\Firmware\[sensor name with MID and IID]\installation file name with code [MID/IID], package number [P] identification file [AC/BC/DD] and version number.

For example:

- D:\HACH\Firmware\LDO2_0_42\LDO2_0_42_P03_AC_V1_24_A.bin

Where,

- MID—Manufacturer ID
- IID—Instrument ID.
- AC—Application code file.
- BC—Boot code file.
- DD—Device driver file.

One or more installation files can be in the installation folder.

3. Connect the USB flash drive to the controller. Refer to [Connect a USB flash drive \(optional\)](#) on page 28.

¹⁶ Based on the controller model

¹⁷ Based on the controller model

4. Make sure that the USB icon shows on the main screen.

Note: If the controller does not find a connected USB flash drive or the USB icon is grey, refer to [Troubleshooting](#) on page 46.

5. Push the main menu icon, then select Controller > USB transfer > Sensor update.

Updates the software of the SC sensors connected to the controller (which includes updates like mA output, PROFINET and EtherNet/IP as necessary).

6. Follow the instructions on the screen to install the firmware update.

7. When the update is complete, a message shows on the display. Remove the USB flash drive.

Note: If there is an error during the firmware update, a message shows on the display. Refer to [Troubleshooting](#) on page 46.

8. Close the USB cover.

If the sensor update was successful and the controller does not shows the measurement for the sensor, disconnect and connect the sensor again. If the problem continues, restart the controller.

6.5 Configure the outputs

6.5.1 Configure the high voltage relays

The instrument has two non-powered relays, each with a single-pole change-over contact. Make sure that the wiring of the relays is complete before this procedure is started. Refer to [Connect the high-voltage relays](#) on page 18.

1. On the display push the main menu icon, then select Outputs > High voltage relay > System setup.
2. Enter the settings for each relay.

Option	Description
Source	Sets the source device for the relay output. Note: The source device is a sensor connected to the controller or analog inputs (if connected).
Parameter	Sets the parameter for the relay output based on the selected source.
Data view	Sets the value that will be displayed and stored in the data logger as the measured value. Options: Input configuration (default) or Relay contact status.
Function	Sets the function value. Setup options change based on the selected function. • Alarm—Operates the relays in response to the measured parameter. • Feeder control—Operates the relays in response to the measured parameter. • 2 point control—Operates the relays in response to the measured parameter with two setpoints. • Warning—Operates the relays when the controller finds a SC device warning. Shows the warning and error condition of the selected devices. • Pulse width control—Lets the relays give a pulse width modulated output. • Frequency control—Lets the relays operate in a cyclic manner at a frequency between the minimum pulses for each minute and maximum pulses for each minute. • Timer—Lets the relays to operate at set times independently of the process value. • System error—Shows if a device has an internal error or warning.
Transfer	Sets the transfer value. Options: Relay is energized or Relay is de-energized. (default).

Option	Description
Input value	Shows the process value read from the selected source after the internal formula parser sends the process value (if prompted).
Data logger interval	Sets the interval at which the controller saves the shown value to the data logger. Options: OFF (default), 5 minutes, 10 minutes, 15 minutes, 20 minutes or 30 minutes.

3. Complete the settings based on the Function setting.

Alarm function

Option	Description
Phase	Sets the relay condition when the process value is out of the controlled band. Options: Direct control or Reverse
High alarm	Sets the maximum value of the controlled band in the selected parameter unit.
Low alarm	Sets the minimum value of the controlled band in the selected parameter unit.
High deadband	Sets the hysteresis value used at the upper limit.
Low deadband	Sets the hysteresis value used at the lower limit.
Timer on delay	Sets a delay time for the relay to stay on.
Timer off delay	Sets a delay time for the relay to stay off.
Relay contact status	Displays and logs the status of the relay contact (ON or OFF).

Feeder control function

Option	Description
Phase	Sets the relay condition if the process value is more than the setpoint. Options: Value above the limit or Value below the limit.
Relay setpoint	Set the process value at which the relay condition changes.
Deadband	Sets a hysteresis so the relay will not swing unregulated when the process value converges to the setpoint.
OnMax TIMER	Sets a maximum period of time. During this period the relay stays on when passing the setpoint. When the time expires, the relay changes to OFF regardless of the process value.
Timer on delay	Sets a delay time for the relay to stay on.
Timer off delay	Sets a delay time for the relay to stay off.
Maximum timer expiration	Indicates a period of time (in seconds) for the expiration of the OnMax TIMER and the OffMax TIMER. Relay set to ON, OnMax TIMER set to ON: The time left is displayed before the relay is set to OFF automatically. Relay set to OFF, OffMax TIMER set to ON: The time left is displayed before the relay is set ON again.
Relay contact status	Displays and logs the status of the relay contact (ON or OFF).

2 point control function

Option	Description
Phase	Sets the status of the relay. When the process value enters the band between high and low alarm, the relay condition does not change. Options: Value above the limit or Value below the limit.
High alarm	Sets the upper limit in the unit of the selected parameter of the 2 point control band.
Low alarm	Sets the lower limit in the unit of the selected parameter of the 2 point control band.
Timer on delay	Sets a delay time for the relay to set ON.
Timer off delay	Sets a delay time for the relay to set OFF.
OnMax TIMER	Sets a maximum period of time. During this period the relay is set ON when passing the corresponding limit. As soon as the time expires the relay is set to OFF regardless of the process value.
OffMax TIMER	Sets a maximum period of time (in minutes). During this period the relay is set to OFF when passing the corresponding limit. As soon as the time expires the relay is set ON regardless of the process value.
OnMin TIMER	Sets a minimum period of time. During this period the relay is set ON when passing the corresponding limit. The relay can only be set OFF after the period has expired and after this expiration will be set OFF dependent on the process value.
OffMin TIMER	Sets a minimum period of time. During this period the relay is set to OFF when passing the corresponding limit. The relay can only be set to ON after the period has expired and after this expiration will be set to ON dependent on the process value.
Maximum timer expiration	Shows a period of time (in seconds) for the expiration of the OnMax TIMER and the OffMax TIMER. Options: Relay set to ON, OnMax TIMER set to ON—The time left is displayed before the relay is set to OFF automatically. Relay set to OFF, OffMax TIMER set to ON—The time left is displayed before the relay is set to ON again.
Minimum timer expiration	Shows a period of time (in seconds) for the release of the OnMin TIMER and the OffMin TIMER. Options: Relay set to ON, OnMin TIMER set to ON—Displays the time left before the relay can be set to OFF again. Relay set to OFF, OffMin TIMER set to ON—Displays the time left before the relay can be set ON again.
Relay contact status	Displays and logs the status of the relay contact (ON or OFF).

Warning function

Option	Description
Warning list	Sets the monitoring of the internal warning bits of the selected source. Enabled (default): Monitoring is active. Disabled: Monitoring is not active.
Error list	Sets the monitoring of the internal error bits of the selected source. Enabled: Monitoring is active. Disabled (default): Monitoring is not active.

