BLUE DRAGON TECHNOLOGY

C620TUR

ONLINE TURBIDITY ANALYZER

Operation, Installation & Maintenance Manual

Blue Dragon C620TUR Online Turbidity Analyzer.

Blue Dragon Water & Environmental Analysis Series

Document No. BD-C620TUR-MAN-EN | Version 1.0 | 8 August 2026

For trained installation, operation, calibration and maintenance personnel

Document Control

This Version 1.0 manual is the public operation, installation and maintenance reference for the Blue Dragon C620TUR standard immersion turbidity system. The delivered nameplate, packing list, factory test record and order-specific drawings govern the exact supplied configuration.

Field	Details
Product	Blue Dragon C620TUR Online Turbidity Analyzer
Document	Operation, Installation & Maintenance Manual
Document number	BD-C620TUR-MAN-EN
Version	1.0
Release date	8 August 2026
Language	English
Product family	Blue Dragon Water & Environmental Analysis Series
Standard configuration	0-4000 NTU immersion turbidity system; 850 +/-10 nm infrared, 90-degree scattered-light measurement; self-wiping sensor; local controller/transmitter
Standard warranty	12 months, subject to the sales contract
Sensor sealing / cable	No O-ring in the standard sensor configuration; PUR cable jacket
Copyright	

Contents

1. About This Manual

1.1 Purpose

This manual provides the information required to receive, inspect, install, wire, commission, operate, calibrate, maintain, store and troubleshoot the Blue Dragon C620TUR Online Turbidity Analyzer. It covers the standard immersion configuration consisting of the C620TUR controller/transmitter and the Blue Dragon self-wiping immersion turbidity sensor.

1.2 Intended Audience

- Instrumentation and electrical technicians responsible for panel mounting, power, signals and communications.
- Process, environmental and operations personnel responsible for online turbidity monitoring and alarm response.
- Laboratory or quality personnel supporting turbidity-standard handling, calibration and comparison checks.
- Maintenance personnel responsible for optical-window cleaning, wiper replacement, seal inspection and cable inspection.

1.3 Configuration Control

The controller platform can support multiple turbidity-sensor types. This manual covers the Blue Dragon C620TUR standard immersion configuration and the approved installation, operation, calibration and communications guidance for customer use. Order-specific drawings, the packing list, the factory test report and the delivered nameplate govern the exact supplied configuration.

1.4 Terminology

Term	Meaning
NTU	Nephelometric turbidity unit. Standard display unit for the C620TUR.
FTU	Formazin turbidity unit. Alternative display unit available in the controller.
Scattered light	Light redirected by suspended particles and detected at an angle to the incident beam.
One-point / factor calibration	Calibration using one turbidity standard to calculate or apply a multiplicative correction factor.
LRV / URV	Lower and upper range values used to scale the 4-20 mA output.
General purpose / safe area	Non-hazardous, non-classified installation location.
Controller platform	The underlying controller or sensor architecture integrated into the Blue Dragon branded system.

2. Safety Information

WARNING	**Installation and servicing shall be performed by qualified personnel. Isolate power before opening the controller or changing wiring. Review sample pressure, temperature, biological hazards and chemical compatibility before installing or removing the sensor.**

2.1 Safe-Area Limitation

The standard C620TUR is intended for general-purpose, non-hazardous locations. It has no ATEX or IECEx approval. Do not install the controller or sensor in a classified hazardous area unless a separately engineered and certified solution has been supplied and approved by the responsible site authority.

2.2 Electrical Safety

- Provide an accessible external disconnect and correctly rated overcurrent protection.
- Connect protective earth before energising the system. Do not use signal common as protective earth.
- Keep mains conductors separated from sensor, 4-20 mA and RS485 wiring.
- Use suitable cable glands and maintain the controller enclosure seal.
- Do not perform unauthorised internal electronic repair.

2.3 Process and Mechanical Safety

- Do not expose the sensor to freezing conditions.
- Do not exceed 0.4 MPa process pressure or 2.5 m/s local flow velocity.
- Secure the immersion assembly so that process flow cannot strike the sensor against walls, pipes or structures.
- Depressurise, isolate and drain the process before removing a sensor from a pressurised chamber.
- Do not lift or support the sensor by the electrical cable.

2.4 Chemical Compatibility

The standard sensor uses a stainless-steel body, quartz optical window, rubber wiper and PUR cable jacket. The standard sensor configuration does not use a separate O-ring. Application review is required for strong acids, hydrofluoric acid, concentrated sulfuric acid, hot high-chloride service, strong oxidants, refinery wastewater containing aggressive chemicals, solvents or unknown mixtures.

CAUTION	Do not treat the automatic wiper as maintenance-free. Fouling, scaling, biological growth, oils, fibres and abrasive solids can still require manual cleaning and shortened inspection intervals.

3. Product Overview

3.1 Description

The Blue Dragon C620TUR is an online turbidity monitoring system consisting of a local controller/transmitter and a digital self-wiping immersion sensor. The sensor measures light scattered by suspended particles, communicates digitally with the controller, and provides a local display, 4-20 mA output, RS485/Modbus RTU communication, relay functions, data storage and trend display.

Figure 1. Blue Dragon C620TUR controller and self-wiping immersion turbidity sensor.

3.2 Intended Applications

- Municipal and industrial wastewater treatment.
- Process-water and water-treatment monitoring.
- Surface-water and intake monitoring where the range and matrix are suitable.
- Clarifier, filter, settling and treatment-process trend monitoring.
- Industrial discharge, utility-water and plant-water applications.
- High-solids or fouling-prone applications where the automatic wiper reduces optical-window deposits.

3.3 Applications Outside the Initial Positioning

NOTE	The C620TUR shall not initially be promoted as a low-level drinking-water turbidity instrument. Values below 50 NTU may be checked against standards, but manufacturer water-sample comparison data below 50 NTU has not been supplied.

3.4 Standard Supply

Category	Typical items
Standard supply	C620TUR controller/transmitter; Blue Dragon self-wiping immersion turbidity sensor; 10 m sensor cable; L-shaped mounting bracket; four replacement rubber scrapers; operation manual; certificate of conformity.

Category	Typical items
Order-specific / optional	24 VDC controller power; extended cable up to 50 m; mounting hardware; instrument enclosure; sample chamber; communication accessories; turbidity standards.
Recommended initial spares	Rubber scraper/wiper set; sensor cable or extension as applicable; mounting fasteners; approved turbidity standard.

3.5 System Architecture

Measurement point	Local analyzer	Plant interface
Self-wiping immersion turbidity sensor - 0-4000 NTU - 10 m standard cable	C620TUR controller/transmitter - display and setup - calibration - alarm/output configuration - history and waveform	4-20 mA to PLC/DCS RS485/Modbus RTU to SCADA/PLC/PC Relays for high/low alarm and cleaning function

4. Measurement Principle and Performance

4.1 Optical Measurement Principle

The sensor uses an infrared light source at 850 +/-10 nm. Suspended particles scatter the incident light, and an optical detector positioned at approximately 90 degrees to the source measures the scattered-light intensity. The signal is processed into a turbidity value displayed in NTU or FTU.

IMPORTANT	**The specified measurement method uses an 850 +/-10 nm infrared source and approximately 90-degree scattered-light detection. No ISO 7027, EPA, NSF or MCERTS compliance claim is made for the C620TUR.**

4.2 Performance Characteristics

Parameter	C620TUR standard specification	Qualification / note
Measurement range	0-4000 NTU	Actual sensor range; controller display capacity extends to 9999 NTU.
Accuracy	+/-2% of measured value	Specified for the standard C620TUR configuration.
Repeatability	+/-2%	Specified performance.
Resolution	0.01 to 0.1 NTU	Depends on the selected range and displayed value.
Response time	Less than 60 seconds	Total response also depends on sensor location, mixing and process transport.
Light source	850 +/-10 nm infrared	Specified optical source.
Detection geometry	90-degree scattered light	Scattering photometry.
Measurement units	NTU, FTU	Selectable in controller.
Low-range qualification	Below 50 NTU: standard-solution comparison only	Do not make low-level drinking-water performance claims.

4.3 Matrix and Installation Effects

Condition	Potential effect	Recommended action
Bubbles or foam	May scatter light and produce unstable or high readings.	Select a location free of entrained gas; orient the optical face to avoid bubble collection.
Large particles or fibres	May cause short spikes, strike the wiper or become trapped.	Use representative location and stable mounting; inspect more frequently.
Window fouling	Causes drift or reduced response.	Increase wiping frequency and clean manually as required.
Direct external light	Can influence calibration when the sensor is outside the process.	Shield the calibration vessel and keep it away from strong light.
Process stratification	Reading may not represent the bulk stream.	Install at a well-mixed representative point.
High velocity	Can cause vibration, impact or unstable reading.	Keep local velocity at or below 2.5 m/s and mechanically support the sensor.

5. Technical Specifications

5.1 System and Sensor

Item	Specification
Blue Dragon model	C620TUR Online Turbidity Analyzer
Controller	Blue Dragon C620TUR local controller / transmitter
Sensor configuration	Blue Dragon self-wiping immersion turbidity sensor with automatic rubber scraper
Range	0-4000 NTU
Accuracy	+/-2% of measured value
Repeatability	+/-2%
Resolution	0.01-0.1 NTU
Response time	<60 s
Optical method	850 +/-10 nm infrared, 90-degree scattered-light measurement
Process temperature	0-45 degC, no freezing
Maximum pressure	0.4 MPa
Maximum local flow velocity	2.5 m/s
Sensor body	SUS316L stainless steel
Optical window	Quartz
Wiper / scraper	Rubber
O-ring / seal material	Not applicable - no separate O-ring in the standard sensor configuration
Cable-jacket material	PUR
Sensor protection	IP68 / NEMA 6P (manufacturer rating)
Sensor weight	Approx. 1.65 kg
Cable length	10 m standard; 50 m maximum for this Blue Dragon configuration
Sensor power / communications	12 VDC from controller; digital RS485

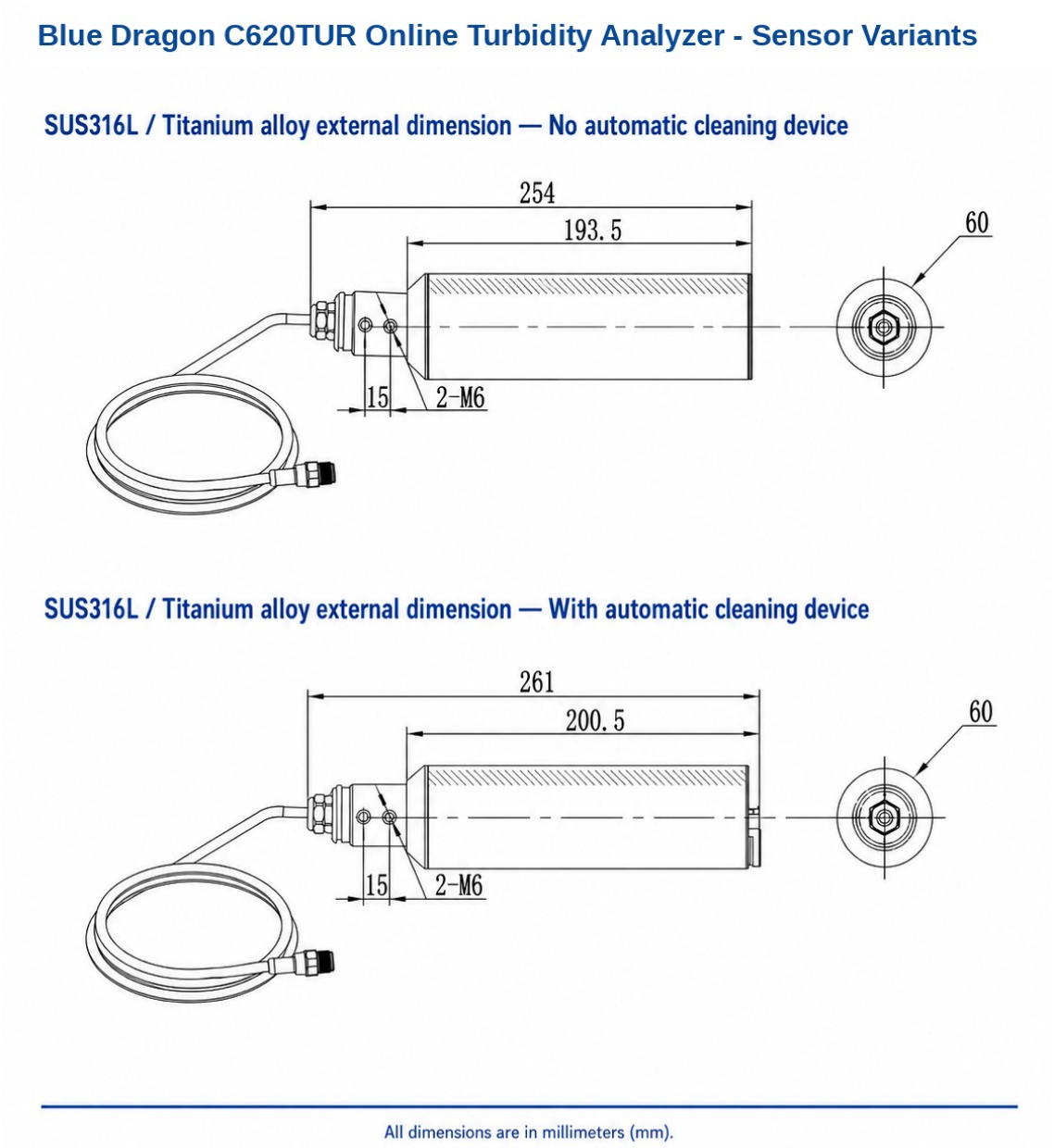


Figure 2. SUS316L/titanium immersion-sensor dimensional variants. The standard C620TUR supply uses the automatic-cleaning stainless-steel configuration.

Other body materials or cleaning arrangements are supplied only when specifically stated on the order.