Option	Description
Process event	Sets the monitoring of the internal process event bits of the selected source. Enabled: Monitoring is active. Disabled (default): Monitoring is not active.
Transfer	Sets the status of the relay. Options: Relay is energized or Relays are de-energized. (default) if some or all conditions (this means warning, error or process event bits) are detected in the selected source or if the source is missing.
Timer on delay	Sets a delay time for the relay to set ON.
Timer off delay	Sets a delay time for the relay to set OFF.
Relay contact status	Displays and logs the status of the relay contact (ON or OFF).

Pulse width control function

Option	Description
Mode	Automatic—The relay output works as a PID (Proportional, Integral, Derivative) controller. Manual—The relay output has got an on/off ratio as set in the Manual output.
High alarm	Sets the process value which leads the PWM ratio to 100% (Duty cycle set to Direct control).
Low alarm	Sets the process value which leads the PWM ratio to 0% (Duty cycle set to Direct control).
Manual output	Additionally the on/off ratio can be set (condition: Mode is set to Manual). Note that this ratio cannot exceed a value beyond the values set in the Minimum and Maximum menus.
Phase	Reverses the leading sign of the control deviation for the PID controller.
Minimum	Sets the minimum pulse ratio.
Maximum	Sets the maximum pulse ratio.
Relay setpoint	Sets the process value which is controlled by the PID controller.
Dead zone	The dead zone is a band around the setpoint. In this band the PID controller does not change the PWM on/off ratio output signal. This band is determined as setpoint +/- dead zone. The dead zone stabilizes the PID controlled system which have a tendency to oscillate.
Periode time	Sets the cycle duration of the pulse output signal.
Minimum	Sets the minimum PWM ratio.
Maximum	Sets the maximum PWM.
Duty cycle	Sets the status of PWM ratio.
Proportional	Sets the proportional part of the PID controller. The proportional part of the controller generates an output signal which is linearly dependent to the control deviation. The proportional part reacts on any changes at the input but starts to oscillate easily if the value is set high. The proportional part cannot completely compensate disturbances.

Option	Description
Integral	Sets the integration part of the PID controller. The integration part of the controller generates an output signal. The output signal increases linearly if the control deviation is constant. The integration part responds slower than the proportional part and can completely compensate disturbances. The higher the integration part, the slower it responds. If the integration part is set to low, it starts to oscillate.
Derivative	Sets the derivative part of the PID controller. The derivative part of the PID controller generates an output signal which depends on the control deviation changes. The faster the control deviation changes, the higher the output signal gets. The derivative part creates an output signal as long as the control deviation changes. If the control deviation is constant, no signal is created. The derivative part is able to smoothen the oscillation caused by the proportional part. The derivative part allows the proportional part to be set higher and the controller responds faster. If there is no knowledge about the controlled process behavior, it is recommended to set this part to "0", because this part tends to oscillate strongly.

Frequency control function

Option	Description
Mode	Automatic—The relay output works as a PID controller. Manual—The relay output frequency has a cycle duration which is set in the MANUAL OUTPUT menu.
High alarm	Sets the maximum cycle duration which can be set by the PID controller.
Low alarm	Sets the minimum cycle duration which can be set by the PID controller.
Manual output	Indicates the current cycle duration of the output frequency. Additionally the cycle duration can be set (condition: Mode is set to Manual).
Phase	With this menu the leading sign of the control deviation for the PID controller can be reversed.
Relay setpoint	Sets the process value which is controlled by the PID controller.
Dead zone	The dead zone is a band around the setpoint. In this band the PID controller does not change the output frequency. This band is determined as setpoint +/- dead zone. The dead zone stabilizes the PID controlled system which have a tendency to oscillate.
Proportional	Sets the proportional part of the PID controller. The proportional part of the controller generates an output signal which is linearly dependent to the control deviation. The proportional part reacts on any changes at the input but starts to oscillate easily if the value is set to high. The proportional part cannot completely compensate disturbances.

Option	Description
Integral	Sets the integration part of the PID controller. The integration part of the controller generates an output signal. The output signal increases linearly if the control deviation is constant. The integration part responds slower than the proportional part and can completely compensate disturbances. The higher the integration part, the slower it responds. If the integration part is set to low, it starts to oscillate.
Derivative	Sets the derivative part of the PID controller. The derivative part of the PID controller generates an output signal which depends on the control deviation changes. The faster the control deviation changes, the higher the output signal gets. The derivative part creates an output signal as long as the control deviation changes. If the control deviation is constant, no signal is created. The derivative part is able to smoothen the oscillation caused by the proportional part. The derivative part allows the proportional part to be set higher and the controller responds faster. If there is no knowledge about the controlled process behavior, it is recommended to set this part to "0", because this part tends to oscillate strongly.

Timer function

Option	Description
Outputs on hold	Lets the relay put a mark on the sensor configured in the menu SENSOR at the DURATION time. Other SC modules such as other relay cards or current output cards which access data of this sensor read this 'mark' and go into hold. To go into hold means the accessing module does not read the latest measurement from the marked sensor but works with the last measurement read before the sensor was marked. To activate this function set this menu to YES. If the sensor will never let other modules go into hold, set this menu to NO. Note: The setting Outputs on hold always adapts to the DURATION time.
Relay off-time	Sets the period of time to set OFF the relay in one duty cycle (provided the Duty cycle option is set to Direct control).
Duration unit	Sets the units for the DURATION setting.
DURATION	Sets the period of time for setting ON the relay in one duty cycle (provided the Duty cycle option is set to Direct control).
Timer off delay	Delays the check mark of a probe even if DURATION time has expired. The Timer off delay starts immediately after the DURATION time is expired. This setting only takes effect if Outputs on hold is set to YES.
Duty cycle	Direct control—Sets the relay ON for the time set in the DURATION menu. Sets the relay OFF for the time set in the Relay off-time menu. Reverse—Sets the relay OFF for the time set in the DURATION menu. Sets the relay ON for the time set in the Relay off-time menu.
Relay contact status	Displays and logs the status of the relay contact (ON or OFF).
Next toggle	Shows the seconds until the relay will toggle.

System error function

Option	Description
Warning list	Enabled—Monitors the internal warning bits of every probe. Disabled—Monitoring is disabled.
Error list	Enabled—Monitors the internal error bits of every probe. Disabled—Monitoring is disabled.
Sensor is missing.	Enabled—Monitors the connection of every connected probe. Disabled— Monitoring is not active.
Timer on delay	Sets a delay for the relay to set ON.
Timer off delay	Sets a delay for the relay to set OFF.
Relay contact status	Displays and saves to the log the status of the relay contact (ON or OFF).

4. Push OK to apply the changes.
5. Push the main menu icon, then select Outputs > High voltage relay > Test/Maintenance.
The Test/Maintenance menu lets the user do a test of the internal high voltage relays.
6. Select an option.

Option	Description
Function test	Does a test on the selected relay. Set the Relay 1, Relay 2 or All to ON or OFF for the test. Output mode does a test on the relay output. Options: Hold (default), Active or Transfer.
Relay status	Shows the condition of the relays.

6.5.2 Configure the analog outputs

Make sure that a 4-20 mA output module is installed in the controller. Refer to the documentation supplied with the module. Make sure that all of the necessary electrical connections are complete before the 4-20 mA output is configured.