5.2 Controller

Item	Specification
Controller enclosure	ABS panel-mount enclosure
Power supply	100-240 VAC, 50/60 Hz; optional 24 VDC
Power consumption	4 W nominal
Display range	Up to 9999 NTU; actual C620TUR sensor range is 0-4000 NTU
Analog output	One active, isolated 4-20 mA output
Maximum analog load	500 ohm

Item	Specification
Digital communication	RS485, Modbus RTU
Relays	Three outputs, maximum 5 A at 250 VAC or 5 A at 30 VDC
Controller dimensions	144 x 144 x 104 mm
Controller weight	Approx. 0.9 kg
Front protection	IP65 (manufacturer rating)
Operating environment	-20 to 50 degC; 0-95% RH, non-condensing; altitude <=2000 m
Storage environment	-40 to 70 degC; <=95% RH, non-condensing

5.3 Data and User Functions

Function	Capability
Measurement display	Turbidity, unit, date, time, status, corresponding 4-20 mA value and relay state
History	Up to 1000 records; oldest record overwritten when full
Storage interval	Configurable; minimum interval 5 minutes
Trend	Local waveform display
USB / export	USB-based CSV data export on current-production controllers; verify fitted interface and firmware during commissioning
Wiper interval	15, 30, 60, 240, 720, 1440, 4320 or 10080 minutes at sensor level; controller menu may present equivalent interval settings
Calibration	One-point / factor calibration for the standard C620TUR configuration

6. Receiving, Inspection and Storage

6.1 Receiving Inspection

1. Inspect the shipping container for impact, moisture or mishandling.
2. Compare the received items with the packing list.
3. Record controller and sensor serial numbers.
4. Inspect the quartz window, rubber wiper, cable, connector, bracket, enclosure and display.
5. Do not install equipment with cracked optics, damaged cable, loose fasteners or evidence of water ingress.

6.2 Storage

- Store the controller in a clean, dry, non-condensing indoor location.
- Store the sensor clean and dry, protected from impact and freezing.
- Do not bend the cable sharply or place heavy objects on it.
- Keep protective caps and packing materials until commissioning is complete.
- For extended storage, inspect seals and the wiper before installation.

7. Installation Planning

7.1 Measurement Location

- Choose a representative, well-mixed point.
- Avoid dead zones, sediment beds, air-release points and locations where the sensor may be exposed when the level falls.
- Provide access for safe removal, cleaning, calibration and wiper replacement.
- Ensure the cable route is protected from abrasion, heat, chemicals and mechanical damage.

- Keep the controller within the permitted cable length and in a location suitable for its enclosure rating.

7.2 Mounting Orientation

Install the sensor so that the optical window remains submerged and does not face a surface at very close distance. Maintain sufficient clearance around the optical face and wiper. A clearance of approximately 150 mm from the bottom of a calibration vessel is recommended during calibration; use comparable open clearance in the process where practical.

7.3 Application Review

Review item	Project requirement
Range and normal turbidity	Confirm normal, minimum, maximum and upset values are within 0-4000 NTU.
Temperature and pressure	Confirm 0-45 degC, no freezing, and <=0.4 MPa.
Velocity and mounting loads	Confirm <=2.5 m/s and provide rigid support.
Chemical compatibility	Review pH, chlorides, oxidants, acids, solvents and cleaning chemicals.
Fouling and solids	Set an initial wiper interval and maintenance frequency.
Site classification	Safe area only unless separately engineered and certified.
Plant interface	Confirm 4-20 mA scaling, RS485 parameters, relay logic and cable segregation.

8. Mechanical Installation

8.1 Controller Panel Mounting

Mount the controller in a rigid panel using the supplied panel clamps. Provide clearance behind the panel for the 104 mm enclosure depth, terminals, cable bend radius and ventilation. Protect the controller from direct spray, condensation, corrosive vapour, vibration and direct sunlight.

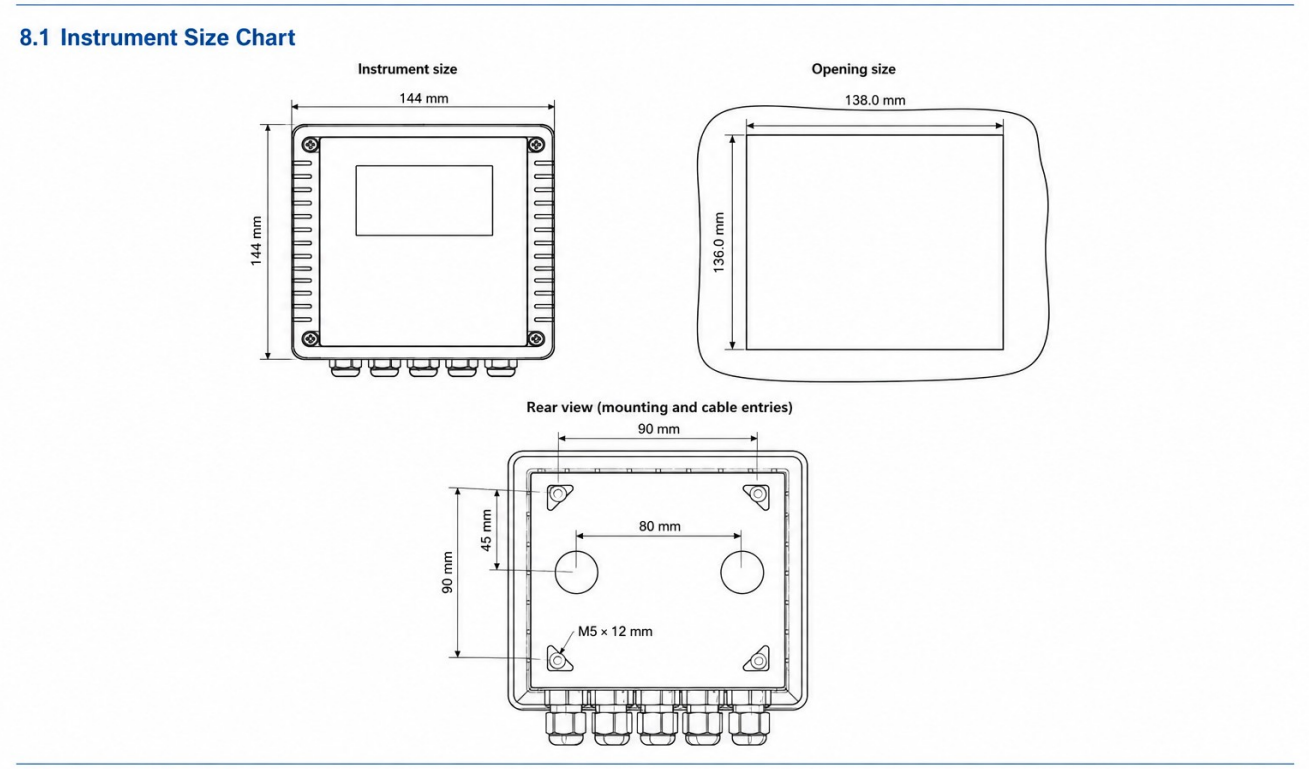


Figure 3. Controller dimensions and panel cutout.

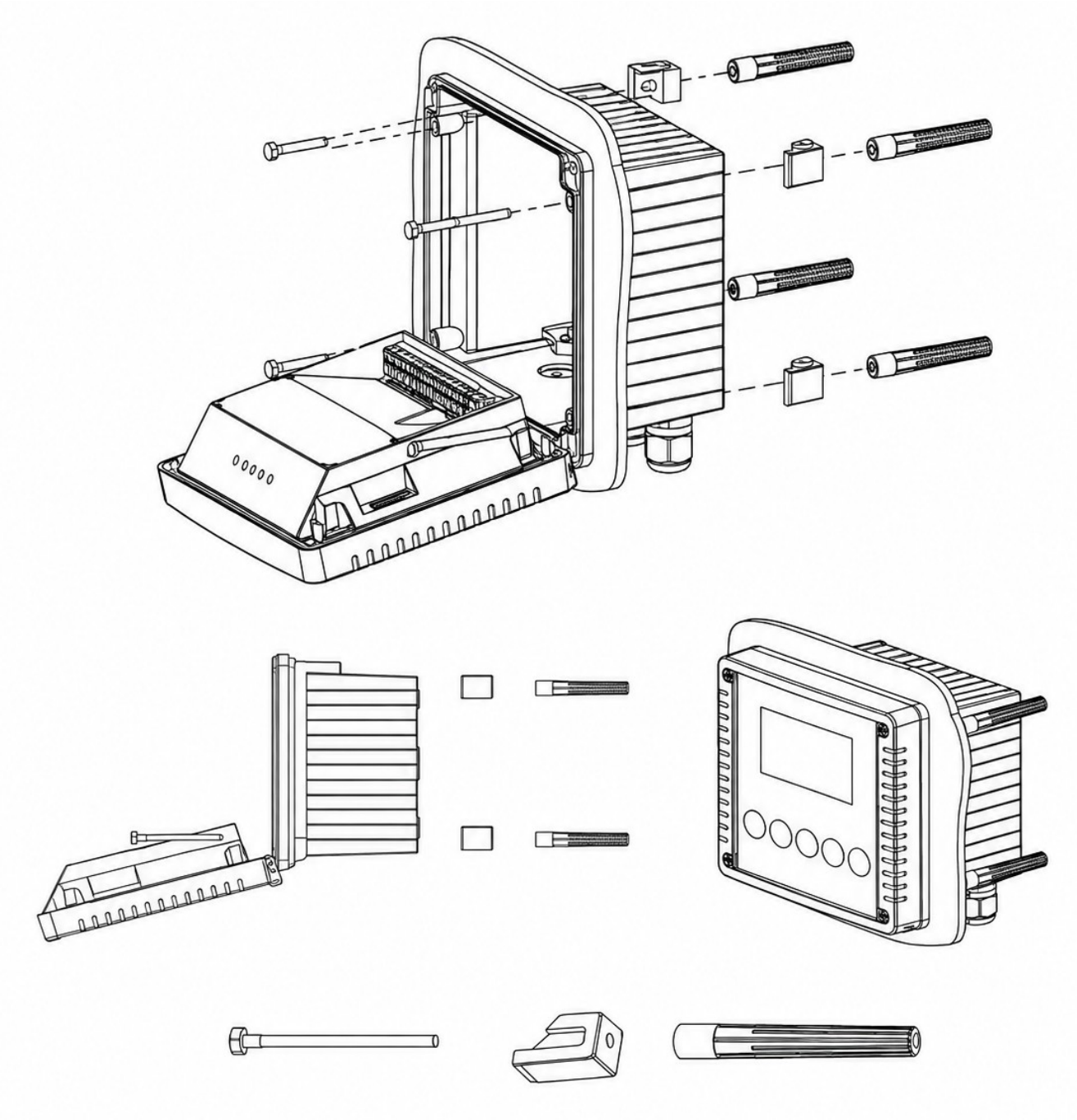


Figure 4. Controller panel-mounting exploded view.

8.2 Sensor Immersion Mounting

1. Assemble the L-shaped or project-specific mounting bracket and support pipe.
2. Attach the sensor securely without twisting the cable.
3. Orient the optical face and wiper into representative flow while avoiding direct impact from large debris.
4. Lower the sensor to the required depth and lock the support against rotation and vibration.
5. Form a drip loop before the cable enters a junction box or controller enclosure.
6. Verify that the sensor remains submerged through the expected operating-level range.

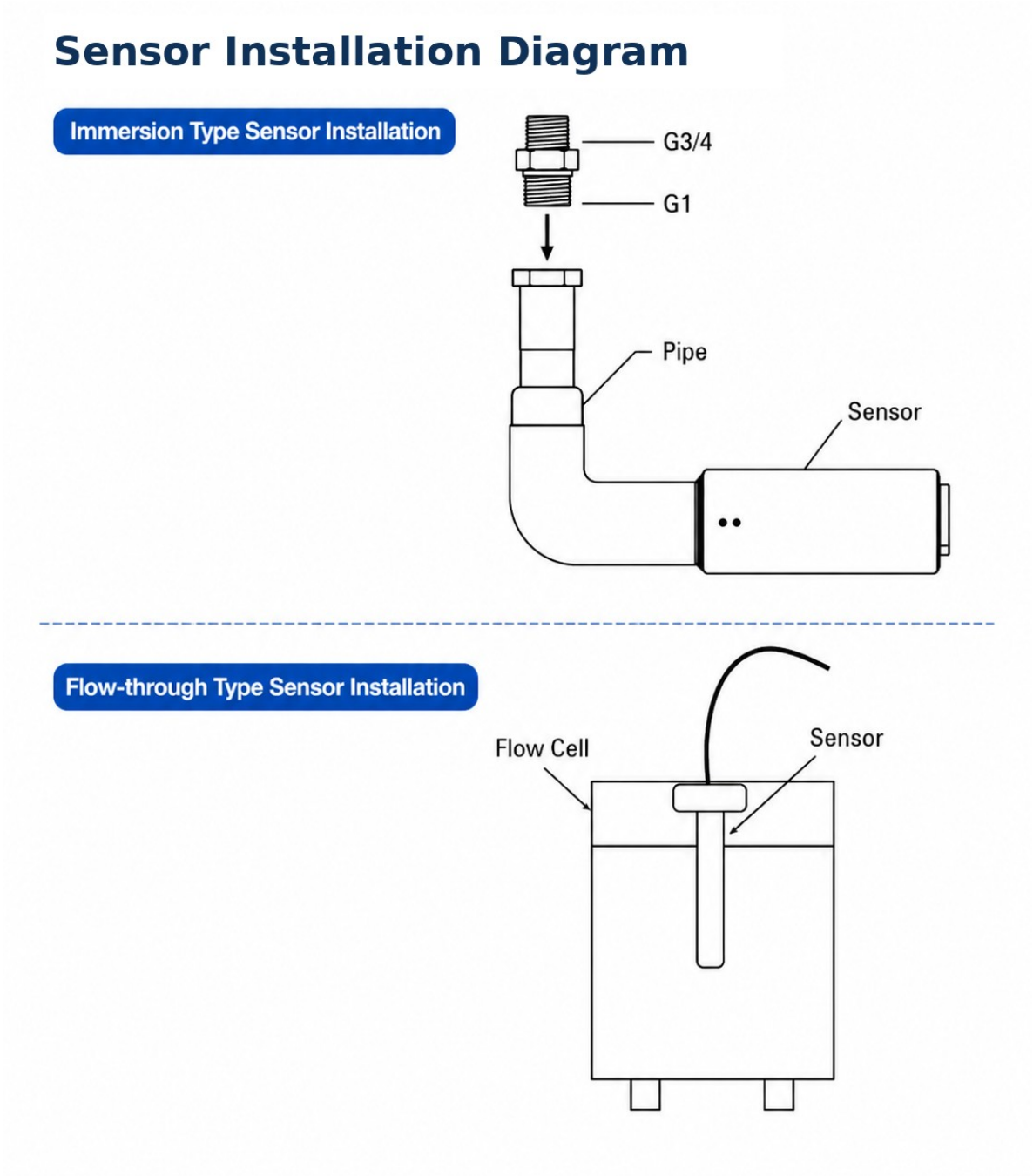
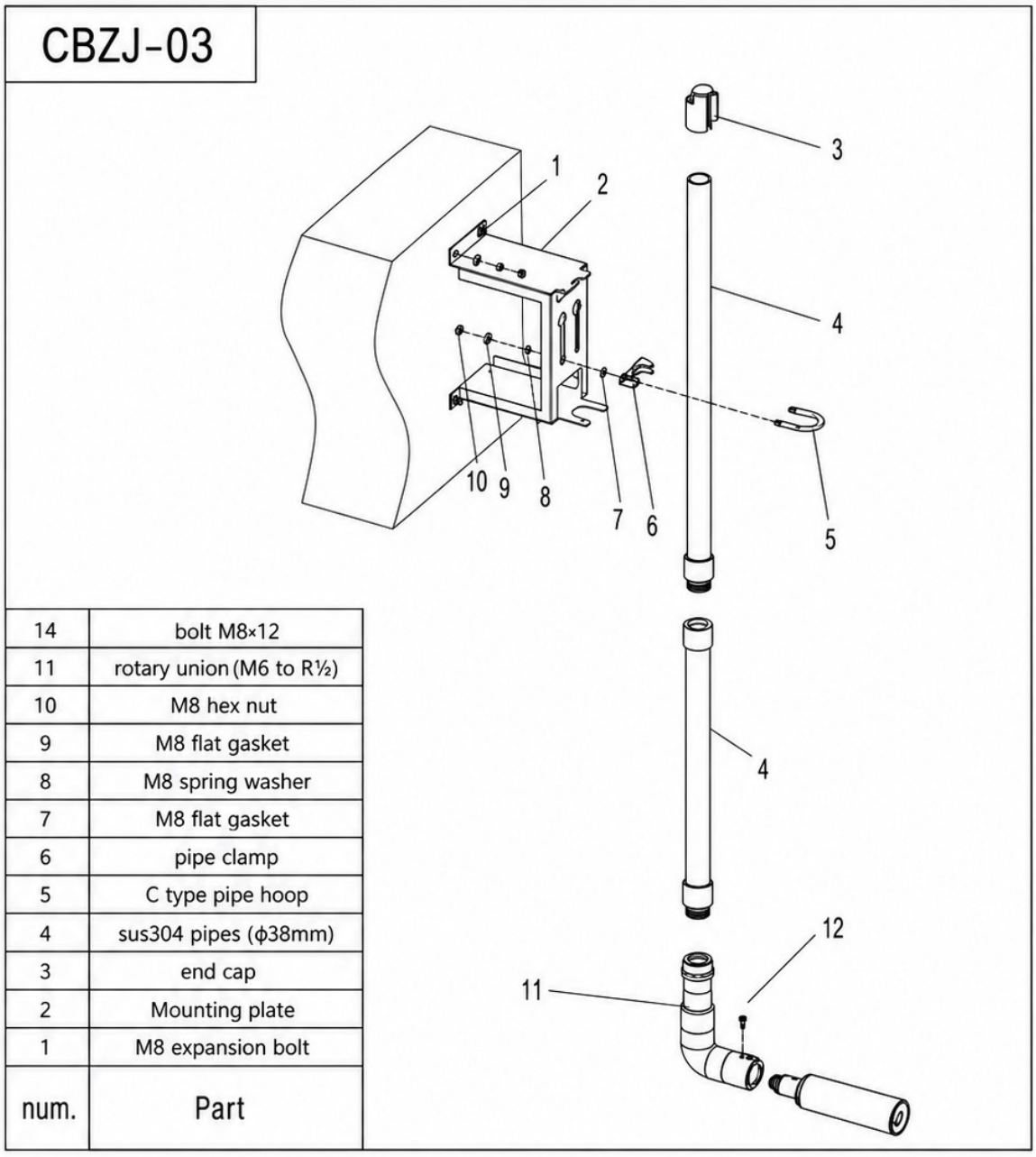


Figure 5. Sensor installation arrangements for immersion type and optional flow-through type sensors.

The standard C620TUR supply is the immersion configuration. Flow-through installation is shown for reference when that option is specifically supplied.



num.	Part
14	bolt M8×12
11	rotary union (M6 to R½)
10	M8 hex nut
9	M8 flat gasket
8	M8 spring washer
7	M8 flat gasket
6	pipe clamp
5	C type pipe hoop
4	sus304 pipes (ϕ38mm)
3	end cap
2	Mounting plate
1	M8 expansion bolt

Quick-dismantling poolside installation sketch

Figure 6. Quick-dismantling poolside mount.

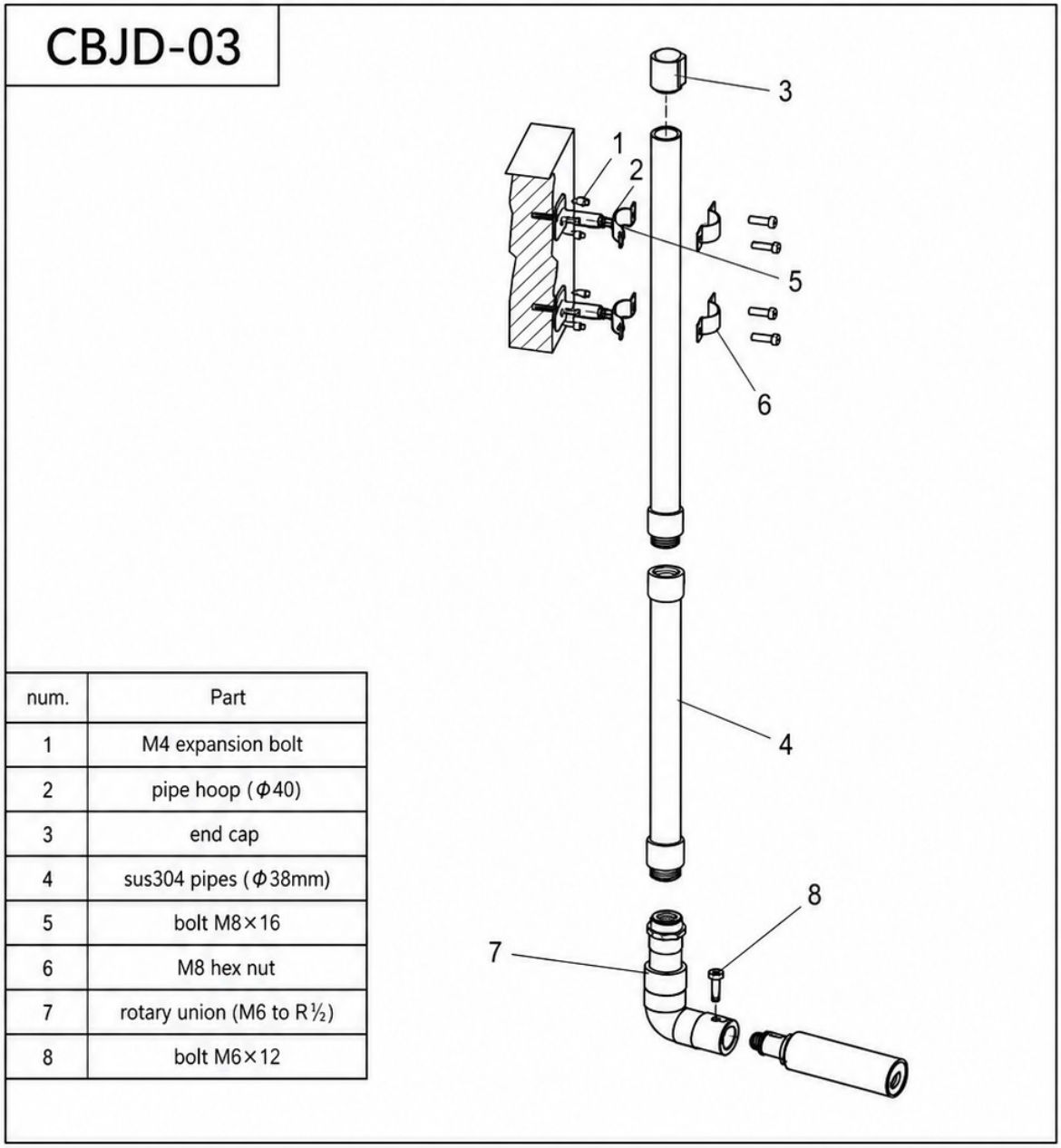


Figure 7. Classic poolside mount.

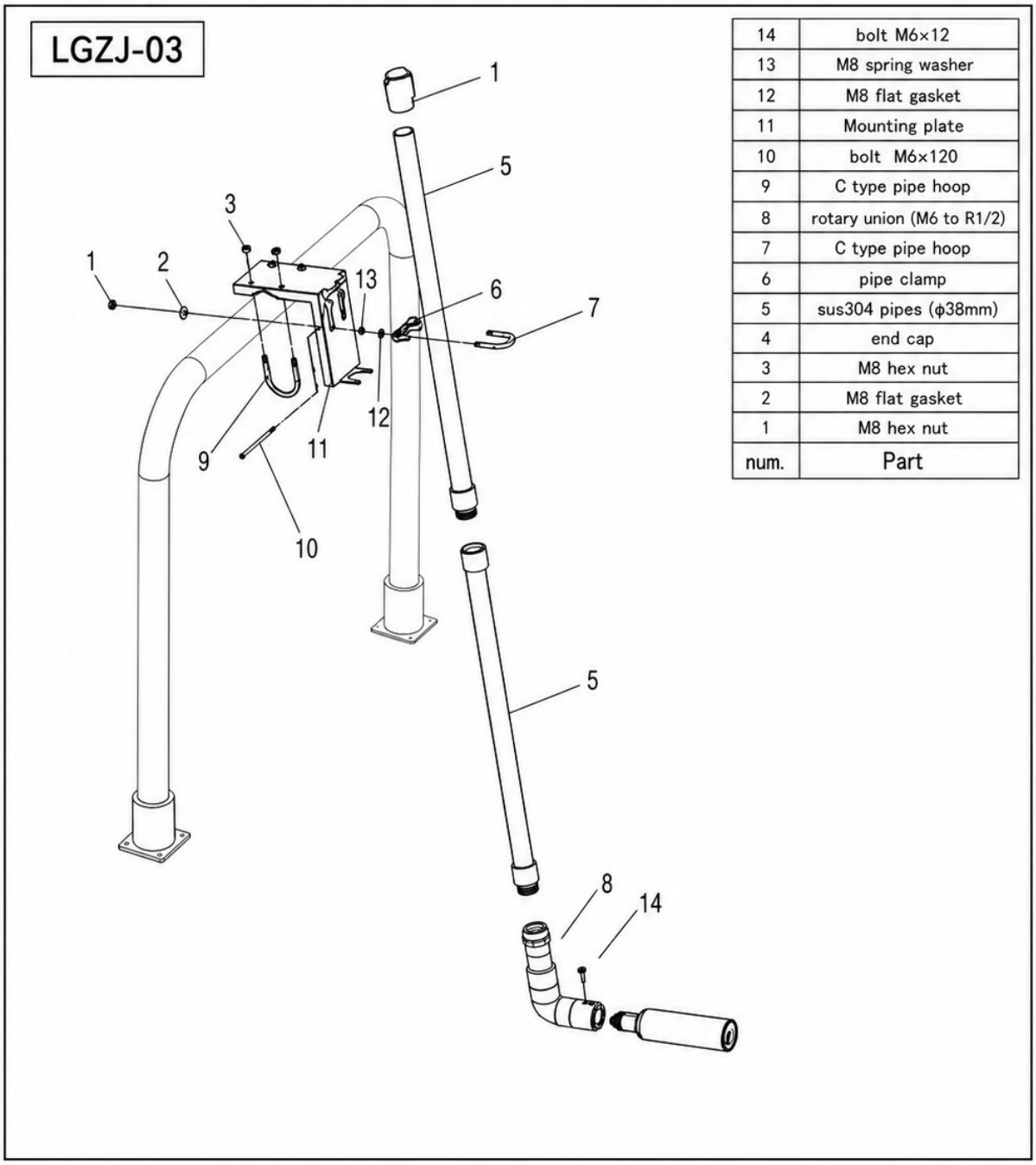


Figure 8. Railing mount.

8.3 Installation Restrictions

- Do not suspend the complete sensor solely from the electrical cable.
- Do not position the wiper where it can strike a wall, bracket or pipe.
- Do not install in a pressurised chamber without confirming pressure rating and safe removal arrangement.
- Do not install where cleaning chemicals exceed the confirmed material compatibility.

9. Electrical Installation

WARNING	**Disconnect and isolate all power before wiring. Verify whether the supplied controller is AC or 24 VDC before connection.**

9.1 Sensor Cable

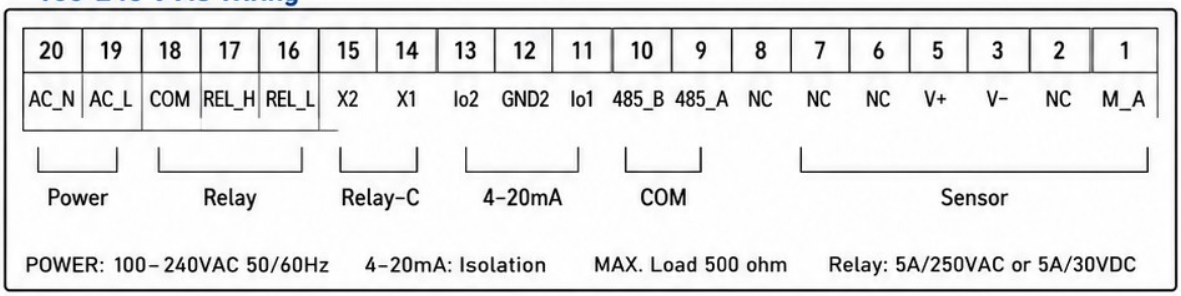
Core colour	Function
Brown	+12 VDC sensor supply
Black	AGND / sensor supply common
Blue	RS485 A
White	RS485 B
Yellow + green	Ground / shield lead

9.2 Controller Terminal Schedule

Terminal	Designation	Function
1	M_A	Digital sensor RS485 A
2	M_B	Digital sensor RS485 B
3	NC	Not used / order specific
4	V-	Digital sensor power negative
5	V+	Digital sensor power positive
6-8	NC	Not used / reserved
9	485_A	External RS485 A
10	485_B	External RS485 B
11	Io1	4-20 mA turbidity output
12	GND2	4-20 mA common
13	Io2	Reserved / not used
14-15	X1 / X2	Auxiliary cleaning relay/output; verify supplied function before use
16	REL_L	Low-alarm relay contact
17	REL_H	High-alarm relay contact
18	COM	Alarm relay common
19	AC_N / 24V-	AC neutral or 24 VDC negative
20	AC_L / 24V+	AC live or 24 VDC positive

Terminal	Blue Dragon Terminal Name	Function
1	M_A	Digital sensor RS485_A
2	M_B	Digital sensor RS485_B
3	NC	Not used pin
4	V-	Digital sensor power (-)
5	V+	Digital sensor power (+)
6	NC	Not used pin
7	NC	Not used pin
8	NC	Not used pin
9	485_A	RS485_A
10	485_B	RS485_B
11	Io1	4-20mA Io1 (Turbidity)
12	GND2	4-20mA Common GND
13	Io2	Reserved pin, not used
14	X1	Cleaning pump Relay-C X1
15	X2	Cleaning pump Relay-C X2
16	REL_L	Alarm Relay low
17	REL_H	Alarm Relay high
18	COM	Alarm Relay COM
19	AC_N / 24V-	Power neutral line / 24V DC negative pole
20	AC_L / 24V+	Power livewire / 24V DC positive pole

100-240 V AC Wiring



24V DC Wiring

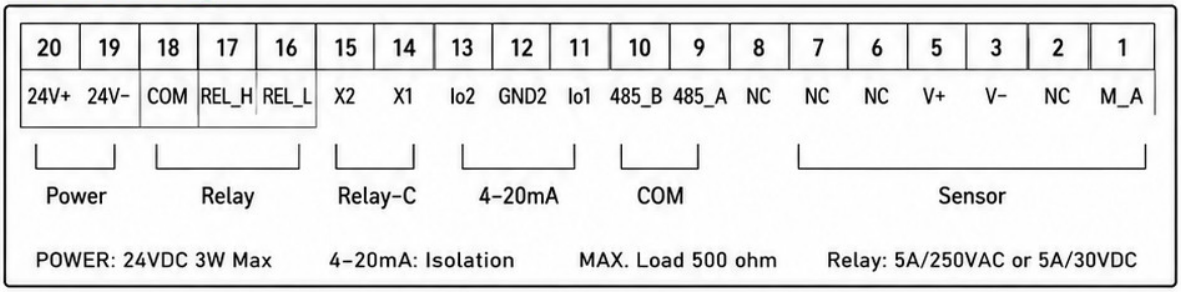


Figure 9. Controller terminals and AC/DC wiring.