1. Identify the relation between input current and calculated concentration as follows:
 - Identify what analog output range uses the connected device (0-20 mA or 4-20 mA).
 - Identify the maximum concentration that is equal to the 20 mA on the analog output.
 - Identify the minimum concentration that is equal to the 0 or 4 mA on the analog output.
2. Push the main menu icon, then select Outputs > mA outputs > System setup
The available channels based on the installed modules show.
3. Enter the settings for each channel.

Option	Description
Source	Selects the analog output to configure. For the selected device, select the parameter that set the measurement options.
Parameter	Changes the parameter selected on the source option.
Data view	Sets the measured value that shows on the display and saves to the data log. Options: Input value (default) or Current.

Option	Description
Function	Sets the output function. Setup options change based on the selected function. • Linear control—Signal is linearly dependent on the process value. • PID control—Signal works as a PID (Proportional, Integral or Derivative) controller.
Transfer	Sets the transfer value shown on the analog output when the selected source reports an internal error, is disconnected from the system or its output mode is set to Transfer. Default: 10 mA
Current	Shows the calculated output current (in mA). By default, the calculated output current value is not the same as the real output current. The real current output is based on the opposite input resistance and cannot be more than 22 mA.
Data logger interval	Sets the interval at which the shown value is saved to the data logger. Options: OFF (default), 5 minutes, 10 minutes, 15 minutes, 20 minutes or 30 minutes

4. Complete the settings based on the Function setting.

Linear control function

Option	Description
Filter	Sets the record time for the recorded measured values. The average of the recorded values during the record time is shown on the analog output.
Filter unit	Sets the time unit for the Filter setting. Options: seconds (default), minutes, hours or days.
Maximum	Sets the maximum current value on the analog output. Default: 20 mA
Scale	Sets the output current range. Options: 0-20 mA (default) or 4-20 mA
Low value	Sets the selected source value shown as 0 mA (0-20 mA) or 4 mA (4–20 mA) on the analog output. Default: 0
High value	Sets the selected source value shown as 20 mA on the analog output. Default: 20
Error mode	Sets the controller to not change the analog output value (Hold) or show the transfer value on the analog output when an internal error occurs. Options: Hold or Transfer

PID control function

Option	Description
Error mode	Sets the controller to not change the analog output value (Hold) or show the transfer value on the analog output when an internal error occurs. Options: Hold or Transfer
Mode	Sets the output condition when the process value is out of the controlled band. Options: Direct control or Reverse
Mode	Automatic—The output works as a PID controller. Manual—The output has got an on/off ratio as set in Manual output.
Manual output	Additionally the on/off ratio can be set (condition: Mode is set to Manual). Note that this ratio cannot exceed a value beyond the values set in the Minimum and Maximum menus.

Option	Description
Minimum	Sets the lower limit for the output current. Default: 0.1 mA
Maximum	Sets an upper limit for the possible output current value. Default: 20.0 mA
Relay setpoint	Sets the process value which is controlled by the PID controller.
Dead zone	The dead zone is a band around the setpoint. In this band the PID controller does not change the PWM on/off ratio output signal. This band is determined as setpoint +/- dead zone. The dead zone stabilizes the PID controlled system which have a tendency to oscillate.
Proportional	Sets the proportional part of the PID controller. Refer to Configure the high voltage relays on page 31.
Integral	Sets the integration part of the PID controller.
Derivative	Sets the derivative part of the PID controller.
Snap shot	Shows the snap shot value.

5. Push OK to apply the changes.
6. Push the main menu icon, then select Outputs > mA outputs > Test/Maintenance.
The Test/Maintenance menu lets the user do a test of the internal plug in the expansion cards.
7. Select an option.

Option	Description
Function test	Does a test on the outputs on the selected module.
Output status	Shows the condition of the outputs on the selected module.

6.5.3 Configure the telegram

The industrial communication protocols usually operates with a cyclic transmission of data between main (master) and secondary (slave) devices on a network. The controller uses Telegram for data transmission. The content of the Modbus TCP telegram is the same as the Profibus telegram, the PROFINET telegram and the EtherNet/IP telegram. Configure the telegram settings as follows:

1. Push the main menu icon, then select Outputs > [output source] > Telegram.
2. Select Add device. A list of available devices show.
3. Select the devices to add to the telegram list and push OK.
4. On the Telegram menu, select one device.
5. Select Add tag. A list of available tags for the selected device shows.
6. Select the tags to add to the device and push OK.
7. Push SAVE.
8. To remove a device from the telegram list, do the steps that follow:
 - a. Go to Outputs > [output source] > Telegram
 - b. Select - Delete device. A list of available devices shows.
 - c. Select the devices to remove and push OK. Confirm to remove the selected devices from the telegram list.

Note: Use the drag and drop function to change the elements on the Telegram list. Push and hold on the element and move the device or tag to the new position. Make sure to update the PLC configuration accordingly after the elements are moved.

6.5.4 Configure the Modbus TCP

Use the Modbus TCP/IP to connect the controller to measurement and control systems that use the TCP/IP protocol for data transmission.

Make sure that all of the necessary electrical connections are complete. Make sure that the Ethernet port in the controller is configured to Modbus TCP. Refer to [LAN connection](#) on page 25.

Configure the controller to use the Modbus TCP communication protocol as follows:

1. Push the main menu icon, then select Outputs > Modbus TCP.
2. Set the Modbus TCP button to on.
3. Select an option.

Option	Description
Modbus TCP	Sets the Modbus TCP to on or off.
IP address	Shows the IP address.
TCP Port	Shows the TCP Port.
Telegram	Manages the Telegram data structure. Select the devices and the device data tags in the Telegram. Refer to Configure the telegram on page 39.
Modbus address	Sets the address (1 to 255) of the Modbus secondary device configured in the Telegram menu.
Virtual modbus slave	Adds virtual secondary devices. The virtual secondary devices are copies of devices configured in the Telegram menu. When set to on, the virtual device is enabled. When set to off (default), the virtual device is disabled.
Data order	Sets the byte sequence for the transmission of floating point values. A floating point value has 4 bytes. The floating point value is only data of the configured slaves. • Normal (default)—The pairs are not changed. • Swapped—Changes the first byte pair with the last byte pair. Note: An incorrect setting in the Data order menu can cause small changes in the floating point values (moved in one register).
Simulation	Simulates two floating point values and errors (or statuses) to replace an instrument. The first floating point value goes through a ramp between limits set in the Minimum and Maximum menus. • Simulation—Enables or disables the simulation. Options: on or off. • Period—Sets the time in minutes (0 to 1000) for the first floating point value to go through the full range between Minimum and Maximum settings. • Maximum—The upper limit for the first floating point value. Range: 0.0 to 1000.0 • Minimum—The lower limit for the first floating point value. Range: 0.0 to 1000.0 • Error—Sets the value in the first simulated register. Range: 0 to 65535 • Status—Sets the value in the second simulated register, Range: 0 to 65535 • Toggle—Changes the direction of the simulated ramp application.