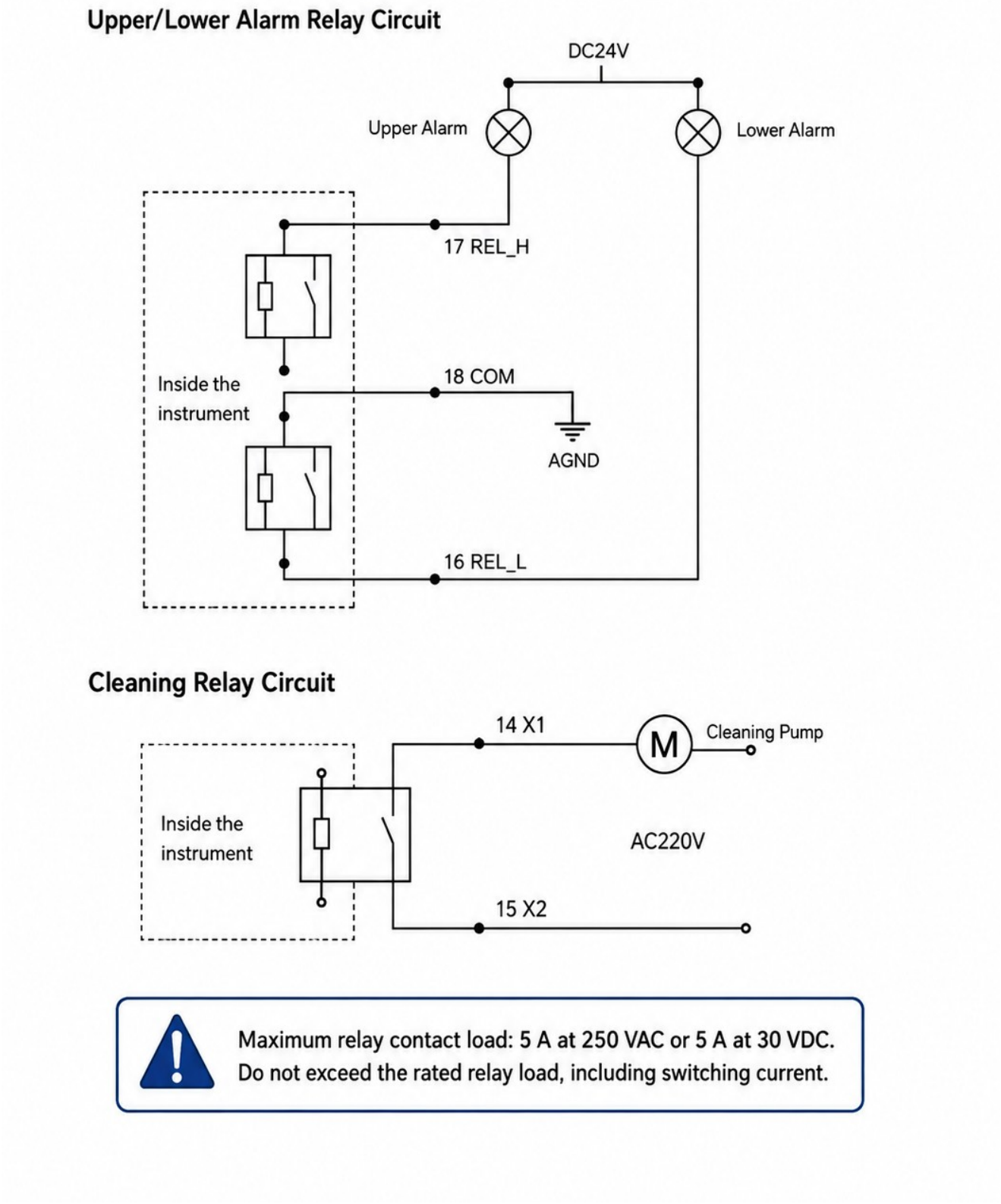


Figure 10. High/low alarm and cleaning-relay circuits.

9.3 Wiring Practice

- Use local electrical codes and the project wiring diagram.
- Use shielded twisted pair for RS485 and route it separately from power and relay wiring.
- Ground the shield at one designated end unless the project grounding design specifies otherwise.
- Observe RS485 polarity throughout the network.
- Use interposing relays where the plant load exceeds the controller relay rating or requires electrical segregation.
- Verify 4-20 mA polarity and scaling before connecting to the PLC/DCS.

10. Start-up and Commissioning

10.1 Pre-Energisation Checks

1. Verify model, power supply and terminal wiring.
2. Confirm protective earth and cable segregation.
3. Inspect the sensor window and wiper; clean if required.
4. Confirm the sensor is securely installed and submerged.
5. Check process temperature, pressure, velocity and chemical suitability.
6. Confirm 4-20 mA, relay and RS485 connections are safe to energise.

10.2 Initial Start-up

1. Energise the controller.
2. Allow the start-up animation and sensor search to complete.
3. Confirm the status changes to Measuring.
4. Verify the displayed unit and range.
5. Allow the process reading to stabilise.
6. Set date and time.
7. Configure 4-20 mA range, RS485 parameters, alarms, storage interval and wiper interval.
8. Perform a one-point verification or calibration using an appropriate standard.
9. Record the as-left configuration in the commissioning checklist.

10.3 Abnormal Status Messages

Message	Meaning / action
Type Err	Sensor type or configured mode mismatch. Verify connected sensor and measurement mode.
No Sensor	No valid digital sensor detected. Check power, RS485 wiring, connector and cable.
Measuring	Normal operating state.
Searching	Controller is attempting to identify the sensor.
Out Range	Measurement or configured current range is exceeded; controller may drive the analog output to 22 mA.

11. User Interface and Menu Structure

11.1 Front-Panel Keys

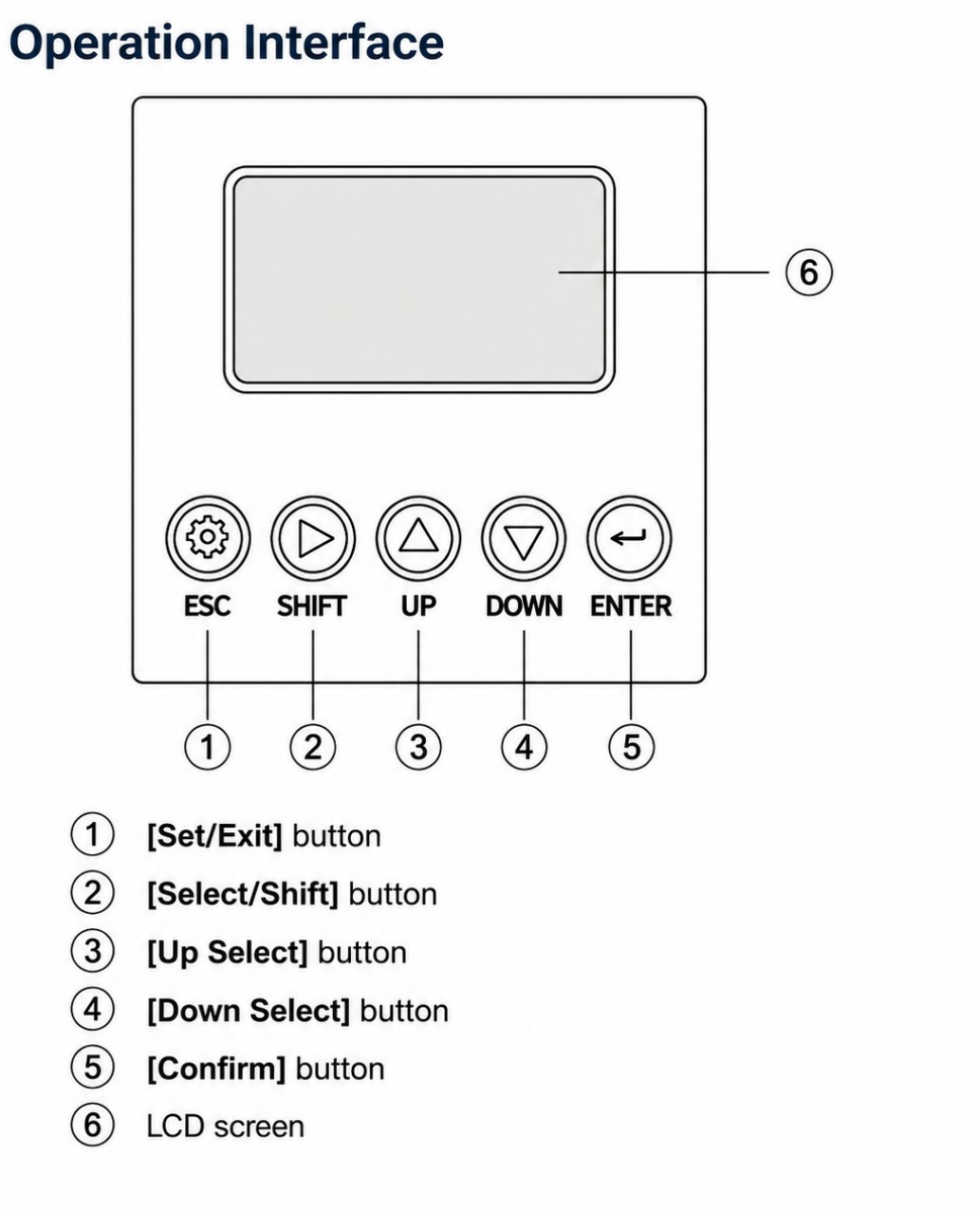


Figure 11. Controller front-panel operation interface and key functions.

Key	Blue Dragon label	Function
Gear	ESC / Set-Exit	Enter password/menu; exit or return.
Triangle right	SHIFT / Select	Move cursor or shift selected digit.
Triangle up	UP	Increase value or move upward.
Triangle down	DOWN	Decrease value or move downward.
Return arrow	ENTER / Confirm	Open selected item or save/confirm.

11.2 Main Measurement Screen

- Main turbidity value.
- NTU or FTU unit.
- Date and time.
- Measurement status.
- 4-20 mA value corresponding to the displayed turbidity.
- Relay-state indicators.

11.3 Settings Menu

NOTE	Settings password: 3700. Calibration password: 3900. History password: 1300. Waveform password: 1400. Protect these passwords under the site instrument-management procedure.

Menu	Purpose
Measure	Select immersion mode and configure offset/response settings as available.
4-20mA	Set analog-output lower and upper range values.
RS485	Set Modbus address and baud rate.
Brush	Set automatic wiper interval for supported sensors.
Simu.1 / Simu.2	Test analog output and relay operation.
Relay1 / Relay2	Configure high and low alarm functions, thresholds and delay/hysteresis settings.
Relay3	Cleaning function/output as supported by the supplied firmware.
Storage	Enable storage and set record interval.
Date	Set date and time.
Language	Select interface language.
Backlight	Set mode, brightness and contrast.
Factory Reset	Restore controller settings; use only with configuration records available.
Auto Drain	Flow-through sensor function; not used for the standard C620TUR immersion configuration.