Option	Description
Status	Shows information about the data transfer.
External measurements	Shows when the controller is added to the Telegram menu. For each measurement tag (1 to 16) added in the Telegram menu, select a Parameter and Unit that will show on the tag for external measurements as follows: 1. Select Parameter and Unit. 2. Select Search parameter and search for related parameters. For example, enter DO to find all of the parameters related to dissolved oxygen. A message shows the quantity of parameters found. Push OK. 3. Select Parameter to go to the list of parameters found. 4. Select one parameter, then push OK. 5. Select Unit to select one unit based on the selected parameter. 6. Apply changes to save the configuration. 7. Do the steps again for the other text parameters or go back to the Modbus TCP menu.

4. Push OK.

6.5.5 Configure the Profibus DP

Use Profibus DP (Decentralised Peripherals) to operate sensors and actuators with a centralised controller in production (factory) automation. Make sure that a digital Fieldbus module is installed in the controller. Refer to the documentation supplied with the module. Make sure that all of the necessary electrical connections are complete before the settings are configured.

Configure the Profibus DP settings as follows:

1. Push the main menu icon, then select Outputs > Profibus DP.
2. Set the Profibus DP button to on.
3. Select an option.

Option	Description
Profibus DP	Selects one of the options that follow: • Fieldbus address—Changes the slave address. • Data order—Sets the byte sequence for the transmission of floating point values. A floating point value has 4 bytes. Options: Normal—IEEE Float Big Endian (default). The pairs are not changed. The Normal Data order mode can be used with all known Profibus master systems. Swapped—IEEE Float word wise swapped. Changes the first byte pair with the last byte pair.
Telegram	Manages the Telegram data structure. Select the devices and the device data tags in the Telegram. Refer to Configure the telegram on page 39.

Option	Description
Simulation	Simulates two floating point values and errors (or statuses) to replace an instrument. The first floating point value goes through a ramp between limits set in the Minimum and Maximum menus. • Simulation—Enables or disables the simulation. • Period—Sets the time in minutes (0 to 65535) for the first floating point value to go through the full range between Minimum and Maximum settings. • Maximum—The upper limit for the first floating point value. Range: -3.402823E to 3.402823E+38 • Minimum—The lower limit for the first floating point value. Range: -3.402823E to 3.402823E+38 • Error—Sets the value in the first simulated register. Range: 0 to 65535 • Status—Sets the value in the second simulated register, Range: 0 to 65535 • Toggle—Changes the direction of the simulated ramp application.
Version	Shows the software version of the Profibus network module.
Location	Sets the location name to identify the Profibus network module. Default: network module serial number
Status	Shows the condition of the Profibus network module. • Status—Options: Please wait—Shows until the network module finds all of the configured secondary devices or shows when the module configuration is new and looks for devices connections. Ready—Shows when the network module is prepared to send data to the Profibus. Online—Shows when the network module is connected to the PLC and cyclic data is sent. Note: Based on the number of devices, the duration of a new or initial telegram configuration can take some minutes. • PLC configuration error—Shows when the network card has received a wrong configuration of a PLC (programmable logic controller), such as write to a read only variable.
Input from PLC	• Datalog Interval—Sets the data log interval. • Unit—For each text parameter (1 to 8), select a Parameter and Unit that will show on the tag that will send the PLC as follows: 1. Select Parameter and Unit. 2. Select Search parameter and search for related parameters. For example, enter DO to find all of the parameters related to dissolved oxygen. A message shows the quantity of parameters found. Push OK. 3. Select Parameter to go to the list of parameters found. 4. Select one parameter, then push OK. 5. Select Unit to select one unit based on the selected parameter. 6. Apply changes to save the configuration. 7. Do the steps again for the other text parameters or go back to the Profibus DP menu.
Reset configuration	Sets the configuration back to the factory settings.

4. Push OK.

6.5.6 Configure the EtherNet/IP

The controller can connect to a PLC through Industrial Ethernet Protocol including a EtherNet/IP solution. Ring and bus topologies are available.

Pre-requisites:

1. Make sure that a EtherNet/IP module is installed in the controller. Refer to the documentation supplied with the module.
2. Make sure that all of the necessary electrical connections are complete before the module is configured.
3. Make sure to set the Ethernet ports option to IEP only or Mix IEP. Refer to [LAN connection](#) on page 25.

For configuration information, refer to the EtherNet/IP documentation, available on the manufacturer's website.

6.5.7 Configure the PROFINET

The controller can connect to a PLC through the Industrial Ethernet Protocol, which includes a PROFINET solution. Ring and bus topologies are available.

Pre-requisites:

1. Make sure that a PROFINET module is installed in the controller. Refer to the documentation supplied with the module.
2. Make sure that all of the necessary electrical connections are complete before the module is configured.
3. Make sure to set the Ethernet ports option to IEP only or Mix IEP. Refer to [LAN connection](#) on page 25.

For configuration information, refer to the PROFINET documentation, available on the manufacturer's website.

6.6 Hach Controller Network Bus configuration

The Hach Controller Network Bus (HCNB) is a network used to share the connection to the PLC embedded by one controller and configure the system with remote sensors connected to other controllers (SC4500, SC4200c, SC1500 or RTC). The HCNB is applicable to Claros and non-Claros controllers, but all of the controllers must be connected to the HCNB.

Make sure that the controller connects to the network through LAN or WiFi. Refer to [LAN connection](#) on page 25 and [WiFi network connection](#) on page 26. To configure the controller to use the HCNB, do the steps that follow:

1. Push the main menu icon, then select Controller > Connectivity > HCNB.
2. Set the HCNB button to on. The controller automatically sets the default parameters for Port, Interface and Auto detection.

Note: When the HCNB option is enabled, the controllers in the same network are automatically found.

3. Push APPLY. The controller is set to off and then on again, and HCNB is enabled.

For additional information, refer to the SC4500 network documentation, available on the manufacturer's website.

6.7 Prognosis diagnostic system

The Prognosis diagnostic system shows the status of maintenance tasks and gives the status of the instrument condition. The measure indicator monitors the instrument components and uses the information to show the condition of the instrument. The service indicator counts the number of days until the maintenance tasks must be completed.

If the controller has Prognosys enabled, the Prognosys icon shows on the measurement window in the main view. The device screen shows the device measurement quality with a percentage of the Health indication. In addition, the device screen shows the maintenance tasks with the number of days that remain until the tasks must be completed. Refer to the sensor documentation for additional information.

6.8 Claros

Based on the controller configuration, the controller can connect to Claros for data transmission and device configuration.

Configure Claros on the controller as follows:

1. Make sure that the controller is connected to the internet with a cellular network, WiFi network or through LAN. Refer to [Connect the instrument to a network](#) on page 25.
Note: Push the main menu icon, then select **Information > Network status** to examine the network connection of the controller.
2. Push the main menu icon, then select **Controller > Connectivity > Claros**.
3. Make sure that the Claros button is set to on.
4. Connect to your Claros account and provision the controller. Follow the steps in the Claros interface.
Note: Contact Hach to learn more about Claros or to get a Claros account.
Note: Sensor measurements may go out of view until the controller is successfully provisioned to Claros. If the controller is disconnected from Claros, make sure to set the Claros button to off to show sensor measurements on the display.

When the Claros configuration is complete, the Cloud icon shows on the status bar of the main screen.

6.9 Show the instrument information

Shows information about the controller and connected SC sensors. Shows the controller connection status.

1. Push the main menu icon, then select **Information**.
2. Select an option.

Option	Description
Controller details	Shows the controller serial number, installed software package, the user-defined facility and location of the controller.
SC Devices details	Shows the data for the connected devices. SC sensors: shows the status, device type, serial number, firmware and Claros connection. Shows the connected mA inputs and relays.
Connectivity status	Shows the network condition based on the controller connectivity. • Claros—Shows if the controller is successfully connected to the internet and Claros. • Wi-Fi—Shows if the controller is successfully connected to internet using Wi-Fi connectivity. If there is an error, shows possible causes and solutions. • Cellular—Shows if the controller is successfully connected to internet using Cellular connectivity. If there is an error, shows possible causes and solutions. • LAN—Shows the connection condition and the MAC and IP address of each configured Ethernet port.

Section 7 Maintenance

NOTICE

Do not disassemble the instrument for maintenance. If the internal components must be cleaned or repaired, contact the manufacturer.

7.1 Clean the instrument

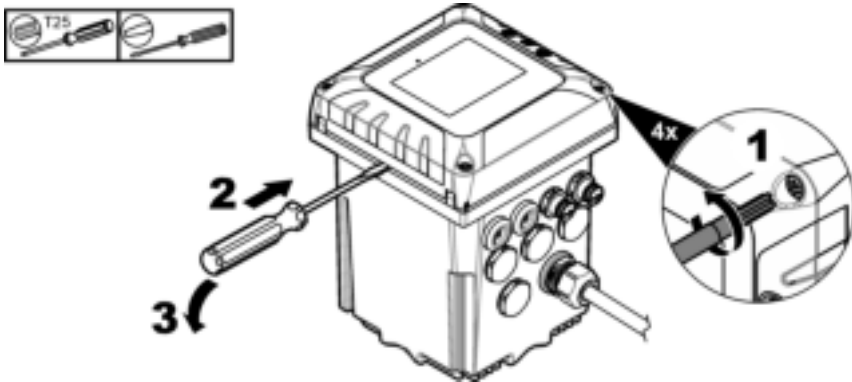
Clean the exterior of the instrument with a moist cloth and a mild soap solution and then wipe the instrument dry as necessary.

Note: The manufacturer recommends that the screen is locked during cleaning, or when a waterjet is used near the controller.

7.2 Unlock the controller cover

Some outdoor conditions can cause a blockage in the controller cover. If necessary, use a flat screwdriver to push at the hinge groove and unlock the controller cover. Refer to [Figure 16](#).

Figure 16 Unlock the controller cover



7.3 Fuse replacement

Fuses are not user-serviceable items. The need for fuse replacement in controllers indicates severe technical failure and is therefore considered to be a service activity. If a blown fuse is suspected, contact Technical Support.

7.4 Battery replacement

The lithium ion backup battery is not user replaceable. Contact technical support for replacement.

Section 8 Troubleshooting

Problem	Possible cause	Solution
Controller will not power up, or powers up intermittently.	Power is not supplied to the controller.	Make sure that the power cable is connected to the controller. Make sure that the power connections are properly terminated in the controller. Make sure the power strip, line power, wall plug are all properly plugged in. Make sure that the controller is connected to the correct power source: 100-240 VAC for AC controllers and 18-28 VDC for DC controllers. Contact technical support.
The controller shows a sensor warning or error.	The sensor reported a warning message.	Refer to the sensor warning description shown in the device detail screen and to the sensor user manual.
	The measurement is not correct because of a sensor error.	Refer to the sensor warning description shown in the device detail screen and to the sensor user manual.
Sensor is not recognized.	Sensor connection issue	Make sure that only two sensors are installed in the controller. Although two analog module ports are available, only two of the three devices will be seen by the controller if a digital sensor and two modules are installed.
		Make sure that the analog module and the digital sensor are not connected to the same channel. The analog module ports are internally connected to the sensor channel. If a digital sensor and an analog module is connected to the same channel only the module is seen by the controller.
		If applicable, remove extension cables from the sensors and directly connect the sensor to the controller. Connect the sensor to a different controller to discard a sensor damage.
	The communication between the sensor and the controller is defective.	Examine the sensor and the sensor cable for damage. If damage is found, contact technical support.
		If no damage is found, disconnect the sensor, wait 15 seconds, then connect the sensor again. Contact technical support if the communication failure shows again.
	The sensor version is not applicable to the controller.	Make sure that the sensor is applicable to the controller. Contact technical support.
	The sensor software is not applicable to the controller.	Make sure to update the sensor software to the latest available version. Refer to Install sensor firmware updates on page 30.

Problem	Possible cause	Solution
No relay activation	Incorrect relay connection or configuration	Make sure that the relay connections are secure. Make sure that the relay wiring is correct. Make sure that the relay configuration is correct. The relay should energize and de-energize as selected.
The controller does not recognize the USB flash drive.	Non-compatible USB flash drive	Make sure that the USB flash drive is formatted with FAT32 and has a minimum of 350 Mb capacity. The USB port on the controller is compatible with USB 2.0 devices. Note: USB 3.0 devices are also compatible but the device will have a USB 2.0 transfer speed. Try again with a more recent USB flash drive.
Firmware update failed	The USB flash drive was removed during the update or the update file is corrupted.	Remove the USB flash drive and do the firmware update process again. Download a new firmware update file. Make sure that the downloaded file is more than 300 Mb. Contact technical support if the error shows again.
Download failed: A problem occurred while downloading the log files.	USB flash drive issue	Push Yes to try again. If the error shows again, restart the controller and try the download again. Contact technical support if the error shows again.
Module is not recognized.	Module connection issue	Make sure that the module is correctly installed. Refer to the module documentation. If possible, remove the module and install the module into a different slot. Contact technical support.
There are navigation issues on the controller touchscreen.	There is dirt on the touchscreen.	Clean the screen. The manufacturer recommends a regular cleaning of the touchscreen. Note: Make sure that the screen is locked during cleaning to prevent unwanted touches. Refer to Configure the controller settings on page 25.
The Claros connection icon shows crossed out.	No access to Claros, but access to internet	If the controller is connected for the first time to Claros, make sure that the controller is provisioned in Claros. If the controller was connected to Claros before, set the controller to off and on again. Examine the controller connectivity. Refer to Show the instrument information on page 44. Contact technical support if the error shows again.