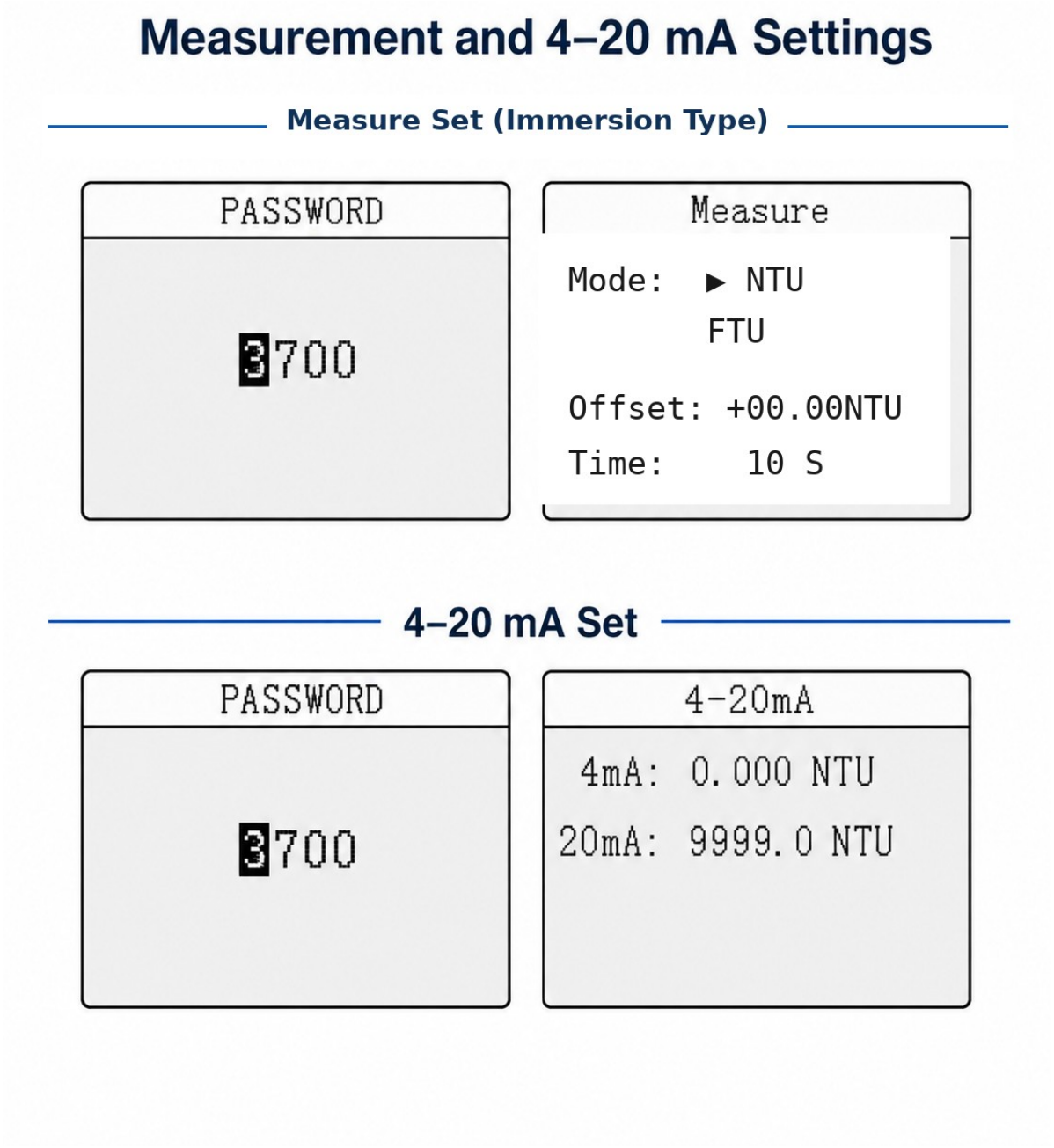


Figure 12. Measurement and 4-20 mA settings.

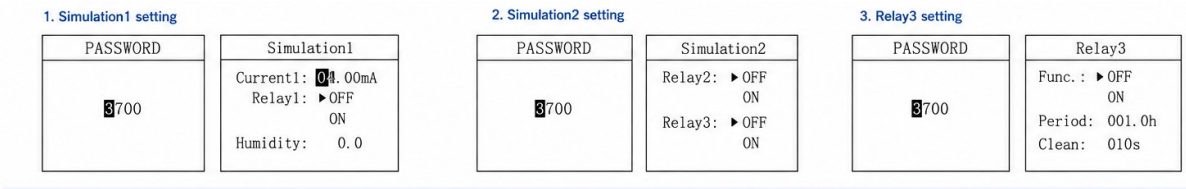


Figure 13. Immersion simulation and cleaning-relay settings screens.

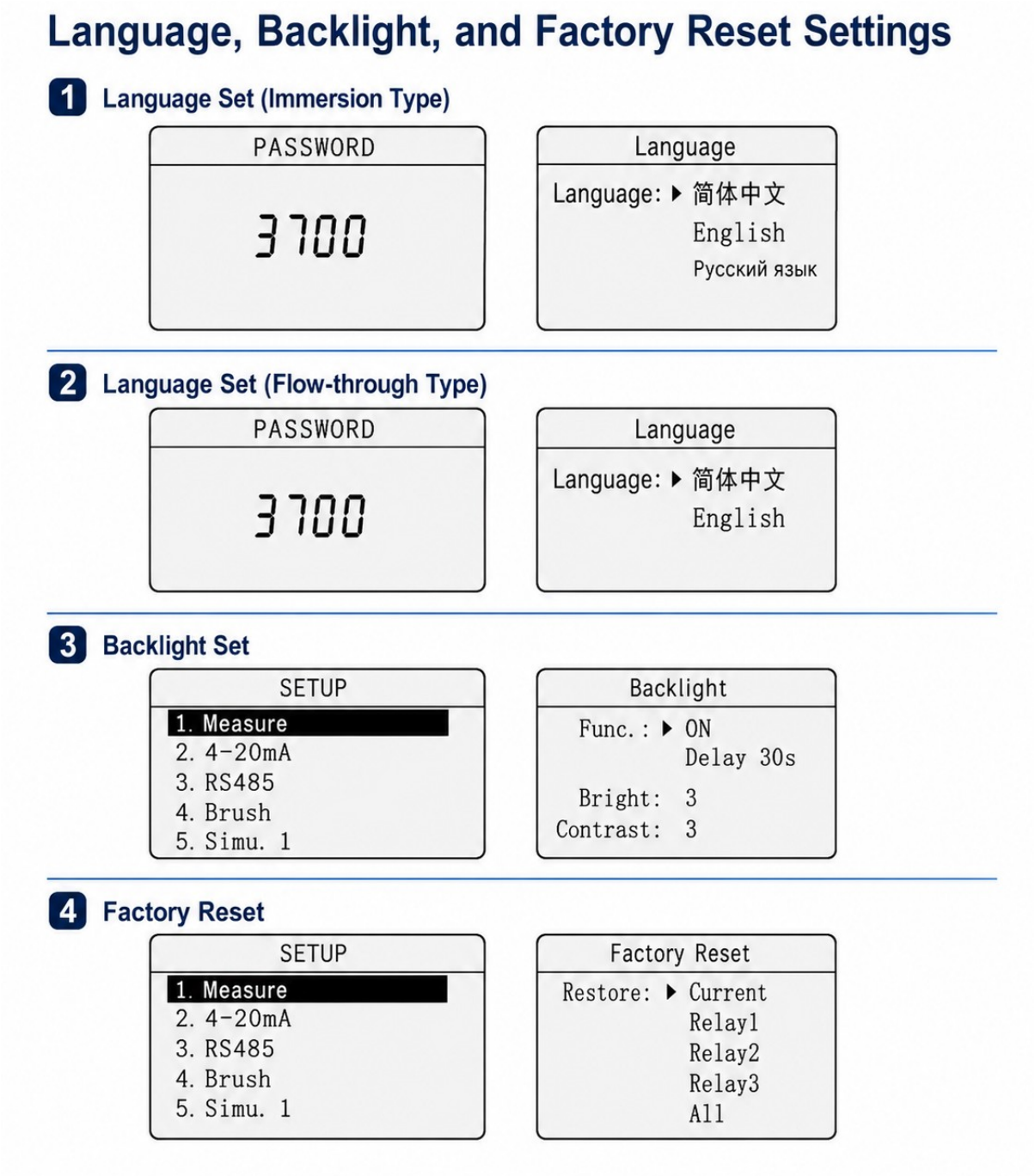


Figure 14. Language, backlight and factory-reset settings.

12. Routine Operation

12.1 Daily / Shift Checks

- Confirm the status is Measuring and no Out Range or No Sensor alarm is present.
- Review the value for process plausibility and sudden changes.
- Check relay and 4-20 mA indications against the control system.
- Inspect the mounting, cable and process level where accessible.
- Confirm the wiper has operated and no solids are obstructing the optical face.

12.2 Alarm Response

1. Confirm whether the alarm represents a genuine process change.

2. Check the sensor for bubbles, fouling, obstruction, exposure to air or mounting movement.
3. Compare with a grab sample or independent method appropriate to the process.
4. Clean and verify the sensor before changing calibration.
5. Record process, maintenance and calibration actions.

12.3 Process Verification

Online turbidity is sensitive to particle size, shape, colour, bubbles and installation. Establish site acceptance limits and comparison procedures. Do not use an unverified reading as the sole basis for a safety-critical shutdown, custody transfer or regulatory compliance decision.

13. One-Point Calibration and Verification

13.1 Approved Calibration Method

The standard C620TUR configuration uses one-point / factor calibration. Curve calibration and two-point calibration shown in broader platform manuals are not claimed as supported functions for the Blue Dragon C620TUR configuration.

13.2 Standard Selection and Frequency

- Use a certified or traceable turbidity standard suitable for the expected operating range.
- Select a standard reasonably close to the normal process concentration where practical.
- The manufacturer recommends calibration approximately every six months; shorten the interval based on fouling, process criticality and the site quality plan.
- Verify after sensor replacement, major cleaning, wiper service, cable repair or unexplained drift.

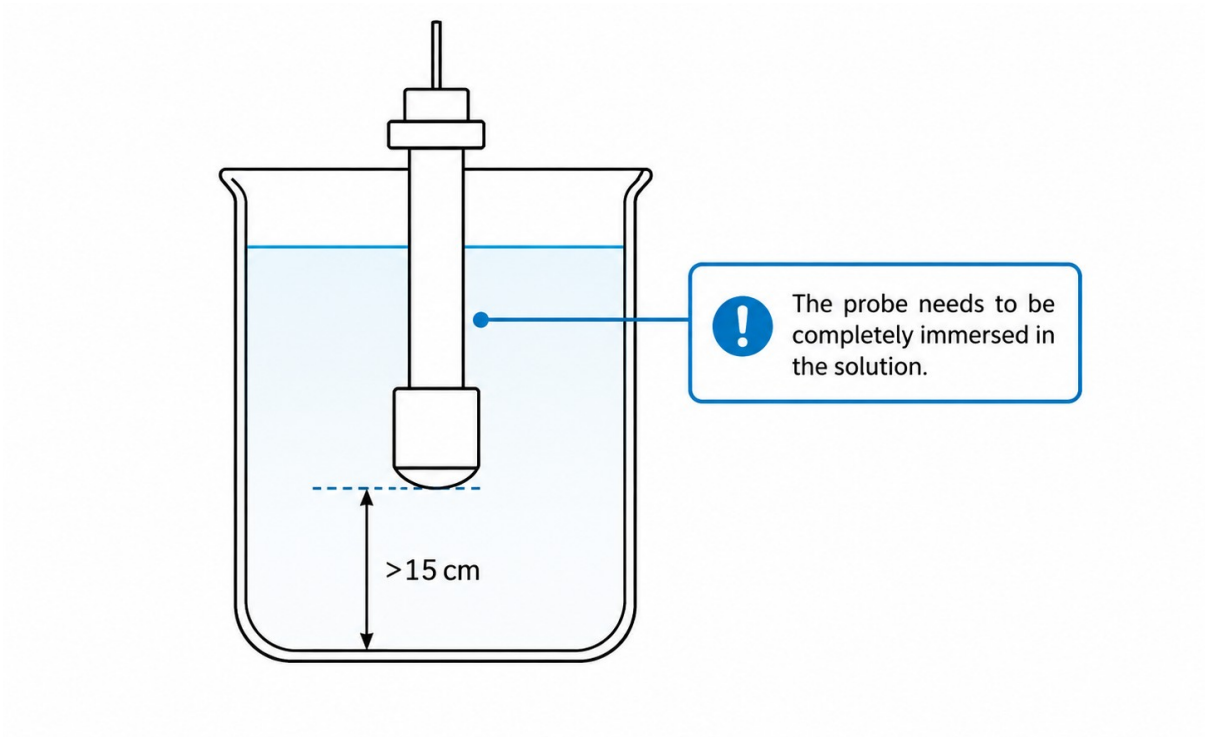


Figure 15. Calibration probe placement.

13.3 Controller One-Point Factor Calibration

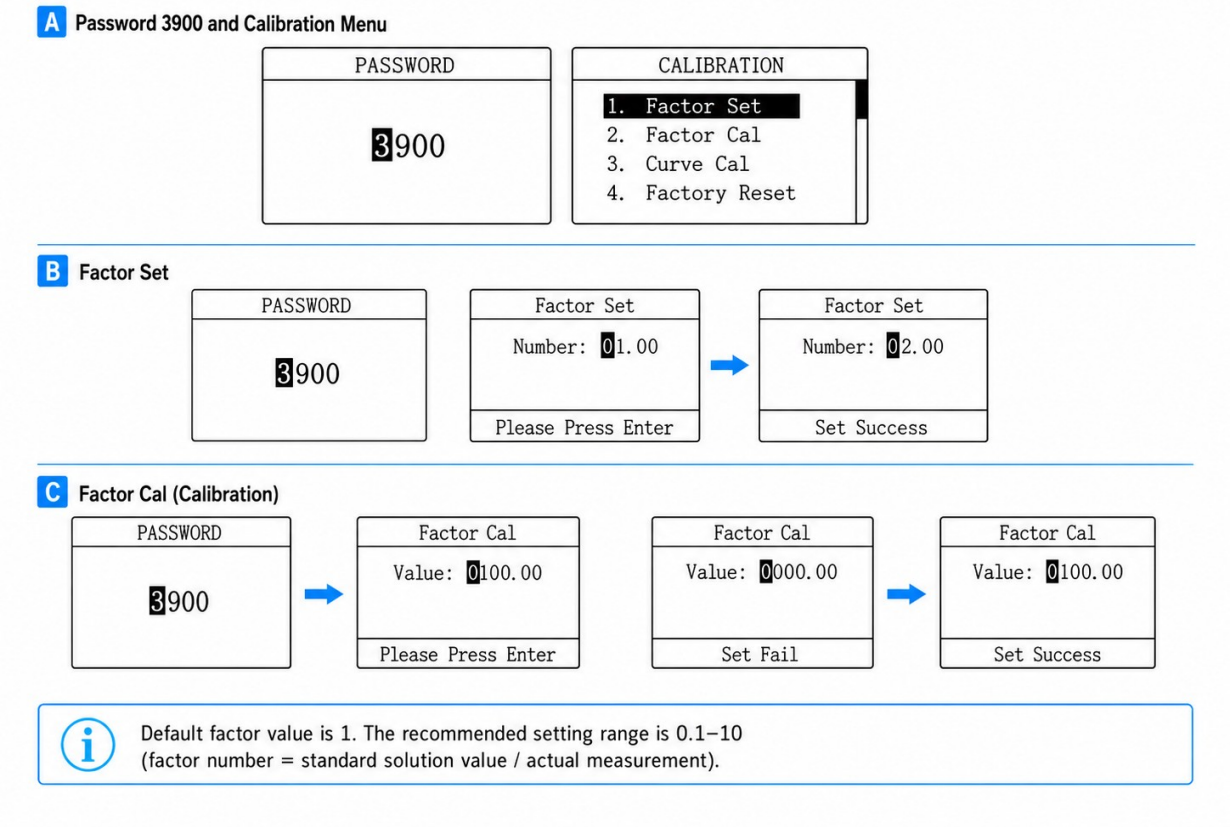


Figure 16. Immersion calibration menu, Factor Set and Factor Calibration screens.

1. Remove and clean the sensor. Inspect the quartz window and wiper.
2. Prepare the turbidity standard in a clean, opaque or shielded vessel. Mix as instructed without introducing bubbles.
3. Immerse the optical end with adequate clearance; keep the lens approximately 150 mm from the vessel bottom and away from walls.
4. Allow the indicated value to stabilise.
5. Press ESC/Set-Exit, enter password 3900 and open the immersion calibration menu.
6. Select Factor Cal.
7. Enter the certified standard value.
8. Press ENTER/Confirm to complete the factor calibration.
9. Return to measurement mode and confirm the displayed result is acceptable.
10. Record the standard, before value, after value, factor and acceptance decision.

CAUTION	Do not calibrate over a process problem. First eliminate bubbles, fouling, poor mixing, damaged optics, cable faults and incorrect installation.

13.4 Manual Factor Method

Where the Factor Set function is used, calculate: correction factor = standard value / stable measured value. The normal factor is 1.0 and the recommended factor range is 0.1 to 10. Enter the calculated factor under Factor Set and confirm the standard reading.

13.5 Direct-Sensor Software Method

Service software is available for qualified service personnel. A trained technician may connect the sensor through an isolated USB-to-RS485 converter and write the calculated factor to the sensor register. Use only Blue Dragon service software and the approved service procedure; do not change unrelated registers.

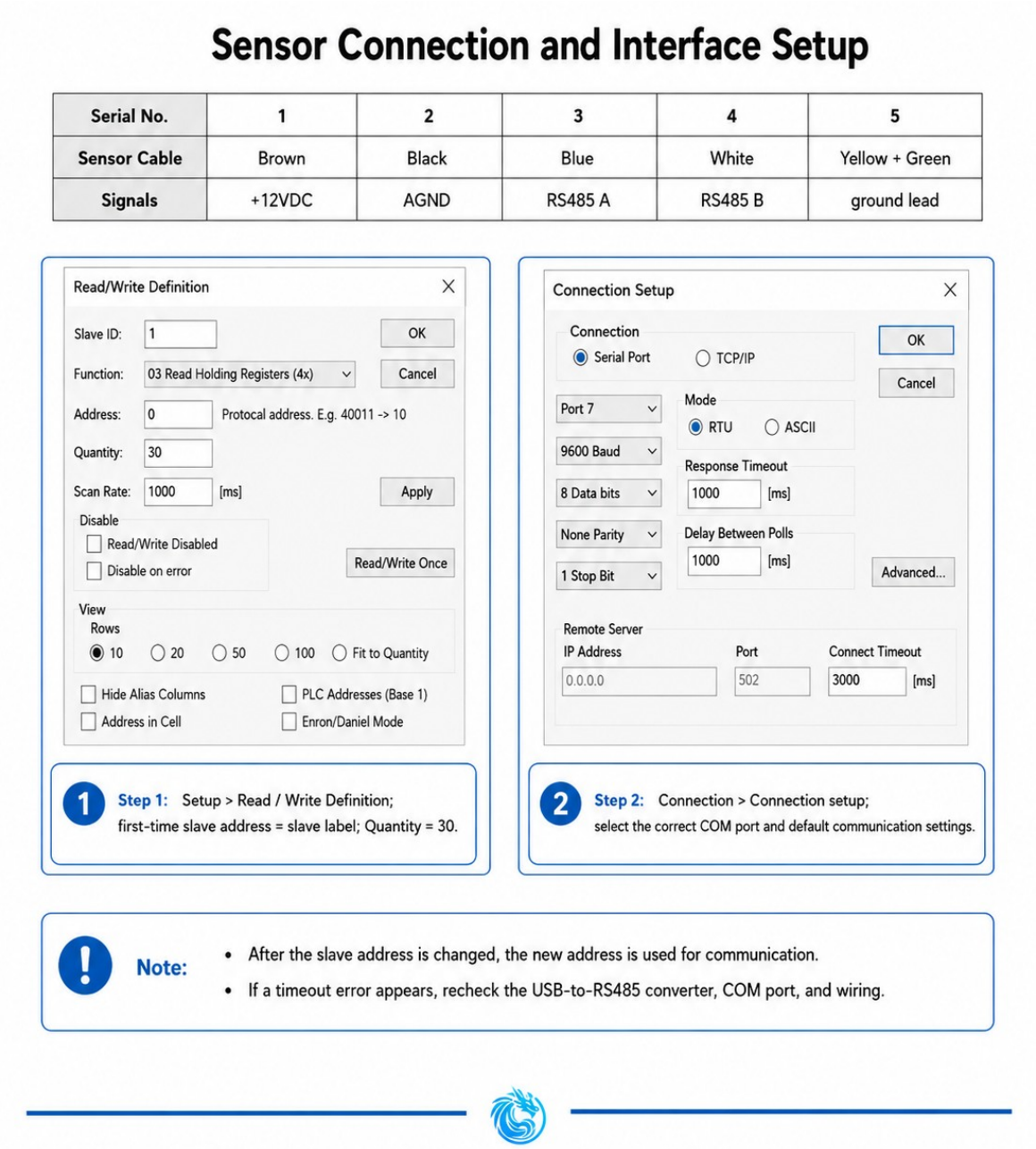


Figure 17. Direct-sensor connection and service-software interface setup.

Communication Protocol

Note: The sensor is equipped with Modbus RS485 communication. Wiring should follow the defined sensor connection.

MODBUS-RTU	
Baud Rate	4800/9600/19200/38400
Data Bits	8 bit
Parity Check	no
Stop Bit	1bit

Register Name	Address Location	Read/Write	Data Type	Register Number	Descriptions
Turbidity Value	0	RO	Float	2	0-Range
Turbidity Factor	4	RW	Float	2	0.1-10

The protocol is used through Modbus Poll software via RS485 communication. Connect the sensor to the computer using the RS485 to USB converter.

Figure 18. Direct-sensor Modbus RTU communication protocol.

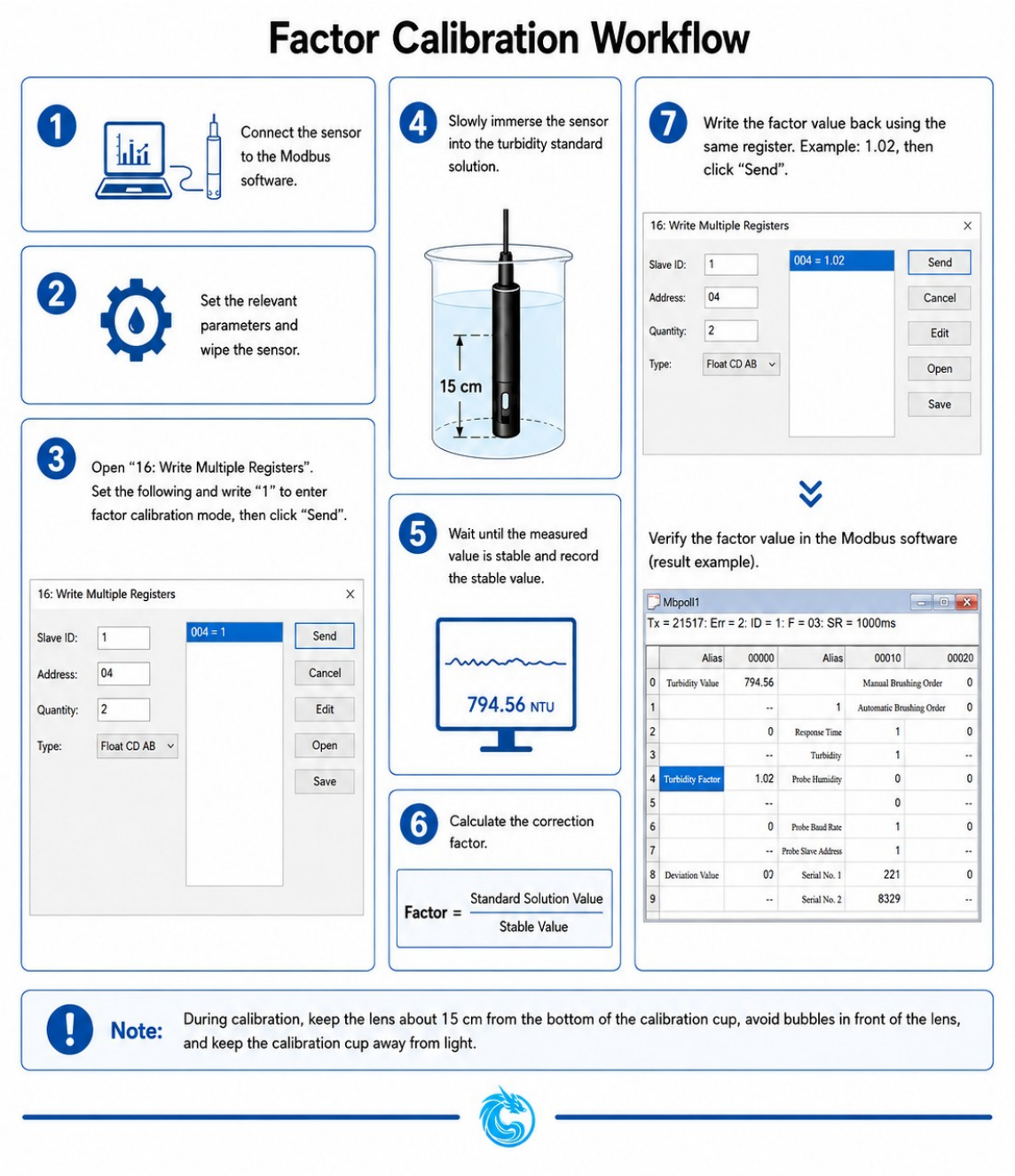


Figure 19. Direct-sensor factor-calibration workflow.

Curve calibration and two-point calibration are not approved field procedures for the standard Blue Dragon C620TUR configuration.

14. Self-Cleaning Wiper System

14.1 Function

The integrated motor-driven rubber wiper passes across the quartz optical window at the configured interval. This reduces normal deposits but does not eliminate manual inspection and cleaning.

14.2 Interval Selection

Service condition	Initial interval guidance
Clean process water	720 to 1440 minutes, then optimise from inspection results.

Service condition	Initial interval guidance
Typical wastewater	60 to 240 minutes.
High solids, biological growth or rapid fouling	15 to 60 minutes, subject to wear review.
Extended idle or storage	Disable automatic operation only when the sensor is removed, cleaned and safely stored.

NOTE	The sensor register supports intervals of 15, 30, 60, 240, 720, 1440, 4320 and 10080 minutes. The controller display may present the interval in an equivalent form.

14.3 Wiper Inspection and Replacement

1. Isolate the process and remove the sensor safely.
2. Clean the optical face and wiper assembly.
3. Inspect the rubber edge for hardening, cuts, permanent deformation or poor contact.
4. Replace the wiper if damaged or if cleaning performance declines.
5. Do not force or rotate the motor-driven arm by hand.
6. Confirm free movement by using the manual brush command after reinstallation.

Typical wiper life is approximately three to six months, with quarterly replacement recommended as a conservative starting point. Actual life depends on solids, abrasiveness and cleaning frequency.

15. Outputs, Relays and Communications

15.1 4-20 mA Output

- Configure the lower and upper turbidity values under the 4-20mA menu.
- Verify 4 mA at the configured lower value and 20 mA at the configured upper value.
- The controller indicates 22 mA when the measurement/current range is exceeded.
- Use the simulation function during commissioning and loop checks.
- Maximum 4-20 mA loop load: 500 ohm.

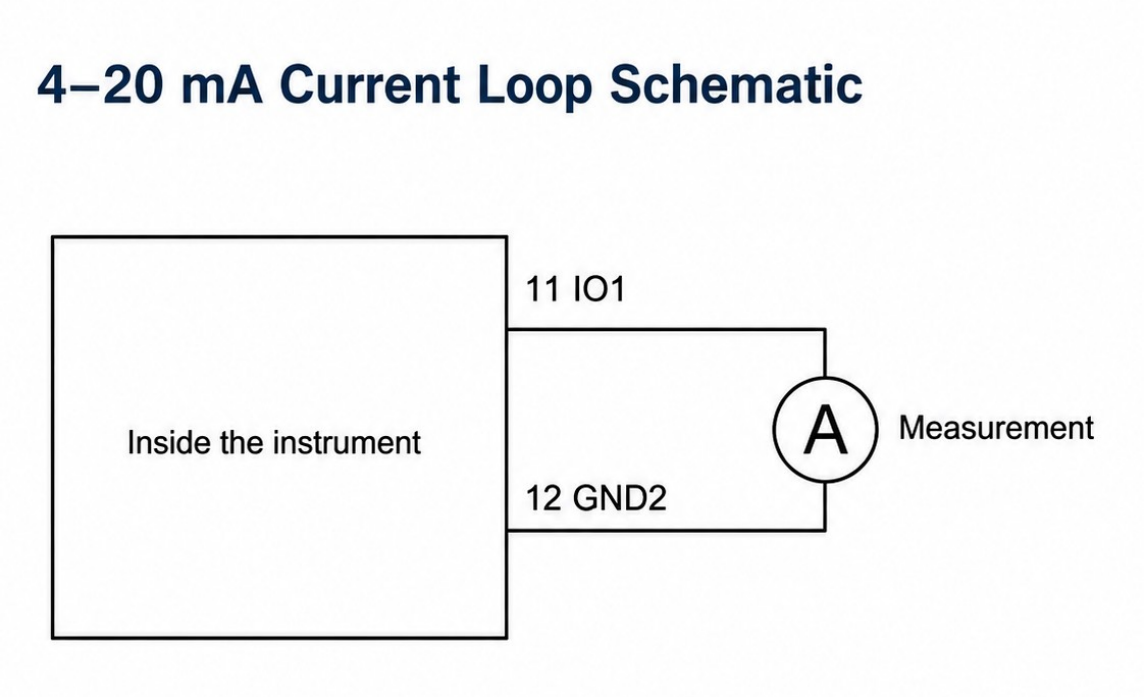


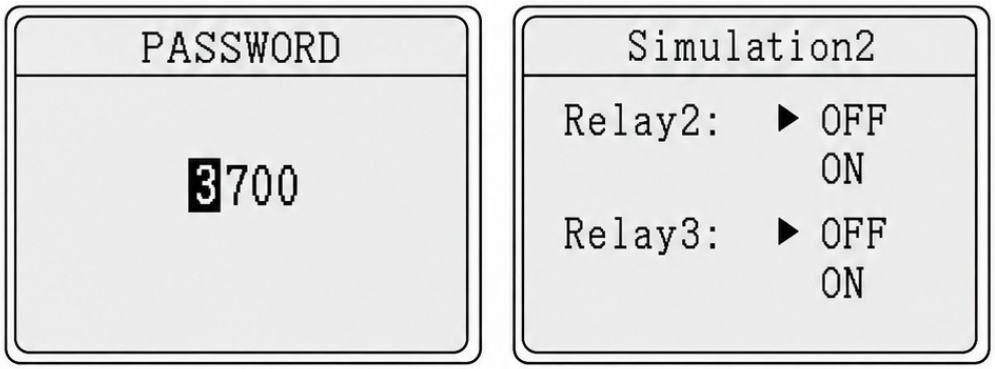
Figure 20. 4-20 mA current-loop schematic.