Problem	Possible cause	Solution
Time synchronization OFF	The controller cannot access the NPT internet service to get the clock automatically synchronized.	Make sure that there are no restrictions to external access in the controller network. Contact your IT department and make sure that the network has access to the internet NTP service. If the controller does not connect to Claros, go to Controller > Connectivity > Claros and disable Claros. Then, add the date and time manually in the controller settings.
	The controller has Claros enabled but there is no access to internet.	Make sure that the controller connects to the internet. Examine the controller connectivity.
NTP service unreachable	The controller cannot access the NPT internet service to connect to Claros.	Make sure that there are no restrictions to external access in the controller network. Contact your IT department and make sure that the network has access to the internet NTP service. Make sure that UDP port 123 is open and Pool.ntp.org address is approved in the network.
The Claros icon stays off. The Claros connection icon shows crossed out.	No access to internet	Cellular internet access: - Examine the controller connectivity. Refer to Show the instrument information on page 44. - Examine the cellular signal strength. Move the USB box to a location with higher signal strength. - Examine the SIM card settings (provider, APN etc.). - Make sure that prepaid SIM card has credit. - Make sure that the SIM card data volume is not exceeded.
		Wi-Fi internet access: - Examine the controller connectivity. Refer to Show the instrument information on page 44. - Examine the Wi-Fi signal strength. Move the USB box to a location with higher signal strength. - Use another device to make sure that WiFi access point is enabled. - Make sure that the correct credentials were used in the WiFi configuration. Refer to WiFi network connection on page 26.
		LAN internet access: Examine the controller connectivity. Refer to Show the instrument information on page 44.
	No access to Claros	Make sure that the sensors and devices are correctly connected and provisioned in Claros.

Section 9 Replacement parts and accessories

⚠ WARNING



Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

Note: Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.

Replacement parts

Description	Item number
M12/RJ45 connector kit (Ethernet cable)	LXZ524.99.00009
M12/M12 connector kit (Ethernet cable)	LXZ524.99.00010
Ethernet cable M12 to M12, 10 m	LXZ524.99.00011
Ethernet cable M12 to RJ45, 5 m	LXZ524.99.00012
USB to Ethernet Adapter	LZ472-01
Panel mount bracket	8001316
Controller installation kit	8806200
Mounting hardware kit (screws only)	9177800
Mounting bracket inserts	9177900
SC4500 USB cover replacement, includes screws	LXZ525.99.00012
SC4500 set of front door screws (2x)	LXZ525.99.00023
SC controller M20 Cable Gland Kit	LXZ525.99.00024
SC controller M16 Cable Gland Kit	LXZ525.99.00022
Plug kit for openings	LXZ525.99.00021
M20 Hole Plug	LXZ525.99.00008

Expansion modules

Description	Item number
SC4500 mA output module, five outputs	LXZ525.99.D0002
SC4500 Profibus DP network module	LXZ524.99.00007
SC4500 PROFINET upgrade Kit	LXZ525.99.C0001
SC4500 EtherNet/IP upgrade Kit	LXZ525.99.C0002
SC4500 Modbus TCP upgrade Kit	LXZ525.99.C0003
SC4500 connector upgrade Kit, includes cable nut and cap	LXZ525.99.00001
SC4500 mA input module	LXZ524.97.00042 LXZ524.98.00042

Accessories

Description	Item number
Power box with power connection cable for AMTAX sc and PHOSPHAX sc	LQV155.99.00012
Power box without power connection cable for AMTAX sc and PHOSPHAX sc	LQV155.99.00002
SC4500 External USB box WiFi (for EU)	LXZ525.99.A0001
SC4500 External USB box WiFi (for North America)	LXZ525.99.A0002
SC4500 External USB box Cellular (for EU)	LXZ525.99.A0011
SC4500 External USB box Cellular (for North America)	LXZ525.99.A0012
SC4500 Wi-Fi USB Box (for Asia and Americas)	LXZ525.99.00018
SC4500 M12/RJ45 cable for USB box, includes nut and cap	LXZ525.99.00004
SC4500 USB flash drive	LXZ525.99.00017
UV protection screen	LXZ524.99.00004
UV protection screen including sunroof	LXZ524.99.00005
Holder for mobiles	LXZ524.99.00013
Sunroof visor	LXZ524.99.00033
Sunroof	LXZ524.99.00037
Mounting hardware for sunroof	LXZ524.99.00036

Appendix A Telegram tag list

Legend:

- **Device**—Shows all of the SC devices that can be selected for the SC4500 controller as source (for mA output or High voltage relay) or as device in Telegram (for Profibus DP, Modbus TCP, PROFINET and EtherNet/IP).
- **Name**—Analog source parameters (used for mA output or High voltage relay) or Telegram tags (Telegram is used for digital and Ethernet protocols.)
- **Type**—Type of data: float (32 bits) or integer (16 bits)
- **mA-O**—Applicable to mA output (source)
- **HVR**—Applicable to high voltage relay (source)
- **P-DP**—Applicable to Profibus DP (Telegram)
- **M-TCP**—Applicable to Modbus TCP (Telegram)
- **PRN**—Applicable to PROFINET (Telegram)
- **E/IP**—Applicable to EtherNet/IP (Telegram)

Notes:

1. The first eight rows in the table that follows are the generic tags. The set of eight generic tags show on all of the SC devices. The tags are applicable in Telegram for Profibus DP, Modbus TCP, PROFINET and EtherNet/IP protocol. The tags are not applicable in source for mA output and High voltage relay.
 - The tags are "classified" because they apply to all of the sensors equally. Each bit of each register has the same meaning on all of the devices.

- Heartbeat is a lower clock register. The register changes every second to show that read values are refreshed continuously.
2. Device Error condition is float type in AN-ISE sc and TU5x00 sc. Device Warning is float type in AN-ISE sc, AMTAX sc and PHOSPHAX sc.
 3. SC4500— Select the controller itself to configure the Modbus TCP to import an external measurement. Refer to [Configure the Modbus TCP](#) on page 39.
 4. mA output—It is not possible to select the local mA output itself or a remote mA output.
High voltage relay—It is not possible to select the local High voltage relay itself. If HCNB is ON, it is possible to select a remote High voltage relay.
 5. Measurement indicator [%] and Service indicator [days] only shows if the sensor has Prognosys.

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
All SC devices (Set of eight generic tags. Refer to Note 1)	Classified Error	Integer	X	X	✓	✓	✓	✓
	Classified Status 1	Integer	X	X	✓	✓	✓	✓
	Classified Status 2	Integer	X	X	✓	✓	✓	✓
	Classified Status 3	Integer	X	X	✓	✓	✓	✓
	Classified Status 4	Integer	X	X	✓	✓	✓	✓
	Device Error Condition (refer to Note 2)	Integer	X	X	✓	✓	✓	✓
	Device Warning Condition (refer to Note 2)	Integer	X	X	✓	✓	✓	✓
	Heartbeat	Integer	X	X	✓	✓	✓	✓
SC4500 (refer to Note 3)	Measurement 1	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 10	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 11	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 12	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 13	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 14	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 15	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 16	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 2	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 3	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 4	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 5	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 6	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 7	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 8	Float	✓	✓	✓	✓	✓	✓
SC4500	Measurement 9	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
High voltage relay (refer to Note 4)	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
High voltage relay	Contact Position ch1	Integer	✓	X	✓	✓	✓	✓
High voltage relay	Contact Position ch2	Integer	✓	X	✓	✓	✓	✓
High voltage relay	Input Value ch1	Float	✓	X	✓	✓	✓	✓
High voltage relay	Input Value ch2	Float	✓	X	✓	✓	✓	✓
MAOUTPUT (refer to Note 4)	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
MAOUTPUT	Current ch1 [mA]	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Current ch2 [mA]	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Current ch3 [mA]	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Current ch4 [mA]	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Current ch5 [mA]	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Input Value ch1	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Input Value ch2	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Input Value ch3	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Input Value ch4	Float	X	✓	✓	✓	✓	✓
MAOUTPUT	Input Value ch5	Float	X	✓	✓	✓	✓	✓
Profibus DP	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Profibus DP	External measurement value 1	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 2	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 3	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 4	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 5	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 6	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 7	Float	✓	✓	✓	✓	✓	✓
Profibus DP	External measurement value 8	Float	✓	✓	✓	✓	✓	✓
PROFINET	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
PROFINET	External measurement value 1	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
PROFINET	External measurement value 2	Float	✓	✓	✓	✓	✓	✓
PROFINET	External measurement value 3	Float	✓	✓	✓	✓	✓	✓
PROFINET	External measurement value 4	Float	✓	✓	✓	✓	✓	✓
PROFINET	External measurement value 5	Float	✓	✓	✓	✓	✓	✓
PROFINET	External measurement value 6	Float	✓	✓	✓	✓	✓	✓
PROFINET	External measurement value 7	Float	✓	✓	✓	✓	✓	✓
PROFINET	External measurement value 8	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
EtherNet/IP	External measurement value 1	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 2	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 3	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 4	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 5	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 6	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 7	Float	✓	✓	✓	✓	✓	✓
EtherNet/IP	External measurement value 8	Float	✓	✓	✓	✓	✓	✓
mA input	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
mA input	Current [mA]	Float	✓	✓	✓	✓	✓	✓
mA input	Input	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Measurement indicator [%] (refer to Note 5)	Integer	X	X	✓	✓	✓	✓
AMTAX sc	Service indicator [days] (refer to Note 5)	Integer	X	X	✓	✓	✓	✓
AMTAX sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
AMTAX sc	Ammonium NH4 ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
AMTAX sc	Ammonium NH4 ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Ammonium NH4-N ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Ammonium NH4-N ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Cleaning solution level [%]	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Enclosure temperature [°C]	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Last electrode exchange date	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Last membrane exchange date	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	mV from active Sample	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Process state	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Reagent Level [%]	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Slope of electrode mV	Float	✓	✓	✓	✓	✓	✓
AMTAX sc	Standards Level [%]	Float	✓	✓	✓	✓	✓	✓
A-ISE sc	Measurement indicator [%]	Integer	✗	✗	✓	✓	✓	✓
A-ISE sc	Service indicator [days]	Integer	✗	✗	✓	✓	✓	✓
A-ISE sc	Set of eight generic tags	Integer	✗	✗	✓	✓	✓	✓
A-ISE sc	Ammonium NH4 [mg/L]	Float	✓	✓	✓	✓	✓	✓
A-ISE sc	Ammonium NH4-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
A-ISE sc	Potassium K [mg/L]	Float	✓	✓	✓	✓	✓	✓
A-ISE sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
A-ISE sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Measurement indicator [%]	Integer	✗	✗	✓	✓	✓	✓
AN-ISE sc	Service indicator [days]	Integer	✗	✗	✓	✓	✓	✓
AN-ISE sc	Set of eight generic tags	Integer	✗	✗	✓	✓	✓	✓
AN-ISE sc	Ammonium NH4 [mg/L]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Ammonium NH4-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Chloride Cl [mg/L]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Nitrate NO3 [mg/L]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
AN-ISE sc	Nitrate NO ₃ -N [mg/L]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Potassium K [mg/L]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
AN-ISE sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
N-ISE sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
N-ISE sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
N-ISE sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
N-ISE sc	Chloride Cl [mg/L]	Float	✓	✓	✓	✓	✓	✓
N-ISE sc	Nitrate NO ₃ [mg/L]	Float	✓	✓	✓	✓	✓	✓
N-ISE sc	Nitrate NO ₃ -N [mg/L]	Float	✓	✓	✓	✓	✓	✓
N-ISE sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
N-ISE sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
CL 17 sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
CL 17 sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
CL 17 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
CL 17 sc	Vol [mL/min]	Float	✓	✓	✓	✓	✓	✓
CL 17 sc	Free chlorine [mg/L]	Float	✓	✓	✓	✓	✓	✓
CL 17 sc	Total chlorine [mg/L]	Float	✓	✓	✓	✓	✓	✓
CL 17 sc	LED drive [%]	Float	✓	✓	✓	✓	✓	✓
CL 10 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
CL 10 sc	Free chlorine	Float	✓	✓	✓	✓	✓	✓
CL 10 sc	pH [pH]	Float	✓	✓	✓	✓	✓	✓
CL 10 sc	Temperature	Float	✓	✓	✓	✓	✓	✓
LDO2 sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
LDO2 sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
LDO2 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
LDO2 sc	Dissolved Oxygen [%]	Float	✓	✓	✓	✓	✓	✓
LDO2 sc	Dissolved Oxygen [mg/L]	Float	✓	✓	✓	✓	✓	✓
LDO2 sc	Dissolved Oxygen [ppm]	Float	✓	✓	✓	✓	✓	✓
LDO2 sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
LDO2 sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
Nitratax60 sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
Nitratax60 sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
Nitratax60 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Nitratax60 sc	Nitrate NO3 or NOx-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
Nitratax eco sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
Nitratax eco sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
Nitratax eco sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Nitratax eco sc	Nitrate NO3 or NOx-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
Nitratax plus sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
Nitratax plus sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
Nitratax plus sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Nitratax plus sc	Nitrate NO3 or NOx-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
Nitratax clear sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
Nitratax clear sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
Nitratax clear sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Nitratax clear sc	Nitrate NO3 or NOx-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
Nitratax sc (Germany only)	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
Nitratax sc (Germany only)	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
Nitratax sc (Germany only)	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Nitratax sc (Germany only)	Nitrate NO3 or NOx-N [mg/L]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc LR	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc LR	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc LR	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc LR	Phosphate-Phosphorus PO4-P [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc LR	Phosphate PO4 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