15.2 Relays

The controller provides three relay functions. The standard menu supports high alarm, low alarm and a cleaning-related function/output. Relay contacts are rated up to 5 A at 250 VAC or 5 A at 30 VDC. Use interposing relays for inductive, high-current or safety-related loads. Confirm fail-safe logic and power-loss behaviour in the project cause-and-effect.

Simulation2 and Relay1 Settings

Simulation2 Set



Relay1 Set

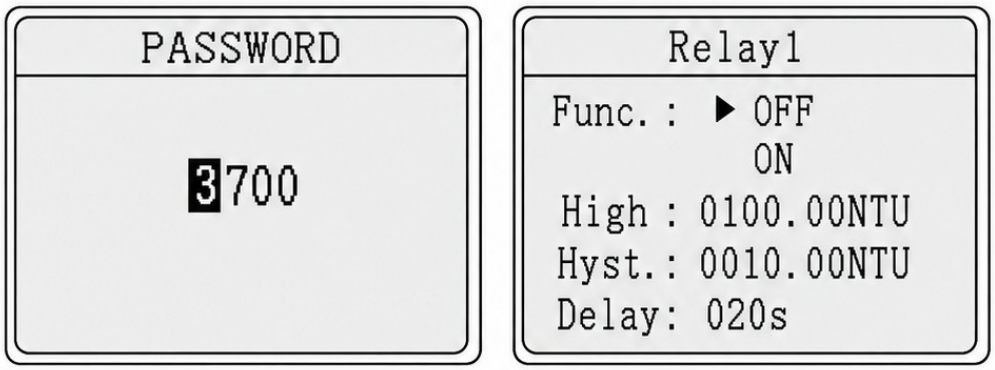


Figure 21. Simulation 2 and Relay 1 settings.

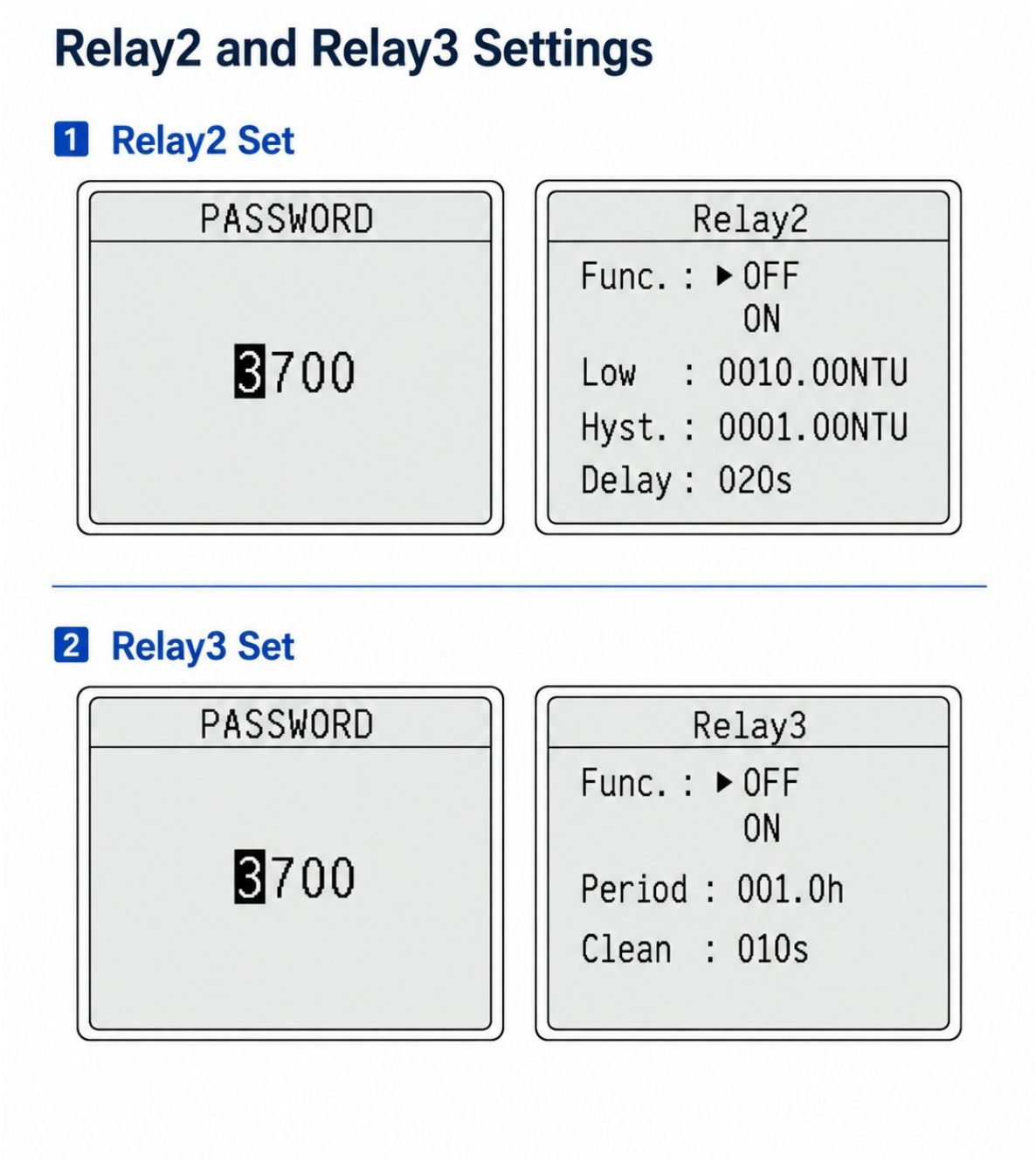


Figure 22. Relay 2 and Relay 3 settings.

15.3 Controller Modbus RTU

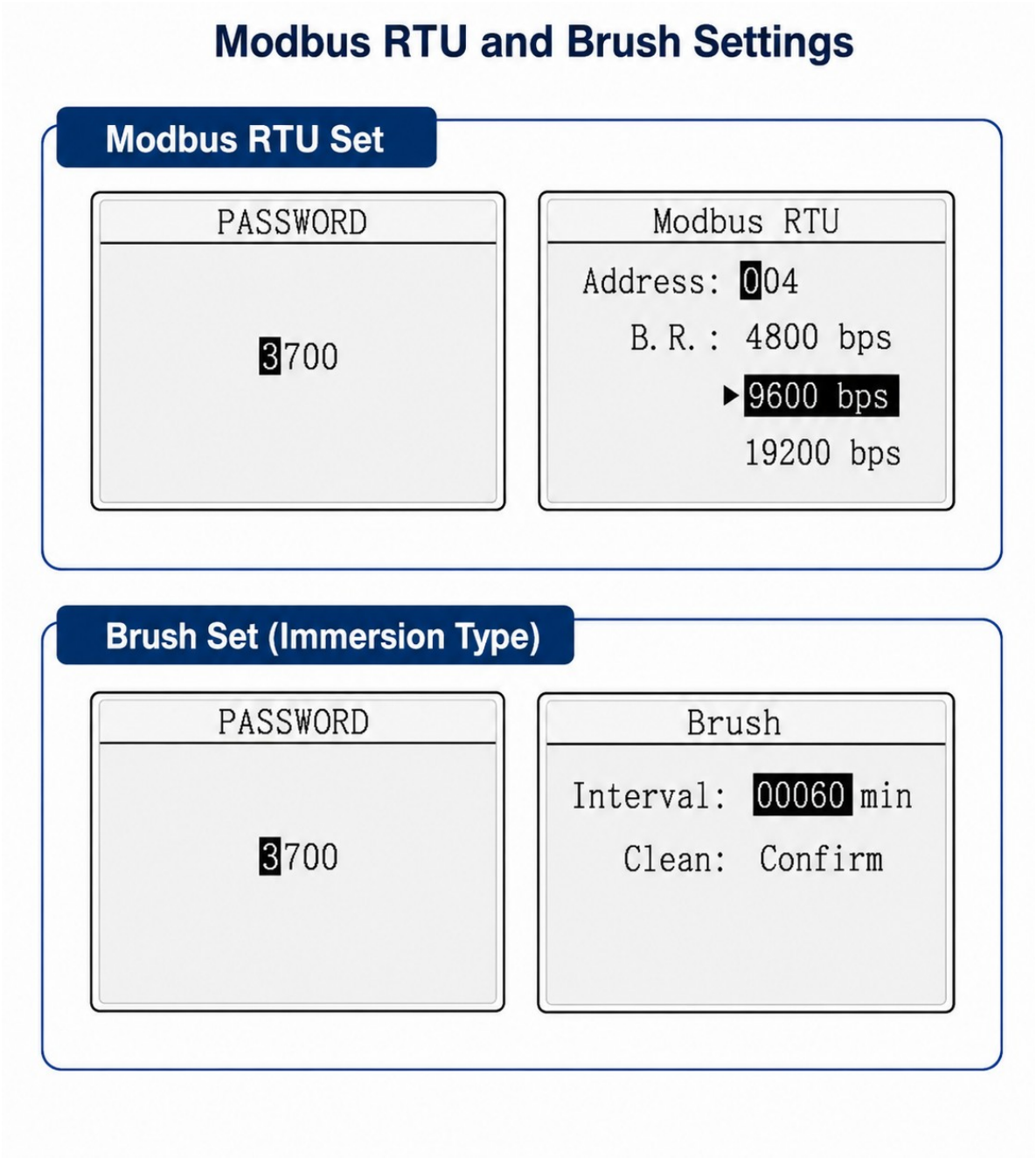


Figure 23. Modbus RTU and brush settings.

Parameter	Setting
Physical layer	RS485
Baud rate	4800, 9600 or 19200; default 9600
Format	8 data bits, no parity, 1 stop bit
Function code	03 - Read Holding Registers
Device address	1-247; controller default 4
Turbidity registers	Decimal 2-3, FP32 Float ABCD
Device address register	Decimal 8

Parameter	Setting
Baud-rate register	Decimal 9

NOTE	The controller factory default address is 4. Read and record the actual instrument address during commissioning; use that address in the host software.

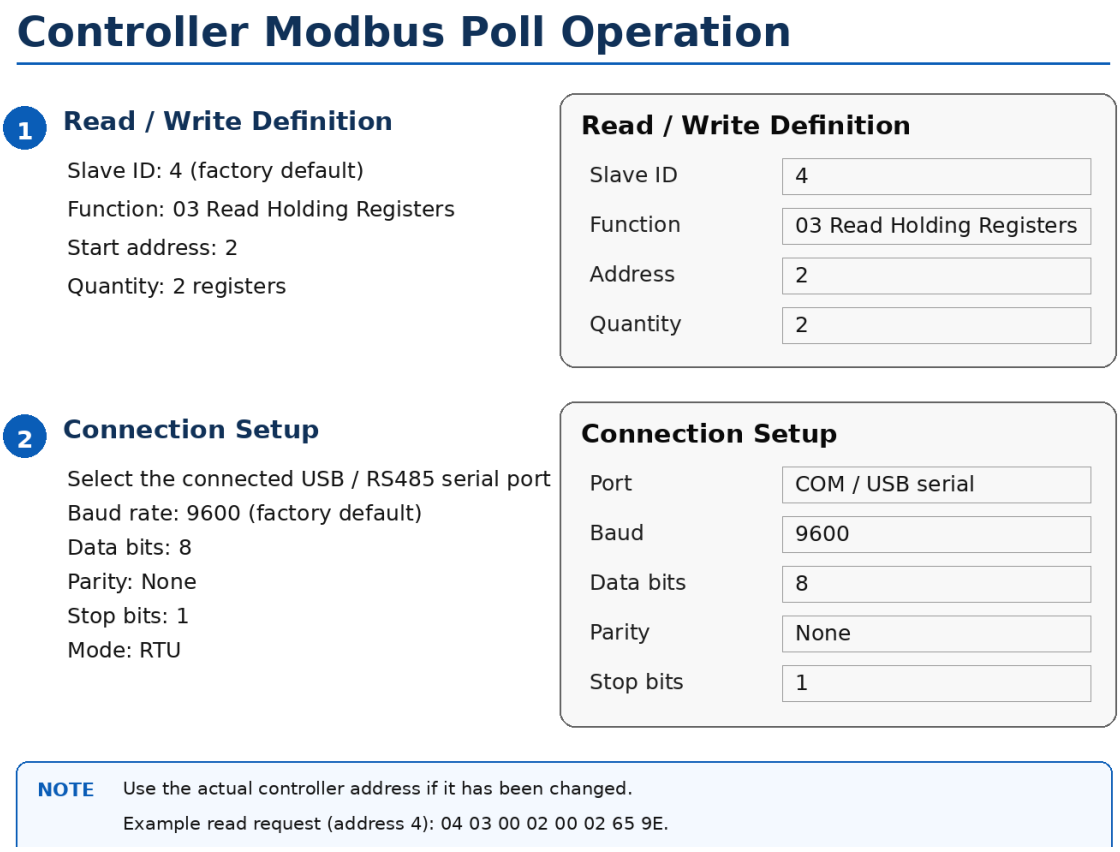


Figure 24. Controller Modbus Poll operation example.

15.4 Example Read Request

Example request for device address 4, function 03, starting register 2, quantity 2: 04 03 00 02 00 02 65 9E. The returned four data bytes are interpreted as FP32 ABCD. CRC values shall be generated by the host system.

16. Data Storage, History and USB

16.1 Internal History

- Enable storage and select the interval under the Storage menu.
- The controller stores up to 1000 records.
- When full, the oldest data is overwritten automatically.
- Access history using password 1300 and use UP/DOWN to browse.
- Access the local waveform using password 1400.

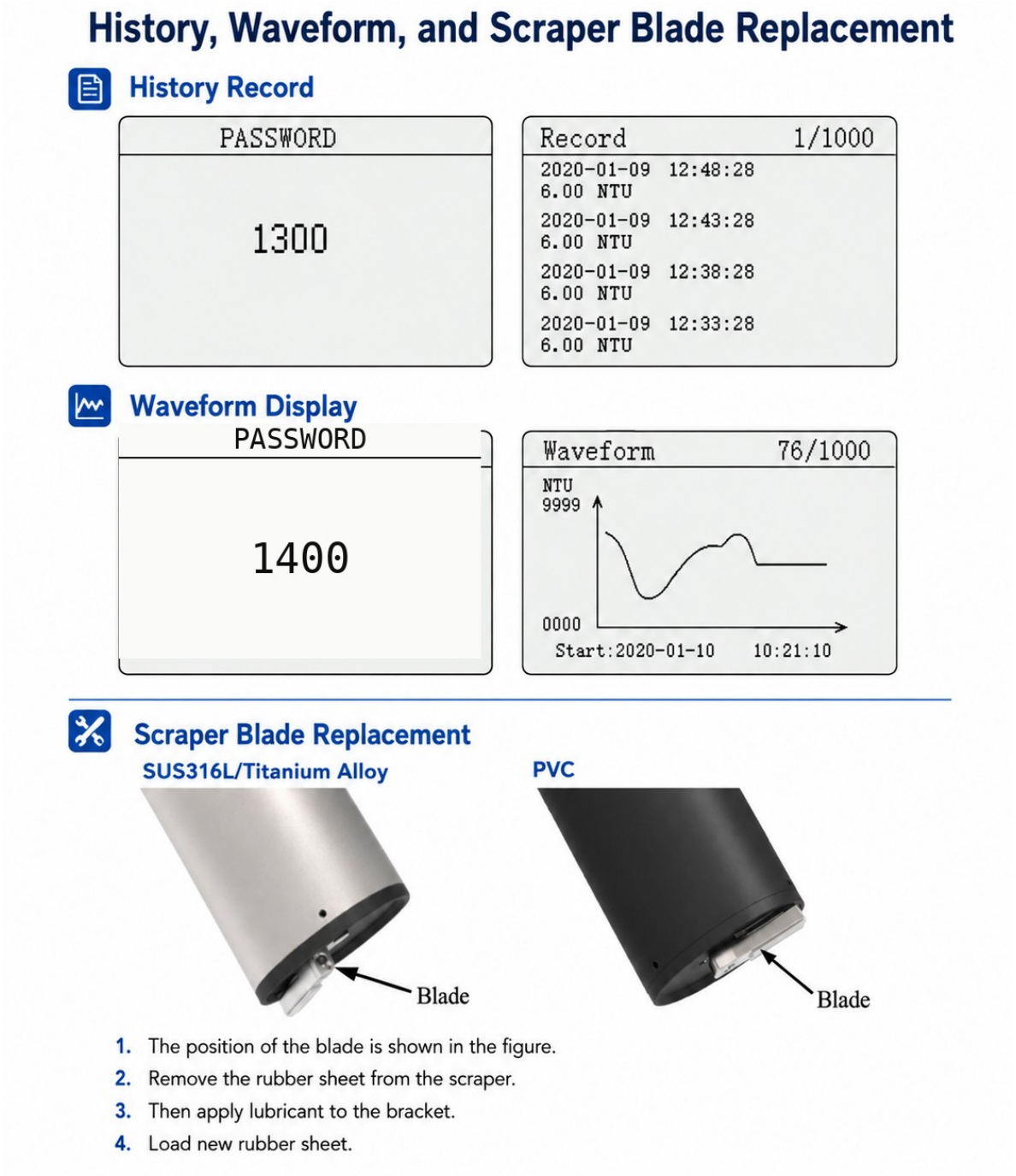


Figure 25. History record, waveform display and scraper-blade replacement.

16.2 USB / CSV Export

Current-production controllers support USB-based data download and CSV export. Availability and menu sequence can vary with firmware revision; confirm the physical USB interface and successfully export a test file during commissioning.

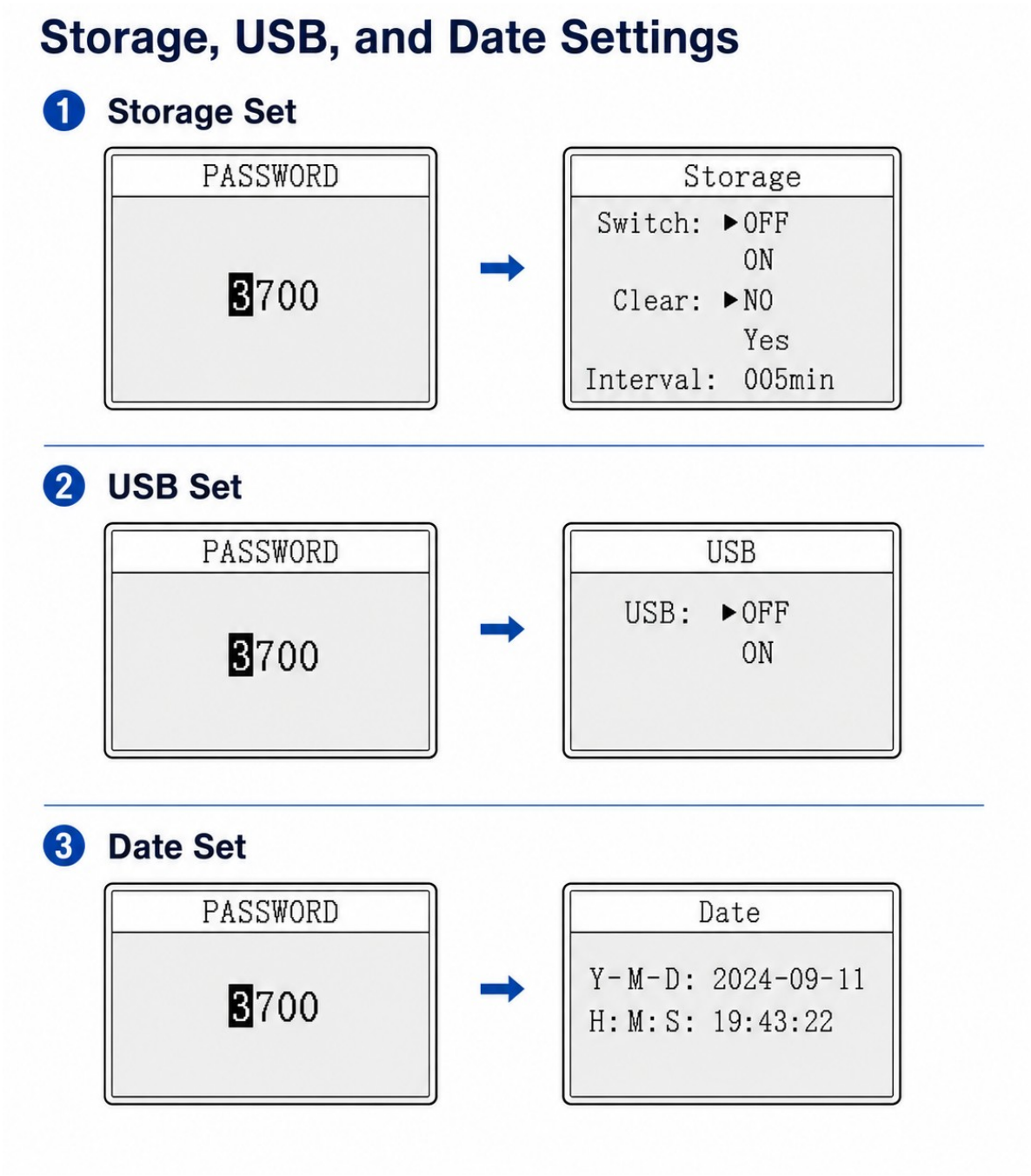


Figure 26. Storage, USB and date settings.

NOTE	USB export availability and menu sequence can vary with firmware. Confirm the fitted interface during commissioning and verify that the exported CSV file opens correctly before relying on USB data retrieval.

17. Routine Maintenance

Interval	Task
Each shift / daily	Check status, plausibility, alarm state, mounting and cable.
Weekly initially	Inspect optical face through the process or remove if safe; adjust wiper interval from observed fouling.

Interval	Task
Monthly	Clean the quartz window manually if required; inspect bracket, cable and connector.
Quarterly	Replace rubber wiper as a conservative starting interval; verify output and alarms.
Every six months	Perform one-point calibration or verification; review maintenance history.
Annually	Inspect cable entry and housing seals, inspect the full PUR cable length, and verify enclosure sealing and protective earth.
After upset or maintenance	Inspect, clean and verify before returning to service.

17.1 Cleaning the Quartz Window

1. Remove the sensor using the site isolation procedure.
2. Rinse loose deposits with clean water.
3. Use a soft lint-free cloth or non-abrasive swab.
4. Use mild detergent only when compatible and rinse thoroughly.
5. Do not use abrasive pads, metal tools or aggressive chemicals on the quartz window.
6. Inspect for scratches, chips or clouding.

17.2 Cable and Sealing Inspection

Inspect the PUR cable jacket, cable entry and housing joints for cracks, swelling, hardening, cuts, water ingress or looseness. The standard sensor configuration does not use a separate O-ring. Replace damaged parts only with approved components.

18. Troubleshooting

Symptom	Possible causes	Corrective actions
Blank display	No power; incorrect supply; blown protection; controller fault.	Verify external disconnect, supply voltage, terminals and protection.
No Sensor / Searching	Sensor power missing; RS485 polarity; loose connector; cable damage; wrong mode.	Check brown/black power and blue/white RS485 wiring; inspect cable; select immersion mode.
Reading too high or unstable	Bubbles; solids striking optics; fouling; poor mounting; electrical noise.	Relocate/orient sensor; clean; secure mounting; separate signal wiring.
Reading too low or slow	Window coating; aged/damaged wiper; poor mixing; incorrect factor.	Clean window; replace wiper; review location; verify with standard.
Out Range / 22 mA	Process exceeds sensor or 4-20 mA URV; incorrect scaling.	Check actual turbidity; inspect sensor; correct output range.
Wiper not operating	Interval disabled; obstruction; worn mechanism; firmware/configuration issue.	Run manual brush command; remove obstruction; inspect/replace wiper; contact service.
RS485 communication failure	Wrong address/baud/polarity; duplicate address; termination/bias issue.	Read local settings; correct host configuration; inspect network wiring.
History not recording	Storage disabled; interval not set; memory full/overwriting.	Enable storage, set interval, export data and verify date/time.
Calibration fails or gives implausible factor	Wrong/expired standard; bubbles; direct light; dirty window; unstable value.	Prepare fresh standard, clean, shield vessel, wait for stability and repeat.

IMPORTANT	**Do not repeatedly recalibrate to force agreement with an uncertain process sample. Confirm the standard, sensor condition, location and independent reference first.**

19. Shutdown, Storage and Disposal

19.1 Planned Shutdown

1. Notify operations and place related alarms/loops in the approved maintenance state.
2. Record the final reading and configuration.
3. Isolate power and process as required.
4. Remove the sensor, rinse, clean and dry it.
5. Inspect the wiper, window, cable entry, housing joints and cable.
6. Store the sensor protected from impact, sunlight, chemicals and freezing.

19.2 Disposal

Dispose of electronic equipment, cable, rubber components and contaminated cleaning materials in accordance with local regulations and the site waste procedure. Decontaminate the sensor before transport or return for service.

20. Warranty and Technical Support

The standard warranty is 12 months unless the sales contract states otherwise. Warranty coverage does not include damage caused by incorrect power, unauthorised modification, unsuitable chemicals, freezing, excessive pressure or velocity, impact, abrasion, unapproved cleaning agents or failure to maintain the optical window and wiper.

20.1 Information Required for Support

- Blue Dragon model and serial numbers.
- Controller and sensor model / serial numbers.
- Firmware version and configuration.
- Process description, range, temperature, pressure and chemistry.
- Photographs of installation, optical face, wiper and wiring.
- Displayed status, readings, output values and Modbus settings.
- Calibration standard, before/after results and maintenance history.

Technical support: bluedragontechnology.com

Appendix A. Quick Start Checklist

☐ Correct safe-area location confirmed

☐ Power supply and protective earth verified

☐ Controller panel mounted and sealed

☐ Sensor bracket rigid and sensor fully submerged

☐ Sensor cable wired: brown +12 V, black AGND, blue A, white B

☐ 4-20 mA scaling and loop test completed

☐ RS485 address/baud recorded

☐ High/low alarms tested

☐ Wiper interval set and manual wipe tested

☐ Date/time and storage interval set

☐ One-point standard verification completed

☐ Commissioning record signed

Appendix B. Terminal and Wiring Record

Terminal / cable	Function	Connected to / wire number	Verified
Sensor brown +12 V			
Sensor black AGND			

Terminal / cable	Function	Connected to / wire number	Verified
Sensor blue RS485 A			
Sensor white RS485 B			
Sensor yellow/green ground			
Controller 4-20 mA Io1			
Controller 4-20 mA common			
External RS485 A/B			
High alarm relay			
Low alarm relay			
Cleaning relay/output			
Power L/+ and N/-			
Protective earth			

Appendix C. Controller Key and Password Reference

Item	Reference
ESC / Set-Exit	Open password screen; exit current screen
SHIFT / Select	Move selection or digit position
UP / DOWN	Navigate or change values
ENTER / Confirm	Open or save selected value
Settings password	3700
Calibration password	3900
History password	1300
Waveform password	1400
Default Modbus address	4; confirm actual instrument address during commissioning
Default baud rate	9600, 8N1

Appendix D. Calibration and Verification Record

Field	Record
Instrument model / serial	
Sensor serial	
Date / technician	
Standard manufacturer / lot / expiry	
Certified standard value (NTU)	
Temperature	
Initial indicated value	

Field	Record
Calculated factor (if used)	
Final indicated value	
Acceptance limit	
Result: Pass / Fail	
Comments / corrective action	

Appendix E. Commissioning Checklist

Check	As found / setting	Result / initials
Nameplate and supply voltage		
Controller mounting and enclosure		
Protective earth		
Sensor mounting and immersion		
Cable condition and routing		
Displayed unit and range		
4-20 mA LRV / URV		
4 mA simulation		
20 mA simulation		
High alarm setpoint / test		
Low alarm setpoint / test		
RS485 address / baud / format		
History storage interval		
USB/CSV export verification		
Wiper interval / manual test		
One-point calibration / verification		
Final process reading		

Appendix F. Application Data Sheet

Application parameter	Project information
Industry / plant / unit	
Measurement point	
Normal / minimum / maximum turbidity	
Expected upset turbidity	
Temperature range	

Application parameter	Project information
Pressure range	
Flow velocity	
pH range	
Chloride / salinity	
Suspended solids / particle type	
Chemicals / oxidants / cleaning agents	
Bubbles / foam risk	
Mounting arrangement	
Cable length	
4-20 mA range	
RS485 requirements	
Alarm setpoints	
Required comparison method	
Maintenance access / interval	

Appendix G. Maintenance Log

Date	Reading / status	Work performed	Parts / standard used	Technician