PHOSPHAX sc LR	Phosphorus Pentoxide P2O5 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc MR	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc MR	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc MR	Cleaning solution level [%]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Phosphate-Phosphorus PO4-P ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Phosphate-Phosphorus PO4-P ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Phosphate PO4 ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Phosphate PO4 ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Phosphorus Pentoxide P2O5 ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Phosphorus Pentoxide P2O5 ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Process state	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc MR	Reagent Level [%]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc HR	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc HR	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
PHOSPHAX sc HR	Cleaning solution level [%]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Phosphate-Phosphorus PO4-P ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Phosphate-Phosphorus PO4-P ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Phosphate PO4 ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Phosphate PO4 ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Phosphorus Pentoxide P2O5 ch1 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
PHOSPHAX sc HR	Phosphorus Pentoxide P2O5 ch2 [mg/L or ppm]	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Process state	Float	✓	✓	✓	✓	✓	✓
PHOSPHAX sc HR	Reagent Level [%]	Float	✓	✓	✓	✓	✓	✓
pHD sc V2	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
pHD sc V2	ORP [mV]	Float	✓	✓	✓	✓	✓	✓
pHD sc V2	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
pHD sc V2	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
pHD sc V2	pH [pH]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
SOLITAX sc	Measurement indicator [%]	Float	X	X	✓	✓	✓	✓
SOLITAX sc	Service indicator [days]	Float	X	X	✓	✓	✓	✓
SOLITAX sc	Solid [%]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Solid [g/L]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Solid [mg/L]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Solid [ppm]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Turbidity [EBC]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Turbidity [FNU]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Turbidity [FTU]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Turbidity [NTU]	Float	✓	✓	✓	✓	✓	✓
SOLITAX sc	Turbidity [TEF]	Float	✓	✓	✓	✓	✓	✓
SONATAX sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
SONATAX sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
SONATAX sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
SONATAX sc	Sludge height [ft]	Float	✓	✓	✓	✓	✓	✓
SONATAX sc	Sludge height [m]	Float	✓	✓	✓	✓	✓	✓
SONATAX sc	Sludge level [ft]	Float	✓	✓	✓	✓	✓	✓
SONATAX sc	Sludge level [m]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
TSS sc	Solid [%]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Solid [g/L]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Solid [mg/L]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Solid [ppm]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
TSS sc	Turbidity [EBC]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Turbidity [FNU]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Turbidity [FTU]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Turbidity [NTU]	Float	✓	✓	✓	✓	✓	✓
TSS sc	Turbidity [TEF]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
TU5300 sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
TU5300 sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
TU5300 sc	Flow [L/min]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Turbidity [DEG]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Turbidity [EBC]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Turbidity [FTU]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Turbidity [FNU]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Turbidity [NTU]	Float	✓	✓	✓	✓	✓	✓
TU5300 sc	Turbidity [TEF]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
TU5400 sc	Measurement indicator [%]	Integer	X	X	✓	✓	✓	✓
TU5400 sc	Service indicator [days]	Integer	X	X	✓	✓	✓	✓
TU5400 sc	Flow [L/min]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Relative Standard Deviation [%]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [DEG]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [EBC]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [FTU]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [FNU]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [mFNU]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [mNTU]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [NTU]	Float	✓	✓	✓	✓	✓	✓
TU5400 sc	Turbidity [TEF]	Float	✓	✓	✓	✓	✓	✓
SS7 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
SS7 sc	Turbidity	Float	✓	✓	✓	✓	✓	✓
Ultraturb Seawater	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
Ultraturb Seawater	Turbidity	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
1720E Low Range Turbidimeter	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
1720E Low Range Turbidimeter	Turbidity	Float	✓	✓	✓	✓	✓	✓
UVASplus sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
UVASplus sc	Selected Parameter [selected unit]	Float	✓	✓	✓	✓	✓	✓
UVASeco sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
UVASeco sc	Selected Parameter [selected unit]	Float	✓	✓	✓	✓	✓	✓
1200-S sc V2	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
1200-S sc V2	ORP [mV]	Float	✓	✓	✓	✓	✓	✓
1200-S sc V2	pH [pH]	Float	✓	✓	✓	✓	✓	✓
1200-S sc V2	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
1200-S sc V2	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
3798-S sc V2	Conductivity [S/cm]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Conductivity [S/m]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Conductivity [uS/cm]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Resistivity [Ohm.cm]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Resistivity [Ohm.m]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
3798-S sc V2	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
9184 sc	Concentration [mg/L]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Concentration [ppb]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Concentration [ppm]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Concentration [ug/L]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Current [nA]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Current [uA]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
9184 sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
9184 sc	pH [pH]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
9185 sc	Concentration [mg/L]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
9185 sc	Concentration [ppb]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Concentration [ppm]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Concentration [ug/L]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Current [nA]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Current [uA]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
9185 sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
9185 sc	pH [pH]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
9187 sc	Concentration [mg/L]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Concentration [ppb]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Concentration [ppm]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Concentration [ug/L]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Current [nA]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Current [uA]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
9187 sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
9187 sc	pH [pH]	Float	✓	✓	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Conductivity	Float	✓	✓	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Resistivity	Float	✓	✓	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Salinity [ppt]	Float	✓	✓	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
D3422 (digital) - 3400 sc	Total dissolved solids	Float	✓	✓	✓	✓	✓	✓
D3700 sc (analogic) 6120800 (gateway)	Set of eight generic tags	Integer	X	X	✓	✓	✓	✓
D3700 sc (analogic) 6120800 (gateway)	#DEVICETYPETAG.CONCENTRATION_USER %-en#	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
D3700 sc (analogic) 6120800 (gateway)	#DEVICETYPETAG.CO NCENTRATION_TDS_ PPM-en#	Float	✓	✓	✓	✓	✓	✓
D3700 sc (analogic) 6120800 (gateway)	Conductivity	Float	✓	✓	✓	✓	✓	✓
D3700 sc (analogic) 6120800 (gateway)	Salinity [ppt]	Float	✓	✓	✓	✓	✓	✓
D3700 sc (analogic) 6120800 (gateway)	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
D3700 sc (analogic) 6120800 (gateway)	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Set of eight generic tags	Integer	✗	✗	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Conductivity	Float	✓	✓	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Resistivity	Float	✓	✓	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Salinity [ppt]	Float	✓	✓	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
34yyxx (analog) + Gateway (6120700)	Total dissolved solids	Float	✓	✓	✓	✓	✓	✓
pHD (analog) + Gateway (6120500)	Set of eight generic tags	Integer	✗	✗	✓	✓	✓	✓
pHD (analog) + Gateway (6120500)	ORP [mV]	Float	✓	✓	✓	✓	✓	✓
pHD (analog) + Gateway (6120500)	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
pHD (analog) + Gateway (6120500)	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
pHD (analog) + Gateway (6120500)	pH [pH]	Float	✓	✓	✓	✓	✓	✓
RC and PC (analog) + Gateway (6120600)	Set of eight generic tags	Integer	✗	✗	✓	✓	✓	✓
RC and PC (analog) + Gateway (6120600)	ORP [mV]	Float	✓	✓	✓	✓	✓	✓
RC and PC (analog) + Gateway (6120600)	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓

Device	Name	Type	mA-O	HVR	P-DP	M-TCP	PRN	E/IP
RC and PC (analog) + Gateway (6120600)	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓
RC and PC (analog) + Gateway (6120600)	pH [pH]	Float	✓	✓	✓	✓	✓	✓
8362 sc panel pH/ORP V5	Set of eight generic tags	Integer	✗	✗	✓	✓	✓	✓
8362 sc panel pH/ORP V5	ORP [mV]	Float	✓	✓	✓	✓	✓	✓
8362 sc panel pH/ORP V5	pH [pH]	Float	✓	✓	✓	✓	✓	✓
8362 sc panel pH/ORP V5	Temperature [°C]	Float	✓	✓	✓	✓	✓	✓
8362 sc panel pH/ORP V5	Temperature [°F]	Float	✓	✓	✓	✓	✓	✓

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